LOWELL REGIONAL WATER UTILITY
Water System Improvements

Contract No. 2
DWSRF-3531

Bidding Documents For Construction

IFB# 15-71

WOODARD &CURRAN

40 Shattuck Road | Suite 110
Andover, MA 01810
(978) 557-8150

woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

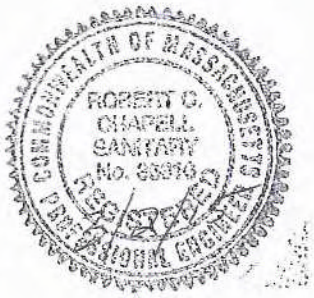
224802.20
Lowell Regional Water Utility

March 2015

SECTION 00 01 07

SEALS PAGE

The engineering material and data contained in these Contract Documents were prepared under the supervision and direction of the undersigned, whose seal as a registered professional engineer is affixed below.



Robert Chapell

Robert Chapell, P.E.
Senior Project Manager
Woodard and Curran, Inc. (Engineer)

3/11/15
Date of Issue

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SECTION 00 01 10

TABLE OF CONTENTS

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

INTRODUCTORY INFORMATION

PROCUREMENT/BIDDING REQUIREMENTS

CONTRACTING REQUIREMENTS

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS (CONTINUED)

CONTRACTING REQUIREMENTS (CONTINUED)

00 60 00 Project Forms

Application for Payment Form (C-00 62 76)
Request for Interpretation/Information Form (C-00 63 15)
Field Order Form (C-00 63 36)
Work Change Directive Form (C-00 63 49)
Change Request Form (C- 00 63 60) MA
MASRF Change Order Form
Change Order Form (C-00 63 63)
Notice of Substantial Completion Form (C-00 65 15)
Certificate of Substantial Completion Form (C-00 65 16)
Notice of Completion Form (C-00 65 18)

00 72 05 Standard General Conditions of the Construction Contract (EJCDC C-700, 2007) with modifications

00 73 05 Supplementary Conditions

00 73 10	Project Specific Requirements
00 73 19	Health and Safety Requirements
00 73 37	Equal Employment Opportunity/Affirmative- Action Requirements (Standard Federal)
00 73 38	D/MBE & D/WBE Requirements
00 73 43	Wage Rate Requirements
00 73 46	Wage Determination Schedule
00 73 73	Statutory Requirements

SPECIFICATIONS

DIVISION 01 GENERAL REQUIREMENTS

01 00 10	Overall General Requirements
01 11 00	Summary of Work
01 11 20	Summary of Filed Sub-Bid Requirements
01 15 00	Specific Project Requirements and Procedures
01 15 30	Payment and Administrative Procedures and Quality Requirements
01 20 25	Measurement and Payment
01 50 00	Temporary Facilities and Controls
01 51 38	Temporary Water Piping
01 60 00	Product Requirements
01 70 00	Execution and Closeout Requirements

DIVISION 02 - EXISTING CONDITIONS

02 26 00	Hazardous Material Assessment
02 41 14	Selective Site Demolition
02 61 00	Removal and Disposal of Contaminated Soil and Water
02 80 05	Hazardous Material Abatement
02 82 33	Removal and Disposal of Asbestos Containing Material
02 82 35	Asbestos Cement Pipe Removal and Disposal

SPECIFICATIONS (CONTINUED)

SPECIFICATIONS (CONTINUED)

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) (CONTINUED)

DIVISION 26 - ELECTRICAL
(FILED SUB-BID REQUIRED – ALL SECTIONS)

DIVISION 31 – EARTHWORK

DIVISION 32 – EXTERIOR IMPROVEMENTS

DIVISION 33 – UTILITIES

SPECIFICATIONS (CONTINUED)

DIVISION 34 – TRANSPORTATION

34 71 13 Guardrails

DIVISION 40 – PROCESS INTEGRATION

40 05 00 Process Pipe, Fittings, and Appurtenances
40 90 00 Instrumentation and Control for Process Systems
40 91 00 Instruments
40 92 13 Hydraulically Operated Control Valves
40 94 43 Programmable Logic Controllers
40 95 13 Process Control Panels and Hardware

DIVISION 43 – PROCESS GAS AND LIQUID HANDLING, PURIFICATION, AND STORAGE EQUIPMENT

43 21 00 Sample Pumps

END OF SECTION

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SECTION 00 01 15

LIST OF DRAWING SHEETS

DRAWING NUMBER	DRAWING TITLE
G-000	COVER SHEET
G-001	SHEET INDEX, GENERAL NOTES, LEGEND AND ABBREVIATIONS
C-101	RAW WATER PUMP STATION SITE PLAN
C-301	STACKPOLE STREET PUMP STATION DEMOLITION PLAN
C-302	STACKPOLE STREET PUMP STATION SITE PLAN
C-303	WATER MAIN UPGRADES NORTH OF MERRIMACK RIVER
C-501	CIVIL DETAILS 1
C-502	CIVIL DETAILS 2
C-503	CIVIL DETAILS 3
S-001	STRUCTURAL LEGEND ABBREVIATIONS, & NOTES
S-101	RAW WATER PUMP STATION BUILDING ELEVATIONS - 1
S-102	RAW WATER PUMP STATION BUILDING ELEVATIONS - 2
S-103	RAW WATER PUMP STATION PLANS, SECTIONS, & DETAILS
S-104	RAW WATER PUMP STATION ROOFING PLANS & NOTES
S-105	RAW WATER PUMP STATION ROOFING SECTIONS & DETAILS
S-106	RAW WATER PUMP STATION SCHEDULES & DETAILS

DRAWING NUMBER	DRAWING TITLE
S-201	VERTICAL WHEELCHAIR LIFT PLANS AND SECTIONS (SRF INELIGIBLE)
S-301	STACKPOLE STREET PUMP STATION PLAN, ELEVATION, SECTIONS, & DETAILS
M-201	RAW & FINISH WATER FLOW VAULT MODIFICATIONS
M-202	RAW WATER FLOW CONTROL VAULTS MODIFICATIONS
M-203	GAC FILTER MODIFICATIONS
M-204	SAND MEDIA FILTER ROOM MODIFICATIONS
M-205	DUAL MEDIA FILTER ROOM MODIFICATIONS
M-206	CHEMICAL FEED ROOM MODIFICATIONS
M-301	STACKPOLE STREET PUMP STATION PLAN AND SECTIONS
M-501	INSTRUMENTATION MOUNTING PANEL ELEVATIONS
H-001	HVAC LEGEND & GENERAL NOTES
H-201	WATER TREATMENT PLANT HVAC DEMOLITION PLAN
H-202	WATER TREATMENT PLANT HVAC ROOF & FLOOR PLANS
H-203	HVAC SCHEDULES & BOILER ROOM PART PLAN
H-501	HVAC DETAILS 1
H-502	HVAC DETAILS 2
E-001	ELECTRICAL LEGEND
E-101	RAW WATER PUMP STATION FLOOR PLAN & EXTERIOR LIGHTING

DRAWING NUMBER	DRAWING TITLE
E-201	WATER FILTRATION PLANT ELECTRICAL SITE PLAN
E-201A	VERTICAL WHEELCHAIR LIFT DETAILS (SRF INELIGIBLE)
E-202	WATER TREATMENT PLANT ELECTRICAL ONE-LINE DIAGRAM AND PANEL SCHEDULES
E-211	10 MGD PLANT ELECTRICAL PLANS
E-212	20 MGD PLANT ELECTRICAL PLAN
E-213	FLOW CONTROL VAULTS ELECTRICAL PLANS
E-214	GAC FILTER ELECTRICAL PLANS
E-215	SAND MEDIA FILTER ELECTRICAL PLANS
E-216	DUAL MEDIA FILTER ELECTRICAL PLANS
E-221	WATER TREATMENT PLANT INSTRUMENTATION & CONTROLS RISER DIAGRAMS
E-222	WATER TREATMENT PLANT INSTRUMENTATION & CONTROLS RISER DIAGRAMS
E-301	STACKPOLE STREET PUMP STATION ELECTRICAL SITE PLANS
E-302	STACKPOLE STREET PUMP STATION ONE LINE & PANEL SCHEDULE
E-311	STACKPOLE STREET PUMP STATION ELECTRICAL PLANS
E-321	STACKPOLE STREET PUMP STATION BUILDING SYSTEMS, INSTRUMENTATION & CONTROLS RISER DIAGRAM
E-401	ELECTRICAL DETAILS
E-402	STACKPOLE STREET BOOSTER STATION ANTENNA INSTALLATION DETAILS

INSTRUMENTATION AND CONTROLS DRAWINGS (Attachment to Specifications)

I-001	CONTROL SYSTEM MODIFICATIONS SHEET INDEX
I-102	PLC-1 CONTROL PANEL LAYOUT MODIFICATIONS
I-104	PLC-1 CONTROL PANEL POWER DISTRIBUTION MODIFICATIONS
I-105	PLC-1 CONTROL PANEL COMMUNICATIONS MODIFICATIONS
I-106	PLC-1 CONTROL PANEL DIGITAL INPUTS MODIFICATIONS
I-107	PLC-1 CONTROL PANEL DIGITAL OUTPUTS MODIFICATIONS
I-108	PLC-1 CONTROL PANEL ANALOG INPUTS MODIFICATIONS
I-111	PLC-1 CONTROL PANEL MOTOR CIRCUIT WIRING MODIFICATIONS
I-202	PLC-2 CONTROL PANEL LAYOUT (EXTERIOR) MODIFICATIONS
I-205	PLC-2 CONTROL PANEL POWER DISTRIBUTION MODIFICATIONS
I-206	PLC-2 CONTROL PANEL COMMUNICATIONS MODIFICATIONS
I-208	PLC-2 CONTROL PANEL DIGITAL INPUTS MODIFICATIONS

I-209 PLC-2 CONTROL PANEL DIGITAL OUTPUTS MODIFICATIONS

I-211 PLC-2 CONTROL PANEL ANALOG INPUTS MODIFICATIONS

I-212 PLC-2 CONTROL PANEL ANALOG OUTPUTS MODIFICATIONS

I-213 PLC-2 CONTROL PANEL ANALOG OUTPUTS MODIFICATIONS

I-302 PLC-3 CONTROL PANEL LAYOUT (EXTERIOR) MODIFICATIONS

I-305 PLC-3 CONTROL PANEL POWER DISTRIBUTION MODIFICATIONS

I-306 PLC-3 CONTROL PANEL POWER COMMUNICATIONS MODIFICATIONS

I-307 PLC-3 CONTROL PANEL DIGITAL INPUTS MODIFICATIONS

I-308 PLC-3 CONTROL PANEL DIGITAL INPUTS MODIFICATIONS

I-310 PLC-3 CONTROL PANEL ANALOG INPUTS MODIFICATIONS

I-313 PLC-3 CONTROL PANEL MOTOR CIRCUIT WIRING MODIFICATIONS

I-401 PLC-4 CONTROL PANEL POWER BILL OF MATERIALS MODIFICATIONS

I-402 PLC-4 CONTROL PANEL LAYOUT MODIFICATIONS

I-405 PLC-4 CONTROL PANEL POWER DISTRIBUTION MODIFICATIONS

I-410 PLC-4 CONTROL PANEL DIGITAL INPUTS MODIFICATIONS

I-412 PLC-4 CONTROL PANEL RELAY INPUTS MODIFICATIONS

I-413 PLC-4 CONTROL PANEL ANALOG INPUTS MODIFICATIONS

I-414 PLC-4 CONTROL PANEL ANALOG INPUTS & OUTPUTS MODIFICATIONS

I-416 PLC-4 CONTROL PANEL ANALOG OUTPUTS MODIFICATIONS

I-501 PLC-5 CONTROL PANEL BILL OF MATERIAL MODIFICATIONS

I-502 PLC-5 CONTROL PANEL EQUIPMENT LAYOUT MODIFICATIONS

I-504 PLC-5 CONTROL PANEL POWER DISTRIBUTION MODIFICATIONS

I-505 PLC-5 CONTROL PANEL COMMUNICATIONS MODIFICATIONS

I-601 STACKPOLE STREET BOOSTER STATION PLC-20 CONTROL PANEL LEGEND & NOTES

I-602 STACKPOLE STREET BOOSTER STATION PLC-20 CONTROL PANEL EQUIPMENT LAYOUT

I-603 STACKPOLE STREET BOOSTER STATION PLC-20 CONTROL PANEL TERMINAL BLOCK LAYOUT

I-604 STACKPOLE STREET BOOSTER STATION PLC-20 CONTROL PANEL POWER DISTRIBUTION

I-605 STACKPOLE STREET BOOSTER STATION PLC-20 CONTROL PANEL COMMUNICATIONS

I-606 STACKPOLE STREET BOOSTER STATION PLC-20 CONTROL PANEL PLC BASE I/O DIGITAL INPUTS & RELAY OUTPUTS

I-607 STACKPOLE STREET BOOSTER STATION PLC-20 CONTROL PANEL PLC BASE I/O ANALOG INPUTS & OUTPUTS

I-608 STACKPOLE STREET BOOSTER STATION PLC-20 CONTROL PANEL PLC EXPANSION I/O DIGITAL & ANALOG INPUTS

I-609 STACKPOLE STREET BOOSTER STATION PLC-20 CONTROL PANEL PLC EXPANSION I/O ANALOG OUTPUTS

I-701 PLC-16 CONTROL PANEL ANALOG INPUTS MODIFICATIONS

I-801 TYPICAL SAMPLE PUMP CONTROL PANEL EQUIPMENT LAYOUT & WIRING DETAILS

END OF SECTION

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SECTION 00 11 16

INVITATION TO BID

On behalf of the City of Lowell, Massachusetts (Owner and Awarding Authority), the Lowell Regional Water Utility (LRWU and Bidding Authority) invites Bidders to submit Bids for Contract No. 2, MA DEP Project No. DWSRF-3531, Water System Improvements, which includes, but is not limited to the Work described in Section 01 11 00 Summary of Work; and all materials, equipment, services and construction inherent to the Work.

The Work shall be substantially complete within 365 calendar days from the commencement of Contract Time and completed and ready for final payment 395 calendar days from the commencement of Contract Time.

This Project is to be funded in part with monies made available by the Drinking Water State Revolving Fund (SRF) and the Massachusetts Water Pollution Abatement Trust (the "Trust"), and compliance with the following is required: Diesel Retrofit Program; Disadvantaged Business Enterprise Program; the American Iron and Steel requirements of P.L. 113-76 (the Consolidated Appropriations Act of 2014); Federal Minimum Wage Rates as determined by the United States Department of Labor under the Davis-Bacon Act; and other MassDEP/DMS provisions and policies.

The Project being bid is subject to Massachusetts General Laws, Chapter 149, Sections 44A-J. Sealed Sub-Bids are required for the following classes of Work.

roofing and flashing
painting
heating, ventilating and air-conditioning
electrical work
masonry work
elevators

General Bidders must be certified by the Commonwealth of Massachusetts Division of Capital Asset Management and Maintenance (DCAMM) for **Pumping Stations** and **Sewage and Water Treatment Plants**. Sub-Bidders must be DCAMM certified for their respective class of Work.

A mandatory pre Bid conference will be held at 10:00 AM local time on Thursday, March 19, 2015 at the Lowell Water Treatment Plant, 815 Pawtucket Boulevard, Lowell, MA 01854 for General Bidders. General Bidders are required to attend and participate in the conference.

Sub-Bids will be received until 11:00 AM local time on Tuesday, March 31, 2015 at the City of Lowell Purchasing Department, City Hall, 375 Merrimack Street, Lowell, MA 01852, Attention: Mr. P. Michael Vaughn, Chief Procurement Officer. Sub-Bids filed will then and there be publicly opened and read aloud. Sub-Bids received after the time of announced opening will not be accepted.

General Bids will then be received until 11:00 AM local time on Wednesday, April 15, 2015 at the City of Lowell Purchasing Department, City Hall, 375 Merrimack Street, Lowell, MA 01852, Attention: Mr. P. Michael Vaughn, Chief Procurement Officer. General Bids will then and there be publicly opened and read aloud. General Bids received after the time of announced opening will not be accepted.

General Bidders must submit the DCAMM Prime/General Certificate of Contractor Eligibility and the DCAMM Prime/General Contractor Update Statement. Sub-Bidders must submit the DCAMM Filed Sub-Bid Certificate of Contractor Eligibility and the DCAMM Sub-Bidder Update Statement.

Sets of Bidding Documents may be examined at the following location(s) on or after 10:00 AM local time on Wednesday, March 11, 2015.

Issuing Office:
City of Lowell Purchasing Department
City Hall
375 Merrimack Street
Lowell, MA 01852
Attention: Mr. P. Michael Vaughn, Chief Procurement Officer
Phone: (978) 674-4110

Sets of Bidding Documents may be obtained on or after 10:00 AM local time on Wednesday, March 11, 2015

in electronic format at no cost by registering on the City of Lowell website.

http://www.lowellma.gov/purchasing

Bidding Documents can be found by click “Open Solicitations” under the Department Facts tab on the left hand side.

Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of the incomplete sets of Bidding Documents or for modifications to the Bidding Documents including electronic conversion.

Bid security in the amount of 5 percent of the prices bid must accompany each General Bid and each Sub-Bid in accordance with the Instructions to Bidders.

Minimum wage rates as issued by the Executive Office of Labor and Workforce Development, Department of Labor Standards under the provisions of Massachusetts General Laws, Chapter 149, Sections 26 to 27D inclusive, as amended, apply to this Project. It is the responsibility of the Bidders, before Bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who may be employed for the proposed Work under the resulting Contract. Federal Minimum Wage Rates as determined by the United States

Department of Labor under the Davis-Bacon Act also apply to this Project per SRF requirements.

Disadvantaged Business Enterprise (DBE) goals are applicable to the total dollars paid under the resulting construction Contract. The goals for this Project are a minimum of **3.40 percent D/MBE participation and 3.80 percent D/WBE participation** by certified DBEs. **The two lowest responsive Bidders shall submit completed DBE forms (EEO-DEP-190 & EEO-DEP-191) by close of business on the third business day after Bid opening**. Failure to comply with these requirements may render a Bid non-responsive. No waiver of any provision of the D/MBE & D/WBE Requirements will be granted unless approved by the MassDEP.

Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be eligible or responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project or the public to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

END OF SECTION

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SECTION 00 21 13
INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACTS

Based on that prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by

CONSTRUCTION SPECIFICATIONS INSTITUTE

ARTICLE 1 – DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the Standard General and Supplementary Conditions and the Additional Supplementary Conditions (if any). Additional terms used in these Instructions to Bidders have the meanings indicated below and as may be included in the Supplementary Instructions to Bidders:

A. *Issuing Office* – The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered identified in the Invitation to Bid.

B. *Supplements* – Those portions of the Bidding Requirements to be submitted with and made a condition of a Bid including required submittals.

C. *Notice of Intent to Award* – The written notice to the Successful Bidder indicating, conditions precedent to receiving a Notice of Award and Agreement for execution.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

2.01 Sets of Bidding Documents may be examined and obtained as stated in the Invitation to Bid.

2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents, Bidding Documents provided by third parties, or for modifications to the Bidding Documents not made by official Addenda, including electronic conversion.

2.03 Owner and engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data requested in the Bidding Documents, and within the time frames stipulated upon Owner's request.

3.02 Bidders shall meet minimum criteria regarding experience and qualifications set forth in the General Requirements and the Specifications.

ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 *Subsurface and Physical Conditions*

A. Section 00 73 10 of the Additional Supplementary Conditions identifies:

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. Copies of reports and drawings referenced in Section 00 73 10, if any, are included in the Bidding Documents as indicated in Section 00 31 00. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the Standard General and Supplementary Conditions, has been identified and established in Section 00 73 10.

C. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.02 *Underground Facilities*

A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and engineer by Owners of such Underground Facilities, including Owner, or others.

4.03 *Hazardous Environmental Condition*

A. Section 00 73 10 of the Additional Supplementary Conditions identifies any reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.

B. Copies of reports and drawings referenced in Section 00 73 10, if any, are included in the Bidding Documents as indicated in Section 00 31 00. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.06 of the Standard General and Supplementary Conditions, has been identified and established in Section 00 73 10.

C. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the Standard General and Supplementary Conditions and Section 00 73 10. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 4.06 of the Standard General and Supplementary Conditions and Section 00 73 10.

4.05 Upon request, Owner may provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall be responsible for obtaining permission and necessary permits and insurance for access to the Site. Bidder shall clean up and restore the Site to its former condition upon completion of any such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.

4.06 Reference is made to Article 7 of the Standard General and Supplementary Conditions and Section 00 73 10 for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, Owner will provide to each Bidder for examination access to or copies of contract documents (other than portions thereof related to price) for such other work.

4.07 It is the responsibility of each Bidder before submitting a Bid to:

A. Examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;

B. Visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. Become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;

D. Carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Section 00 73 10, as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Section 00 73 10, as containing reliable "technical data";

E. Consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;

F. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;

G. Become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. Correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

I. Promptly give engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by engineer is acceptable to Bidder; and

J. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given engineer written notice of all conflicts, errors,

ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 – PRE-BID CONFERENCE

5.01 A pre bid conference will be held at the time, date and location as indicated in the Invitation to Bid. General Bidders are required to attend and participate in the conference. Sub Bidders are encouraged to attend and participate in the conference.

5.02 Addenda will be issued to all prospective Bidders of record considered necessary in response to questions arising at the conference by posting on the City's website only. Oral statements may not be relied upon and will not be binding or legally effective. It is each Bidder's responsibility to check the Owner's website for Addenda per Paragraph 7.03.

ARTICLE 6 – SITE AND OTHER AREAS

6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by contractor.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to the Owner in writing as follows. Submission of questions via email is acceptable.

City of Lowell Purchasing Department
City Hall
375 Merrimack Street
Lowell, MA 01852
Attention: Mr. P. Michael Vaughn, Chief Procurement Officer
Phone: (978) 674-4110
Email: pmvaughn@lowellma.gov

7.02 Interpretations or clarifications considered necessary by engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by engineer as having received the Bidding Documents. Questions received less than 10 days prior to the date for opening of Bids will not be answered. Only answers in the Addenda will be binding. Oral statements, interpretations, and clarifications may not be relied upon and will not be binding or legally effective.

7.03 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer. Addenda will be available for examination at the Issuing Office and will be posted on the Owner's website identified in the Invitation to Bid and will NOT otherwise be transmitted to registered Bidders. **It is each Bidder's responsibility to check the website for Addenda and obtain and acknowledge Addenda issued.** Neither Owner nor Engineer assumes any responsibility for notifying Bidders that addenda have been posted on the Owner's website.

ARTICLE 8 – BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price and in the form of a certified check, treasurer's or cashier's check, or money order, or a Bid bond (on the form included in the Bidding Documents in Section 00 43 13 issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the Standard General and Supplementary Conditions and the Additional Supplementary Conditions (if any).

8.02 The Bid security of the Successful Bidder will be retained until such Bidder has furnished the required contract security, met the conditions of the Notice of Intent to Award (if any) and Notice of Award, and executed the Agreement, whereupon the Bid security will be returned. If the Successful Bidder fails to comply with the conditions set forth in the Notice of Intent to Award (if any) and Notice of Award within the time specified therein, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Agreement or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned. See Supplementary Instructions to Bidders (if any) for additional information.

8.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within 5 days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by contractor if acceptable to engineer, application for such acceptance will not be considered by engineer until after the Effective Date of the Agreement.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS AND OTHERS

12.01 The Bidding Documents may require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner with the Bid.

12.02 As required in the Bidding Documents, or within 5 days after Bid opening if requested by Owner, Bidder shall submit a listing and experience statement with pertinent information regarding similar projects and other evidence of qualification for each Subcontractor, Supplier, individual, or entity. If Owner or engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute without an increase in the Bid.

12.03 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest responsible Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the Standard General and Supplementary Conditions and the Additional Supplementary Conditions (if any).

12.04 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

ARTICLE 13 – PREPARATION OF BID

13.01 The Bid Form and Supplements are included with the Bidding Documents.

13.02 Bids are to be submitted as indicated in the Bid Form. All blanks on the Bid Form shall be completed in ink or typewritten and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form.

13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.

13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.

13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.

13.06 A Bid by an individual shall show the Bidder's name and official address.

13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.

13.08 All names shall be printed in ink below the signatures**.**

13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.

13.10 Postal and e-mail addresses and telephone numbers for communications regarding the Bid shall be shown.

13.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form. See Supplementary Instructions to Bidders for additional requirements, if any.

13.12 Bidders are advised to carefully review those portions of the Bid Form and Supplements requiring Bidder's representations and certifications that are to be submitted with a Bid or subsequent to the Bid opening, and made a condition of the Bid.

ARTICLE 14 – BASIS OF BID; COMPARISON OF BIDS

14.01 *Bid Pricing*

A. Bidders shall submit a Bid on a lump sum and unit price basis as provided for in the Bid Form. Bid prices shall be stated in both words and figures.

B. The total of all prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price plus the lump sum amount. The final quantities for unit priced items and Contract Price will be determined in accordance with Paragraph 11.03 of the Standard General and Supplementary Conditions and the Additional Supplementary Conditions (if any).

C. Discrepancies between prices written in words and prices written in figures will be resolved in favor of prices written in words. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

ARTICLE 15 – SUBMITTAL OF BID

15.01 With each copy of the Bidding Documents, a Bidder is furnished a copy of the Bid Form, the Bid Security Form and Supplements. An original signed hard copy of the Bid Form, the original of the Bid security, Supplements (as listed in the Bid Submittal Checklist), and the Bid Submittal Checklist are to be completed and submitted.

15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Invitation to Bid and shall be enclosed in a plainly marked package with the Project title, the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED."

A. A Bid sent by mail or courier shall be addressed to Owner **c/o the City of Lowell Purchasing Department at City Hall, 375 Merrimack Street, Lowell, MA 01852, Attention: Mr. P. Michael Vaughn, Chief Procurement Officer, City of Lowell.**

15.03 Bidders shall be responsible to confirm the ability of overnight mailing or courier services to deliver to the Owner's offices.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

16.02 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is re-Bid, that Bidder will be disqualified from submitting a Bid on the Work.

ARTICLE 17 – OPENING OF BIDS

17.01 Bids will be opened at the time and place indicated in the Invitation to Bid and, unless obviously non-responsive, read aloud publicly.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS

19.01 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

19.02 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data as may be requested in the Bid Form or prior to the Notice of Award.

19.03 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities are submitted.

19.04 Owner may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.

19.06 Owner may conduct reference checks for the projects listed by the Bidder. Poor references may be a basis for deeming Bidder as not responsible. Reference questions will include, but are not limited to, product quality and durability, overall work quality, performance, timely delivery/completion, customer service, and general customer satisfaction.

19.07 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible or eligible or does not meet the specified qualification or quality requirements ,based on poor references or otherwise. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project or public to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate Contract terms with the Successful Bidder.

19.08 Additional statutory requirements, if any, are included in the Supplementary Instructions to Bidders.

ARTICLE 20 – AWARD OF CONTRACT

20.01 If the Contract is to be awarded, Owner may award the Contract to the responsive, responsible, and eligible Bidder, offering the lowest price for the Bid and whose Bid is in the best interests of the Project or public.

ARTICLE 21 – CONTRACT SECURITY AND INSURANCE

21.01 Article 5 of the Standard General and Supplementary Conditions and the Additional Supplementary Conditions (if any), set forth Owner's requirements as to performance and payment bonds and insurance. The Successful Bidder shall deliver such bonds and evidence of insurance coverage within 10 days of receipt of the Notice of Award.

ARTICLE 22 – SIGNING OF AGREEMENT

22.01 The Owner will issue a Notice Award to the Successful Bidder in the form included in Bidding Documents. Within 10 days of receipt of the Notice of Award, the Successful Bidder shall comply with the conditions precedent and provide requested information. Based on required reviews and approvals, Owner will thereafter provide the required number of counterparts of the Agreement and other Contract Documents which are identified in the Agreement. The Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and other Contract Documents to Owner within the time specified by the Owner. After obtaining required reviews and approvals for Contract execution, Owner shall return one fully signed counterpart the Agreement and other Contract Documents.

ARTICLE 23 – RETAINAGE

23.01 Provisions concerning retainage are set forth in the Agreement.

ARTICLE 24 – EQUAL EMPLOYMENT OPPORTUNITY, ANTI-DISCRIMINATION, AND AFFIRMATIVE ACTION

24.01 Provisions regarding the requirements for equal employment opportunity, anti-discrimination, and affirmative action programs are set forth in Section 00 73 37 of the Additional Supplementary Conditions.

ARTICLE 25 – CONTRACTOR'S WARRANTY AND GUARANTEES; CORRECTION PERIOD

25.01 Provisions concerning contractor's general warranty and guarantees and correction period are set forth in Articles 6.19, 13.06, and 13.07 of the Standard General and Supplementary Conditions and the Additional Supplementary Conditions (if any).

ARTICLE 26 – SAFETY AND HEALTH REGULATIONS

26.01 This Project is subject to the Safety and Health Regulations of the U.S. Department of Labor set forth in Title 29 CFR, Part 1926 and to all subsequent amendments and other requirements identified in Section 00 73 19 of the Additional Supplementary Conditions.

ARTICLE 27 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

27.01 Supplementary Instructions to Bidders, if any, are included in Section 00 22 13 and may include certain provisions required by Laws and Regulations and funding agencies. Bidders are solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

END OF SECTION

SECTION 00 22 13

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

The following supplement or modify the Instructions to Bidders pursuant to Article 27 therein. This section does not represent or reflect all applicable Laws and Regulations and may only include excerpts, portions, and para-phrasing of certain Laws and Regulations. Bidders are solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

1.01 Applicable Laws for Bid and Award; General

A. This Contract is being bid and awarded under the provisions of Commonwealth of Massachusetts General Laws ("MGL") Chapter 149, Section 44A, *Definitions; competitive bids; award; bonds . . .* whereby Sections 44A through 44H shall apply.

1. The time period for holding Bids is 30 days after the opening of Bids (Saturdays, Sundays and legal holidays excluded) where Federal approval is not required; where Federal approval is required, the time period for holding bids is 30 days after Federal approval (Saturdays, Sundays and holidays excluded); or for such longer period of time that General Bidder may agree to in writing upon request of Owner.

B. Pursuant to MGL Chapter 149, Sections 44A to 44H and the Bidding Requirements,

1. Bidders must be pre-certified as eligible by the Division of Capital Asset Management and Maintenance (DCAMM), submit such certification along with an Update Statement in accordance with the Annex to the Form for General Bid and sub-Bid; and

2. Sub-Bids for certain classes of Work must first be submitted to the Owner per the Bidding Requirements. If sub-Bids are received and not rejected, they will be considered "filed sub-Bids". Filed sub-Bids will be made available to general Bidders for inclusion in general Bids as applicable, in accordance with the Bidding Requirements.

C. For this Project,

1. the General Bidder must be DCAMM certified for sewage and water treatment plants and pumping stations;

2. Work involving the removal, containment, or encapsulation of asbestos or material containing asbestos must be performed by a licensed contractor in accordance with MGL Chapter 149, Section 6B;

3. Sheet metal work must be performed by a contractor licensed in accordance with 271 CMR 1.00, et seq. governing licensing, permitting, and sheet metal work in Massachusetts; and

4. sub-Bids are required for the following classes of Work as summarized in Section 01 11 20:

   roofing and flashing
   painting
   heating, ventilating and air-conditioning
   electrical work
   masonry work
   elevators

1.02 Additional Defined Terms

A. *General Bidder* – Also "Bidder" as defined in the General Conditions and Supplementary Conditions; a Bidder who submits a general Bid to Owner on the Form for General Bid in accordance with MGL Chapter 149, Sections 44A to 44H along with required Supplements.

B. *Sub-Bidder* – Also "Bidder" as defined in the General Conditions and Supplementary Conditions; a Bidder who files a sub-Bid with Owner for use by a General Bidder, for a class of Work specified in Chapter 149, Section 44F on the applicable Form for Sub-Bid along with required Supplements.

C. *Bid security* – per the Instructions to Bidders and "bid deposit" as used in MGL Chapter 149, Sections 44A to 44H.

D. *Bid Form* – as defined in the General Conditions and Supplementary Conditions and also includes Form for General Bid, Annex and Supplements, Form for Sub-Bid for each class of Work, Annex and Supplements.

E. *Eligible* – A Bidder able to meet all requirements for Bidders or offerors set forth in MGL Chapter 149, Sections 44A to 44H, inclusive; Bidders not debarred from bidding under MGL Chapter 149, Section 44C or any other applicable law, and Bidders who certify they are able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work.

F. *Responsible* – A Bidder demonstrably possessing the skill, ability and integrity necessary to faithfully perform the Work, based upon a determination of competent workmanship and financial soundness in accordance with the provisions of MGL Chapter 149, Section 44D.

G. *General Contractor* – The Successful General Bidder.

1.03 Submission of Sub-Bids

A. Each sub-Bid shall be submitted pursuant to MGL Chapter 149, Section 44F and in accordance with Article 15 of the Instructions to Bidders, and also be identified as "SUB-BID" with the name of the sub-trade for which the sub-Bid is submitted on the outside of the sealed envelope containing the sub-Bid.

B. Within 2 days, Saturdays, Sundays and legal holidays excluded, after opening of sub-Bids, the Owner will reject every sub-Bid which is not accompanied by the required Bid deposit or which otherwise does not conform to the statutory requirements, or which is on a form not completely filled in, or which is incomplete, conditional or obscure, or which contains any addition not called for; provided, however, that the failure of the Owner to reject such a sub-Bid within such period shall not validate such a sub-Bid nor preclude the Owner from subsequently rejecting.

C. Not later than the second day, Saturdays, Sundays and legal holidays excluded, before the day fixed by the Owner for the opening of general Bids, the Owner shall mail to every person on record as having taken a set of Plans and Specifications, a list of Sub-Bidders arranged by sub-trades and listing for each sub-trade the name, address and sub-Bid price of every Sub-Bidder submitting a sub-Bid thereon not rejected by the Owner and the general Bidders excluded from using such sub-Bid. A person shall not be named by a general Bidder as a Sub-Bidder for a sub-trade on the Form for General Bid unless such person is included for such sub-trade in said list.

D. If a General Bidder not excluded in said list from doing so names as a Sub-Bidder for a sub-trade on the Form for General Bid, a person included for such sub-trade in said list at the sub-Bid price stated in said list, neither the general Bid of such General Bidder nor the Contract executed on the basis of such general Bid shall be invalid or rejected because of the invalidity of such sub-Bid, or because of error in said list, nor shall such general Bid be rejected nor shall such Contract be invalid because of any invalid action taken by the Owner in connection with any sub-Bid or sub-Bids; but there shall be substitution of Sub-Bidders and adjustment of Contract Price as if MGL Chapter 149, Section 44F, subsection (4)(c) were applicable.

1. If no sub-Bid is filed for a sub-trade designated in the general Bid Form or if the only sub-Bids which are filed are restricted to the use of one or more General Bidders, the Owner may state, in an Addendum issued with the list of Sub-Bidders referred to above, that the General Bidder shall include in the cost of its own Work, an amount to cover all the Work required for any such sub-trade. The general Contractor shall cause the Work covered by such sub-trade to be done by a qualified and responsible Subcontractor, subject to the written approval of the Owner. If the Owner determines that any Subcontractor chosen by the general Contractor as provided in this

paragraph is not qualified or responsible, the general Contractor shall obtain another Subcontractor who is satisfactory to the Owner with no adjustment in the general Contractor's price.

2. If a rejection of all sub-Bids, other than as set forth above, for such a sub-trade occurs pursuant to MGL Chapter 149, Section 44E subsection (1) or Section 44F subsection (3), the Owner shall state, in an Addendum issued with the list of Sub-Bidders referred to above, the amount to be included by a General Bidder on the general Bid form for such sub-trade; and without in any way affecting other Sub-Bidders who have conformed to the prescribed bidding procedure, new sub-Bids for such sub-trade shall be requested forthwith by written invitation to three or more qualified Sub-Bidders and shall be publicly opened and read by the Owner at a time and place to be specified in such invitation. The general Contractor shall cause the work covered by such sub-trade to be done by the lowest responsible and eligible Sub-Bidder against whose standing and ability the general Contractor makes no objection or, if there is no such Sub-Bidder, by such Subcontractor against whose standing and ability the general Contractor makes no objection and for such sum as the general Contractor and the Owner may agree upon; and the Contract Price shall be adjusted by the difference between the Subcontract sum and the amount stated in the Addendum. The General Bidder shall include in the cost of its own Work on the Form for General Bid all expenses and profits on account of such adjustments.

E. If a General Bidder customarily performs, with employees on his own payroll who are mechanics or laborers as referred to in MGL Chapter 149 Section 26, a sub-trade for which the Owner has invited filed sub-Bids, it may submit a sub-Bid for such sub-trade which shall be considered on a par with other sub-Bids, and it shall also list under the appropriate sub-Bid category in its Bid its own name and sub-Bid price for such sub-trade. No such sub-Bid shall be considered unless the General Bidder can show (a) it does so customarily perform such sub-trade, and (b) it is qualified to do the sub-trade work. In lieu of listing its name and sub-Bid price in its general Bid, such General Bidder may list the name and amount of the lowest responsible and eligible Sub-Bidder for that sub-trade if (a) such Sub-Bidder's price is lower than his, (b) such sub-Bid is available for his use; and (c) such sub-Bid is not restricted to his use alone or to his use and that of another General Bidder, or Bidders.

F. All Sub-Bidders when finally selected shall be notified in writing of their selection within 48 hours thereafter by the General Bidder.

1.04 Bid Security

A. The Bid security of the 3 lowest Responsible and Eligible General Bidders will be retained until execution of a Contract or within 30 days after Bid opening if no award is made, except if forfeited.

1. If the Bid security is forfeited per the Instructions to Bidders and MGL Chapter 149, Section 44B, the amount of such forfeiture shall be liquidated damages and shall not exceed the difference between the Successful General Bidder's Bid price and the Bid price of the next lowest Responsible and Eligible General Bidder; and provided further that, in case of death, disability, bona fide clerical or mechanical error of a substantial nature, or other similar unforeseen circumstances affecting the General Bidder, the Bid security shall be returned to it.

B. The Bid security of the Sub-Bidders named in the general Bids of the three lowest Responsible and Eligible General Bidders and those of the 3 lowest Responsible and Eligible Sub-Bidders for each sub trade will be retained until execution of a Contract or within 30 days after Bid opening if no award is made, except if forfeited.

1. If the Bid security is forfeited per the Instructions to Bidders and MGL Chapter 149, Section 44B, the amount of such forfeiture shall be liquidated damages and shall not exceed the difference between the Successful Sub-Bidder's sub-Bid price and the sub-Bid price of the next lowest Responsible and Eligible Sub-Bidder; and provided further that, in case of death, disability, bona fide clerical or mechanical error of a substantial nature, or other similar unforeseen circumstances affecting any such Sub-Bidder, the Bid security shall be returned to it.

1.05 Evaluation of Bids

A. In determining a lowest Responsible and Eligible General Bidder and Sub-Bidder, the Owner will consider the information submitted by each General Bidder and Sub-Bidder in the DCAMM Update Statements.

1.06 Substitution of Sub-Bidders Subsequent to Award

A. If, after the selection of the lowest Responsible and Eligible General Bidder, it be decided to consider Sub-Bidders other than the ones named by such General Bidder in his general Bid, the Owner and such General Bidder shall jointly consider all filed sub-Bids not rejected in accordance with MGL Chapter 149 Section 44F subsection (3).

B. Any agreement to substitute a sub-Bid for the one named in the selected General Bid shall result in an adjustment of the General Bid price in accordance with MGL Chapter 149 Section 44F subsection (4)(b).

C. The General Bidder's price for Work shall also be adjusted by the amount of the change in the premium for the general Contractor's performance bond and his labor and materials or payment bond caused by substitutions.

1.07 Subcontracts with Sub-Bidders

A. Not later than 10 days after the General Bidder selected as the general Contractor is notified by the Owner of his selection as the general Contractor, the General Bidder so selected shall present subcontract agreements to each of the filed Sub-Bidders finally selected in the form included in Section 00 73 10. The selected General Bidder and each of the selected Sub-Bidders shall promptly execute the subcontract agreements, and fully executed copies of the subcontract agreements shall be delivered to the Owner not later than 25 calendar days after award of the Contract to the selected General Bidder.

B. Pursuant to MGL Chapter 149, Section 44F subsection (4)(c), if a selected Sub-Bidder fails, within five (5) days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the General Bidder selected as the general Contractor, to perform his agreement to execute a subcontract in the form set forth in the Contract Documents with such General Bidder, contingent upon the execution of the Contract, and, if requested so to do by such General Bidder in the general Bid, to furnish a performance and payment bond as stated in his sub-Bid, such General Bidder and the Owner shall select, from the other sub-Bids duly filed with the Owner for such sub-trade and not rejected under MGL Chapter 149 Section 44H, the lowest responsible and eligible Sub-Bidder at the amount named in his sub-Bid as so filed, against whose standing and ability the general Contractor makes no objection, and the Contract Price shall be adjusted by the difference between the amount of such sub-Bid and the amount of the sub-Bid of the delinquent Sub-Bidder.

1.08 Other Requirements of the MGL Applicable to the Project

A. **Foreign Corporations**: The provisions of MGL Chapter 30, Section 39L, *Public construction work by foreign corporations; restrictions and reports*, apply to this Project. If a Bidder is a foreign corporation, it shall provide with its Bid, a certificate from the Commonwealth of Massachusetts Secretary of State stating that the corporation has complied with requirements of Section 15.03 of subdivision A of Part 15 of MGL Chapter 156D and the date of compliance, and further has filed all annual reports required by Section 16.22 of subdivision B of Part 16 of said Chapter 156D, and further, will provide such certificate for each Subcontractor that is a foreign corporation if it receives a Notice of Award. See Section 00 45 05 of the Bidding Requirements.

B. **Taxes:** Bidder shall submit with its Bid, a "Certificate of Good Standing" with respect to all returns due and taxes from the Commonwealth of Massachusetts Department of Revenue certifying Bidder has complied with all laws relating to taxes, reporting of employees and contractors, and withholding and remitting of

child support. Bidder will provide such certificate for each Subcontractor if it receives a Notice of Award. Bidders are encouraged to obtain such Certificate of Good Standing online at http://www.mass.gov/dor/businesses/programs-and-services/certificate-of-good-standing.html. See explanation and instructions at the end of this Section.

C. **Debarment**: Bidders shall not be debarred from bidding on or entering into a public contract in the Commonwealth of Massachusetts under the provisions of MGL Chapter 29, Section 29F, *Debarment from bidding; definitions; lists; notice; affiliates; mitigating circumstances*, or any other applicable debarment provisions of any other chapter of the MGL or any rule or regulations promulgated thereunder.

D. **Financial Statements**: If Bidder receives a Notice of Award, the following shall be submitted prior to execution of the Agreement in accordance with MGL Chapter 30, Section 39R *Definitions; contract provisions; management and financial statements; enforcement.*

- A statement by management on internal accounting controls;
- A statement prepared by an independent certified public accountant regarding management's statement; and
- An audited financial statement for the most recent completed fiscal year.

E. **Labor Preferences and Work Hours**

1. The provisions of MGL Chapter 149, Section 26, *Public works; preference to veterans and citizens; wages*, apply to this Project whereby employment in the construction of public works is subject to preference being given to citizens of the Commonwealth of Massachusetts, citizens of the town or city where the Project is located, veterans and service-disabled veterans, and citizens of the United States, and the provisions of MGL Chapter 149, Section 179A, *Preference to citizens in awarding public work contracts, violations*, apply to this Project whereby award of contracts for public work is subject to preference being given to persons who are citizens of the United States.

2. The provisions of MGL Chapter 149, Sections 26, 27, and 27A through 27D, as amended, covering minimum wage rates as issued by the Executive Office of Labor and Workforce Development, Department of Labor Standards apply to this Project. It is the responsibility of the Bidders, before Bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who may be employed for the proposed Work under the resulting Contract. See Supplementary Conditions.

3. The provisions of MGL Chapter 149, Section 30, *Eight hour day and six day week; emergencies; work on highways* and Section 34, *Public contracts; stipulation as to hours and days of work; void contracts* apply to this Project which regulate work hours for public construction.

F. **Sales Tax Exemption**: MGL Chapter 64H, Section 6, *Exemptions*, subsection (f) exempts building materials and supplies to be used in the Project from Commonwealth of Massachusetts sales tax and Bidder shall not include any amount therefor. The words "building materials and supplies" shall include all materials and supplies consumed, employed or expended in the construction, reconstruction, alteration, remodeling or repair of any building, structure, public highway, bridge, or other such public work, as well as such materials and supplies physically incorporated therein. Said words shall also include rental charges for construction vehicles, equipment and machinery rented specifically for use on the Project Site, or while being used exclusively for the transportation of materials for the Project.

G. **Safety and Health**: This Project is subject to Massachusetts Department of Labor and Industries, Division of Occupational Safety *454 CMR 10.00 et seq.* "*Construction Industry Rules and Regulations*"; Massachusetts Department of Public Safety *520 CMR 14.00 et seq.* "*Excavation and Trench Safety*"; MGL Chapter 82, *The Laying Out, Alteration, Relocation and Discontinuance Of Public Ways, and Specific Repairs Thereon*, MGL Chapter 82A, *Excavation and Trench Safety*, and MGL Chapter 149 Section 129A, *Shoring Trenches for local governments.*

In addition, MGL Chapter 30, Section 39S, requires that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins Work, and documentation of successful completion of said course shall be submitted with the first certified payroll report for each employee. Any employee found on a Work Site subject to this section without documentation of successful completion of a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration shall be subject to immediate removal.

1.09 Environmental Protection Agency State Revolving Loan Fund Program (SRF) Provisions

A. This Project is to be funded in part with monies made available by the Drinking Water State Revolving Fund (SRF) and compliance with the following is required.

1. *Diesel Retrofit Program*: General Bidders and Sub-Bidders must submit a signed and dated Statement of Intent to Comply form, included in Section 00 45 58, as part of its Bid. See detailed requirements included in Section 00 73 10 for required certification after award.

2. *American Iron and Steel requirements of P.L. 113-76 (the Consolidated Appropriations Act of 2014)*: See detailed requirements included in Section 00 73 10 and the General Requirements.

3. *Federal minimum wage rates as determined by the United States Department of Labor under the Davis-Bacon Act*: See Supplementary Conditions. In case of discrepancy between Federal and state wage rates, the higher wage rates shall apply.

4. *Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled "Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons)"* (copies of such regulations available at http://www.gpoaccess.gov/cfr/index.html): Contractors, Subcontractors, or Suppliers that appear on the Excluded Parties List System at www.epls.gov are not eligible for award of any contracts funded under the SRF Program.

5. *Applicable provisions of the United States Code of Federal Regulations* govern the Bidding Requirements and resulting Contract, and any provision in violation of the foregoing shall be deemed null, void and of no effect. Where conflicts between the Code of Federal Regulations and state Laws and Regulations exist, the more stringent requirement shall apply.

6. Massachusetts Department of Environmental Protection (MassDEP), Division of Municipal Services (DMS) SRF Provisions

a. The Project is to be funded in part by the Massachusetts Water Pollution Abatement Trust (the "Trust") and subject to the approval by the MassDEP.

b. Disadvantaged Business Enterprise (DBE) goals are applicable to the total dollars paid under the resulting Contract. The goals for this Project are a minimum of **3.40 percent D/MBE** participation **and 3.80 percent D/WBE participation** by certified DBEs. **The two lowest responsible and eligible General Bidders shall submit completed DBE forms (EEO-DEP-190C & EEO-DEP-191C) in accordance with Section 00 45 57 by the close of business on the third business day after Bid opening**. Failure to comply with the requirements of this paragraph or the requirements in Section 00 45 57 may be deemed to render a general Bid non-responsive. No waiver of any provision of the D/MBE & D/WBE Requirements including those in Section 00 73 38 will be granted unless approved by the MassDEP.

c. The lowest responsive, responsible, and eligible General Bidder will be required to submit a projected monthly cash flow schedule and Statement of Direct Labor Cost percentages per Section 00 73 10 for MassDEP approval prior to issuance of a Notice of Award.

d. Bids shall reflect financial participation limitations of MassDEP - DMS under the SRF Program including mobilization not exceeding 5 percent of the total Contract Price and other certain items included in Section 01 15 00.

e. Applicable provisions of the MGL and the Code of Massachusetts Regulations shall also govern the Bidding Requirements and resulting Contract.

f. Whenever it is written that an equipment manufacturer must have a specified period of experience with its product, equipment which does not meet the specified experience period can be considered if the equipment Supplier or manufacturer is willing to provide an "Efficiency Guarantee Bond" or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of failure.

The Official Website of the Department of Revenue (DOR)

Department of Revenue

About DOR

Home Businesses Programs & Services Certificate of Good Standing

Certificate of Good Standing

Powered by Google Translate

Corporations and other organizations often need proof that they are in good standing with the Commonwealth, i.e., that all tax liabilities have been met in order to obtain financing, sell their business, renew licenses or enter into other business transactions.

The fastest and easiest way to obtain a Certificate is via our online application. Both taxpayers and authorized practitioners can use this program to obtain a Certificate within a few days. Before beginning this process, make sure that key authenticating data is readily available, including the entity's id number, a list of tax types filed with DOR and the dates when the entity was first required to collect and submit these taxes.

Once the applicant has been authenticated, a search will be made of our databases to identify any returns that need to be filed or bills that remain unpaid. Since this process takes up to 48 hours, users will be given an application number and asked to come back to the program in a couple of days. At that time, fully compliant taxpayers will be able to print a Certificate or request that it be mailed to the address of record. If bills are identified, an opportunity will be given to pay the amount owed via EFW. A Certificate will then be issued. Taxpayers with nonfiled Trustee tax returns (Sales, Meals, Withholding, Room Occupancy), can file and pay within the application and obtain their Certificate. Taxpayers with nonfiled Income and Corporate returns will be given instructions on how to file on paper and obtain a Certificate.

Please note:

Taxpayers responsible for certain taxes such as Alcoholic Beverage Excise, Cigarette Excise, Sales Tax on Boats, International Fuels Tax Agreement, Smokeless Tobacco or Ferry Embarkation will need to file a paper application. This form can be printed from this site. **Paper applications can take 4 to 6 weeks.**

Paper applications are also required in order to obtain a Waiver of Corporate Tax lien.

Dissolutions: Corporations have not been required to obtain a Certificate of Good Standing prior to a voluntary dissolution since March 1992.

Site Policies Contact Us

END OF SECTION

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SECTION 00 31 00

AVAILABLE PROJECT INFORMATION

INFORMATION	LOCATION OF INFORMATION
Geotechnical Data Geotechnical Report Soil Boring Data	Section 01 15 00
ZBA Special Permit Application and Approval for Stackpole Street Pump Station	Section 01 15 00
Notice of Intent (NOI) for Raw Water Pump Station	Section 01 15 00
Order of Conditions	Section 01 15 00
Hazardous Materials Report for Stackpole Street PS	Section 01 15 00
Draft Driveway Permit Application for Stackpole Street Pump Station (Contractor must submit official driveway permit application)	Section 01 15 00
MassDOT Access Permit and Traffic Management Plan	Section 01 15 00

END OF SECTION

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SECTION 00 41 02

FORM FOR GENERAL BID

To the Awarding Authority:

A. The Undersigned proposes to furnish all labor and materials required for the Water System Improvements in Lowell, MA, known as Contract 2 and corresponds with DWSRF-3531 and Project number 224802.20, in accordance with the accompanying Plans and Specifications prepared by Woodard & Curran, for the Total Contract Price written below, subject to additions and deductions according to the terms of the Contract Documents.

B. This Bid includes Addenda numbered:_____

C. The proposed Contract Price (excluding sales and use tax) is:

TOTAL LUMP SUM PRICE FOR ITEMS G1, G2, OC1, U1-U2, and S1-S6

$_____
(in figures)

_____ Dollars and
(in words)

_____ Cents
(in words)

D. The subdivision of the proposed Contract Price is as follows (excluding sales and use tax).

Item G1 – Work of the General Contractor
(being all Work <u>other than</u> that covered in
<u>Item G2, Owner's Contingency Allowance OC1, Owner's Contingency Allowance OC2, Unit Priced Items U1 – U3, and Sub-Bids Items S1-S6)</u>

G1 General Contractor Work for completing the Water System Improvements Project as specified and shown on the Drawings.

$_____

Item G2 – Work of the General Contractor for Wheelchair Lift (SRF INELIGIBLE)

G2 General Contractor Work to provide Wheelchair Lift as specified and shown on the Drawings.

$_____

Item OC1 – Owner's Contingency Allowances per Paragraph 11.02 of the General Conditions (excluding Item G1, Item G2 and Sub-Bids Items S1-S6)

OC1	Owner's Contingency Allowance: General Contractor Work for additional Work associated with replacement of the Stackpole Street Pump Station.	Not to exceed $ 200,000.00
OC2	Owner's Contingency Allowance: General Contractor Work for additional Work associated with abatement of hazardous materials at the Raw Water Pump Station.	Not to exceed $ 30,000.00

Items U1-U3 -- Unit Priced Items

Item No.	Item Description with Unit Price in Written Words	Estimated Quantity & Unit	Unit Bid Price		Total Bid Item Price	
			Dollars	Cents	Dollars	Cents
U1	Stucco Finish @_____ _____ Dollars and _____/100 PER SQUARE FOOT	2331 SF				
U2	Rock Removal @_____ _____ Dollars and _____/100 PER CUBIC YARD	10 CY				
U3	Concrete Spall Repair @_____ _____ Dollars and _____/100 PER SQUARE FOOT	25 SF				

Sub-Bid Items S1 through S6:

Sub-trade	Name of Sub-Bidder	Amount	Bonds required (Yes or No)
Item S1: Roofing & Flashing		$	
Item S2: Painting		$	
Item S3: HVAC		$	
Item S4 (SRF INELIGIBLE): Electrical Item S4 (SRF ELIGIBLE): Electrical		$ $	
Item S5: Masonry		$	
Item S6 (SRF INELIGIBLE): Elevators		$	

The Undersigned agrees that each of the above named Sub-Bidders will be used for the Work indicated at the amount stated, unless a substitution is made. The Undersigned further agrees to pay the premiums for the performance and payment bonds furnished by Sub-Bidders as requested herein and that all of the cost of all such premiums is included in the amount set forth in Item 1 of this Bid.

The Undersigned agrees that if selected as general Contractor, Undersigned will promptly confer with the Awarding Authority on the question of Sub-Bidders; and that the Awarding Authority may substitute for any sub-Bid listed above, a sub-Bid filed with the Awarding Authority by another Sub-Bidder for the sub-trade against whose standing and ability the Undersigned makes no objection; and that the Undersigned will use all such finally selected Sub-Bidders at the amounts named in their respective Sub-Bids and be in every way as responsible for them and their Work as if they had been originally named in this General Bid, the total Contract Price being adjusted to conform thereto.

E. The Undersigned agrees that, if selected as general Contractor, Undersigned will within 5 days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the Awarding Authority, execute a Contract in accordance with the terms of this Bid and the Contract Documents and furnish a performance bond and also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority and each in the sum of the Contract Price, the premiums for which are to be paid by the general Contractor and are included in the Contract Price; provided however that if there is more than 1 surety company, the surety companies shall be jointly and severally liable.

The Undersigned hereby certifies that Undersigned is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work; that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that Undersigned will comply fully with all Laws and Regulations applicable to awards made subject to MGL Chapter 149, Section 44A.

The Undersigned further certifies under the penalties of perjury that this Bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection, the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The Undersigned further certifies under penalty of perjury that the said Undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Chapter 29, Section 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or Regulation promulgated thereunder.

This Bid is submitted by the Undersigned.

A Corporation

Corporation Name: _____

State of incorporation: _____

Type: _____
(*General Business, Professional, Service, other*)

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

(CORPORATE SEAL)
Attest: _____
(*Signature of Corporate Secretary*)

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Date of qualification to do business as out-of-state corporation: _____

A Limited Liability Company (LLC)

LLC Name: _____

State in which organized: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Partnership

Partnership Name: _____(SEAL)

By: _____
(*Signature of general partner – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Joint Venture

First Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Second Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation and limited liability company that is a party to the joint venture should be in the manner indicated above.)

SUBMITTED ON:
State License No. (if applicable)
EIN/FEIN:

END OF SECTION

SECTION 00 41 02.01

ANNEX TO FORM FOR GENERAL BID

1.01 The undersigned General Bidder acknowledges that the time period for holding Bids, *where Federal approval is not required* is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of Bids; and *where Federal approval is required*, the time period for holding Bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval. Notwithstanding the above, by mutual agreement, the general Bid will remain subject to acceptance for 60 days after the Bid opening, allowing for Federal approval if needed as stated above, or for such longer period of time that General Bidder may agree to in writing upon request of Owner.

1.02 The undersigned General Bidder proposes and agrees, if its general Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents, to perform all Work as specified or indicated in the Bidding Documents for the prices indicated in the general Bid and within the times indicated in the Bidding Documents, and in accordance with the other terms and conditions of the Bidding Documents.

1.03 General Bidder accepts all of the terms and conditions of the Bidding Documents including, without limitation:

A. Those dealing with disposition of Bid security;
B. Those included in the Supplementary Instructions to General Bidders;
C. Insurance and bonding requirements (payment bond and performance bond each equal to 100% of the total Contract Price) set forth in the Standard General and Supplementary Conditions and Additional Supplementary Conditions, if any;
D. Contract Times as set forth in the Agreement; and
E. Provisions for liquidated damages as set forth in the Agreement.

1.04 General Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for unit price items will be based on actual quantities determined and based on the unit prices included in the Form for General Bid, as provided in the General Conditions and Supplementary Conditions.

1.05 The following documents are submitted with and made a condition of the general Bid as acknowledged in the General Bid Submittal Checklist.

- 00 43 13 Bid Security Form
  OR required Bid security in the form of _____
- 00 43 93 General Bid Submittal Checklist
- 00 45 05 General Bidder's Representations and Certifications
- 00 45 19 Non-collusion Affidavit

- DCAMM Prime/General Certificate of Contractor Eligibility (sample included at the end of this Section)
- 00 45 55 DCAMM Prime/General Contractor Update Statement
- 00 45 57 DBE Forms
- 00 45 58 Statement of Intent to Comply Diesel Retrofit Program

1.06 Communications concerning the general Bid shall be addressed to:

Name _____

Title _____

Address _____

_____

Telephone No. _____

Facsimile No. _____

Email _____

SUBMITTED ON:
By:
Authorized person per Form for General Bid

END OF SECTION

The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Division of Capital Asset Management
One Ashburton Place
Boston, Massachusetts 02108
Tel: (617) 727-4050
Fax: (617) 727-5363

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LIEUTENANT GOVERNOR

JAY GONZALEZ
SECRETARY, ADMINISTRATION & FINANCE

CAROLE CORNELISON
COMMISSIONER

Prime/General
Certificate of Contractor Eligibility

CONTRACTOR IDENTIFICATION NUMBER: 0000

This Certificate Shall Be Used for Submitting Prime/General Bids Only

1. CERTIFICATION PERIOD: **This Certificate is valid from 1/1/2011 to 1/1/2012**

2. CONTRACTOR'S NAME: **Sample Contractor**

3. CONTRACTOR'S ADDRESS: **123 Main Street Anytown, MA 01234**

4. WORK CATEGORIES: **This Contractor is certified to file bids under Massachusetts General Laws Chapter 149, Chapter 149A and Chapter 25A in the following checked Categories of Work:**

☑ Alarm Systems	☑ Elevators	☑ Historical Masonry	☑ Painting
☑ Asbestos Removal	☑ Energy Management Systems	☑ Historical Painting	☑ Plumbing
☑ Deleading	☑ Exterior Siding	☑ Historical Roofing	☑ Pumping Stations
☑ Demolition	☑ Fire Protection Sprinkler Systems	☑ HVAC	☑ Roofing
☑ Doors & Windows	☑ Floor Covering	☑ Masonry	☑ Sewage & Water Treatment Plants
☑ Electrical	☑ General Building Construction	☑ Mechanical Systems	☑ Telecommunication Systems
☑ Electronic Security Systems	☑ Historical Building Restoration	☑ Modular Construction/Prefab	☑ Waterproofing

5. EVALUATIONS:

Number of Projects Evaluated:	12
Average Project Evaluation Rating:	92
Number of Projects Below Passing Score:	0

6. PROJECT LIMITS:

Single Project Limit (SPL):	$2,500,000.00
Aggregate Work Limit (AWL):	$5,000,000.00
General Building Construction Limit:	N/A

7. SUPPLIER DIVERSITY OFFICE CERTIFICATION: N/A

_____ _____

Taran Grigsby, General Counsel, for Carole J. Cornelison, Commissioner — **Approval Date**

NOTE TO CONTRACTORS: *Complete Applications for Renewal of Contractor Eligibility are due no later than three months PRIOR to the Expiration Date of the Certification Period shown above. Failure to submit Completed Applications timely may result in a gap in Certification or a lapse in Certification altogether for your company.*

Reviewer's Initials _____

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SECTION 00 41 03.01

FORM FOR SUB-BID – ROOFING AND FLASHING

To all General Bidders Except those Excluded:

A. The Undersigned proposes to furnish all labor and materials required in for completing, in accordance with the hereinafter described accordance with the hereinafter described Drawings, Specifications and Addenda, all the Work identified in Section 01 11 20 and in any Plans specified in such section of the Specifications and according to the terms of the Contract Documents prepared by Woodard & Curran for the Water System Improvements in Lowell, MA, known as Contract 2 and corresponds with DWSRF-3531 and Project number 224802.20, for the contract sum (excluding sales and use tax) of

TOTAL ITEM S1 LUMP SUM PRICE: $_____
(in figures)

_____ Dollars and
(in words)

_____ Cents
(in words)

B. This sub-Bid includes Addenda numbered:_____

C. This sub-Bid

may be used by any General Bidder except:

_____

_____

may only be used by the following General Bidders:

_____

_____

[To exclude General Bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no General Bidders are excluded.]

D. The Undersigned agrees that, if it is selected as a Sub-Bidder, Undersigned will, within 5 days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the General Bidder selected as the general Contractor, execute with such general Contractor a subcontract in accordance with the terms of this sub-Bid, and contingent upon the execution of the Contract; and, if requested so to do in the sub-Bid by the General Bidder, who shall pay the premiums therefore, or if prequalification is required pursuant to MGL Chapter 149 Section 44D 3/4, furnish a performance and payment bond of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the Undersigned labor or labor and materials for the class or classes or part thereof of Work for which the provisions of the section(s) of the Specifications for this sub-trade require a listing in this paragraph, including the Undersigned if customarily furnished by persons Undersigned's own payroll, and in the absence of a contrary provision in the Specifications, the name of each such class of Work or part thereto and the bid price for such class of Work or part thereof are:

Name	Class of Work	Bid Price

[Do not give bid price for any class or part thereof furnished by Undersigned.]

F. The Undersigned agrees that the above list of bids to the Undersigned represents bona fide bids based on the hereinbefore described Plans, Specifications and Addenda and that, if the Undersigned is awarded the subcontract, they will be used for the Work indicated at the amounts stated, if satisfactory to the Awarding Authority.

G. The Undersigned further agrees to be bound to the general Contractor by the terms of the hereinbefore described Plans, Specifications, including the Contract Documents, and Addenda, and to assume toward the general Contractor all the obligations and responsibilities that general Contractor, by those documents, assumes toward the Awarding Authority.

H. The Undersigned offers the following information as evidence of the Sub-Bidder's qualifications to perform the Work as bid upon according to all the requirements of the Plans and Specifications.

1. Have been in business under present business name _____ years.

2. Ever failed to complete any work awarded? _____

3. List one or more recent buildings/projects with names of the general contractor and architect/engineer on which you served as a subcontractor for work of similar character as required for the above-named building/Project.

Building/Project	Architect/Engineer	General Contractor	Amount of Contract

4. Bank Reference _____

I. The Undersigned hereby certifies that Undersigned is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work; that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that Undersigned will comply fully with all Laws and Regulations applicable to awards made subject to MGL Chapter 149, Section 44F.

The Undersigned further certifies under the penalties of perjury that this Sub-Bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection, the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The Undersigned further certifies under penalty of perjury that the said Undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Chapter 29, Section 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or Regulation promulgated thereunder.

This Bid is submitted by the Undersigned.

A Corporation

Corporation Name: _____

State of incorporation: _____

Type: _____
(*General Business, Professional, Service, other*)

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

(CORPORATE SEAL)
Attest: _____
(*Signature of Corporate Secretary*)

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Date of qualification to do business as out-of-state corporation: _____

A Limited Liability Company (LLC)

LLC Name: _____

State in which organized: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Partnership

Partnership Name: _____(SEAL)

By: _____
(*Signature of general partner – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Joint Venture

First Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Second Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation and limited liability company that is a party to the joint venture should be in the manner indicated above.)

SUBMITTED ON:
State License No. (if applicable)
EIN/FEIN:

END OF SECTION

ANNEX TO FORM FOR SUB-BID – ROOFING AND FLASHING

1.01 The undersigned Sub-Bidder acknowledges that the time period for holding Bids, *where Federal approval is not required* is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of Bids; and *where Federal approval is required*, the time period for holding bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval. Notwithstanding the above, by mutual agreement, the sub-Bid will remain subject to acceptance for 60 days after the Bid opening, allowing for Federal approval if needed as stated above, or for such longer period of time that Sub-Bidder may agree to in writing upon request of Owner.

1.02 The undersigned Sub-Bidder proposes and agrees, if its sub-Bid is accepted, to enter into a subcontract with the general Contractor in the form included in the Bidding Documents, to perform all Work as specified or indicated in the Bidding Documents for the prices indicated in the sub-Bid and within the times indicated in the Bidding Documents, and in accordance with the other terms and conditions of the Bidding Documents.

1.03 Sub-Bidder accepts all of the terms and conditions of the Bidding Documents including, without limitation:

A. those dealing with disposition of Bid security;
B. those included in the Supplementary Instructions to Sub-Bidders;
C. insurance and bonding requirements (payment bond and performance bond each equal to 100% of the total subcontract price) set forth in the Standard General and Supplementary Conditions and Additional Supplementary Conditions, if any;
D. Contract Times as set forth in the Agreement; and
E. provisions for liquidated damages as set forth in the Agreement.

1.04 Sub-Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for unit price items will be based on actual quantities determined and based on the unit prices included in the Form for Sub-Bid, as provided in the General Conditions and Supplementary Conditions.

1.05 The following documents are submitted with and made a condition of the sub-Bid as acknowledged in the Sub-Bid Submittal Checklist:

- 00 43 13 Bid Bond – Penal Sum Form
  OR required Bid security in the form of _____
- 00 43 93.01 Sub-Bid Submittal Checklist
- 00 45 05.01 Sub-Bidder's Representations and Certifications
- 00 45 19 Non-collusion Affidavit
- DCAMM Filed Sub-Bid Certificate of Contractor Eligibility (sample included at the end of this Section)
- 00 45 56 DCAMM Sub-Bidder Update Statement
- 00 45 58 Statement of Intent to Comply Diesel Retrofit Program

1.06 Communications concerning the sub-Bid shall be addressed to:

Name _____

Title _____

Address _____

_____

Telephone No. _____

Facsimile No. _____

Email _____

SUBMITTED ON:
By:
Authorized person per Form for Sub-Bid

END OF SECTION

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LIEUTENANT GOVERNOR

The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Division of Capital Asset Management
One Ashburton Place
Boston, Massachusetts 02108
Tel: (617) 727-4050
Fax: (617) 727-5363

JAY GONZALEZ
SECRETARY, ADMINISTRATION & FINANCE

CAROLE CORNELISON
COMMISSIONER

Filed Sub-Bid
Certificate of Contractor Eligibility

CONTRACTOR IDENTIFICATION NUMBER: 0000

This Certificate Shall Be Used for Submitting Filed Sub-Bids Only

1. **CERTIFICATION PERIOD:** **This Certificate is valid from 1/1/2011 to 1/2/2012**
2. **CONTRACTOR'S NAME:** **Test Screen --Do Not Type Over**
3. **CONTRACTOR'S ADDRESS:** **123 Main Street Anytown, MA 01950**
4. **WORK CATEGORIES:** **This Contractor is certified to file bids under Massachusetts General Laws Chapter 149, Chapter 149A and Chapter 25A in the following checked Categories of Work:**

☑ Acoustical Tile	☑ HVAC	☑ Miscellaneous & Ornamental Iron	☑ Terrazzo
☑ Electrical Work	☑ Lathing & Plastering	☑ Painting	☑ Tile
☑ Elevators	☑ Marble	☑ Plumbing	☑ Waterproofing, Damp proofing, and Caulking
☑ Fire Protection Sprinkler Systems	☑ Masonry Work	☑ Resilient Floors	
☑ Glass and Glazing	☑ Metal Windows	☑ Roofing & Flashing	

5. **EVALUATIONS:**
   - **Number of Projects Evaluated:** 15
   - **Average Project Evaluation Rating:** 85
   - **Number of Projects Below Passing Score:** 2
6. **SUPPLIER DIVERSITY OFFICE CERTIFICATION:** **Minority Owned Business Enterprise**

_____ _____

Freya S. Bernstein, Deputy General Counsel, for Carole J. Cornelison, Commissioner — **Approval Date**

NOTE TO CONTRACTORS: ***Complete Applications for Renewal of Contractor Eligibility are due no later than three months PRIOR to the Expiration Date of the Certification Period shown above. Failure to submit Completed Applications timely may result in a gap in Certification or a lapse in Certification altogether for your company.***

Reviewer's Initials _____

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SECTION 00 41 03.02

FORM FOR SUB-BID – PAINTING

To all General Bidders Except those Excluded:

A. The Undersigned proposes to furnish all labor and materials required in for completing, in accordance with the hereinafter described accordance with the hereinafter described Drawings, Specifications and Addenda, all the Work identified in Section 01 11 20 and in any Plans specified in such section of the Specifications and according to the terms of the Contract Documents prepared by Woodard & Curran for the Water System Improvements in Lowell, MA, known as Contract 2 and corresponds with DWSRF-3531 and Project number 224802.20, for the contract sum (excluding sales and use tax) of

TOTAL ITEM S2 LUMP SUM PRICE: $_____
(in figures)

_____ Dollars and
(in words)

_____ Cents
(in words)

B. This sub-Bid includes Addenda numbered:_____

C. This sub-Bid

may be used by any General Bidder except:

_____

_____

may only be used by the following General Bidders:

_____

_____

[To exclude General Bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no General Bidders are excluded.]

D. The Undersigned agrees that, if it is selected as a Sub-Bidder, Undersigned will, within 5 days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the General Bidder selected as the general Contractor, execute with such general Contractor a subcontract in accordance with the terms of this sub-Bid, and contingent upon the execution of the Contract; and, if requested so to do in the sub-Bid by the General Bidder, who shall pay the premiums therefor, or if prequalification is required pursuant to MGL Chapter 149 Section 44D 3/4, furnish a performance and payment bond of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the Undersigned labor or labor and materials for the class or classes or part thereof of Work for which the provisions of the section(s) of the Specifications for this sub-trade require a listing in this paragraph, including the Undersigned if customarily furnished by persons Undersigned's own payroll, and in the absence of a contrary provision in the Specifications, the name of each such class of Work or part thereto and the bid price for such class of Work or part thereof are:

Name	Class of Work	Bid Price

[Do not give bid price for any class or part thereof furnished by Undersigned.]

F. The Undersigned agrees that the above list of bids to the Undersigned represents bona fide bids based on the hereinbefore described Plans, Specifications and Addenda and that, if the Undersigned is awarded the subcontract, they will be used for the Work indicated at the amounts stated, if satisfactory to the Awarding Authority.

G. The Undersigned further agrees to be bound to the general Contractor by the terms of the hereinbefore described Plans, Specifications, including the Contract Documents, and Addenda, and to assume toward the general Contractor all the obligations and responsibilities that general Contractor, by those documents, assumes toward the Awarding Authority.

H. The Undersigned offers the following information as evidence of the Sub-Bidder's qualifications to perform the Work as bid upon according to all the requirements of the Plans and Specifications.

1. Have been in business under present business name _____ years.

2. Ever failed to complete any work awarded? _____

3. List one or more recent buildings/projects with names of the general contractor and architect/engineer on which you served as a subcontractor for work of similar character as required for the above-named building/Project.

Building/Project	Architect/Engineer	General Contractor	Amount of Contract

4. Bank Reference _____

I. The Undersigned hereby certifies that Undersigned is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work; that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that Undersigned will comply fully with all Laws and Regulations applicable to awards made subject to MGL Chapter 149, Section 44F.

The Undersigned further certifies under the penalties of perjury that this Sub-Bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection, the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The Undersigned further certifies under penalty of perjury that the said Undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Chapter 29, Section 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or Regulation promulgated thereunder.

This Bid is submitted by the Undersigned.

A Corporation

Corporation Name: _____

State of incorporation: _____

Type: _____
(*General Business, Professional, Service, other*)

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

(CORPORATE SEAL)
Attest: _____
(*Signature of Corporate Secretary*)

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Date of qualification to do business as out-of-state corporation: _____

A Limited Liability Company (LLC)

LLC Name: _____

State in which organized: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Partnership

Partnership Name: _____(SEAL)

By: _____
(*Signature of general partner – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Joint Venture

First Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Second Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation and limited liability company that is a party to the joint venture should be in the manner indicated above.)

SUBMITTED ON:
State License No. (if applicable)
EIN/FEIN:

END OF SECTION

ANNEX TO FORM FOR SUB-BID – PAINTING

1.01 The undersigned Sub-Bidder acknowledges that the time period for holding Bids, *where Federal approval is not required* is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of Bids; and *where Federal approval is required*, the time period for holding bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval. Notwithstanding the above, by mutual agreement, the sub-Bid will remain subject to acceptance for 60 days after the Bid opening, allowing for Federal approval if needed as stated above, or for such longer period of time that Sub-Bidder may agree to in writing upon request of Owner.

1.02 The undersigned Sub-Bidder proposes and agrees, if its sub-Bid is accepted, to enter into a subcontract with the general Contractor in the form included in the Bidding Documents, to perform all Work as specified or indicated in the Bidding Documents for the prices indicated in the sub-Bid and within the times indicated in the Bidding Documents, and in accordance with the other terms and conditions of the Bidding Documents.

1.03 Sub-Bidder accepts all of the terms and conditions of the Bidding Documents including, without limitation:

A. those dealing with disposition of Bid security;
B. those included in the Supplementary Instructions to Sub-Bidders;
C. insurance and bonding requirements (payment bond and performance bond each equal to 100% of the total subcontract price) set forth in the Standard General and Supplementary Conditions and Additional Supplementary Conditions, if any;
D. Contract Times as set forth in the Agreement; and
E. provisions for liquidated damages as set forth in the Agreement.

1.04 Sub-Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for unit price items will be based on actual quantities determined and based on the unit prices included in the Form for Sub-Bid, as provided in the General Conditions and Supplementary Conditions.

1.05 The following documents are submitted with and made a condition of the sub-Bid as acknowledged in the Sub-Bid Submittal Checklist:

- 00 43 13 Bid Bond – Penal Sum Form
  OR required Bid security in the form of _____
- 00 43 93.01 Sub-Bid Submittal Checklist
- 00 45 05.01 Sub-Bidder's Representations and Certifications
- 00 45 19 Non-collusion Affidavit
- DCAMM Filed Sub-Bid Certificate of Contractor Eligibility (sample included at the end of this Section)
- 00 45 56 DCAMM Sub-Bidder Update Statement
- 00 45 58 Statement of Intent to Comply with Diesel Retrofit Program

1.06 Communications concerning the sub-Bid shall be addressed to:

Name _____

Title _____

Address _____

_____

Telephone No. _____

Facsimile No. _____

Email _____

SUBMITTED ON:
By:
Authorized person per Form for Sub-Bid

END OF SECTION

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LIEUTENANT GOVERNOR

The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Division of Capital Asset Management
One Ashburton Place
Boston, Massachusetts 02108
Tel: (617) 727-4050
Fax: (617) 727-5363

JAY GONZALEZ
SECRETARY, ADMINISTRATION & FINANCE

CAROLE CORNELISON
COMMISSIONER

Filed Sub-Bid
Certificate of Contractor Eligibility

CONTRACTOR IDENTIFICATION NUMBER: 0000

This Certificate Shall Be Used for Submitting Filed Sub-Bids Only

1. CERTIFICATION PERIOD: **This Certificate is valid from 1/1/2011 to 1/2/2012**

2. CONTRACTOR'S NAME: **Test Screen --Do Not Type Over**

3. CONTRACTOR'S ADDRESS: **123 Main Street Anytown, MA 01950**

4. WORK CATEGORIES: **This Contractor is certified to file bids under Massachusetts General Laws Chapter 149, Chapter 149A and Chapter 25A in the following checked Categories of Work:**

- ☑ Acoustical Tile
- ☑ Electrical Work
- ☑ Elevators
- ☑ Fire Protection Sprinkler Systems
- ☑ Glass and Glazing
- ☑ HVAC
- ☑ Lathing & Plastering
- ☑ Marble
- ☑ Masonry Work
- ☑ Metal Windows
- ☑ Miscellaneous & Ornamental Iron
- ☑ Painting
- ☑ Plumbing
- ☑ Resilient Floors
- ☑ Roofing & Flashing
- ☑ Terrazzo
- ☑ Tile
- ☑ Waterproofing, Damp proofing, and Caulking

5. EVALUATIONS:

Number of Projects Evaluated:	**15**
Average Project Evaluation Rating:	**85**
Number of Projects Below Passing Score:	**2**

6. SUPPLIER DIVERSITY OFFICE CERTIFICATION: **Minority Owned Business Enterprise**

_____ _____

Freya S. Bernstein, Deputy General Counsel, for Carole J. Cornelison, Commissioner **Approval Date**

NOTE TO CONTRACTORS: ***Complete Applications for Renewal of Contractor Eligibility are due no later than three months PRIOR to the Expiration Date of the Certification Period shown above. Failure to submit Completed Applications timely may result in a gap in Certification or a lapse in Certification altogether for your company.***

Reviewer's Initials _____

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SECTION 00 41 03.03

FORM FOR SUB-BID – HEATING, VENTILATING AND AIR-CONDITIONING (HVAC)

To all General Bidders Except those Excluded:

A. The Undersigned proposes to furnish all labor and materials required in for completing, in accordance with the hereinafter described accordance with the hereinafter described Drawings, Specifications and Addenda, all the Work identified in Section 01 11 20 and in any Plans specified in such section of the Specifications and according to the terms of the Contract Documents prepared by Woodard & Curran for the Water System Improvements in Lowell, MA, known as Contract 2 and corresponds with DWSRF-3531 and Project number 224802.20, for the contract sum (excluding sales and use tax) of

TOTAL ITEM S3 LUMP SUM PRICE: $_____
(in figures)

_____ Dollars and
(in words)

_____ Cents
(in words)

B. This sub-Bid includes Addenda numbered:_____

C. This sub-Bid

may be used by any General Bidder except:

_____

_____

may only be used by the following General Bidders:

_____

_____

[To exclude General Bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no General Bidders are excluded.]

D. The Undersigned agrees that, if it is selected as a Sub-Bidder, Undersigned will, within 5 days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the General Bidder selected as the general Contractor, execute with such general Contractor a subcontract in accordance with the terms of this sub-Bid, and contingent upon the execution of the Contract; and, if requested so to do in the sub-Bid by the General Bidder, who shall pay the premiums therefor, or if prequalification is required pursuant to MGL Chapter 149 Section 44D 3/4, furnish a performance and payment bond of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the Undersigned labor or labor and materials for the class or classes or part thereof of Work for which the provisions of the section(s) of the Specifications for this sub-trade require a listing in this paragraph, including the Undersigned if customarily furnished by persons Undersigned's own payroll, and in the absence of a contrary provision in the Specifications, the name of each such class of Work or part thereto and the bid price for such class of Work or part thereof are:

Name	Class of Work	Bid Price

[Do not give bid price for any class or part thereof furnished by Undersigned.]

F. The Undersigned agrees that the above list of bids to the Undersigned represents bona fide bids based on the hereinbefore described Plans, Specifications and Addenda and that, if the Undersigned is awarded the subcontract, they will be used for the Work indicated at the amounts stated, if satisfactory to the Awarding Authority.

G. The Undersigned further agrees to be bound to the general Contractor by the terms of the hereinbefore described Plans, Specifications, including the Contract Documents, and Addenda, and to assume toward the general Contractor all the obligations and responsibilities that general Contractor, by those documents, assumes toward the Awarding Authority.

H. The Undersigned offers the following information as evidence of the Sub-Bidder's qualifications to perform the Work as bid upon according to all the requirements of the Plans and Specifications.

1. Have been in business under present business name _____ years.

2. Ever failed to complete any work awarded? _____

3. List one or more recent buildings/projects with names of the general contractor and architect/engineer on which you served as a subcontractor for work of similar character as required for the above-named building/Project.

Building/Project	Architect/Engineer	General Contractor	Amount of Contract

4. Bank Reference _____

I. The Undersigned hereby certifies that Undersigned is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work; that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that Undersigned will comply fully with all Laws and Regulations applicable to awards made subject to MGL Chapter 149, Section 44F.

The Undersigned further certifies under the penalties of perjury that this Sub-Bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection, the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The Undersigned further certifies under penalty of perjury that the said Undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Chapter 29, Section 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or Regulation promulgated thereunder

This Bid is submitted by the Undersigned.

A Corporation

Corporation Name: _____

State of incorporation: _____

Type: _____
(*General Business, Professional, Service, other*)

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

(CORPORATE SEAL)
Attest: _____
(*Signature of Corporate Secretary*)

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Date of qualification to do business as out-of-state corporation: _____

A Limited Liability Company (LLC)

LLC Name: _____

State in which organized: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Partnership

Partnership Name: _____(SEAL)

By: _____
(*Signature of general partner – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Joint Venture

First Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Second Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation and limited liability company that is a party to the joint venture should be in the manner indicated above.)

SUBMITTED ON:
State License No. (if applicable)
EIN/FEIN:

END OF SECTION

ANNEX TO FORM FOR SUB-BID – HEATING, VENTILATING AND AIR-CONDITIONING

1.01 The undersigned Sub-Bidder acknowledges that the time period for holding Bids, *where Federal approval is not required* is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of Bids; and *where Federal approval is required*, the time period for holding bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval. Notwithstanding the above, by mutual agreement, the sub-Bid will remain subject to acceptance for 60 days after the Bid opening, allowing for Federal approval if needed as stated above, or for such longer period of time that Sub-Bidder may agree to in writing upon request of Owner.

1.02 The undersigned Sub-Bidder proposes and agrees, if its sub-Bid is accepted, to enter into a subcontract with the general Contractor in the form included in the Bidding Documents, to perform all Work as specified or indicated in the Bidding Documents for the prices indicated in the sub-Bid and within the times indicated in the Bidding Documents, and in accordance with the other terms and conditions of the Bidding Documents.

1.03 Sub-Bidder accepts all of the terms and conditions of the Bidding Documents including, without limitation:

A. those dealing with disposition of Bid security;
B. those included in the Supplementary Instructions to Sub-Bidders;
C. insurance and bonding requirements (payment bond and performance bond each equal to 100% of the total subcontract price) set forth in the Standard General and Supplementary Conditions and Additional Supplementary Conditions, if any;
D. Contract Times as set forth in the Agreement; and
E. provisions for liquidated damages as set forth in the Agreement.

1.04 Sub-Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for unit price items will be based on actual quantities determined and based on the unit prices included in the Form for Sub-Bid, as provided in the General Conditions and Supplementary Conditions.

1.05 The following documents are submitted with and made a condition of the sub-Bid as acknowledged in the Sub-Bid Submittal Checklist:

- 00 43 13 Bid Bond – Penal Sum Form
  OR required Bid security in the form of _____
- 00 43 93.01 Sub-Bid Submittal Checklist
- 00 45 05.01 Sub-Bidder's Representations and Certifications
- 00 45 19 Non-collusion Affidavit
- DCAMM Filed Sub-Bid Certificate of Contractor Eligibility (sample included at the end of this Section)
- 00 45 56 DCAMM Sub-Bidder Update Statement
- 00 45 58 Statement of Intent to Comply with Diesel Retrofit Program

1.06 Communications concerning the sub-Bid shall be addressed to:

Name _____

Title _____

Address _____

_____

Telephone No. _____

Facsimile No. _____

Email _____

SUBMITTED ON:
By:
Authorized person per Form for Sub-Bid

END OF SECTION

The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Division of Capital Asset Management
One Ashburton Place
Boston, Massachusetts 02108
Tel: (617) 727-4050
Fax: (617) 727-5363

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LIEUTENANT GOVERNOR

JAY GONZALEZ
SECRETARY, ADMINISTRATION & FINANCE

CAROLE CORNELISON
COMMISSIONER

Filed Sub-Bid
Certificate of Contractor Eligibility

CONTRACTOR IDENTIFICATION NUMBER: 0000

This Certificate Shall Be Used for Submitting Filed Sub-Bids Only

1. **CERTIFICATION PERIOD:** **This Certificate is valid from 1/1/2011 to 1/2/2012**
2. **CONTRACTOR'S NAME:** **Test Screen --Do Not Type Over**
3. **CONTRACTOR'S ADDRESS:** **123 Main Street Anytown, MA 01950**
4. **WORK CATEGORIES:** **This Contractor is certified to file bids under Massachusetts General Laws Chapter 149, Chapter 149A and Chapter 25A in the following checked Categories of Work:**

☑ Acoustical Tile	☑ HVAC	☑ Miscellaneous & Ornamental Iron	☑ Terrazzo
☑ Electrical Work	☑ Lathing & Plastering	☑ Painting	☑ Tile
☑ Elevators	☑ Marble	☑ Plumbing	☑ Waterproofing, Damp proofing, and Caulking
☑ Fire Protection Sprinkler Systems	☑ Masonry Work	☑ Resilient Floors	
☑ Glass and Glazing	☑ Metal Windows	☑ Roofing & Flashing	

5. **EVALUATIONS:**
   Number of Projects Evaluated: 15
   Average Project Evaluation Rating: 85
   Number of Projects Below Passing Score: 2
6. **SUPPLIER DIVERSITY OFFICE CERTIFICATION:** **Minority Owned Business Enterprise**

Freya S. Bernstein, Deputy General Counsel, for Carole J. Cornelison, Commissioner — **Approval Date**

NOTE TO CONTRACTORS: ***Complete Applications for Renewal of Contractor Eligibility are due no later than three months PRIOR to the Expiration Date of the Certification Period shown above. Failure to submit Completed Applications timely may result in a gap in Certification or a lapse in Certification altogether for your company.***

Reviewer's Initials _____

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SECTION 00 41 03.04

FORM FOR SUB-BID – ELECTRICAL WORK

To all General Bidders Except those Excluded:

A. The Undersigned proposes to furnish all labor and materials required in for completing, in accordance with the hereinafter described accordance with the hereinafter described Drawings, Specifications and Addenda, all the Work identified in Section 01 11 20 and in any Plans specified in such section of the Specifications and according to the terms of the Contract Documents prepared by Woodard & Curran for the Water System Improvements in Lowell, MA, known as Contract 2 and corresponds with DWSRF-3531 and Project number 224802.20, for the contract sum (excluding sales and use tax) of

TOTAL ITEM S4 LUMP SUM PRICE FOR ITEMS E1 and E2:

$_____
(in figures)

_____ Dollars and
(in words)

_____ Cents
(in words)

The subdivision of the proposed Contract Price is as follows (excluding sales and use tax).

Item E1 – Work of the Electrical Subcontractor
(being all Work <u>other than</u> that covered in <u>Item E2 VERTICAL WHEELCHAIR LIFTS)</u>

E1	Electrical Subcontractor Work for completing the Water System Improvements Project as specified and shown on the Drawings.	$_____

Item E2 – Work pertaining to VERTICAL WHEELCHAIR LIFTS (SRF INELIGIBLE) <u>(excluding Item E1)</u>

E2	SRF INELIGIBLE: Electrical Subcontractor Work for Work associated with the Vertical Wheelchair Lifts	$_____

B. This sub-Bid includes Addenda numbered:_____

C. This sub-Bid

may be used by any General Bidder except:

_____

_____

may only be used by the following General Bidders:

_____

_____

[To exclude General Bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no General Bidders are excluded.]

D. The Undersigned agrees that, if it is selected as a Sub-Bidder, Undersigned will, within 5 days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the General Bidder selected as the general Contractor, execute with such general Contractor a subcontract in accordance with the terms of this sub-Bid, and contingent upon the execution of the Contract; and, if requested so to do in the sub-Bid by the General Bidder, who shall pay the premiums therefor, or if prequalification is required pursuant to MGL Chapter 149 Section 44D 3/4, furnish a performance and payment bond of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the Undersigned labor or labor and materials for the class or classes or part thereof of Work for which the provisions of the section(s) of the Specifications for this sub-trade require a listing in this paragraph, including the Undersigned if customarily furnished by persons Undersigned's own payroll, and in the absence of a contrary provision in the Specifications, the name of each such class of Work or part thereto and the bid price for such class of Work or part thereof are:

Name	Class of Work	Bid Price

[Do not give bid price for any class or part thereof furnished by Undersigned.]

F. The Undersigned agrees that the above list of bids to the Undersigned represents bona fide bids based on the hereinbefore described Plans, Specifications and Addenda and that, if the Undersigned is awarded the subcontract, they will be used for the Work indicated at the amounts stated, if satisfactory to the Awarding Authority.

G. The Undersigned further agrees to be bound to the general Contractor by the terms of the hereinbefore described Plans, Specifications, including the Contract Documents, and Addenda, and to assume toward the general Contractor all the obligations and responsibilities that general Contractor, by those documents, assumes toward the Awarding Authority.

H. The Undersigned offers the following information as evidence of the Sub-Bidder's qualifications to perform the Work as bid upon according to all the requirements of the Plans and Specifications.

1. Have been in business under present business name _____ years.

2. Ever failed to complete any work awarded? _____

3. List one or more recent buildings/projects with names of the general contractor and architect/engineer on which you served as a subcontractor for work of similar character as required for the above-named building/Project.

Building/Project	Architect/Engineer	General Contractor	Amount of Contract

4. Bank Reference _____

I. The Undersigned hereby certifies that Undersigned is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work; that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that Undersigned will comply fully with all Laws and Regulations applicable to awards made subject to MGL Chapter 149, Section 44F.

The Undersigned further certifies under the penalties of perjury that this Sub-Bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection, the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The Undersigned further certifies under penalty of perjury that the said Undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Chapter 29, Section 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or Regulation promulgated thereunder.

This Bid is submitted by the Undersigned.

A Corporation

Corporation Name: _____

State of incorporation: _____

Type: _____
(*General Business, Professional, Service, other*)

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

(CORPORATE SEAL)
Attest: _____
(*Signature of Corporate Secretary*)

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Date of qualification to do business as out-of-state corporation: _____

A Limited Liability Company (LLC)

LLC Name: _____

State in which organized: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Partnership

Partnership Name: _____(SEAL)

By: _____
(*Signature of general partner – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Joint Venture

First Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Second Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation and limited liability company that is a party to the joint venture should be in the manner indicated above.)

SUBMITTED ON:
State License No. (if applicable)
EIN/FEIN:

END OF SECTION

ANNEX TO FORM FOR SUB-BID – ELECTRICAL WORK

1.01 The undersigned Sub-Bidder acknowledges that the time period for holding Bids, *where Federal approval is not required* is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of Bids; and *where Federal approval is required*, the time period for holding bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval. Notwithstanding the above, by mutual agreement, the sub-Bid will remain subject to acceptance for 60 days after the Bid opening, allowing for Federal approval if needed as stated above, or for such longer period of time that Sub-Bidder may agree to in writing upon request of Owner.

1.02 The undersigned Sub-Bidder proposes and agrees, if its sub-Bid is accepted, to enter into a subcontract with the general Contractor in the form included in the Bidding Documents, to perform all Work as specified or indicated in the Bidding Documents for the prices indicated in the sub-Bid and within the times indicated in the Bidding Documents, and in accordance with the other terms and conditions of the Bidding Documents.

1.03 Sub-Bidder accepts all of the terms and conditions of the Bidding Documents including, without limitation:

A. those dealing with disposition of Bid security;
B. those included in the Supplementary Instructions to Sub-Bidders;
C. insurance and bonding requirements (payment bond and performance bond each equal to 100% of the total subcontract price) set forth in the Standard General and Supplementary Conditions and Additional Supplementary Conditions, if any;
D. Contract Times as set forth in the Agreement; and
E. provisions for liquidated damages as set forth in the Agreement.

1.04 Sub-Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for unit price items will be based on actual quantities determined and based on the unit prices included in the Form for Sub-Bid, as provided in the General Conditions and Supplementary Conditions.

1.05 The following documents are submitted with and made a condition of the sub-Bid as acknowledged in the Sub-Bid Submittal Checklist:

- 00 43 13 Bid Bond – Penal Sum Form
  OR required Bid security in the form of _____
- 00 43 93.01 Sub-Bid Submittal Checklist
- 00 45 05.01 Sub-Bidder's Representations and Certifications
- 00 45 19 Non-collusion Affidavit
- DCAMM Filed Sub-Bid Certificate of Contractor Eligibility (sample included at the end of this Section)
- 00 45 56 DCAMM Sub-Bidder Update Statement
- 00 45 58 Statement of Intent to Comply with Diesel Retrofit Program

1.06 Communications concerning the sub-Bid shall be addressed to:

Name _____

Title _____

Address _____

_____

Telephone No. _____

Facsimile No. _____

Email _____

SUBMITTED ON:
By:
Authorized person per Form for Sub-Bid

END OF SECTION

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LIEUTENANT GOVERNOR

The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Division of Capital Asset Management
One Ashburton Place
Boston, Massachusetts 02108
Tel: (617) 727-4050
Fax: (617) 727-5363

JAY GONZALEZ
SECRETARY, ADMINISTRATION & FINANCE

CAROLE CORNELISON
COMMISSIONER

Filed Sub-Bid
Certificate of Contractor Eligibility

CONTRACTOR IDENTIFICATION NUMBER: 0000

This Certificate Shall Be Used for Submitting Filed Sub-Bids Only

1. **CERTIFICATION PERIOD:** **This Certificate is valid from 1/1/2011 to 1/2/2012**
2. **CONTRACTOR'S NAME:** **Test Screen --Do Not Type Over**
3. **CONTRACTOR'S ADDRESS:** **123 Main Street Anytown, MA 01950**
4. **WORK CATEGORIES:** **This Contractor is certified to file bids under Massachusetts General Laws Chapter 149, Chapter 149A and Chapter 25A in the following checked Categories of Work:**

☑ Acoustical Tile	☑ HVAC	☑ Miscellaneous & Ornamental Iron	☑ Terrazzo
☑ Electrical Work	☑ Lathing & Plastering	☑ Painting	☑ Tile
☑ Elevators	☑ Marble	☑ Plumbing	☑ Waterproofing, Damp proofing, and Caulking
☑ Fire Protection Sprinkler Systems	☑ Masonry Work	☑ Resilient Floors	
☑ Glass and Glazing	☑ Metal Windows	☑ Roofing & Flashing	

5. **EVALUATIONS:**
   - **Number of Projects Evaluated: 15**
   - **Average Project Evaluation Rating: 85**
   - **Number of Projects Below Passing Score: 2**
6. **SUPPLIER DIVERSITY OFFICE CERTIFICATION:** **Minority Owned Business Enterprise**

_____ _____

Freya S. Bernstein, Deputy General Counsel, for Carole J. Cornelison, Commissioner — **Approval Date**

NOTE TO CONTRACTORS: ***Complete Applications for Renewal of Contractor Eligibility are due no later than three months PRIOR to the Expiration Date of the Certification Period shown above. Failure to submit Completed Applications timely may result in a gap in Certification or a lapse in Certification altogether for your company.***

Reviewer's Initials _____

SECTION 00 41 03.05

FORM FOR SUB-BID – MASONRY

To all General Bidders Except those Excluded:

A. The Undersigned proposes to furnish all labor and materials required in for completing, in accordance with the hereinafter described accordance with the hereinafter described Drawings, Specifications and Addenda, all the Work identified in Section 01 11 20 and in any Plans specified in such section of the Specifications and according to the terms of the Contract Documents prepared by Woodard & Curran for the Water System Improvements in Lowell, MA, known as Contract 2 and corresponds with DWSRF-3531 and Project number 224802.20, for the contract sum (excluding sales and use tax) of

Item No.	Item Description with Unit or Lump Sum Price in Written Words	Estimated Quantity & Unit	Unit Bid Price (Figures)	Total Bid Item Price (Figures)
S5A	Concrete Spall Repair All @ _____ _____ _____Dollars and _____Cents PER square foot	25 SF		
S5B	Masonry Repointing @ _____ _____ _____Dollars and _____Cents PER foot	100 LF		
S5C	Masonry Work (EXCLUDING items S5A and S5B above) @ _____ _____ _____Dollars and _____Cents	1 LS	N/A	

TOTAL ITEM S5 BID SUM PRICE (ITEMS S5A-S5C):
based on Unit Price Schedule above $_____
(in figures)

_____ Dollars and
(in words)
_____ Cents
(in words)

B. This sub-Bid includes Addenda numbered:_____

C. This sub-Bid

may be used by any General Bidder except:

_____

_____

may only be used by the following General Bidders:

_____

_____

[To exclude General Bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no General Bidders are excluded.]

D. The Undersigned agrees that, if it is selected as a Sub-Bidder, Undersigned will, within 5 days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the General Bidder selected as the general Contractor, execute with such general Contractor a subcontract in accordance with the terms of this sub-Bid, and contingent upon the execution of the Contract; and, if requested so to do in the sub-Bid by the General Bidder, who shall pay the premiums therefor, or if prequalification is required pursuant to MGL Chapter 149 Section 44D 3/4, furnish a performance and payment bond of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the Undersigned labor or labor and materials for the class or classes or part thereof of Work for which the provisions of the section(s) of the Specifications for this sub-trade require a listing in this paragraph, including the Undersigned if customarily furnished by persons Undersigned's own payroll, and in the absence of a contrary provision in the Specifications, the name of each such class of Work or part thereto and the bid price for such class of Work or part thereof are:

Name	Class of Work	Bid Price

[Do not give bid price for any class or part thereof furnished by Undersigned.]

F. The Undersigned agrees that the above list of bids to the Undersigned represents bona fide bids based on the hereinbefore described Plans, Specifications and Addenda and that, if the Undersigned is awarded the subcontract, they will be used for the Work indicated at the amounts stated, if satisfactory to the Awarding Authority.

G. The Undersigned further agrees to be bound to the general Contractor by the terms of the hereinbefore described Plans, Specifications, including the Contract Documents, and Addenda, and to assume toward the general Contractor all the obligations and responsibilities that general Contractor, by those documents, assumes toward the Awarding Authority.

H. The Undersigned offers the following information as evidence of the Sub-Bidder's qualifications to perform the Work as bid upon according to all the requirements of the Plans and Specifications.

1. Have been in business under present business name _____ years.

2. Ever failed to complete any work awarded? _____

3. List one or more recent buildings/projects with names of the general contractor and architect/engineer on which you served as a subcontractor for work of similar character as required for the above-named building/Project.

Building/Project	Architect/Engineer	General Contractor	Amount of Contract

4. Bank Reference _____

I. The Undersigned hereby certifies that Undersigned is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work; that all

employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that Undersigned will comply fully with all Laws and Regulations applicable to awards made subject to MGL Chapter 149, Section 44F.

The Undersigned further certifies under the penalties of perjury that this Sub-Bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection, the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The Undersigned further certifies under penalty of perjury that the said Undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Chapter 29, Section 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or Regulation promulgated thereunder.

This Bid is submitted by the Undersigned.

A Corporation

Corporation Name: _____

State of incorporation: _____

Type: _____
(*General Business, Professional, Service, other*)

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

(CORPORATE SEAL)
Attest: _____
(*Signature of Corporate Secretary*)

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Date of qualification to do business as out-of-state corporation: _____

A Limited Liability Company (LLC)

LLC Name: _____

State in which organized: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Partnership

Partnership Name: _____(SEAL)

By: _____
(*Signature of general partner – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Joint Venture

First Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Second Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation and limited liability company that is a party to the joint venture should be in the manner indicated above.)

SUBMITTED ON:
State License No. (if applicable)
EIN/FEIN:

END OF SECTION

ANNEX TO FORM FOR SUB-BID – MASONRY

1.01 The undersigned Sub-Bidder acknowledges that the time period for holding Bids, *where Federal approval is not required* is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of Bids; and *where Federal approval is required*, the time period for holding bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval. Notwithstanding the above, by mutual agreement, the sub-Bid will remain subject to acceptance for 60 days after the Bid opening, allowing for Federal approval if needed as stated above, or for such longer period of time that Sub-Bidder may agree to in writing upon request of Owner.

1.02 The undersigned Sub-Bidder proposes and agrees, if its sub-Bid is accepted, to enter into a subcontract with the general Contractor in the form included in the Bidding Documents, to perform all Work as specified or indicated in the Bidding Documents for the prices indicated in the sub-Bid and within the times indicated in the Bidding Documents, and in accordance with the other terms and conditions of the Bidding Documents.

1.03 Sub-Bidder accepts all of the terms and conditions of the Bidding Documents including, without limitation:

A. those dealing with disposition of Bid security;
B. those included in the Supplementary Instructions to Sub-Bidders;
C. insurance and bonding requirements (payment bond and performance bond each equal to 100% of the total subcontract price) set forth in the Standard General and Supplementary Conditions and Additional Supplementary Conditions, if any;
D. Contract Times as set forth in the Agreement; and
E. provisions for liquidated damages as set forth in the Agreement.

1.04 Sub-Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for unit price items will be based on actual quantities determined and based on the unit prices included in the Form for Sub-Bid, as provided in the General Conditions and Supplementary Conditions.

1.05 The following documents are submitted with and made a condition of the sub-Bid as acknowledged in the Sub-Bid Submittal Checklist:

- 00 43 13 Bid Security Form
  OR required Bid security in the form of _____
- 00 43 93.01 Sub-Bid Submittal Checklist
- 00 45 05.01 Sub-Bidder's Representations and Certifications
- 00 45 19 Non-collusion Affidavit
- DCAMM Filed Sub-Bid Certificate of Contractor Eligibility (sample included at the end of this Section)
- 00 45 56 DCAMM Sub-Bidder Update Statement
- 00 45 58 Statement of Intent to Comply with Diesel Retrofit Program

1.06 Communications concerning the sub-Bid shall be addressed to:

Name _____

Title _____

Address _____

_____

Telephone No. _____

Facsimile No. _____

Email _____

SUBMITTED ON:
By:
Authorized person per Form for Sub-Bid

END OF SECTION

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LIEUTENANT GOVERNOR

The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Division of Capital Asset Management
One Ashburton Place
Boston, Massachusetts 02108
Tel: (617) 727-4050
Fax: (617) 727-5363

JAY GONZALEZ
SECRETARY, ADMINISTRATION & FINANCE

CAROLE CORNELISON
COMMISSIONER

Filed Sub-Bid
Certificate of Contractor Eligibility

CONTRACTOR IDENTIFICATION NUMBER: 0000

This Certificate Shall Be Used for Submitting Filed Sub-Bids Only

1. CERTIFICATION PERIOD: **This Certificate is valid from 1/1/2011 to 1/2/2012**

2. CONTRACTOR'S NAME: **Test Screen --Do Not Type Over**

3. CONTRACTOR'S ADDRESS: **123 Main Street Anytown, MA 01950**

4. WORK CATEGORIES: **This Contractor is certified to file bids under Massachusetts General Laws Chapter 149, Chapter 149A and Chapter 25A in the following checked Categories of Work:**

☑ Acoustical Tile	☑ HVAC	☑ Miscellaneous & Ornamental Iron	☑ Terrazzo
☑ Electrical Work	☑ Lathing & Plastering	☑ Painting	☑ Tile
☑ Elevators	☑ Marble	☑ Plumbing	☑ Waterproofing, Damp proofing, and Caulking
☑ Fire Protection Sprinkler Systems	☑ Masonry Work	☑ Resilient Floors	
☑ Glass and Glazing	☑ Metal Windows	☑ Roofing & Flashing	

5. EVALUATIONS:

Number of Projects Evaluated: **15**
Average Project Evaluation Rating: **85**
Number of Projects Below Passing Score: **2**

6. SUPPLIER DIVERSITY OFFICE CERTIFICATION: **Minority Owned Business Enterprise**

_____ _____

Freya S. Bernstein, Deputy General Counsel, for Carole J. Cornelison, Commissioner **Approval Date**

NOTE TO CONTRACTORS: ***Complete Applications for Renewal of Contractor Eligibility are due no later than three months PRIOR to the Expiration Date of the Certification Period shown above. Failure to submit Completed Applications timely may result in a gap in Certification or a lapse in Certification altogether for your company.***

Reviewer's Initials _____

SECTION 00 41 03.05

FORM FOR SUB-BID – ELEVATORS

(SRF INELIGIBLE)

To all General Bidders Except those Excluded:

A. The Undersigned proposes to furnish all labor and materials required in for completing, in accordance with the hereinafter described accordance with the hereinafter described Drawings, Specifications and Addenda, all the Work identified in Section 01 11 20 and in any Plans specified in such section of the Specifications and according to the terms of the Contract Documents prepared by Woodard & Curran for the Water System Improvements in Lowell, MA, known as Contract 2 and corresponds with DWSRF-3531 and Project number 224802.20, for the contract sum (excluding sales and use tax) of

TOTAL ITEM S6 BID SUM PRICE: $_____
(in figures)

_____ Dollars and
(in words)
_____ Cents
(in words)

B. This sub-Bid includes Addenda numbered:_____

C. This sub-Bid

may be used by any General Bidder except:

_____

_____

may only be used by the following General Bidders:

_____

_____

[To exclude General Bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no General Bidders are excluded.]

D. The Undersigned agrees that, if it is selected as a Sub-Bidder, Undersigned will, within 5 days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the General Bidder selected as the general Contractor, execute with such general Contractor a subcontract in accordance with the terms of this sub-Bid, and contingent upon the execution of the Contract; and, if requested so to do in the sub-Bid by the General Bidder, who shall pay the premiums therefor, or if prequalification is required pursuant to MGL Chapter 149 Section 44D 3/4, furnish a performance and payment bond of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the Undersigned labor or labor and materials for the class or classes or part thereof of Work for which the provisions of the section(s) of the Specifications for this sub-trade require a listing in this paragraph, including the Undersigned if customarily furnished by persons Undersigned's own payroll, and in the absence of a contrary provision in the Specifications, the name of each such class of Work or part thereto and the bid price for such class of Work or part thereof are:

Name	Class of Work	Bid Price

[Do not give bid price for any class or part thereof furnished by Undersigned.]

F. The Undersigned agrees that the above list of bids to the Undersigned represents bona fide bids based on the hereinbefore described Plans, Specifications and Addenda and that, if the Undersigned is awarded the subcontract, they will be used for the Work indicated at the amounts stated, if satisfactory to the Awarding Authority.

G. The Undersigned further agrees to be bound to the general Contractor by the terms of the hereinbefore described Plans, Specifications, including the Contract Documents, and Addenda, and to assume toward the general Contractor all the obligations and responsibilities that general Contractor, by those documents, assumes toward the Awarding Authority.

H. The Undersigned offers the following information as evidence of the Sub-Bidder's qualifications to perform the Work as bid upon according to all the requirements of the Plans and Specifications.

1. Have been in business under present business name _____ years.

2. Ever failed to complete any work awarded? _____

3. List one or more recent buildings/projects with names of the general contractor and architect/engineer on which you served as a subcontractor for work of similar character as required for the above-named building/Project.

Building/Project	Architect/Engineer	General Contractor	Amount of Contract

4. Bank Reference _____

I. The Undersigned hereby certifies that Undersigned is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work; that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that Undersigned will comply fully with all Laws and Regulations applicable to awards made subject to MGL Chapter 149, Section 44F.

The Undersigned further certifies under the penalties of perjury that this Sub-Bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection, the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The Undersigned further certifies under penalty of perjury that the said Undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Chapter 29, Section 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or Regulation promulgated thereunder.

This Bid is submitted by the Undersigned.

A Corporation

Corporation Name: _____

State of incorporation: _____

Type: _____
(*General Business, Professional, Service, other*)

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

(CORPORATE SEAL)
Attest: _____
(*Signature of Corporate Secretary*)

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Date of qualification to do business as out-of-state corporation: _____

A Limited Liability Company (LLC)

LLC Name: _____

State in which organized: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Partnership

Partnership Name: _____(SEAL)

By: _____
(*Signature of general partner – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

A Joint Venture

First Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Second Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation and limited liability company that is a party to the joint venture should be in the manner indicated above.)

SUBMITTED ON:
State License No. (if applicable)
EIN/FEIN:

END OF SECTION

ANNEX TO FORM FOR SUB-BID – ELEVATORS (SRF-INELIGIBLE)

1.01 The undersigned Sub-Bidder acknowledges that the time period for holding Bids, *where Federal approval is not required* is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of Bids; and *where Federal approval is required*, the time period for holding bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval. Notwithstanding the above, by mutual agreement, the sub-Bid will remain subject to acceptance for 60 days after the Bid opening, allowing for Federal approval if needed as stated above, or for such longer period of time that Sub-Bidder may agree to in writing upon request of Owner.

1.02 The undersigned Sub-Bidder proposes and agrees, if its sub-Bid is accepted, to enter into a subcontract with the general Contractor in the form included in the Bidding Documents, to perform all Work as specified or indicated in the Bidding Documents for the prices indicated in the sub-Bid and within the times indicated in the Bidding Documents, and in accordance with the other terms and conditions of the Bidding Documents.

1.03 Sub-Bidder accepts all of the terms and conditions of the Bidding Documents including, without limitation:

A. those dealing with disposition of Bid security;
B. those included in the Supplementary Instructions to Sub-Bidders;
C. insurance and bonding requirements (payment bond and performance bond each equal to 100% of the total subcontract price) set forth in the Standard General and Supplementary Conditions and Additional Supplementary Conditions, if any;
D. Contract Times as set forth in the Agreement; and
E. provisions for liquidated damages as set forth in the Agreement.

1.04 Sub-Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for unit price items will be based on actual quantities determined and based on the unit prices included in the Form for Sub-Bid, as provided in the General Conditions and Supplementary Conditions.

1.05 The following documents are submitted with and made a condition of the sub-Bid as acknowledged in the Sub-Bid Submittal Checklist:

- 00 43 13 Bid Bond – Penal Sum Form
  OR required Bid security in the form of _____
- 00 43 93.01 Sub-Bid Submittal Checklist
- 00 45 05.01 Sub-Bidder's Representations and Certifications
- 00 45 19 Non-collusion Affidavit
- DCAMM Filed Sub-Bid Certificate of Contractor Eligibility (sample included at the end of this Section)
- 00 45 56 DCAMM Sub-Bidder Update Statement
- 00 45 58 Statement of Intent to Comply with Diesel Retrofit Program

1.06 Communications concerning the sub-Bid shall be addressed to:

Name _____

Title _____

Address _____

_____

Telephone No. _____

Facsimile No. _____

Email _____

SUBMITTED ON:
By:
Authorized person per Form for Sub-Bid

END OF SECTION

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LIEUTENANT GOVERNOR

The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Division of Capital Asset Management
One Ashburton Place
Boston, Massachusetts 02108
Tel: (617) 727-4050
Fax: (617) 727-5363

JAY GONZALEZ
SECRETARY, ADMINISTRATION & FINANCE

CAROLE CORNELISON
COMMISSIONER

Filed Sub-Bid
Certificate of Contractor Eligibility

CONTRACTOR IDENTIFICATION NUMBER: 0000

This Certificate Shall Be Used for Submitting Filed Sub-Bids Only

1. **CERTIFICATION PERIOD:** **This Certificate is valid from 1/1/2011 to 1/2/2012**
2. **CONTRACTOR'S NAME:** **Test Screen --Do Not Type Over**
3. **CONTRACTOR'S ADDRESS:** **123 Main Street Anytown, MA 01950**
4. **WORK CATEGORIES:** **This Contractor is certified to file bids under Massachusetts General Laws Chapter 149, Chapter 149A and Chapter 25A in the following checked Categories of Work:**

☑ Acoustical Tile	☑ HVAC	☑ Miscellaneous & Ornamental Iron	☑ Terrazzo
☑ Electrical Work	☑ Lathing & Plastering	☑ Painting	☑ Tile
☑ Elevators	☑ Marble	☑ Plumbing	☑ Waterproofing, Damp proofing, and Caulking
☑ Fire Protection Sprinkler Systems	☑ Masonry Work	☑ Resilient Floors	
☑ Glass and Glazing	☑ Metal Windows	☑ Roofing & Flashing	

5. **EVALUATIONS:**
   - **Number of Projects Evaluated: 15**
   - **Average Project Evaluation Rating: 85**
   - **Number of Projects Below Passing Score: 2**
6. **SUPPLIER DIVERSITY OFFICE CERTIFICATION:** **Minority Owned Business Enterprise**

_____ _____

Freya S. Bernstein, Deputy General Counsel, for Carole J. Cornelison, Commissioner — **Approval Date**

NOTE TO CONTRACTORS: ***Complete Applications for Renewal of Contractor Eligibility are due no later than three months PRIOR to the Expiration Date of the Certification Period shown above. Failure to submit Completed Applications timely may result in a gap in Certification or a lapse in Certification altogether for your company.***

Reviewer's Initials _____

This page intentionally left blank.

BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER *(Name and Address)*:

SURETY *(Name and Address of Principal Place of Business)*:

OWNER *(Name and Address)*:

BID
Bid Due Date:
Description *(Project Name and Include Location)*:

BOND
Bond Number:
Date *(Not earlier than Bid due date)*:
Penal sum _____ $ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER	**SURETY**
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
_____	_____
Title	Title

Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

3.2 All Bids are rejected by Owner, or

3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

SECTION 00 43 93

GENERAL BID SUBMITTAL CHECKLIST

General Bidder confirms that the following documents are fully completed, included in and made part of its general Bid.

00 41 02 Form for General Bid
00 41 02.01 Annex to Form for General Bid

00 43 13 Bid Security Form
OR Required Bid security in the form of _____

00 45 05 General Bidder's Representations and Certifications

00 45 19 Non-collusion Affidavit

DCAMM Prime/General Certificate of Contractor Eligibility (sample included at the end of Section 00 41 02.01)

00 45 55 DCAMM General Contractor Update Statement

If a foreign corporation, certificate from the Secretary of State of the Commonwealth of Massachusetts that the corporation has complied with requirements of section 15.03 of subdivision A of Part 15 of chapter 156D and the date of compliance, and further has filed all annual reports required by section 16.22 of subdivision B of Part 16 of said chapter 156

Certificate of Good Standing with respect to all returns due and taxes from the Commonwealth of Massachusetts Department of Revenue

00 45 58 Statement of Intent to Comply with Diesel Retrofit Program

One hardcopy, signed original (with original Bid security) of the above has been submitted to the Owner in accordance with Section 00 21 13.

General Bidder further confirms that if it is deemed one of the lowest responsible and eligible General Bidders, as notified by the Owner, it shall submit documents required by and in accordance with Section 00 45 57 by the close of business on the third business day after notification, and such documents submitted shall also be a condition of its Bid.

CONFIRMED BY GENERAL BIDDER ON:
By:
Authorized person per General Bid Form and Annex

END OF SECTION

This page intentionally left blank.

SECTION 00 43 93.01

SUB-BID SUBMITTAL CHECKLIST

Sub-Bidder confirms that the following documents are fully completed, included in and made part of its sub-Bid.

Check that which applies:

00 41 03.01 Form for Sub-Bid and Annex – Roofing and Flashing
00 41 03.02 Form for Sub-Bid and Annex - Painting
00 41 03.03 Form for Sub-Bid and Annex – Heating, Ventilating and Air-Conditioning
00 41 03.04 Form for Sub-Bid and Annex – Electrical Work
00 41 03.05 Form for Sub-Bid and Annex – Masonry
00 41 03.06 Form for Sub-Bid and Annex – Elevators (SRF INELIGIBLE)

Submitted with each sub-Bid:

00 43 13 Bid Security Form

OR Required Bid security in the form of _____

00 45 05.01 Sub-Bidder's Representations and Certifications

00 45 19 Non-collusion Affidavit

DCAMM Filed Sub-Bid Certificate of Contractor Eligibility (sample included at the end of Form for Sub-Bid)

00 45 56 DCAMM Sub-Bidder Update Statement

If a foreign corporation, certificate from the Secretary of State of the Commonwealth of Massachusetts that the corporation has complied with requirements of section 15.03 of subdivision A of Part 15 of chapter 156D and the date of compliance, and further has filed all annual reports required by section 16.22 of subdivision B of Part 16 of said chapter 156

Certificate of Good Standing with respect to all returns due and taxes from the Commonwealth of Massachusetts Department of Revenue

00 45 58 Statement of Intent to Comply with Diesel Retrofit Program

One hardcopy, signed original (with original Bid security) of the above has been submitted to the Owner in accordance with 00 21 13.

CONFIRMED BY SUB-BIDDER ON:
By:
Authorized person per Form for Sub-Bid and Annex

END OF SECTION

SECTION 00 45 05

GENERAL BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

The undersigned, under the penalties of perjury, certifies and represents the following which is made a condition of the general Bid.

1.01 General Bidder's Representations

A. General Bidder has examined and carefully studied the Bidding Documents and other related data identified in the Bidding Documents.

B. General Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. General Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. General Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Section 00 73 10 of the Supplementary Conditions, Paragraph 4.02, as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Section 00 73 10 of the Supplementary Conditions, Paragraph 4.06, as containing reliable "technical data."

E. General Bidder has considered the information known to General Bidder; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by General Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) General Bidder's safety precautions and programs.

F. Based on the information and observations referred to in Paragraph E above, General Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of the general Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. General Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. General Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that General Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to General Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which the General Bid is submitted.

1.02 General Bidder's Certifications

A. The general Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.

B. General Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid. General Bidder has not solicited or induced any individual or entity to refrain from bidding;

C. General Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish Bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

1.03 General Bidder's Certifications Required by Massachusetts General Law

A. General Bidder has submitted a certificate from the Secretary of State of the Commonwealth of Massachusetts that the corporation has complied with requirements of section 15.03 of subdivision A of Part 15 of chapter 156D and the date of compliance, and further has filed all annual reports required by section 16.22 of subdivision B of Part 16 of said chapter 156D <u>if General Bidder is a foreign corporation</u>. General Bidder certifies it will provide such certificate for each Subcontractor that is a foreign corporation if it receives a Notice of Award.

B. General Bidder certifies, under the penalties of perjury, to the best of its knowledge and belief, that all state tax returns have been filed and all state taxes paid pursuant to MGL Chapter 62C, Section 49A, and has submitted a Certificate of Good Standing with respect to all returns due and taxes from the Commonwealth of Massachusetts Department of Revenue certifying General Bidder has complied with all laws of the relating to taxes, reporting of employees and contractors, and withholding and remitting of child support. General Bidder certifies it will provide such certificate for each Subcontractor if it receives a Notice of Award.

C. General Bidder certifies that if awarded the Contract, the following will be submitted prior to execution of the Agreement in accordance with MGL Chapter 30, Section 39R *Definitions; contract provisions; management and financial statements; enforcement.*

- A statement by management on internal accounting controls;
- A statement prepared by an independent certified public accountant regarding management's statement; and
- An audited financial statement for the most recent completed fiscal year.

D. General Bidder certifies that if awarded the Contract, any Work involving the removal, containment, or encapsulation of asbestos or material containing asbestos will only be performed by a licensed contractor in accordance with MGL Chapter 149, Section 6BA.

E. General Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work and further certifies that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins Work and if General Bidder is awarded a Contract, shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.

F. General Bidder will comply with the requirements of the Equal Employment Opportunity, Anti-discrimination, and Affirmative Action Program provisions in the Contract Documents, and if General Bidder is awarded a Contract, it shall incorporate these provisions into all subcontracts and Purchase Orders so that such provisions will be binding upon each Subcontractor or Supplier.

CERTIFIED BY GENERAL BIDDER ON:
By:
Authorized person per Form for General Bid and Annex

END OF SECTION

SECTION 00 45 05.01

SUB-BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

The undersigned, under the penalties of perjury, certifies and represents the following which is made a condition of the General Bid.

1.01 Sub-Bidder's Representations

A. Sub-Bidder has examined and carefully studied the Bidding Documents and other related data identified in the Bidding Documents.

B. Sub-Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Sub-Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Sub-Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Section 00 73 10 of the Additional Supplementary Conditions, Paragraph 4.02. as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Section 00 73 10 of the Additional Supplementary Conditions, Paragraph 4.06, as containing reliable "technical data."

E. Sub-Bidder has considered the information known to Sub-Bidder; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Sub-Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Sub-Bidder's safety precautions and programs.

F. Based on the information and observations referred to in Paragraph E above, Sub-Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of the sub-Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. Sub-Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Sub-Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Sub-Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Sub-Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which the Sub-Bid is submitted.

1.02 Sub-Bidder's Certifications

A. The sub-Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.

B. Sub-Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid. Sub-Bidder has not solicited or induced any individual or entity to refrain from bidding.

C. Sub-Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for a subcontract. For the purposes of this Paragraph:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish Bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of a subcontract.

1.03 Sub-Bidder's Certifications Required by Massachusetts General Law

A. Sub-Bidder has submitted a certificate from the Secretary of State of the Commonwealth of Massachusetts that the corporation has complied with requirements of section 15.03 of subdivision A of Part 15 of chapter 156D and the date of compliance, and further has filed all annual reports required by section 16.22 of subdivision B of Part 16 of said chapter 156D if Sub-Bidder is a foreign corporation. Sub-Bidder certifies it will provide such certificate to the Successful General Bidder receiving a Notice of Award if Sub-Bidder is included in that general Bid.

B. Sub-Bidder certifies, under the penalties of perjury, to the best of its knowledge and belief, that all state tax returns have been filed and all state taxes paid pursuant to MGL Chapter 62C, Section 49A, and has submitted a Certificate of Good Standing with respect to all returns due and taxes from the Commonwealth of Massachusetts Department of Revenue certifying Sub-Bidder has complied with all laws of the relating to taxes, reporting of employees and contractors, and withholding and remitting of child support. Sub-Bidder certifies it will provide such certificate to the Successful General Bidder receiving a Notice of Award if Sub-Bidder is included in that general Bid.

C. Sub-Bidder certifies that if awarded a subcontract, any Work involving the removal, containment, or encapsulation of asbestos or material containing asbestos will only be performed by a licensed contractor in accordance with MGL Chapter 149, Section 6BA.

D. Sub-Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work and further certifies that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins Work and if Sub-Bidder is awarded a subcontract, shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.

E. Sub-Bidder will comply with the requirements of the Equal Employment Opportunity, Anti-discrimination, and Affirmative Action Program provisions in the Contract Documents, and if Sub-Bidder is awarded a subcontract, it shall incorporate these provisions into all subcontracts and Purchase Orders so that such provisions will be binding upon each subcontractor or supplier.

1.04 Sub-Bidder's Certifications and Representations Required by the EPA State Revolving Fund Program

A. *Retrofit Program:* Sub-Bidder certifies it has submitted a signed and dated Statement of Intent to Comply form included in Section 00 45 58 as part of its sub-Bid and will comply with detailed requirements included in Section 00 73 10 for required certification after award.

B. *American Iron and Steel requirements of P.L. 113-76 (the Consolidated Appropriations Act of 2014)*: Sub-Bidder acknowledges to and for the benefit of the Owner and the State that it understands the material and equipment, and services under any resulting Agreement are being funded with monies made available by the Drinking Water State Revolving Fund that have statutory requirements commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the Project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided for the Project. Sub-Bidder hereby represents and warrants to and for the benefit of the Owner and the State that (a) Sub-Bidder has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the Project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) Sub-Bidder will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by Owner.

C. Sub-Bidder certifies compliance with *Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled "Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons)*" in accordance with the Supplementary Instructions to Bidders.

CERTIFIED BY SUB-BIDDER ON:
By:
Authorized person per Form for Sub-Bid and Annex

END OF SECTION

SECTION 00 45 19

NON-COLLUSION AFFIDAVIT

_____, being duly sworn, depose and, under the penalty of perjury, say that the following is true:

1. I am the person responsible within my firm for the final decision as to the price(s) and amount of this Bid or, if not, that I have written authorization, enclosed herewith, from that person to make the statements set out below on his or her behalf and on the behalf of my firm.

2. The price(s) and amount of this Bid have been arrived at independently, without collusion, consultation, communication, or agreement for the purpose of restricting competition with any other contractor, competitor, Bidder, or potential Bidder.

3. Unless otherwise required by law, neither the price(s) nor the amount of this Bid have been disclosed to any other firm or person who is a Bidder, competitor, or potential Bidder on the Project, and will not be so disclosed either directly or indirectly prior to Bid opening.

4. No attempt has been made or will be made to solicit, cause, or induce any firm, partnership, corporation, or person to submit or not submit a Bid on this Project, or to submit a Bid higher than the Bid of this firm, or submit an intentionally high or noncompetitive Bid or other form of complementary Bid, or for the purpose of restricting competition.

5. The Bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary Bid.

6. My firm has not offered or entered into a subcontracting agreement regarding the purchase of materials or services from any firm or person, or offered, promised, or paid cash or anything of value to any firm or person, whether in connection with this or any other Project, in consideration for an agreement or promise by any firm or person to refrain from proposing or to submit a complementary Bid on the Project.

7. My firm has not accepted nor been promised any subcontract or agreement regarding the sale of materials or services to any firm or person, and has not been promised or paid cash or anything of value to any firm or person, whether in connection with this or any other project, in consideration for my firm's submitting a complementary Bid or agreeing to do so, on the Project.

8. I have made a diligent inquiry of all members, officers, employees, and agents of my firm with responsibilities relating to the preparation, approval, or submission of my firm's Bid on the Project and have been advised by each of them that he or she has not participated in any communication, consultation, discussion, agreement, collusion, act, or other conduct inconsistent with any of the statements and representations made in this affidavit.

_____

Company Name

_____

Signature

_____

Company Position

Date: _____

Attest: _____

Date: _____

END OF SECTION

SECTION 00 45 55

DCAMM PRIME/GENERAL CONTRACTOR UPDATE STATEMENT

Required Update Statement (10 pages) included on the following pages.

Electronic version available at http://www.mass.gov/anf/property-mgmt-and-construction/design-and-construction-of-public-bldgs/contractor-certification/prime-general-sub-contract-update-statements.html

END OF SECTION

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SPECIAL NOTICE TO AWARDING AUTHORITY
BIDDERS' UPDATE STATEMENTS ARE NOT PUBLIC RECORDS AND ARE NOT OPEN TO PUBLIC INSPECTION (M.G.L. C.149, §44D)

EFFECTIVE MARCH 30, 2010

Commonwealth of Massachusetts
Division of Capital Asset Management
PRIME/GENERAL CONTRACTOR UPDATE STATEMENT

TO ALL BIDDERS AND AWARDING AUTHORITIES

A COMPLETED AND SIGNED PRIME/GENERAL CONTRACTOR UPDATE STATEMENT MUST BE SUBMITTED WITH EVERY PRIME/GENERAL BID FOR A CONTRACT PURSUANT TO M.G.L. c.149, §44A AND M.G.L. c. 149A. ANY PRIME/GENERAL BID SUBMITTED WITHOUT AN APPROPRIATE UPDATE STATEMENT IS INVALID AND MUST BE REJECTED.

Caution: This form is to be used for submitting Prime/General Contract bids. It is not to be used for submitting Filed Sub-Bids or Trade Sub-Bids.

AWARDING AUTHORITIES

If the Awarding Authority determines that the bidder does not demonstrably possess the skill, ability, and integrity necessary to perform the work on the project, it must reject the bid.

BIDDER'S AFFIDAVIT

I swear under the pains and penalties of perjury that I am duly authorized by the bidder named below to sign and submit this Prime/General Contractor Update Statement on behalf of the bidder named below, that I have read this Prime/General Contractor Update Statement, and that all of the information provided by the bidder in this Prime/General Contractor Update Statement is true, accurate, and complete as of the bid date.

_____ Bid Date

_____ Print Name of Prime/General Contractor

_____ Project Number (or name if no number)

_____ Business Address

_____ Awarding Authority

_____ Telephone Number

SIGNATURE⇨ _____

Bidder's Authorized Representative

INSTRUCTIONS

INSTRUCTIONS TO BIDDERS

- This form must be completed and submitted by all Prime/General contractors bidding on projects pursuant to M.G.L. c. 149, §44A and M.G.L. c. 149A.
- You must give complete and accurate answers to all questions and provide all of the information requested. MAKING A MATERIALLY FALSE STATEMENT IN THIS UPDATE STATEMENT IS GROUNDS FOR REJECTING YOUR BID AND FOR DEBARRING YOU FROM ALL PUBLIC CONTRACTING.
- **This Update Statement must include all requested information that was not previously reported on the Application used for your firm's most recently issued (not extended or amended) Prime/General Contractor Certificate of Eligibility. The Update Statement must cover the entire period since the date of your Application, NOT since the date of your Certification.**
- You must use this official form of Update Statement. Copies of this form may be obtained from the awarding authority and from the Asset Management Web Site: www.mass.gov/dcam .
- If additional space is needed, please copy the appropriate page of this Update Statement and attach it as an additional sheet.
- See the section entitled "Bidding Limits" in the *Instructions to Awarding Authorities* for important information concerning your bidding limits.

INSTRUCTIONS TO AWARDING AUTHORITIES

Determination of Bidder Qualifications

- It is the awarding authority's responsibility to determine who is the lowest eligible and responsible bidder. You must consider all of the information in the low bidder's Update Statement in making this determination. Remember: this information was not available to the Division of Capital Asset Management at the time of certification.
- The bidder's performance on the projects listed in Parts 1 and 2 must be part of your review. Contact the project references.
- AWARDING AUTHORITIES ARE STRONGLY ENCOURAGED TO REVIEW THE LOW BIDDER'S ENTIRE CERTIFICATION FILE AT THE DIVISION OF CAPITAL ASSET MANAGEMENT. Telephone (617) 727-9320 for an appointment.

Bidding Limits

Single Project Limit: The total amount of the bid, including all alternates, may not exceed the bidder's Single Project Limit.

Aggregate Work Limit: The annual value of the work to be performed on the contract for which the bid is submitted, when added to the annual cost to complete the bidder's other currently held contracts, may not exceed the bidder's Aggregate Work Limit. Use the following procedure to determine whether the low bidder is within its Aggregate Work Limit:

Step 1 Review Update Statement Question #2 to make sure that all requested information is provided and that the bidder has accurately calculated and totaled the annualized value of all incomplete work on its currently held contracts (column 9).

Step 2 Determine the annual dollar value of the work to be performed on your project. This is done as follows:

(i) If the project is to be completed in less than 12 months, the annual dollar value of the work is equal to the full amount of the bid.

(ii) If the project will take more than 12 months to complete, calculate the number of years given to complete the project by dividing the total number of months in the project schedule by 12 (calculate to 3 decimal places), then divide the amount of the bid by the calculated number of years to find the annual dollar value of the work.

Step 3 Add the annualized value of all of the bidder's incomplete contract work (the total of column 9 on page 5) to the annual dollar value of the work to be performed on your project. **The total may not exceed the bidder's Aggregate Work Limit**.

Correction of Errors and Omissions in Update Statements

Matters of Form: An awarding authority shall not reject a contractor's bid because there are mistakes or omissions of form in the Update Statement submitted with the bid, provided the contractor promptly corrects those mistakes or omissions upon request of the awarding authority. [810 CMR 8.05(1)].

Correction of Other Defects: An awarding authority may, in its discretion, give a contractor notice of defects, other than mistakes or omissions of form, in the contractor's Update Statement, and an opportunity to correct such defects, provided the correction of such defects is not prejudicial to fair competition. An awarding authority may reject a corrected Update Statement if it contains unfavorable information about the contractor that was omitted from the Update Statement filed with the contractor's bid. [810 CMR 8.05(2)].

PART 1 - COMPLETED PROJECTS

LIST ALL PUBLIC AND PRIVATE *BUILDING* PROJECTS YOUR FIRM HAS COMPLETED SINCE THE DATE OF APPLICATION FOR YOUR MOST RECENTLY ISSUED (NOT EXTENDED OR AMENDED) DCAM CERTIFICATE OF ELIGIBILITY. YOU MUST REPORT ALL REQUESTED INFORMATION NOT PREVIOUSLY REPORTED ON THAT DCAM APPLICATION*.

PROJECT TITLE & LOCATION	WORK CATEGORY	CONTRACT PRICE	START DATE	DATE COMPLETED

Attach additional sheets if necessary

* If your firm has been terminated from a project prior to completion of the work or has failed or refused to complete its work under any contract, full details and an explanation must be provided. See Part 3 of this Update Statement.

PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH COMPLETED PROJECT LISTED ON THE PREVIOUS PAGE.

PROJECT TITLE	COMPANY NAME	CONTACT PERSON	TELEPHONE
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above, either through a business or family relationship? ☐ YES ☐ NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? ☐ YES ☐ NO

If you have answered YES to either question, explain. _____

PART 2 - CURRENTLY HELD CONTRACTS

LIST ALL PUBLIC AND PRIVATE BUILDING AND NON-BUILDING *CONSTRUCTION* PROJECTS YOUR FIRM HAS UNDER CONTRACT ON THIS DATE REGARDLESS OF WHEN OR WHETHER THE WORK COMMENCED.

1	2	3	4	5	6	7	8	9
PROJECT TITLE & LOCATION	WORK CATEGORY	START AND END DATES	ON SCHEDULE (yes / no)	CONTRACT PRICE	% NOT COMPLETE	$ VALUE OF WORK NOT COMPLETE (col. 5 X col. 6)	NO. OF YEARS REMAINING (see note below)	ANNUALIZED VALUE OF INCOMPLETE WORK (col. 7 ÷ col. 8) (divided by)

ANNUALIZED VALUE OF ALL INCOMPLETE CONTRACT WORK (Total of Column 9) $_____

Column 8
- If less than one year is left in the project schedule, write 1.
- If more than 12 months are left in the project schedule, divide the number of months left in the project schedule by 12 (calculate to three decimal places).

PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH INCOMPLETE PROJECT LISTED ON THE PREVIOUS PAGE.

PROJECT TITLE	COMPANY NAME	CONTACT PERSON	TELEPHONE
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above either through a business or family relationship? ☐ YES ☐ NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? ☐ YES ☐ NO

If you have answered YES to either question, explain. _____

PART 3 - PROJECT PERFORMANCE

For Parts 3 and 4, if you answer YES to any question, please provide on a separate page a complete explanation. Information you provide herein must supplement the Application for your most recently issued (not extended or amended) DCAM Certificate of Eligibility. You must report all requested information not previously reported on that DCAM Application for Prime/General Certificate of Eligibility. Include all details [project name(s) and location(s), names of all parties involved, relevant dates, etc.].

	YES	NO
1. Has your firm been terminated on any contract prior to completing a project or has any officer, partner or principal of your firm been an officer, partner or principal of another firm that was terminated or failed to complete a project?	☐	☐
2. Has your firm failed or refused either to perform or complete any of its work under any contract prior to substantial completion?	☐	☐
3. Has your firm failed or refused to complete any punch list work under any contract?	☐	☐
4. Has your firm filed for bankruptcy, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that filed for bankruptcy?	☐	☐
5. Has your surety taken over or been asked to complete any of your work under any contract?	☐	☐
6. Has a payment or performance bond been invoked against your current firm, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that had a payment or performance bond invoked?	☐	☐
7. Has your surety made payment to a materials supplier or other party under your payment bond on any contract?	☐	☐
8. Has any subcontractor filed a demand for direct payment with an awarding authority for a public project on any of your contracts?	☐	☐
9. Have any of your subcontractors or suppliers filed litigation to enforce a mechanic's lien against property in connection with work performed or materials supplied under any of your contracts?	☐	☐
10. Have there been any deaths of an employee or others occurring in connection with any of your projects?	☐	☐
11. Has any employee or other person suffered an injury in connection with any of your projects resulting in their inability to return to work for a period in excess of one year?	☐	☐

PART 4 - Legal or Administrative Proceedings; Compliance with Laws

Please answer the following questions. Information must supplement all judicial and administrative proceedings involving bidder's firm, which were instituted or concluded (adversely or otherwise) since your firm's Application for your most recently issued (not extended or amended) Certificate of Eligibility. You must report all requested information not previously reported on that DCAM Application for Prime/General Certificate of Eligibility.

The term "administrative proceeding" as used in this Prime/General Contractor Update Statement includes (i) any action taken or proceeding brought by a governmental agency, department or officer to enforce any law, regulation, code, legal, or contractual requirement, except for those brought in state or federal courts, or (ii) any action taken by a governmental agency, department or officer imposing penalties, fines or other sanctions for failure to comply with any such legal or contractual requirement.

The term "anyone with a financial interest in your firm" as used in this Section "I", shall mean any person and/or entity with a 5% or greater ownership interest in the applicant's firm.

If you answer YES to any question, on a separate page provide a complete explanation of each proceeding or action and any judgment, decision, fine or other sanction or result. Include all details (name of court or administrative agency, title of case or proceeding, case number, date action was commenced, date judgment or decision was entered, fines or penalties imposed, etc.).

	YES	NO
1. Have any civil, judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract, including but not limited to actions to obtain payment brought by subcontractors, suppliers or others?	☐	☐
2. Have any criminal proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract including, but not limited to, any of the following offenses: fraud, graft, embezzlement, forgery, bribery, falsification or destruction of records, or receipt of stolen property?	☐	☐
3. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state's or federal procurement laws arising out of the submission of bids or proposals?	☐	☐
4. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of M.G.L. Chapter 268A, the State Ethics Law?	☐	☐

PART 4 - Legal or Administrative Proceedings; Compliance with Laws (continued)

	YES	NO
5. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law regulating hours of labor, unemployment compensation, minimum wages, prevailing wages, overtime pay, equal pay, child labor or worker's compensation?	☐	☐
6. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law prohibiting discrimination in employment?	☐	☐
7. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a claim of repeated or aggravated violation of any state or federal law regulating labor relations?	☐	☐
8. Have any proceedings by a municipal, state, or federal agency been brought, concluded, or settled relating to decertification, debarment, or suspension of your firm or any principal or officer or anyone with a financial interest in your firm from public contracting?	☐	☐
9. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of state or federal law regulating the environment?	☐	☐
10. Has your firm been fined by OSHA or any other state or federal agency for violations of any laws or regulations related to occupational health or safety? Note: this information may be obtained from OSHA's Web Site at www.osha.gov	☐	☐
11. Has your firm been sanctioned for failure to achieve DBE/MBE/WBE goals, workforce goals, or failure to file certified payrolls on any public projects?	☐	☐
12. Other than previously reported in the above paragraphs of this Section I, have any administrative proceedings or investigations involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled by any local, state or federal agency relating to the procurement or performance of any construction contract?	☐	☐
13. Are there any other issues that you are aware which may affect your firm's responsibility and integrity as a building contractor?	☐	☐

PART 5 - SUPERVISORY PERSONNEL

List all supervisory personnel, such as project managers and superintendents, who will be assigned to the project if your firm is awarded the contract. **Attach the resume of each person listed below**.

NAME	TITLE OR FUNCTION

PART 6 - CHANGES IN BUSINESS ORGANIZATION OR FINANCIAL CONDITION

Have there been any changes in your firm's business organization, financial condition or bonding capacity since the date your current Certificate of Eligibility was issued? ☐ Yes ☐ No
If YES, attach a separate page providing complete details.

PART 7 – LIST OF COMPLETED CONSTRUCTION PROJECTS SUBMITTED TO THE DIVISION OF CAPITAL ASSET MANAGEMENT.

Attach here a copy of the list of completed construction projects which was submitted with your firm's DCAM Application for your most recently issued (not extended or amended) DCAM Certificate of Eligibility. The Attachment must include a complete copy of the entire Section G – "Completed Projects" and the final page – "Certification" (Section J) containing the signature and date that the Completed Projects list (Section G) was submitted to the Division of Capital Asset Management.

SECTION 00 45 56

DCAMM SUB-BIDDER UPDATE STATEMENT

Required Update Statement (10 pages) included on the following pages.

Electronic version available at http://www.mass.gov/anf/property-mgmt-and-construction/design-and-construction-of-public-bldgs/contractor-certification/prime-general-sub-contract-update-statements.html

END OF SECTION

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*

SPECIAL NOTICE TO AWARDING AUTHORITY
SUB-BIDDERS' UPDATE STATEMENTS ARE NOT PUBLIC RECORDS AND ARE NOT OPEN TO PUBLIC INSPECTION (M.G.L. C.149, §44D)

EFFECTIVE MARCH 30, 2010

Commonwealth of Massachusetts
Division of Capital Asset Management

☐

SUB-BIDDER
UPDATE STATEMENT

TO ALL SUB-BIDDERS, TRADE CONTRACTORS AND AWARDING AUTHORITIES

A COMPLETED AND SIGNED SUB-BIDDER UPDATE STATEMENT MUST BE SUBMITTED WITH EVERY FILED SUB-BID PURSUANT TO M.G.L. c.149, §44F AND EVERY TRADE SUB-BID PURSUANT TO M.G.L. c. 149A. ANY FILED SUB-BID OR TRADE SUB-BID SUBMITTED WITHOUT AN APPROPRIATE SUB-BIDDER UPDATE STATEMENT IS INVALID AND MUST BE REJECTED.

Caution: This form is to be used for submitting Filed Sub-Bids and Trade Sub-Bids. It is not to be used for submitting Prime/General Contract bids.

AWARDING AUTHORITIES

If the Awarding Authority determines that the sub-bidder is not competent to perform the work as specified on the project, it should reject the bid.

SUB-BIDDER'S AFFIDAVIT

I swear under the pains and penalties of perjury that I am duly authorized by the bidder named below to sign and submit this Sub-bidder Update Statement on behalf of the bidder named below, that I have read this Sub-bidder Update Statement, and that all of the information provided by the bidder in this Sub-bidder Update Statement is true, accurate, and complete as of the bid date.

_____ _____
Bid Date Print Name of Sub-bidder or Trade Contractor

_____ _____
Project Number (or name if no number) Business Address

_____ _____
Awarding Authority Telephone Number

SIGNATURE⇨ _____
Bidder's Authorized Representative

_____

INSTRUCTIONS

INSTRUCTIONS TO SUB-BIDDERS

- This form must be completed and submitted by all Filed Sub-Bidders bidding on projects pursuant to M.G.L. c. 149, §44F and Trade Contractors bidding on projects pursuant to M.G.L. c. 149A.
- You must give complete and accurate answers to all questions and provide all of the information requested. MAKING A MATERIALLY FALSE STATEMENT IN THIS SUB-BIDDER UPDATE STATEMENT IS GROUNDS FOR REJECTING YOUR BID AND FOR DEBARRING YOU FROM ALL PUBLIC CONTRACTING.
- **This Sub-Bidder Update Statement must include all requested information that was not previously reported on the Application used for your firm's most recently issued (not extended or amended) Sub-Bidder Certificate of Eligibility. The Sub-Bidder Update Statement must cover the entire period since the date of that Application, NOT since the date of your Certification.**
- You must use this official form of Sub-bidder Update Statement. Copies of this form may be obtained from the awarding authority and from the DCAM Web Site: www.mass.gov/dcam .
- If additional space is needed, please copy the appropriate page of this Sub-bidder Update Statement and attach it as an additional sheet.

INSTRUCTIONS TO AWARDING AUTHORITIES

Determination of Sub-Bidder Qualifications

- It is the awarding authority's responsibility to determine each responsible bidder. You must consider all of the information in the bidder's Sub-bidder Update Statement in making this determination. Remember: this information was not available to the Division of Capital Asset Management at the time of certification.
- The sub-bidder's performance on the projects listed in Parts 1 and 2 must be part of your review. Contact the project references.
- AWARDING AUTHORITIES ARE STRONGLY ENCOURAGED TO REVIEW THE SUB-BIDDER'S ENTIRE CERTIFICATION FILE AT THE DIVISION OF CAPITAL ASSET MANAGEMENT. Telephone (617) 727-9320 for an appointment.

Correction of Errors and Omissions in Sub-bidder Update Statements

Matters of Form: An awarding authority shall not reject a sub-bidder's bid because there are mistakes or omissions of form in the Sub-bidder Update Statement submitted with the bid pursuant to M.G.L. c.149, §44D, provided the sub-bidder promptly corrects those mistakes or omissions upon request of the awarding authority. [810 CMR 8.13(1)].

Correction of Other Defects: An awarding authority may, in its discretion, give a sub-bidder notice of minor defects and omissions as to form in the Sub-bidder's Update Statement and provide an opportunity to correct its Sub-bidder Update Statement. However, the sub-bidder shall not be allowed to make corrections to a Sub-bidder Update Statement if material information about the sub-bidder was omitted from the Sub-bidder Update Statement filed with the sub-bidder's bid. The Awarding Authority shall advise DCAM of any material omissions in a Sub-bidder's Update Statement.. [810 CMR 8.13(2)].

PART 1 - COMPLETED PROJECTS

LIST ALL PUBLIC AND PRIVATE PROJECTS OF $20,000 OR MORE THAT YOUR FIRM HAS COMPLETED SINCE THE DATE OF APPLICATION FOR YOUR MOST RECENTLY ISSUED (NOT EXTENDED OR AMENDED) SUB-BIDDER CERTIFICATE OF ELIGIBILITY*.

PROJECT TITLE & LOCATION	WORK CATEGORY	CONTRACT PRICE	START DATE	DATE COMPLETED

Attach additional sheets if necessary

* If your firm has been terminated from a project prior to completion of the work or has failed or refused to complete its work under any contract, full details and an explanation must be provided. See Part 3 of this Sub-bidder Update Statement.

PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH COMPLETED PROJECT LISTED ON THE PREVIOUS PAGE.

PROJECT TITLE	COMPANY NAME	CONTACT PERSON	TELEPHONE
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above, either through a business or family relationship? ☐ YES ☐ NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? ☐ YES ☐ NO

If you have answered YES to either question, explain. _____

PART 2 - CURRENTLY HELD CONTRACTS

LIST ALL PUBLIC AND PRIVATE PROJECTS OF $20,000 OR MORE THAT YOUR FIRM HAS UNDER CONTRACT ON THIS DATE REGARDLESS OF WHEN OR WHETHER THE WORK COMMENCED.

1	2	3	4	5	6	7
PROJECT TITLE & LOCATION	WORK CATEGORY	START AND END DATES	ON SCHEDULE (yes / no)	CONTRACT PRICE	% NOT COMPLETE	$ VALUE OF WORK NOT COMPLETE (col. 5 X col. 6)

PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH INCOMPLETE PROJECT LISTED ON THE PREVIOUS PAGE.

PROJECT TITLE	COMPANY NAME	CONTACT PERSON	TELEPHONE
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above either through a business or family relationship? ☐ YES ☐ NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? ☐ YES ☐ NO

If you have answered YES to either question, explain. _____

PART 3 - PROJECT PERFORMANCE

For Parts 3 and 4, if you answer YES to any question, please provide on a separate page a complete explanation. Information you provide herein must supplement the Application for your most recently issued (not extended or amended) Sub-Bidder Certificate of Eligibility. You must report all requested information not previously reported on that Application. Include all details [project name(s) and location(s), names of all parties involved, relevant dates, etc.].

	YES	NO
1. Has your firm been terminated on any contract prior to completing a project or has any officer, partner or principal of your firm been an officer, partner or principal of another firm that was terminated or failed to complete a project?	☐	☐
2. Has your firm failed or refused either to perform or complete any of its work under any contract prior to substantial completion?	☐	☐
3. Has your firm failed or refused to complete any punch list work under any contract?	☐	☐
4. Has your firm filed for bankruptcy, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that filed for bankruptcy?	☐	☐
5. Has your surety taken over or been asked to complete any of your work under any contract?	☐	☐
6. Has a payment or performance bond been invoked against your current firm, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that had a payment or performance bond invoked?	☐	☐
7. Has your surety made payment to a materials supplier or other party under your payment bond on any contract?	☐	☐
8. Has any subcontractor filed a demand for direct payment with an awarding authority for a public project on any of your contracts?	☐	☐
9. Have any of your subcontractors or suppliers filed litigation to enforce a mechanic's lien against property in connection with work performed or materials supplied under any of your contracts?	☐	☐
10. Have there been any deaths of an employee or others occurring in connection with any of your projects?	☐	☐
11. Has any employee or other person suffered an injury in connection with any of your projects resulting in their inability to return to work for a period in excess of one year?	☐	☐

PART 4 - Legal or Administrative Proceedings; Compliance with Laws

Please answer the following questions. Information must supplement all judicial and administrative proceedings involving bidder's firm, which were instituted or concluded (adversely or otherwise) since your firm's Application for your most recently issued (not extended or amended) Sub-Bidder Certificate of Eligibility. You must report all requested information not previously reported on that DCAM Application.

The term "administrative proceeding" as used in this Sub-Bidder Update Statement includes (i) any action taken or proceeding brought by a governmental agency, department or officer to enforce any law, regulation, code, legal, or contractual requirement, except for those brought in state or federal courts, or (ii) any action taken by a governmental agency, department or officer imposing penalties, fines or other sanctions for failure to comply with any such legal or contractual requirement.

The term "anyone with a financial interest in your firm" as used in this Section "I", shall mean any person and/or entity with a 5% or greater ownership interest in the applicant's firm.

If you answer YES to any question, on a separate page provide a complete explanation of each proceeding or action and any judgment, decision, fine or other sanction or result. Include all details (name of court or administrative agency, title of case or proceeding, case number, date action was commenced, date judgment or decision was entered, fines or penalties imposed, etc.).

	YES	NO
1. Have any civil, judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract, including but not limited to actions to obtain payment brought by subcontractors, suppliers or others?	☐	☐
2. Have any criminal proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract including, but not limited to, any of the following offenses: fraud, graft, embezzlement, forgery, bribery, falsification or destruction of records, or receipt of stolen property?	☐	☐
3. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state's or federal procurement laws arising out of the submission of bids or proposals?	☐	☐
4. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of M.G.L. Chapter 268A, the State Ethics Law?	☐	☐

PART 4 - Legal or Administrative Proceedings; Compliance with Laws (continued)

	YES	NO
5. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law regulating hours of labor, unemployment compensation, minimum wages, prevailing wages, overtime pay, equal pay, child labor or worker's compensation?	☐	☐
6. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law prohibiting discrimination in employment?	☐	☐
7. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a claim of repeated or aggravated violation of any state or federal law regulating labor relations?	☐	☐
8. Have any proceedings by a municipal, state, or federal agency been brought, concluded, or settled relating to decertification, debarment, or suspension of your firm or any principal or officer or anyone with a financial interest in your firm from public contracting?	☐	☐
9. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of state or federal law regulating the environment?	☐	☐
10. Has your firm been fined by OSHA or any other state or federal agency for violations of any laws or regulations related to occupational health or safety? Note: this information may be obtained from OSHA's Web Site at www.osha.gov	☐	☐
11. Has your firm been sanctioned for failure to achieve DBE/MBE/WBE goals, workforce goals, or failure to file certified payrolls on any public projects?	☐	☐
12. Other than previously reported in the above paragraphs of this Section I, have any administrative proceedings or investigations involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled by any local, state or federal agency relating to the procurement or performance of any construction contract?	☐	☐
13. Are there any other issues that you are aware which may affect your firm's responsibility and integrity as a building contractor?	☐	☐

PART 5 - SUPERVISORY PERSONNEL

List all supervisory personnel who will be assigned to the project if your firm is awarded the contract. **Attach the resume of each person listed below**.

NAME	TITLE OR FUNCTION

PART 6 - CHANGES IN BUSINESS ORGANIZATION OR FINANCIAL CONDITION

Have there been any changes in your firm's business organization, financial condition or bonding capacity since the date your current Certificate of Eligibility was issued? ☐ Yes ☐ No
If YES, attach a separate page providing complete details.

PART 7 – LIST OF COMPLETED CONSTRUCTION PROJECTS SUBMITTED TO THE DIVISION OF CAPITAL ASSET MANAGEMENT ALONG WITH CERTIFICATION PAGE.

Attach here a copy of the list of completed construction projects which was submitted with your firm's Application for your most recently issued (not extended or amended) Sub-Bidder Certificate of Eligibility. The Attachment must include a complete copy of the entire Section F – "Completed Projects" (Section G – "Completed Projects" for firms certified based upon their Prime/General Application), and the final page – "Certification Page", (Section I in the Sub-bidder Application or Section J in Prime/General Application) containing the signature and date that the Completed Projects list (Section F or G) was submitted to the Division of Capital Asset Management.

SECTION 00 45 57

DISADVANTAGED BUSINESS ENTERPRISE REQUIREMENTS

The following is a condition of all Bids. The two lowest responsible and eligible General Bidders shall submit the required information. The terms used in this Section have the meanings stated in the Bidding Requirements and the Supplementary Conditions. Referenced forms are included at the end of this Section. See detailed requirements in Section 00 73 38 .

In this Contract, the percentage of business activity to be performed by disadvantaged business enterprise(s) (DBE) shall not be less than the following percentages of the total Contract Price or the percentage submitted in the Schedule of Participation, whichever is greater:

Disadvantaged MBE (D/MBWE): **3.40%** Disadvantaged WBE (D/WBE): **3.80%**

SDO will continue to be the certifying agency for the SRF program. SDO certifies firms under the federal Department of Transportation program, which is acceptable for use in the SRF program. An additional form has been added to the DBE package to verify that the DBEs are owned or controlled by United States citizens.

1.01 REQUIREMENTS FOR CONTRACT AWARD

DBE packages must be submitted by the two lowest General Bidders on the Project. Following Bid opening, the LGU (also "Owner") shall notify the two lowest General Bidders to submit DBE packages to the LGU or the LGUs consultant (also "Engineer"), as directed. By the close of business on the third business day after notification, the two lowest General Bidders, including a General Bidder who is a MBE, WBE or DBE, shall submit the following information:

A. A Schedule of Participation (Form EEO-DEP-190). The Schedule of Participation shall list those certified DBEs the General Bidder intends to use in fulfilling the contract obligations, the nature of the Work to be performed by each certified DBE Subcontractor and the total price they are to be paid.

1. A listing of bona-fide services such as a professional, technical, consultant or managerial services, assistance in the procurement of essential personnel, facilities, equipment, materials, or supplies required for performance of the Contract, and reasonable fees or commissions charged.

2. A listing of haulers, truckers, or delivery services, not the contractors, including reasonable fees for delivery of said materials or supplies to be included on the Project.

B. A Letter of Intent (Form EEO-DEP-191) for each DBE the General Bidder intends to use on the Project. The Letter of Intent shall include, among other things, a reasonable description of the work the certified DBE is proposing to perform and the prices the certified DBE proposes to charge for the Work. A

Letter of Intent shall be jointly signed by the certified DBE and the Contractor who proposes to use them in the performance of the Contract.

C. Each DBE must also sign and return the DBE Certification of United States Citizenship form to verify that the firm is owned or controlled by a United States citizen.

D. The SDO "DBE Certification" as prepared by each certified DBE.

E. A completed Request for Waiver form and backup documentation should the goals not be achieved (See 1.02 below).

1.02 REQUIREMENTS FOR MODIFICATION OR WAIVERS

The General Bidder shall make every possible effort to meet the minimum requirements of certified DBE participation. If the percentage of DBE participation submitted by the General Bidder on its Schedule of Participation (EEO-DEP-190) does not meet the minimum requirements, the bid may be rejected by the Awarding Authority (also "Owner") and found not to be eligible for award of the Contract.

In the event that the General Bidder is unable to meet the minimum requirements of DBE participation, the General Bidder shall submit with his/her submittal required in Section III. Requirement of Contract Award a Request for Waiver form (EEO-DEP-490). The Awarding Authority shall review the waiver request to determine if the request should proceed. If approved by the Awarding Authority, the Awarding Authority shall submit the waiver request and supporting documentation, with a recommendation to MassDEP within five days of receipt of the Request for Waiver. MassDEP in conjunction with the project manager, Compliance Unit, will determine whether the waiver will be granted.

The waiver request shall include detailed information as specified below to establish that the General Bidder has made a good faith effort to comply with the minimum requirements of DBE participation specified in the Supplementary Instructions to Bidders. In addition, the General Bidder must show that such efforts were undertaken well in advance of the time set for opening of Bids to allow adequate response. A waiver request shall include the following:

A. A detailed record of the effort made to contact and negotiate with the certified DBE, including, but not limited to:

1. names, addresses and telephone numbers of all such companies contacted;

2. copies of written notices(s) which were sent to certified DBE potential subcontractors, prior to bid opening;

3. a detailed statement as to why each subcontractor contacted (i) was not willing to do the job or (ii) was not qualified to perform the work as solicited; and

4. in the case(s) where a negotiated price could not be reached the General Bidder should detail what efforts were made to reach an agreement on a competitive price;

5. copies of advertisements, dated not less than ten (10) days prior to bid opening, as appearing in general publications, trade-oriented publications, and applicable minority/ women-focused media detailing the opportunities for participation.

B. MassDEP may require the General Bidder to produce such additional information as it deems appropriate.

C. No later than fifteen (15) days after MassDEP receives all required information and documentation, it shall make a decision in writing, whether the waiver is granted and shall provide that determination to the General Bidder and Awarding Authority. If the waiver request is denied, the facts upon which a denial is based will be set forth in writing. If the waiver request is denied, the bid shall be rejected by the Awarding Authority, or the Contract will be determined ineligible for SRF funding.

If a Request for Waiver is denied by MassDEP and the Bid is rejected by the Awarding Authority, the Awarding Authority may then move to the second General Bidder on the project. At the Awarding Authority's discretion, it may collect a DBE package from the third lowest responsible and eligible General Bidder on the Project.

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DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF MUNICIPAL SERVICES

SCHEDULE OF PARTICIPATION FOR SRF CONSTRUCTION

Project Title: **Project Location:**

Disadvantaged Minority Business Enterprise Participation in the SRF Loan Work

Name & Address of D/MBE	Nature of Participation	Dollar Value of Participation
1.		
2.		
3.		
	Total D/MBE Commitment:	$
Percentage D/MBE Participation = (Total D/MBE Commitment) / (Bid Price) =		%

Disadvantaged Women Business Enterprise Participation in the SRF Loan Work

Name & Address of D/WBE	Nature of Participation	Dollar Value of Participation
1.		
2.		
3.		
	Total D/WBE Commitment:	$
Percentage D/WBE Participation = (Total D/WBE Commitment) / (Bid Price) =		%

The Bidder agrees to furnish implementation reports as required by MassDEP to indicate the D/MBEs and D/WBE(s) which it has used or intends to use. Breach of this commitment constitutes a breach of the contract.

Name of Bidder: _____

Date: _____ By: _____
Signature

NOTE: Participation of a DBE may be counted in only their certified category; the same dollar participation cannot be used in computing the percentage of D/MBE participation and again of D/WBE participation.

June 2012 EEO-DEP-190C

LETTER OF INTENT FOR SRF CONSTRUCTION

This form is to be completed by the D/MBE and D/WBE and must be submitted by the Bidder as part of the bid. A separate form must be completed for each D/MBE and D/WBE involved in the project.

Project Title: Project Location:

TO: _____
(Name of Bidder)

FROM: _____
(Please Indicate Status [ ] D/MBE or [ ] D/WBE)

° I/we intend to perform work in connection with the above project as (check one):

[ ] An individual
[ ] A corporation
[ ] Other (explain): _____
[ ] A partnership
[ ] A joint venture with: _____

° It is understood that if you are awarded the contract, you intend to enter into an agreement to perform the activity described below for the prices indicated.

DBE PARTICIPATION

Description of Activity	Date of Project Commencement	$ Amount	% Bid Price
		$	%

* The undersigned certify that they will enter into a formal agreement upon execution of the contract for the above referenced project.

BIDDER		**DBE**	
(Authorized Original Signature)	Date	(Authorized Original Signature)	Date
ADDRESS:		ADDRESS:	
TELEPHONE #:		TELEPHONE #:	
FEIN:		FEIN:	

ORIGINALS:
° **Compliance Mgr. City/Town Project Location**
° **DEP Program Manager for DEP's AAO Director**

*** Attach a copy of current (within 2 years) DBE Certification**

June 2012 EEO-DEP-191C

DBE CERTIFICATION OF UNITED STATES CITIZENSHIP

For the SRF program, under the EPA Disadvantage Business Enterprise (DBE) Rule, a DBE must be owned or controlled by a socially and economically disadvantaged person that is also a **citizen of the United States** (*See* 40 CFR 33.202). "Ownership" is defined at 13 CFR 124.105 and "control" is defined at 13 CFR 124.106.

DBEs are certified for the SRF program through the Supplier Diversity Office using the federal Department of Transportation (DOT) DBE rules. EPA allows the use of DBEs certified under the DOT rules as long as they are also United States citizens. To ensure compliance with the EPA rule, MassDEP must verify United States citizenship through the completion of the following form for each DBE used on the project.

SRF Project Number _____

Contract Number _____

Contract Title _____

DBE Subcontractor _____

The undersigned, on behalf of the above named DBE subcontractor, hereby certifies that the DBE firm is either owned or controlled by a person or persons that are citizens of the United States.

_____
Printed Name and Title of DBE Signatory

_____
DBE Signature

_____
Date

REQUEST FOR WAIVER FOR SRF CONSTRUCTION

Upon exhausting all known sources and making every possible effort to meet the minimum requirements for DBE participation, the Bidder may seek relief either partially or entirely from these requirements by submitting a completed waiver package by the close of business on the third business day after notification by the LGU. Failure to comply with this process shall be cause to reject the bid thereby rendering the Bidder not eligible for award of the contract.

General Information

Project Title: _____ Project Location: _____

Bid Opening (time/date) _____

Bidder:

Mailing Address:

Contact Person: _____ Telephone No. ( ) _____ Ext. _____

Minimum Requirements

The bidder must demonstrate that good faith efforts were undertaken to comply with the percentage goals as specified. The firm seeking relief must show that such efforts were taken appropriately in advance of the time set for opening bid proposals to allow adequate time for response(s) by submitting the following:

A. A detailed record of the effort made to contact and negotiate with disadvantaged minority and/or woman owned businesses, including:

1. names, addresses, telephone numbers and contact dates of all such companies contacted;

2. copies of written notice(s) which were sent to DBE potential subcontractors prior to bid opening;

3. a detailed statement as to why each subcontractor contacted (i) was not willing to do the job or (ii) was not qualified to perform the work as solicited; and

4. in the case(s) where a negotiated price could not be reached the bidder should detail what efforts were made to reach an agreement on a competitive price.

5. copies of advertisements, dated not less than ten (10) days prior to bid opening, as appearing in general publications, trade-oriented publications, and applicable minority/women-focused media detailing the opportunities for participation;

June 2012 EEO-DEP-490C
(Page 1)

B. MassDEP may require the bidder to produce such additional information as it deems appropriate.

C. No later than fifteen (15) days after submission of all required information and documentation, MassDEP shall make a determination, in writing, whether the waiver request is granted and shall provide that determination to the bidder and Awarding Authority. If the waiver request is denied, the facts upon which a denial is based will be set forth in writing.

CERTIFICATION

The undersigned herewith certifies that the above information and appropriate attachments are true and accurate to the best of my knowledge and that I have been authorized to act on behalf of the bidder in this matter.

_____ _____

(authorized original signature) DATE

June 2012 EEO-DEP-490C

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SECTION 00 45 58

STATEMENT OF INTENT TO COMPLY WITH DIESEL RETROFIT PROGRAM

DIESEL RETROFIT PROGRAM

STATEMENT OF INTENT TO COMPLY

This form must be signed and submitted by the bidder as part of the bid.

Local Governmental Unit _____ **SRF Project No.** _____

Contract No. _____ **Contact Title** _____

Bidder

The undersigned, on behalf of the above-named Bidder, agrees that, if awarded the Contract:

1. **the Bidder shall comply with the Department of Environmental Protection's ("DEP") Diesel Retrofit Program by ensuring that all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract are equipped or retrofitted with a pollution control device in accordance with the Diesel Retrofit Program Standard;**

2. **the Bidder shall require all Subcontractors to comply with DEP's Diesel Retrofit Program by ensuring all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract are equipped or retrofitted with a pollution control device in accordance with the Diesel Retrofit Program Standard; and**

3. **The Bidder shall submit and shall require each Subcontractor to submit a Diesel Retrofit Program Contractor Certification (form attached) with a Diesel Retrofit List to DEP (NAME and ADDRESS) and the Bidder within 10 days of the bidder being notified that it has been awarded the Contract. The Bidder shall require each Subcontractor to update such Certification and List within 2 days of using additional Diesel Construction Equipment on the project under the Contract.**

_____

(Signature of Bidder's Authorized Representative) (Date)

DEP-DMS-P&S-21

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SAMPLE NOTICE OF INTENT TO AWARD (C- 00 50 55)

Date: _____

Project:	
Owner:	Owner's Contract No.:
Contract:	Engineer's Project No.:
Bidder:	
Bidder's Address:	

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and it is intended that a Contract for _____ be awarded to you subject to required reviews and approvals and submission of the following required by the SRF Program prior to Notice of Award per Section 00 22 13:

- Diesel Retrofit Program Contractor Certification per Section 00 73 10
- Projected monthly cash flow schedule
- Statement of Direct Labor Cost percentage(s)

Subject to the above, a formal Notice of Award will be sent which will require you to comply with certain conditions within 10 days of the date you receive the Notice of Award, including, but not limited to the following.

1. Delivering the Contract security (Bonds) as specified in the Standard General and Supplementary Conditions and Additional Supplementary Conditions (Articles 2 and 5);
2. Delivering the insurance certificates indicating coverage as specified in the Standard General and Supplementary Conditions and Additional Supplementary Conditions (Articles 2 and 5);
3. Delivering the following completed and executed certifications and documents:
    a. Pursuant to MGL Chapter 30, Section 39R *Definitions; contract provisions; management and financial statements; enforcement:*
        - A statement by management on internal accounting controls;
        - A statement prepared by an independent certified public accountant; and
        - An audited financial statement for the most recent completed fiscal year.
    b. From each Subcontractor:
        - Certificate of Good Standing from the Department of Revenue with respect to all returns due and taxes per Section 00 22 13
        - Certification from the Secretary of State for foreign corporations per Section 00 22 13
        - Diesel Retrofit Program Contractor Certification per Section 00 73 10

4. Other conditions precedent:

LIST OTHERS IF ANY

After you comply with the conditions of the Notice of Award and required reviews and approvals are obtained, Owner will thereafter deliver the conformed Contract Documents for execution.

_____
Owner

By:_____
Authorized Signature

_____
Title

Copy to Engineer

Based on EJCDC C-510 Notice of Award
Prepared by the Engineers Joint Contract Documents Committee and endorsed by the Construction Specifications Institute.

SAMPLE NOTICE OF AWARD (C-00 51 00)

Date: _____

Project:

Owner: Owner's Contract No.:

Contract: Engineer's Project No.:

Bidder:

Bidder's Address:

You are notified that your Bid dated [_____] for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for [_____] subject to the following conditions being met and subject to required reviews and approvals. *and specifically, *funding* approval by [_____].**

The Contract Price of your Contract is _____ Dollars ($_____).

You must have been submitted the following prior to issuance of this Notice of Award in compliance with SRF Program requirements per Section 00 22 13*:*

- Diesel Retrofit Program Contractor Certification per Section 00 73 10

You must comply with the following conditions precedent **within 10 days** of the date you receive this Notice of Award.

1. Deliver the Contract security (Bonds) as specified in the General Conditions and Supplementary Conditions (Articles 2 and 5);
2. Deliver the insurance certificates indicating coverage as specified in the General Conditions and Supplementary Conditions (Articles 2 and 5);
3. Deliver the following completed and executed certifications and documents:
    a. Pursuant to MGL Chapter 30, Section 39R *Definitions; contract provisions; management and financial statements; enforcement* per Section 00 22 13*:*
        - A statement by management on internal accounting controls (sample attached);
        - A statement prepared by an independent certified public accountant regarding management's statement (sample attached); and
        - An audited financial statement for the most recent completed fiscal year.
    b. From each Subcontractor:
        - Certificate of Good Standing from the Department of Revenue with respect to all returns due and taxes per Section 00 22 13

- Certification from the Secretary of State for foreign corporations per Section 00 22 13
- Diesel Retrofit Program Contractor Certification per Section 00 73 10

4. Other conditions precedent:

LIST OTHERS IF ANY

Failure to comply with the above conditions within the time specified will entitle the Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

After confirming that you have complied with the above conditions *and required approvals are obtained,* Owner will deliver the conformed Contract Documents for execution.

_____
Owner

By:_____
Authorized Signature

_____
Title

Copy to Engineer

SECTION 00 52 10

AGREEMENT FORM

THIS AGREEMENT made and entered into this _____ day of [YEAR], by and between [INSERT CONTRACTOR NAME], a_[INSERT CO TYPE], duly organized by law and having a usual place of business at [INSERT ADDRESS], hereinafter called "CONTRACTOR", and the CITY OF LOWELL, a municipal corporation duly established by law and located in the County of Middlesex and said Commonwealth, acting by and through its Executive Director of Lowell Regional Water Utility, hereinafter called "CITY" (and defined as “Owner”), WITNESSETH: That

WHEREAS, the CITY issued its Notice to Contractors for certain Water System Improvements for the Lowell Regional Water Utility in the City of Lowell; and

WHEREAS, the CONTRACTOR did bid and offer to do all the Work and furnish all the labor, materials, equipment, tools, appliances, etc. necessary for Water System Improvements, Contract No. 2 DWSRF# 3531, in the City of Lowell; and

WHEREAS, the CITY has accepted the CONTRACTOR'S Bid, subject to the conditions and agreements herein contained;

NOW, THEREFORE, in consideration of the mutual agreements of the parties hereinafter set forth, and the price to be paid by the CITY to the CONTRACTOR for the Work to be done under this Agreement, the parties agree as follows:

-1-

The CONTRACTOR agrees that it will do all the Work and furnish all the labor, materials, equipment, tools, appliances, etc. necessary, for the Water System Improvements in the City of Lowell, under Contract No. 2 DWSRF #3531, during the period commencing upon issuance of a "Notice to Proceed" issued by the Executive Director of Lowell Regional Water Utility in strict accordance with the Contract Documents.

The CONTRACTOR agrees the Work shall be substantially complete within 365 calendar days from the commencement of Contract Time and completed and ready for final payment within 395 calendar days from the commencement of Contract Time in accordance with Paragraph 14.07 of the General Conditions and Supplementary Conditions, if any.

The CONTRACTOR and CITY recognize time is of the essence and CITY will suffer financial loss if the Work is not completed within the times specified above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions and Supplementary Conditions, if any. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by CITY if the Work is not completed on time. Accordingly, instead of requiring any such proof, CITY and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay CITY the sum of **$1,000** per day for each and every calendar day that expires after the time specified above for Substantial Completion until Work is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by CITY, CONTRACTOR shall pay CITY **$1,000** per day for each and every calendar day that expires after the time specified in above for completion and readiness for final payment until the Work is completed and ready for final payment.

-2-

The Contract Documents consist of the following, which are attached to this Agreement and made a part hereof: items listed in Section 00 54 00, forms listed in Section 00 60 00, General Conditions and in Section 00 72 05, Supplementary Conditions listed in Section 00 73 05, Specifications and Drawings as listed in the table of contents, and Notice to Proceed, Work Change Directives, and Change Orders which may be issued on or after the Effective Date of the Agreement and are not attached. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions and Supplementary Conditions, if any.

-3-

Total payments under this Agreement shall not exceed [IN WORDS] Dollars and [# OF CENTS] CENTS ($_____). This Agreement shall be subject to annual appropriation.

-4-

The Work to be done under this Agreement, including the furnishing of materials, equipment, tools, appliances, etc. necessary in connection therewith must, in all respects, notwithstanding any provision herein to the contrary or inconsistent therewith, meet with the requirements of the Contract Documents and the approval of the said Executive Director of Lowell Regional Water Utility and the Massachusetts Department of Environmental Protection ("MassDEP") Division of Municipal Services ("DMS") under the State Revolving Loan Fund Program.

-5-

The CITY, in consideration of the above Agreements on the part of the CONTRACTOR to be performed, agrees to pay to the CONTRACTOR the price set forth in Paragraph No. 3 above for all Work performed and materials, equipment, tools, appliances, etc. furnished in accordance with the Contract Documents. Payment shall be made on the twentieth day of the month for all Work performed and materials, equipment, tools, appliances, etc. furnished as Applications for Payment are filed in the Office of the Executive Director of Lowell Regional Water Utility on or before the first day of the month in which payment is to be made. Any payment under this Agreement shall not constitute or be deemed a waiver, relinquishment, release or abandonment of any claim which the CITY may have against the CONTRACTOR for breach of this Agreement.

-6-

The said CONTRACTOR agrees that before commencing any Work to be done under this Agreement, it shall provide, at its own cost and expense, insurance as specified in the General Conditions and Supplementary Conditions, and for the payment of compensation and the furnishing of other benefits under the provisions of the Massachusetts General Laws Chapter 152, and amendments thereto, to cover all employees to be employed by the CONTRACTOR in connection with the Work to be done under this Agreement; and the said CONTRACTOR agrees that it shall continue in force and effect said policy of insurance during the period covered by this Agreement. Failure to provide and continue in force, said insurance shall be deemed a material breach of this Agreement and shall operate, without notice of any kind to the said CONTRACTOR, as an immediate termination of this Agreement. In the event that the CITY should be obliged or required to pay compensation or furnish benefits to any of the said CONTRACTOR'S employees, in accordance with the provisions of General Laws, Chapter 152, and amendments thereto, the said CONTRACTOR agrees that it will reimburse and indemnify the said CITY from any payments it may be obliged or required to make under the provisions of General Laws, Chapter 152, and amendments thereto.

-7-

The CONTRACTOR agrees to comply with all the provisions of General Laws, Chapter 149, Sections 26, 27 and 27A through 27H, inclusive, and all related sections, including amendments thereto, in performing all Work under this Agreement, and the provisions of said sections are made a part of this Agreement and are to be considered as covenants, terms and conditions hereof as though all the provisions were specifically incorporated herein. The said CONTRACTOR agrees to pay the minimum wage rates as determined by the Commissioner of the Department of Labor Standards included in in Section 00 73 46, and comply with the requirements set forth in Section 00 73 43. CONTRACTOR further agrees that, in the event that there are to be employees of additional classifications other than those specifically stated therein to be engaged in the Work to be performed under this Agreement, to submit a list of the additional classifications of those to be employed to the said Executive Director of Lowell Regional Water Utility, and the said CONTRACTOR agrees that it will pay the additional minimum wage rates as determined by the said Commissioner of the Department of Labor Standards under the provisions of General Laws, Chapter 149, Section 27, and the amendments thereto.

-8-

No laborer, Workman or mechanic, Working within the Commonwealth, in the employ of the CONTRACTOR, or any Subcontractor authorized under this Agreement shall, in connection with the Work to be done under this Agreement, be required or requested to Work more than 8 hours in any 1 calendar day, or more than 48 hours in any 1 week, except in cases of extraordinary emergency, unless otherwise provided by Laws and Regulations.

-9-

It is further agreed by the CONTRACTOR that, in the event the CITY is sued in a court of law or equity, or demand is made upon the CITY for payment of any damages arising out of the CONTRACTOR'S performance or non-performance of this Contract, then the CONTRACTOR, without reservation, shall indemnify and hold harmless the CITY against any and all claims arising out of the CONTRACTOR'S performance or non-performance of the Agreement.

-10-

This Contract shall not be in force until the CONTRACTOR has executed and delivered to the CITY and until the CITY has accepted a Performance Bond in the amount of one hundred per cent (100%) of the Contract price and a Payment Bond in the amount one hundred percent (100%) of the Contract price. The Performance Bond and Payment Bond shall be secured by and paid for by the CONTRACTOR and shall be issued by a Surety Company in accordance with the General Conditions and Supplementary Conditions, if any, satisfactory to the Executive Director of Lowell Regional Water Utility, and in compliance with the Contract Documents.

-11-

This Contract is subject to all Laws and Regulations of the Commonwealth of Massachusetts, federal, state and local, which are applicable to this Contract, and it is presumed that the CONTRACTOR is cognizant thereof.

-12-

The CONTRACTOR shall give its personal attention constantly to the faithful performance of the Work and shall keep the same under its personal control and shall not assign nor sublet the Work or any part thereof without the previous written consent of the CITY and shall not, either legally or equitably, assign any of the monies payable under this Agreement or its claim thereto unless by and with the written consent of the CITY.

-13-

The CONTRACTOR agrees that its attention has been called to the provisions of the "Reserve System" Ordinance of the City of Lowell, which is now incorporated in the "The Code of Ordinances City of Lowell, Massachusetts", passed by the City Council on April 26, 1988 and amendments thereto and that each purchase order, so-called, issued in accordance with Section 7-76 of said Code to cover the services to be rendered under this Agreement shall be made a part hereof by reference. It is further agreed that no obligation shall be considered to have incurred under this Agreement unless and until a purchase order shall have been duly issued and approved.

And further, that the obligation incurred shall be limited to the amount set forth in purchase order or purchase orders duly issued and approved.

-14-

It is further agreed that the CITY may terminate this Agreement at any time, with or without cause, upon thirty (30) days' written notice to the CONTRACTOR, sent by certified mail, to the usual place of business of the CONTRACTOR.

-15-

The CONTRACTOR certifies under penalties of perjury that its Bid was made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club or other organization, entity, or group of individuals.

-16-

The CONTRACTOR certifies that any and all taxes and municipal fees due and owing to the City of Lowell have been paid in full.

-17-

It is understood and agreed by the CITY and the CONTRACTOR that pursuant to the Code of the City of Lowell, Chapter 28, Article V, a Contract Performance Record Form must be completed on this Contract by the Department Head or his/her designee, who is supervising this Contract, and such Contract Performance Record Form must be submitted to the City Manager, City Auditor, and Purchasing Agent prior to release of final payment under this Contract. If requested by the CONTRACTOR a copy of the Contract Performance Record Form shall be furnished to the CONTRACTOR.

-18-

The CONTRACTOR agrees that it will be responsible for any damage, as determined by the Commissioner of Public Works, caused by the CONTRACTOR, its Subcontractors, agents, servants, employees or any independent contractor hired by the CONTRACTOR to perform any of the Work under this Contract, to the streets, ways, sidewalks, and vegetation or any other property of the CITY as a result of, or in conjunction with, the Work performed under this Contract, whether caused by actual Work or by the use of any equipment in connection with said Work. The CONTRACTOR agrees that, upon notice of such damage by the CITY, the CONTRACTOR shall repair (or replaced if required) to the satisfaction of the CITY, said streets, ways, sidewalks, and vegetation or any other property of the CITY, to which such damage has been caused prior to the completion of this Contract.

-19-

The CONTRACTOR shall not discriminate against or exclude any person from participation herein on grounds of race, religion, color, sex, age, or national origin; and that it shall take affirmative actions to insure that applicants are employed, and that employees are treated during their employment, without regard to race, religion, color, sex, age, handicapped status, or national origin.

-20-

The CONTRACTOR shall not participate in or cooperate with an international boycott, as defined in Section 999 (b)(3) and (4) of the Internal Revenue code 1986, as amended, or engage in conduct declared to be unlawful by Section 2 of Chapter 151 E of the Massachusetts General Laws. .

-21-

All fees for permits or licenses required for this Project by the CITY, or any other agency, shall be an expense of the CONTRACTOR and shall not be waived, except those identified in Section 00 73 10 as obtained by Owner.

The CONTRACTOR agrees to comply with applicable SRF program and Federal requirements set forth in the Supplementary Conditions and General Requirements including D/MBE/D/WBE requirements; Diesel Retrofit Program; and the Davis Bacon Act.

A. The CONTRACTOR agrees that it will fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part1532, entitled Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons). The CONTRACTOR shall not award any subcontracts or purchase any materials from suppliers that appear on the Excluded Parties List System. The CONTRACTOR shall include this requirement in each subcontract and require it to be included in all subcontracts regardless of tier. The CONTRACTOR shall maintain reasonable records to demonstrate compliance with these requirements.

B. CONTRACTOR agrees that Federal minimum wage rates as determined by the United States Department of Labor under the Davis-Bacon Act shall also apply to this Project. The CONTRACTOR further agrees that in all cases where State and Federal Wage Determinations are not the same, the higher of the two should be utilized. State wage forms can be substituted in place of Federal certified payroll forms where the subject matter is the same (i.e. payroll and contractor certification forms). Both Federal and State labor notices and wage determinations must be posted at the construction Site in a visible location. See requirements set forth in Sections 00 73 43 and 00 73 46.

C. The CONTRACTOR agrees to comply with “Special Provisions for Disadvantaged Business Enterprises” of the Massachusetts Department of Environmental Protection Division of Municipal Services as set forth in Section 00 73 38.

IN WITNESS WHEREOF, the said _____, and the said CITY OF LOWELL have hereto and to a duplicate and triplicate hereof caused their corporate seals to be affixed, and these presents, together with said duplicate and triplicate, to be signed in their name and behalf by their duly authorized officers the day and year first above written.

APPROVED

_____
Kevin J. Murphy
City Manager

APPROVED AS TO FORM:

_____
Christine P.O'Connor
City Solicitor

Date: _____

CONTRACTOR

By _____

Federal I.D. or Social Security No.

_____

CITY OF LOWELL

_____
P. Michael Vaughn
Chief Procurement Officer

_____
Erik Gitschier
Executive Director
Lowell Regional Water Utility

APPROVED AS TO APPROPRIATION
Pursuant to M.G.L. c.44, s31C, I certify that an appropriation has been made in the total amount of the Contract

_____
Hannah York
City Auditor

END OF SECTION

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SECTION 00 54 00

AGREEMENT FORM SUPPLEMENTS

The following items supplement the Agreement and are incorporated into the Agreement and made a part thereof. Terms used herein will have the meanings stated in the General Conditions and Supplementary Conditions, if any.

The address system used herein references the paragraph numbers in the Agreement, with the prefix "A" added thereto. Additional terms used in this Section have the meanings stated below, which are applicable to both the singular and plural thereof.

A-3 Total Payments (Contract Price): Add the following.

The total payments stated in the Agreement shall be on the basis of the total price stated in the Bid Form including unit priced items.

A. Unit Prices have been computed in accordance with Paragraph 11.03.A of the General Conditions and Supplementary Conditions, if any.

B. The prices for Unit Price Work set forth as of the Effective Date of the Agreement are based on estimated quantities. As provided in Paragraph 11.03 of the General Conditions and Supplementary Conditions, if any, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer as provided in Paragraph 9.07 of the General Conditions and Supplementary Conditions, if any. Final payment for unit price items will be based on actual quantities determined and based on the unit prices stated in Section 00 41 02.

C. *Actual Damages:* The Water Treatment Plant and Stackpole Street Pump Station must continue to operate during the construction period and Contractor shall prevent interruption to operation of these facilities] in accordance with Section 01 11 00. Contractor shall pay actual damages incurred by Owner for Contractor's failure to maintain operation of the facilities, resulting in damages related thereto.

D. *Contract Price Adjustments*: Adjustments to the Contract Price will be made for each hour Owner's personnel provide services to the Contractor outside regular working hours or on Saturday, Sunday and holidays, in the event the need for performing construction outside of regular working hours or on Saturday, Sunday and holidays is due to delays that are within the Contractor's control, as set forth in SC-6.02 of Section 00 73 10 to cover additional costs incurred by the Owner ("Additional Work Fee"). The Contract Price shall be reduced by an amount equal to the actual cost for the additional hours worked by Owner's personnel and deducted from payments due.

A-5 Payment: Add the following.

A. Submittal and Processing of Payments

1. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions and Supplementary Conditions, if any. Applications for Payment will be processed by Engineer as provided in the General Conditions and Supplementary Conditions, if any, and the General Requirements.

B. Progress Payments; Retainage

1. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment as provided below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions and Supplementary Conditions, if any, (and in the case of Unit Price Work based on the number of units completed).

2. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions and Supplementary Conditions, if any, and additional retainage allowed by Laws and Regulations.

    a. Progress Payments of 95 percent for Work completed (with the balance of 5 percent being retainage). and

    b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance of 5 percent being retainage).

3. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 99 percent of the Work completed (with the balance of 1 percent being retainage), less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General and Supplementary Conditions, if any, and less the Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected (Punch List) attached to the certificate of Substantial Completion and subject to Paragraph 14.04 of the General and Supplementary Conditions, if any.

    However, retainage for items planted in the ground shall remain at 5 percent of the cost of such items until Final Payment per Massachusetts General Laws Chapter 30, Section 39G.

C. Final Payment: Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General and Supplementary Conditions, if any, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

D. Interest: All moneys not paid when due as provided in Article 14 of the General and Supplementary Conditions, if any, shall bear interest at the rate three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston per Massachusetts General Laws Chapter 30, Section 39K. Interest shall not be accrued on retainage.

A-8 Work Hours/Labor: Add the following.

See Section 00 73 37 for additional statutory requirements.

A-9 Indemnity: Add the following.

This indemnification shall also extend to the Engineer and its officers, agents, consultants, and employees.

A-11 Laws: Add the following.

Reference to "General Laws" shall mean the "Massachusetts General Laws" and may be referenced as "M.G.L" or "MGL" in the Contract Documents. See Section to 00 73 73 for statutory requirements.

A-13 Reserve System Ordinance: Add the following.

Notwithstanding the above, the terms and conditions of such purchase orders shall not supersede any terms and conditions of the Contract Documents and in case of conflict, the terms and conditions of the Contract Documents shall take precedence.

A-14 Termination: Add the following.

See also Article 15 of the General Conditions and Supplementary Conditions, if any, for additional provisions.

A-16 Taxes: Add the following.

Contractor's and Subcontractors' Certificates of Good Standing from MA Department of Revenue is included at the end of this Section.

A-18 Damages: Add the following.

See Paragraphs 6.11 and 6.13 of the General Conditions and Supplementary Conditions,, if any, and the General Requirements for additional requirements.

A-20 Non Discrimination: Add the following.

See Section 00 73 37 for additional requirements.

A-21 Statutory Requirements

See Section 00 73 73 for additional statutory requirements.

Add the following new requirements

-26-

The Project has been designed by Woodard and Curran, Inc. (Engineer), which is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

-27-

In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in Paragraph SC-4.02 in Section 00 73 10 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 in Section 00 73 10 of the Supplementary Conditions as containing reliable "technical data."

E. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.

F. Based on the information and observations referred to in Paragraph 8.01.E above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

J. Further, the Contractor certifies, under the penalties of perjury, that:

1. Contractor has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph:

    a. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;

    b. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

c. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

d. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

2. Contractor has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting of child support and, has provided for itself and each Subcontractor, a Certificate of Good Standing from the Department of Revenue with respect to all returns due and taxes and further, and certifies that, to the best of its knowledge and belief, certifies all state tax returns have been filed and all state taxes have been paid as required by Law pursuant to Massachusetts General Laws Chapter 62C, Section 49A;

3. If a foreign corporation, Contractor has provided for itself and each Subcontractor, a certificate of the state secretary stating that the corporation has complied with requirements of Massachusetts General Laws Chapter 156D, Part 15, Section 15.03 of subdivision A and the date of compliance, and further has filed all annual reports required by Section 16.22 of subdivision B of Part 16 of said Chapter 156D, pursuant to Massachusetts General Laws Chapter 30, Section 39L;

4. Contractor is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work and further certifies that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins Work and shall furnish documentation of successful completion of said course with the first certified payroll report for each employee;

5. Contractor is not presently debarred from entering into a public contract Commonwealth of Massachusetts under the provisions of Massachusetts General Laws Chapter 29, Section 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulations promulgated thereunder; and is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

6. Pursuant to Massachusetts General Laws Chapter 30, Section 39R, Contractor has provided a statement by management on internal accounting controls, a statement prepared by an independent certified public accountant; and an audited financial statement for the most recent completed fiscal year; and

7. Contractor will comply with applicable SRF program and Federal requirements set forth in the Supplementary Conditions and General Requirements including D/MBE/D/WBE requirements; Diesel Retrofit Program; and the Davis Bacon Act.

    a. With regard to the American Iron and Steel requirements of P.L. 113-76; the Contractor acknowledges to and for the benefit of the Owner and the State that it understands the material and equipment, and services under this Agreement are being funded with monies made available by the Drinking Water State Revolving Fund that has statutory requirements commonly known as "American Iron and Steel (AIS) Requirement" that requires all of the iron and steel products used in the Project to be produced in the United States including iron and steel products provided by the Contactor pursuant to this Agreement.

    b. The Contractor hereby represents and warrants to and for the benefit of the Owner and the State that (a) the Contractor has reviewed and understands the AIS Requirement, (b) all of the iron and steel products used in the Project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the AIS Requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this Paragraph, or information necessary to support a waiver of the AIS Requirement, as may be requested by Owner.

    c. Notwithstanding any other provision of this Agreement, any failure to comply with this requirement by the Contractor shall permit the Owner or State to recover as damages against the Contractor, any loss, expense, or cost (including without limitation attorney's fees) incurred by the Owner or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Owner).

d. While the Contractor has no direct contractual privity with the State, as a lender to the Owner for the funding of its Project, the Owner and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this requirement force or effect) shall be amended or waived without the prior written consent of the State.

8. Contractor will incorporate the applicable provisions of the Contract Documents into all subcontracts and Purchase Orders so that such provisions will be binding upon each Subcontractor or Supplier.

-28-

Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

-29-

Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

-30-

The following attachments to this Section are incorporated into the Agreement and made a part thereof.

- 00 61 13.13 Performance Bond
- 00 61 13.16 Payment Bond
- Insurance certificates

- **Certifications**
  - Certificate from the Secretary of State for foreign corporations
  - Certificate of Good Standing from MA Department of Revenue with respect to all returns due and taxes
  - A statement by management on internal accounting controls
  - A statement prepared by an independent certified public accountant regarding management's statement
  - An audited financial statement for the most recent completed fiscal year

  - Diesel Retrofit Program Contractor Certification
  - DBE forms and certifications
  - Projected monthly cash flow schedule
  - Statement of Direct Labor Cost percentage(s)

  - Subcontractor certification from the Secretary of State for foreign corporations
  - Subcontractor Certificates of Good Standing from MA Department of Revenue with respect to all returns due and taxes
  - Subcontractor Diesel Retrofit Program Contractor Certification

END OF SECTION

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

PERFORMANCE BOND (Form C-0061113.13)

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:
Amount:
Description *(name and location)*:

BOND

Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ *(seal)*	_____ *(seal)*
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	**By:** _____
Signature	Signature *(attach power of attorney)*
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	**Attest:** _____
Signature	Signature
_____	_____
Title	Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within

two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

PAYMENT BOND (Form C-0061113.16)

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:
Amount:
Description *(name and location)*:

BOND

Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ *(seal)*	_____ *(seal)*
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	**By:** _____
Signature	Signature *(attach power of attorney)*
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	**Attest:** _____
Signature	Signature
_____	_____
Title	Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety's obligations to a Claimant under this Bond shall arise after the following:

    5.1 Claimants who do not have a direct contract with the Contractor,

        5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

        5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).

    5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

    7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

    7.2 Pay or arrange for payment of any undisputed amounts.

    7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or

(2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. **Definitions**

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default**: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

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SAMPLE NOTICE TO PROCEED (C-00 55 00)

Date: _____

Project:

Owner: Owner's Contract No.:

Contract: Engineer's Project No.:

Contractor:

Contractor's Address: [send Certified Mail, Return Receipt Requested]

You are notified that the Contract Times under the above Contract will commence to run on_____. On or before that date, you are to start performing your obligations under the Contract Documents * for the following portion(s) of the Work:
Describe the limits of the Work covered

*A Notice to Proceed for the remaining Work will follow. *

In accordance with Paragraph No. 1 of the Agreement Form, the number of calendar days to achieve Substantial Completion is _____, and the number of calendar days to achieve readiness for final payment is _____ [OR date of Substantial Completion is_____, and the date of readiness for final payment is _____].

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions, and Supplementary Conditions if any, provide that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

[add other requirements].

	Owner
	Given by:
	Authorized Signature
	Title
	Date

Copy to Engineer

SECTION 00 60 00

PROJECT FORMS

The following forms are included in this Section and shall be used for the Project as specified in the General Conditions and Supplementary Conditions if any, and the General Requirements. Completed and execution versions of these forms used during the Project shall be incorporated into the Agreement and made a part thereof.

Application for Payment Form (C-00 62 76)
Request for Interpretation/Information Form (C-00 63 15)
Field Order Form (C-00 63 36)
Work Change Directive Form (C-00 63 49)
Change Request Form (C- 00 63 60)
MASRF Change Order Form
Change Order Form (C-00 06 63)
Notice of Substantial Completion Form (C-00 65 15)
Certificate of Substantial Completion Form (C-00 65 16)
Certificate of Completion Form (C-00 65 19)

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

FORM C-006276

Contractor's Application for Payment No. _____

	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

Application For Payment

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1. ORIGINAL CONTRACT PRICE	**$** _____
2. Net change by Change Orders	**$** _____
3. Current Contract Price (Line 1 ± 2)	**$** _____
4. TOTAL COMPLETED AND STORED TO DATE (Column F on Progress Estimate)	**$** _____
5. RETAINAGE:	
a. X _____ Work Completed	**$** _____
b. X _____ Stored Material	**$** _____
c. Total Retainage (Line 5a + Line 5b)	**$** _____
6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)	**$** _____
7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)	**$** _____
8. AMOUNT DUE THIS APPLICATION	**$** _____
9. BALANCE TO FINISH, PLUS RETAINAGE (Column G on Progress Estimate + Line 5 above)	**$** _____

Contractor's Certification

The undersigned Contractor certifies that to the best of its knowledge: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By:	Date:

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ _____
(Engineer) (Date)

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ _____
(Owner) (Date)

Approved by: _____ _____
Funding Agency (if applicable) (Date)

Approved by: _____ _____

Progress Estimate - Lump Sum Work FORM C-006276

Contractor's Application

For (Contract):	Application Number:
Application Period:	Application Date:

			Work Completed		E	F		G
A		B	C	D	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	% (F / B)	Balance to Finish (B - F)
Specification Section No.	Description	Scheduled Value ($)	From Previous Application (C+D)	This Period				

Progress Estimate - Unit Price Work

FORM C-006276

Contractor's Application

For (Contract):	Application Number:
Application Period:	Application Date:

A				B	B(2)	C	D	E	F		
Item		Bid Item Quantity	Unit Price	Bid Item Value ($)	Estimated Quantity Installed This Month	Estimated Quantity Installed To Date (Include This Month)	Value of Work Installed to Date	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F / B)	Balance to Finish (B - F)
Bid Item No.	Description										
	moblize										
	Totals										

Stored Material Summary FORM C-006276

Contractor's Application

For (Contract):								Application Number:			
Application Period:								Application Date:			
A		B	C		D		E		F		G
Bid Item No.	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Storage Location	Description of Materials or Equpment Stored	Stored Previously		Amount Stored this Month ($)	Subtotal Amount Completed and Stored to Date (D + E)	Incorporated in Work		Materials Remaining in Storage ($) (D + E - F)
					Date Placed into Storage (Month/Year)	Amount ($)			Date (Month/ Year)	Amount ($)	
				Totals							

REQUEST FOR INTERPRETATION/INFORMATION (Form C-006315)

RFI #: _____ ☐ **Attachment**

To: _____ From: _____

Attn: _____ Issue Date: _____

Project: _____ Required Reply Date: _____

DISTRIBUTION:

Contractor	Owner	Engineer
☐ _____	☐ _____	☐ _____
☐ _____	☐ _____	☐ _____
☐ _____	☐ _____	☐ _____

REFERENCES:

- Specifications: _____ Section: _____ Page/Paragraph: _____
- Drawings: _____ Issue Date: _____ Detail/Sections: _____
- Work Area: _____ Grid/Level: _____

RFI DESCRIPTION:

From: _____ Tel No: _____ Fax: No: _____

Initial: _____ E-mail: _____

RFI REPLY:

Possible Cost Effect Yes: ☐ No: ☐ **Possible Schedule Effect** Yes: ☐ No: ☐

From: _____ Reply Date: _____ xc: _____

Initial: _____ _____

Based on: CASE Form B-1999

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Field Order (C-006336)

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Attention:
You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.04.A, for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference: _____ _____
(Specification Section(s)) (Drawing(s) / Detail(s))

Description: _____

Attachments: _____

	Engineer:

Receipt Acknowledged by Contractor:	Date:

Copy to Owner

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Work Change Directive (Form C-006349)

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Contractor is directed to proceed promptly with the following change(s):

Item No.	Description

Attachments (list documents supporting change):

Purpose for Work Change Directive:

Authorization for Work described herein to proceed on the basis of Cost of the Work due to:

- ☐ Nonagreement on pricing of proposed change.
- ☐ Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

Estimated change in Contract Price and Contract Times:

Contract Price $_____ (increase/decrease) Contract Time _____ (increase/decrease)
days

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Received for Contractor by:	Date
Received by Funding Agency (if applicable):	Date:

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CHANGE REQUEST (FORM C-006360)
(Design Changes/Deviations/Substitutions)

CR NO.
DATE

Project:

Request Initiated by:
- ☐ Contractor
- ☐ Owner
- ☐ Engineer

Impact to Contract Price expected ☐
Impact to Contract Time expected ☐
Change Orders will be processed separately

Request submitted as (format):

Description of Change (☐ documentation attached)

Reason for Change

Response: ☐ This constitutes a Written Amendment to the Agreement.

Review of the proposed change/deviation/substitution by Engineer is for general compatibility with the design concept of the Project. This review does not extend to means, methods, sequences, or procedures of construction or to issues of safety incident thereto. This review shall not relieve the Contractor from responsibility for full compliance with the requirements specified and to determine and verify the information contained therein.

Recommended By Engineer for Acceptance (subject to above comments if any) ☐ recommended for processing and approval under a separate Change Order NAME: *Signature* *Date*	☐ Approved by Owner (no schedule or cost impact) ☐ Acknowledged by Owner – to be processed and approved under a separate Change Order NAME: *Signature* *Date*
Approved by Contractor ☐ Change Order to be requested NAME: *Signature* *Date*	

This page intentionally left blank

Change Order No. _____

(Form C-00 63 63) MA

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:	**CHANGE IN CONTRACT TIMES:**
Original Contract Price: $_____	Original Contract Times: ☐ Working days ☐ Calendar days Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: $_____	[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: Substantial completion (days): _____ Ready for final payment (days): _____
Contract Price prior to this Change Order: $_____	Contract Times prior to this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] of this Change Order: $_____	[Increase] [Decrease] of this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
Contract Price incorporating this Change Order: $_____	Contract Times with all approved Change Orders: Substantial completion (days or date): _____ Ready for final payment (days or date): _____

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: _____	Date: _____	Date: _____
Approved by Funding Agency (if applicable):	Approved by Funding Agency (if applicable):	Approved by Funding Agency (if applicable):
_____	_____	_____
Date: _____	Date: _____	Date: _____

Pursuant to MGL c.44, s31C, I certify that an appropriation has been made in the total amount of the Change Order

_____ Date: _____

Owner's Auditor/Accountant (Name)

Pursuant to MGL c.30, s39I, reasons for deviation are as stated on Page 1. The specified deviation(s) does not materially injure the Project as a whole, the Work is of the same cost and quality or an equitable adjustment has been agreed upon, and the deviation is in the best interest of the Owner.

_____ Date: _____

Owner

Change Order

Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

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CHANGE ORDER – FORM C-006363A

CHANGE ORDER FORM

SRF Number _____
Public Entity _____
Contract Number _____
Change Order Number _____

Contract Amount (As Bid) $ _____

Net Change in Contract Price (this change order) $ _____

Total Adjusted Contract Price (including this and all other change orders) $ _____

This change order extends the time to complete the work by _____ calendar days.

The extended completion date is _____

This change order checked by _____ _____
(Chief) Resident Engineer Date

This change order is requested by: _____

This change order is recommended by: _____

_____ _____ _____
Consultant Engineer P.E. Number Date

The undersigned agree to the terms of the change order.

_____ _____
Contractor Date

_____ _____
Owner Date

Certification of Appropriation under M.G.L. c.44, §31C: Adequate funding in an amount sufficient to cover the total cost of this change order is available.

By: _____ _____
Certification Officer (Auditor, accountant, treasurer) Date

Do not write below: this space reserved for STATE AGENCY APPROVAL

DEP/DMS

(As required by DEP-DMS Policy Memorandum No. CG-10)

CHANGE ORDER FORM (Continued)

Public Entity _____

SRF No: _____ Contract No. _____ Change Order No. _____

Contract Title: _____

Owner's Name: _____

Owner's Address: _____

Contractor's Name: _____

Contractor's Address: _____

Description of Change

_____

_____

_____

_____

_____

_____

_____

_____

Reason for Change

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(As required by DEP-DMS Policy Memorandum No. CG-10)

Notice of Substantial Completion (C-006515)

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		

This Notice of Substantial Completion applies to:

☐ The following Systems, Equipment or specified portions ☐ : All Work under the Contract Documents

:

Date of Substantial Completion for above

The following documents are attached to and made part of this Notice.

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Accepted by Contractor — Date

Accepted by Owner — Date

This page intentionally left blank

Certificate of Substantial Completion (Form C-006516)

Project:	
Owner:	Owner's Contract No.:
Contract:	Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

All Work under the Contract Documents: The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

Amended Responsibilities Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer	Date
Accepted by Contractor	Date
Accepted by Owner	Date

Certificate of Completion (Form C-006519)

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		

This Certificate of Completion applies to:

☐ All Work under the Contract Documents: ☐ The following specified portions:

Date of final Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner and Contractor, Contractor has completed all corrections to the satisfaction of Owner, delivered all required documentation, and the Project, or portion designated above, is found to be complete. The Date of Completion of the Project or portion thereof designated above is hereby declared.

Contractor may make application for final payment.

The following documents are attached to and made part of this Certificate:

Final Application for Payment

This Certificate does not constitute a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Only the **making and acceptance of final payment** will constitute:

1. A waiver of all claims by Owner against Contractor, except claims arising from any unsettled liens, from Defective Construction appearing after final inspection; from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
2. A waiver of all claims by Contractor against Owner other than those previously timely made in writing and still unsettled.

Accepted by Contractor — Date

Accepted by Owner — Date

This page intentionally left blank

Notice of Completion (Form C-006519 *00629*)

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		

This NOTICE of Completion applies to:

☐ All Work under the Contract Documents: ☐ The following specified portions:

Date of final Completion

The Work to which this Notice applies is ready for inspection by authorized representatives of Engineer and Owner. Contractor has completed all corrections, delivered all required documentation, and the Project, or portion designated above, is complete. The Date of Completion of the Project or portion thereof designated above is hereby declared by the Contractor.
.

The following documents are attached to and made part of this Certificate:

Final Punchlist

Final Application for Payment

Only the **making and acceptance of final payment** will constitute:

1. A waiver of all claims by Owner against Contractor, except claims arising from any unsettled liens, from Defective Construction appearing after final inspection; from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
2. A waiver of all claims by Contractor against Owner other than those previously timely made in writing and still unsettled.

Submitted by Contractor | Date

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This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

SECTION 00 72 05
STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by

CONSTRUCTION SPECIFICATIONS INSTITUTE

REVISIONS HIGHLIGHTED WITHIN THE TEXT OF THIS SECTION HAVE BEEN PREPARED BY WOODARD & CURRAN ON BEHALF OF AND AS APPROVED BY OWNER *(LOWELL MA)*

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

SECTION 00 72 05
STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

Page

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed. May also be referred to as "Proposal" which may be used interchangeably and shall have the same meaning.

6. *Bidder*—The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*—See Paragraph 11.01 for definition.

17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor and complement the Specifications. Shop Drawings and other Contractor submittals are not Drawings as so defined. May also referred to as "Plans", which may be used interchangeably and shall have the same meaning. Notes on Drawings are directed to Contractor unless specifically noted otherwise.

18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*—The individual or entity named as such in the Agreement.

20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*—Sections of Division 01 of the Specifications which govern the Work of all sections of the Specifications.

22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.

23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction. See Paragraph 17.05 of these General Conditions.

25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*—Polychlorinated biphenyls.

31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times. May also be referred to as "Construction Schedule", which may be used interchangeably and shall have the same meaning.

33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.

37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto. The Specifications are based on the guidelines of the Construction Specifications Institute (CSI) Project Resource Manual, and are directed to Contractor unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases in the Specifications.

43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.

46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions, have been prepared by Engineer on behalf of and are as approved by Owner.

47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.

48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

49. *Unit Price Work*—Work to be paid for on the basis of unit prices.

50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

B. Additional Terms

1. *Final Completion*—The time at which all Work is completed and ready for final payment in accordance with Paragraph 14.07 of these General Conditions.

2. *Industry Practice*—The written practices, methods, materials, supplies and equipment, as changed from time to time, that are commonly used in the industry applicable to the Project to design, construct and operate facilities and plants, or any practices, methods and acts, which in the exercise of reasonable judgment in light of the facts known at the time, could have been expected to accomplish the desired results consistent with good business practices, reliability, safety and expedition.

3. *Punch List*—a list of open items representing portions of the Work which Contractor, Engineer, Owner reasonably agree is not complete on the date of Substantial Completion or Final Completion, but which items will not significantly interfere with the safe, reliable operation and integrity of the Project or its intended use.

4. *Purchase Order*—A written agreement between Contractor and a Supplier for provision of material and equipment.

5. *Warranty Period*—the correction period after the date of Substantial Completion per Paragraph 13.07 of these General Conditions.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. Intent of Certain Terms or Adjectives:

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. Day:

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight. However, in limited instances the parties have agreed explicitly by context to use the terms "business day" or "working day" to further define the meaning of the term day. See also Paragraph 17.02 of these General Conditions.

D. Defective:

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. Furnish, Install, Perform, Provide:

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. ~~When Contractor delivers the executed counterparts~~Prior to execution of the Agreement ~~to Owner~~, Contractor shall ~~also~~ deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Prior to execution of the Agreement and b~~B~~efore any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ~~ten~~ 5 printed or hard copies of the Contract Documents or Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the ~~sixtieth~~ 90th day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, unless mutually agreed otherwise.~~, whichever date is earlier.~~

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents, and the lead times for equipment and materials per the listing in subparagraph 2.05.A.4;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work, which will be confirmed in writing by Contractor at the time of submission. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work; and.

4. a complete listing of equipment and materials with lead times between placing orders and delivery, including normal allowances of time for processing and correcting Shop Drawings. All orders for long lead items shall be placed within 30 days after Effective Date of the Agreement if delivery is critical to scheduling. Failure to place orders promptly may result in full liability for liquidated damages if Contract Times are not met.

B. *Evidence of Insurance*: In accordance with Paragraph 2.01.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records in accordance with the General Requirements.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all and comprise the entire agreement between Owner and Contractor concerning the Work. If any term or provision of any of the Contract Documents, or the application thereof to any party or circumstance shall, to any extent, be determined to be invalid or unenforceable, the remaining provisions of the Contract Documents, or the application of such term or provision to parties or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected thereby, and each term and provision of each of the Contract Documents shall be valid and shall be enforced to the fullest extent permitted by Laws and Regulations.

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies:

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation , (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. Resolving Discrepancies:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification; or~~.~~

4. A Change Request.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or

2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

1. The Contractor may rely upon files transmitted to the Contractor in portable document format (PDF) which are understood by all parties to constitute official Project correspondence such as a response to a request for information or submittal review furnished by Owner or Engineer.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. (Not Used)~~*Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.~~

C. Possible Price and Times Adjustments:

1. The Contract Price or the Contract Times, or both, ~~will~~ may be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

   a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

   b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

   a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

   b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; ~~or~~

   c. Contractor failed to give the written notice as required by Paragraph 4.03.A,or

   ~~c.~~d. written notice is submitted after final payment.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all such information and data;

b. locating all Underground Facilities shown or indicated in the Contract Documents;

c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. Not Shown or Indicated:

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

3. Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, shall not be liable to Contractor for any Claims, losses, or damages incurred by Contractor (including but not limited to all fees and changes of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) related to Underground Facilities not shown or indicated.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by

Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within ~~20~~ 5 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed, complies with the requirements of Article 5, and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

   a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

   b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; ~~and~~

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle~~.~~;

7. claims for damages because of bodily injury or death of any person or for damage to property of arising out of operation of Laws or Regulations; and

8. claims for damages because of negligent acts, errors and omissions arising out of performing or providing professional services.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.~~6~~7 inclusive, be written on an occurrence basis, include as additional insureds by endorsement (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be ~~listed~~ included as additional insureds by endorsement, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide) and will contain waiver provisions in accordance with Paragraph 5.07;

5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

6. include completed operations coverage:

   a. Such insurance shall remain in effect for two years after final payment.

   b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

7. In the event general liability insurance is provided on a claims-made policy, the retroactive date of such policy shall not be later than the date of the Notice to Proceed or the Effective Date of the Agreement, whichever is earlier. For construction periods extending beyond the expiration date of an initial claims-made policy, the retroactive date of all subsequent claims-made policies shall not be later than the date of the Notice to Proceed.

C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation and related coverage:

Minimum limit of liability	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Employer's Liability	$1,000,000

2. Contractor's General Liability:

$3,000,000 per occurrence; $3,000,000 general aggregate, including:

- Broad Form Property Damage Liability including coverage for acts of terrorism
- Completed Operations and Product Liability
- Contractual Liability
- Pollution Liability (covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from the Contractor's operations and completed operations maintained for no less than three years after final completion)
- Independent Contractors
- Explosion, Collapse & Underground Hazards
- Personal Injury Coverage, Exclusion "C" Deleted
- Fire Legal Liability
- Medical payments

Excess or Umbrella Liability: $3,000,000 per occurrence; $3,000,000 general aggregate

3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

Combined Single Limit of $3,000,000 for bodily injury & property damage covering Contractor and any vehicles owned, hired and non-owned by the Contractor

4. Professional Liability (E&O for engineers, architects or surveyors): $1,000,000 for each claim with an annual aggregate of at least $2,000,000 if professional services are required under the Specifications

5. Owners Protective Liability (OCIP): as may be specified in the Supplementary Conditions

Any self-insured retention (not allowed for Worker's Compensation) and/or deductibles must be identified and cannot exceed $100,000 per occurrence without the prior approval of the Owner. Contractor must provide either an audited financial statement to confirm solvency or a letter of credit guaranteeing the $100,000 in case of loss for the duration of the Project and for the Correction Period.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. ~~Unless otherwise provided in the Supplementary Conditions, Owner~~Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. Contractor shall be responsible for any ~~(subject to such~~ deductible amounts or self-insured retention as may be provided in the Supplementary Conditions or required by Laws and Regulations~~)~~. This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, flood, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.

B. (Not used)~~Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.~~

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work. ~~to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.~~

E. ~~If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.~~

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any

party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

~~B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:~~

~~1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and~~

~~2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.~~

~~C.~~B. ~~Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.~~

5.08 *Receipt and Application of Insurance Proceeds*

A. (Not used) ~~Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order~~.

~~B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.~~

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If ~~either~~ Owner ~~or Contractor~~ has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the ~~other party~~the Contractor in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the ~~objecting party~~Owner shall so notify the ~~other party~~Contractor in writing within

10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. ~~Owner and~~ Contractor shall ~~each~~ provide to the ~~other~~ Owner, such additional information in respect of insurance provided as the other may reasonably request. If ~~either party~~Contractor does not purchase or maintain all of the bonds and insurance required ~~of such party~~ by the Contract Documents, ~~such party~~Contractor shall notify the ~~other party~~Owner in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the ~~other party~~Owner may elect to obtain equivalent bonds or insurance to protect ~~such other party's~~Owner's interests at the expense of the ~~party~~ Contractor~~who was required to provide such coverage~~, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

1. Contractor shall comply with the Equal Employment Opportunity Requirements included in the Supplementary Conditions.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work

at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

D. Provision of any instructions:

1. will not be effective to assign to Owner, or any of Owner's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 8.09; and

2. will not be effective to assign to Engineer, or any of Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item, make or catalogue number, or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

   a. in the exercise of reasonable judgment Engineer determines that:

      1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

      2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and

      3) it has a proven record of performance and availability of responsive service.

   b. Contractor certifies that, if approved and incorporated into the Work:

      1) there will be no increase in cost to the Owner or increase in Contract Times; and

      2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items:

   a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

   b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,

b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services; and

4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Bidding Requirements or Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and ~~if~~ the Contractor has submitted a list thereof in accordance with the Bidding Requirements or Supplementary Conditions (which shall be included as an attachment to the Agreement), Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor

2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.

1. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

2. Such agreement between Contractor and the Subcontractor or Supplier shall specifically include arbitration provisions similar to those in Article 16 and provisions required by Laws and Regulations identified in the various Supplementary Conditions.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

D. At the Owner's option, Contractor shall defend claims in connection with any alleged infringement of such rights.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

1. Owner will provide the permits and licenses indicated in the Supplementary Conditions, if any.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. See Supplementary Conditions for specific requirements, if any. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor observes that the Specifications or Drawings are at variance with any Laws or Regulations, Contractor shall give Engineer prompt written notice thereof, and any necessary changes will be authorized by one of the methods set forth in Paragraph 3.04. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

B. If Owner is sales tax exempt, specific provisions shall be as set forth in the Supplementary Conditions.

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas:

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by ~~negotiation~~ agreement or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work, Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings and other closeout submittals will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. Contractor shall comply with the applicable requirements of Owner's safety programs and safety requirements included in the Supplementary Conditions, if any. ~~The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.~~

D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. Shop Drawings:

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. Samples:

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. Submittal Procedures:

1. Before submitting each Shop Drawing or Sample, Contractor shall have:

   a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

   b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

   c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

   d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. Engineer's Review:

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1. or for errors or omissions in a Shop Drawing or Sample.

E. Resubmittal Procedures:

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

2. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than 3 submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.

3. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and in accordance with Subcontractor warranties, manufacturers and Suppliers warranties on equipment and material, and extended or special warranties and will not be defective for the correction period specified in 13.07. Owner and Engineer and ~~its~~ their officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

1. Contractor shall obtain and preserve for the benefit of the Owner:

a. manufacturers' and Suppliers' written warranties and guarantees on equipment and material incorporated into the Work;

b. written warranties and guarantees from each Subcontractor engaged in the performance of the Work; and

2. extended or special warranties.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; ~~or~~

7. any correction of defective Work by Owner; or.

8. any acceptance by Owner or any failure to do so.

D. Contractor shall prepare and execute a written general warranty and guarantee applicable to the Work reflecting the provisions of this Paragraph 6.19, Article 13 and other applicable provisions of the Contract Documents pertaining to warranties and guarantees, Subcontractor, manufacturers and Supplier warranties and guarantees, and extended or special warranties and guarantees. Contractor shall submit this written general warranty and guarantee in accordance with Article 14 and the General Requirements.

E. Provision of any warranties or guarantees:

1. will not be effective to assign to Owner, or any of Owner's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 8.09; and

2. will not be effective to assign to Engineer, or any of Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09.

F. The warranty and guarantee provisions of this Paragraph 6.19 shall be in addition to and not in limitation of any other warranties, guarantees or remedies allowed by Law or the Contract Documents.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend (with counsel designated by the insurer accepting liability for the Claim or damage or, in lieu thereof, counsel acceptable to the Owner), and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

1. Without limiting the generality of the preceding Paragraph, the Contractor hereby specifically agrees to indemnify, defend, and hold harmless the Owner and Engineer from all such claims, losses or expenses which arise out of injuries of employees of the Contractor or any of its Subcontractors or Suppliers of any tier related to performance of the Work. It is the Owner intention that all financial risk of injuries related to the Work be borne by the Contractor, and that the Owner have no financial responsibility, direct or indirect, for any such claims.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of_, ~~or the failure to prepare or approve~~ maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications, provided however, that if the claim, cost, loss or damage referred to in this Paragraph 6.20 results from failure of the Engineer to discover a condition, Underground Facilities or object which is underground or otherwise not reasonably observable by the Engineer, and if said failure to discover either was or should have been apparent to the Contractor in that the said condition or object is omitted from the Engineer's maps, Drawings, opinions, reports, surveys, Change Orders, designs or Specifications, then the Contractor shall be liable for indemnification of the Engineer and Owner under Paragraph 6.20 for claims, costs, losses and damages resulting from said failure to discover unless Contractor shall have notified Engineer of the existence and location of such condition or object prior to the occurrence of such claims, costs, losses and damages and in sufficient time for Engineer to have made provisions therefor.; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage~~.~~; or

3. caused by the negligent acts, errors or omissions of any of them.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.

C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided ~~in the Supplementary Conditions~~herein, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

B. The Resident Project Representative (RPR) will be Engineer's employee or agent at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of Contractor. The RPR shall:

1. *Schedules:* Review the progress schedule, schedule of Shop Drawing and Sample submittals, and schedule of values prepared by Contractor and consult with Engineer concerning acceptability.

2. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.

3. Liaison:

a. Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, assist in providing information regarding the intent of the Contract Documents.

b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.

c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.

4. *Interpretation of Contract Documents:* Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

5. Shop Drawings and Samples:

a. Record date of receipt of Samples and approved Shop Drawings.

b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.

6. Modifications:

a. Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Engineer.

b. Transmit to Contractor in writing, decisions as issued by Engineer.

7. Review of Work and Rejection of Defective Work:

a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.

b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

8. Inspections, Tests, and System Startups:

   a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.

   b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

9. Records:

   a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.

   b. Maintain records for use in preparing Project documentation.

10. Reports:

   a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and Sample submittals.

   b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

   c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition or conditions that may impede the compliant operation of existing facilities on Site.

11. *Payment Requests:* Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

12. *Certificates, Operation and Maintenance Manuals:* During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

13. Completion:

   a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of lists of items to be completed or corrected.

b. Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied.

c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the Notice of Acceptability of the Work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).

2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's superintendent.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work unless such advice or directions are specifically required by the Contract Documents.

5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.

7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.

8. Authorize Owner to occupy the Project in whole or in part or determine operational protocol that may affect the compliant operation of existing facilities.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as

a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

F. Engineer will have no responsibility or authority:

1. To order changes in construction which will result in additional costs or which will require extensions of Contract Times;

2. To suspend all or any portion of Contractor's operations;

3. To terminate all or any portion of the Work;

4. To make final acceptance of all or any portion of the Work; and

5. To operate or maintain any portion of the Work.

9.10 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than ~~30~~ 14 days) after the start of the event giving rise thereto. Failure to comply with this notice requirement shall constitute a waiver of the Claim. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within ~~60~~ 30 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part;

2. approve the Claim; or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

G. Contractor shall not have the right to stop performance of the Work pending resolution of a Claim.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

   a. If applicable, prevailing wage requirements and rates are included in the Supplementary Conditions.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

    a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

    c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

        1) Rentals of construction equipment and machinery and the parts thereof whether rented from Contractor or others in accordance with rates published in current edition of the Rental Rate Blue Book® for construction equipment published by EquipmentWatch® (www.equipmentwatch.com). When Contractor-owned equipment is ordered by Owner or Engineer to be held at standby, equipment rental rates shall be 50% of normal rate. Rental or standby shall not include time that equipment is inoperative because of malfunction or breakdown and shall cease when the use thereof is no longer necessary for the Work.

    d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

    e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

~~B. Cash Allowances:~~

~~1. Contractor agrees that:~~

~~a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and~~

~~b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.~~

~~C.~~B. Owner's Contingency Allowances:

1. Contractor agrees that any Owner's ~~a~~ contingency allowance, ~~if any,~~ is for the sole use of Owner to cover ~~un~~estimated anticipated costs for certain items.

~~D.~~C. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by Owner's contingency allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs by plus or minus 20 percent~~materially and significantly~~ from the estimated quantity of such item indicated in the Agreement or the Unit Prices for individual items differ by plus or minus 5 percent; and

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

   a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be ~~15~~ 10 percent;

   b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

   c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of ~~15~~ 10 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor, provided, however, that on any subcontracted work the total maximum fee to be paid by Owner under this subparagraph shall be no greater than 27 percent of the costs incurred by the Subcontractor who actually performs the Work;

   d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

   e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

   f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, acts of war or terrorism, or acts of God (force majeure).

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of war or terrorism, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Except as provided in 13.03.B above and where responsibility for a specific inspection or test is expressly allocated to Owner in the Specifications or by Laws and Regulations, Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents (such as partial utilization in Paragraph 14.05), any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor and may be deducted from amounts otherwise due the Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work, including materials, equipment and supplies or as defined in manufacturers' and Suppliers' warranties (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed and the terms of this Paragraph 13.07 will continue to apply.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, or immediately in the case of an emergency, correct, or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. Applications for Payments:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

    a. the Work has progressed to the point indicated;

    b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and

    c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

    a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

    b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work, or

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

    d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

    b. the Contract Price has been reduced by Change Orders;

    c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

    d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment:

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

    a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

    b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens and provides an indemnity satisfactory to Owner for all claims, costs, losses and damages arising out of such Liens;

    c. there are other items entitling Owner to a set-off against the amount recommended including liability for liquidated damages and correction of defective work by Owner or others; or

    d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use and final testing has been completed in accordance with the General Requirements, Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) using the Notice of Substantial Completion form included in the Contract Documents, submit the Contractor's written general warranty and guarantee per Paragraph 6.19.D., and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion using the Certificate of Substantial Completion included in the Contract Documents. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment (Punch List). Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

B. Owner may request in writing that Contractor permit Owner to separately operate any part of the Work although it is not substantially complete subject to the following conditions.

1. A copy of such request will be sent to Engineer and, within a reasonable time thereafter, Owner, Contractor and Engineer shall make an inspection of that part of the Work not substantially complete to determine the status of completion and will prepare a Punch List before final payment.

2. If Contractor does not indicate in writing to Owner and Engineer that such part of the Work is not ready for separate operation by Owner, Engineer will finalize the Punch List and will deliver such list to Owner and Contractor, together with a written recommendation as to the division of responsibilities between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties and guarantees for that part of the Work pending final payment.

3. The Engineer's recommendation and Punch List will become binding upon Owner and Contractor at the time the Owner takes over and separately operates such part of the Work unless otherwise agreed in writing and so informed Engineer.

4. During such separate operation by Owner and prior to Substantial Completion of such part of the Work, Owner shall allow Contractor reasonable access to complete or correct Punch List and to complete other related Work.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. Application for Payment:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, warranties, updated Contractor's written general warranty and guarantee per Paragraph 6.19.D if modified., bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, and Engineer has indicated that the Work is acceptable (subject to the provisions of Paragraph 14.09), Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

b. consent of the surety, if any, to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been

paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable using the Certificate of Completion form included in the Contract Documents, subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due:

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted as detailed on the Certificate of Completion. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees

specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

B. If the performance of all or any part of the Work is suspended, delayed, or interrupted due to an order of a court of competent jurisdiction as a result of environmental litigation, as defined below, the Owner, at the request of the Contractor, shall determine whether the order is due in any part to the acts or omissions of the Contractor or a Subcontractor at any tier not required by the terms of this Contract. If it is determined that the order is not due in any part to acts or omissions of the Contractor or a Subcontractor at any tier other than as required by the terms of this Contract, such suspension, delay, or interruption shall be considered as if ordered by the Owner in the administration of this Contract under the terms of Article 15 except that it will not be possible for the Owner to fix the date for resumption of the Work.

1. The term "environmental litigation", as used herein, means a claim or lawsuit alleging that the Work has or will have an adverse effect on the environment or that the Owner has not duly considered, either substantively or procedurally, the effect of the Work on the environment.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's ~~persistent~~ failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's repeated disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents; or~~.~~

5. Contractor commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if Contractor takes any equivalent or similar action by filing a petition or otherwise under any Laws and Regulations in effect at such time relating to the bankruptcy or insolvency; or

6. a petition is filed against Contractor under any chapter of the Bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against Contractor under any Laws and Regulations in effect at the time relating to bankruptcy or insolvency; or

7. Contractor makes a general assignment for the benefit of creditors; or

8. a trustee, receiver, custodian or agent of Contractor is appointed under applicable law or under contract, whose appointment or authority to take charge of property of Contractor is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of Contractor's creditors; or

9. Contractor admits in writing its inability to pay its debts generally as they become due.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. ~~all~~ reasonable claims, costs, losses, and damages (including but not limited to ~~all~~ reasonable fees and charges of engineers, architects, attorneys, and other professionals and ~~all~~ reasonable court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or

2. agrees with the other party to submit the Claim to another dispute resolution process.~~; or~~

3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located. See Supplementary Conditions for specific requirements.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

17.07 *Professional Fees and Court Costs Included*

A. In any action or proceeding to enforce or interpret any contractual provision or to resolve any conflict or dispute relating to or arising from this Contract, the prevailing party shall be entitled to recover, as part of its claim, award or judgment, reasonable attorneys; fees and associated costs and expenses, including expenses of engineering, claims and other consultants.

END OF SECTION

SECTION 00 73 05

SUPPLEMENTARY CONDITIONS

The following sections modify or supplement the Standard General Conditions of the Construction Contract ("General Conditions") included in Section 00 72 05 and are in addition to the modifications highlighted within the text thereof. All provisions which are not so modified or supplemented remain in full force and effect. The Supplementary Conditions may include certain provisions required by Laws and Regulations. Contractor is responsible to determine and obtain applicable Laws and Regulations and to review and interpret the full text of such Laws and Regulations.

The terms used in these Supplementary Conditions have the meanings stated in the Standard General Conditions and as may be included within the Sections listed below.

00 73 10 Specific Project Requirements
00 73 19 Health and Safety Requirements
00 73 37 Equal Employment Opportunity/
Affirmative Action Requirements (Standard Federal
00 73 38 D/MBE & D/WBE Requirements
00 73 43 Wage Rate Requirements
00 73 46 Wage Determination Schedule
00 73 73 Statutory Requirements

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SECTION 00 73 10

PROJECT SPECIFIC REQUIREMENTS

GENERAL

The address system used herein is the same as the address system used in the General Conditions, with the prefix "SC" added thereto. Additional terms used in this Section have the meanings stated below, which are applicable to both the singular and plural thereof.

This Section may include certain provisions required by Laws and Regulations, but does not represent or reflect all applicable provisions and policies or Laws and Regulations, and may only include excerpts and portions thereof. Other required provisions and policies, and Laws and Regulations, shall be deemed to be so included and incorporated herein. Contractor is solely responsible to determine, obtain, review and interpret the full text of applicable provisions and policies, Regulations, and Laws.

This Project is subject to the Environmental Protection Agency's (EPA) Drinking Water State Revolving Fund (SRF) program requirements, Department of Environmental Protection ("MassDEP"), Division of Municipal Services ("DMS") SRF provisions and policies, other Project specific regulations and requirements, and Federal Law.

SC-1.01 *Defined Terms*

Add the following at the end of 1.01.A.6, *Bidder*.

> In applicable statutory provisions, reference to "*offeror*" shall mean Bidder and reference to "*Standard Form 1442*" shall mean Bid Form and Supplements

Add the following at the end of 1.01.A.29, *Owner*.

> Owner may also be referred to as "*Contracting Officer*" in applicable statutory provisions which may be used interchangeably and shall have the same meaning. References to "*Government"* in applicable statutory provisions may also mean Owner if use of the term is consistent with Owner's role and responsibilities under the Contract. Owner may also be referred to as "*Awarding Authority*" and "*Local Government Unit (LGU)*" per MassDEP DMS requirements, which may be used interchangeably and shall have the same meaning.

SC-1.01.B *Additional Terms:* Add the following new definition.

6. *Installer* -- The entity engaged by Contractor or a Subcontractor for installation, erection, application and similar required operations of a particular portion of the Work at the Site, including who has specialty experience in the Work they are engaged to perform.

SC-2.05 ***Before Starting Construction***

Pursuant to subparagraph 2.05.A.3 regarding the Schedule of Values, and per MassDEP DMS policy memoranda, the items included must also be categorized by Eligible and Ineligible items under the State Revolving Loan Fund Program, in particular those listed in the Attachments to this Section and Section 01 15 00.

Add the following after Paragraph 2.05.B.

C. Additionally, within 10 days after the Effective Date of the Agreement, Contractor shall submit a Construction Operations Plan incorporating the schedules submitted pursuant to Paragraph 2.05.A and covering the following.

1. Construction methods and sequence of operations

2. Proposed Site access

3. Proposed erosion control measures and proposed measures to minimize impacts to existing vegetation and impacts to water quality in compliance with the General Requirements.

SC-2.07 ***Initial Acceptance of Schedules***

Add the following immediately after subparagraph 2.07.A.3.

4. Contractor's Construction Operations Plan submitted pursuant to Paragraph 2.05.C. will be acceptable to Engineer if it accurately and reasonably addresses all aspects of the Work.

SC 4.01 ***Availability of Lands***

Pursuant to Paragraph 4.01.A, no easements and rights-of-way exist for the Project.

SC-4.02 ***Subsurface and Physical Conditions***

A. Pursuant to Paragraph 4.02.A,

1. the following reports of explorations and tests of subsurface conditions at or contiguous to the Site are known to Owner:

a. Report dated November 14, 2013 prepared by S.W. Cole Engineering Inc., entitled "Geotechnical Engineering Services: Proposed Stackpole Street Pump Station Lowell, MA" consisting of 23 pages

All information in such report constitutes "technical data".

The "technical data" shall be limited to facts, measurements, field observations, boring logs, soil type and similar data. "Technical data" shall not include opinions regarding suitability of material, dewatering methodologies, soil stability, slope stabilization methods and other opinions or professional judgments.

2. The following drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) are known to Owner:

   a. NONE

3. The reports identified above are not part of the Contract Documents, but the "technical data" contained therein upon which Contractor may rely, as expressly identified and established above, are incorporated in the Contract Documents by reference and may be reflected in the Drawings. Contractor is not entitled to rely upon any other information and data known to or identified by Owner or Engineer.

4. Copies of reports identified above are included as an attachment to Section 01 15 00.

SC 4.05 ***Reference Points***

Pursuant to Paragraph 4.05.A, surveys exist for the Project and are reflected on the Drawings.

SC-4.06 ***Hazardous Environmental Conditions at Site***

A. Pursuant to Paragraph 4.06.A,

1. the following reports regarding Hazardous Environmental Conditions at the Site are known to Owner:

   a. Report dated August 2014 prepared by Enviro-Safe Engineering of Brockton, MA., entitled "Asbestos & Lead Inspection Report for 178 Stackpole Street, Lowell, MA", consisting of 16 pages.

   All information in such report constitutes "technical data".

   The "technical data" shall be limited to facts, measurements, field observations, and similar data. "Technical data" shall not include opinions regarding means and methods, and other opinions or professional judgments.

2. The following drawings regarding Hazardous Environmental Conditions at the Site are known to Owner:

   a. NONE

3. The reports identified above are not part of the Contract Documents, but the "technical data" contained therein upon which Contractor may rely, as expressly identified and established above, are incorporated in the Contract Documents by reference. Contractor is not entitled to rely upon any other information and data known to or identified by Owner or Engineer.

4. Copies of reports identified above are included as an attachment to Section 01 15 00.

Insert the following at the beginning of Paragraph 4.06.D.

Except for removal and disposal of contaminated soils and water encountered during normal excavation and dewatering activities within Contractor's scope of Work and specified in Section 26 10 00,

Insert the following at the beginning of Paragraph 4.06.E.

Except for removal and disposal of contaminated soils and water encountered during normal excavation and dewatering activities within Contractor's scope of Work and specified in Section 26 10 00,

SC-5.04 ***Contractor's Insurance***

Pursuant to subparagraph 5.04.C.5, also provide Owner's Protective Liability in the amount of $3,000,000 (per occurrence for bodily injury & property damage combined single limit)

SC-6.02 ***Labor; Working Hours***

Pursuant to Paragraph 6.02.B, regular working hours for this Project are 7:00 a.m. to 3:00 p.m., Monday through Friday, or as scheduled and authorized by Owner during .

Add the following new subparagraph immediately after Paragraph 6.02.B.

1. No construction will be allowed outside of regular working hours without written authorization from the Owner. The Owner will provide personnel to assist Contractor at no cost to the Contractor: a) only during regular work hours; b) during a scheduled shutdown; or c) when written authorization has been obtained from Owner approving performance of construction outside of regular working hours or on Saturday, Sunday and holidays, <u>provided that</u> the need is for a scheduled shutdown or due to delays beyond the control of Contractor (as set forth in Paragraph 12.03 of the General Conditions and Supplementary Conditions, if any.

2. Adjustments to the Contract Price (deductions) will be made for each hour Owner's personnel work outside regular working hours or on Saturday, Sunday and holidays, as set forth in the Agreement, in the event the need for performing construction outside of regular working hours or on Saturday, Sunday and holidays is due to delays that are within the Contractor's control, as set forth in Paragraph 12.03 of the General Conditions and Supplementary Conditions, if any.

SC-6.03 ***Services, Materials, and Equipment***

Add the following to Paragraph 6.03 per SRF requirements.

E. Contractor and Subcontractors shall comply with the *Diesel Retrofit Program* included as an attachment to this Section and shall each have provided the Contractor Certification (included at the end of the attachment) which are incorporated into the Agreement Form Supplements.

F. Contractor shall fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled "*Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons)*." The Contractor shall not award any subcontracts or purchase any materials from Suppliers that appear on the Excluded Parties List System. The Contractor shall include this requirement in each subcontract and require it to be included in all subcontracts regardless of tier. The Contractor shall maintain reasonable records to demonstrate compliance with these requirements.

G. Except for SRF ineligible items, statutory requirements commonly known as "American Iron and Steel (AIS) Requirement" that requires all of the iron and steel products used in the Project to be produced in the United States including iron and steel products provided by the Contractor, apply to this Contract. Except for SRF ineligible items, Contractor shall provide that all of the iron and steel products used in the Project will be and/or have been produced in the United States in a manner that complies with the AIS Requirement, unless a waiver of the AIS Requirement is approved, and the Contractor will provide any further verified information, certification or assurance of compliance with the AIS Requirement, or information necessary to support a waiver of the AIS Requirement, as may be requested by Owner. See guidance information included in attachments to this section.

H. Per MassDEP DMS requirements, whenever it is written that an equipment manufacturer must have a specified period of experience with his product, equipment which does not meet the specified experience period can be considered if the equipment Supplier or manufacturer is willing to provide an "Efficiency Guarantee Bond" or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of failure.

SC-6.06 ***Concerning Subcontractors, Suppliers and Others***

Add the following to Paragraph 6.06 per SRF requirements.

H. Contractor shall fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled "*Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons)*." The Contractor shall not award any subcontracts or purchase any materials from Suppliers that appear on the Excluded Parties List System. The Contractor shall include this requirement in each subcontract and require it to be included in all subcontracts regardless of tier. The Contractor shall maintain reasonable records to demonstrate compliance with these requirements.

I. Per MassDEP DMS requirements, Contractor shall comply with the minimum Disadvantaged Business Enterprise goals set forth in Section 00 73 38. The Awarding Authority (Owner) may suspend, terminate or cancel the Contract, in whole or in part, or may call upon the Contractor's surety to perform all terms and conditions in the Contract, unless the Contractor is able to demonstrate compliance with the terms of Section 00 73 38, and may further deny to the Contractor, the right to participate in any future contracts awarded by the Awarding Authority for a period of up to three years.

SC-6.08 ***Permits***

Add the following to Paragraph 6.08.A.

Contractor shall comply with the Owner's requirements for obtaining permits set forth in the City Of Lowell, Department Of Public Works, Permit Manual (Effective May 1, 2010) and available online at:

http://www.lowellma.gov/dpw/engineering/Pages/General/Documents.aspx

except for the following which is covered in the Contract Documents:

IV. BOND REQUIREMENTS
v. INSURANCE REQUIREMENTS

Pursuant to subparagraph 6.08.A.1, Contractor shall comply with the following licenses and permits Owner has obtained for the Project.

- Massachusetts Department of Environmental Protection (MassDEP) BRP WS 25 Treatment Facility Modification, included in Section 01 15 00

- Massachusetts Department of Environmental Protection (MassDEP) BRP WS 32 Distribution System Modifications >3,300 people, included in Section 01 15 00

- Massachusetts Department of Environmental Protection (MassDEP) BRP WPA Form 3 Notice of Intent for Lowell Regional Water Utility's Raw Pump Station, included in Section 01 15 00

- City of Lowell Zoning Board of Appeals Special Permit Application and Approval for Stackpole Street Pump Station, included in Section 01 15 00

SC-6.09 ***Laws and Regulations***

Pursuant to Paragraph 6.09, the Contractor shall comply with additional requirements included in Section 00 73 73 and Section 01 15 00 and the following requirements.

- EPA's Drinking Water SRF program requirements
- MassDEP DMS policies and requirements under the SRF Program

SC-7.01 ***Related Work at Site***

Pursuant to Paragraph 7.01, Owner has separately contracted for upgrades to the water treatment plant's residuals lagoons. See SC-7.02 for coordination details.

SC-7.02 ***Coordination***

Pursuant to Paragraph 7.02.A, for other work on the Project at the Site Owner has separately contracted for or intends to separately contract for as identified in SC-7.01, authority and responsibility for coordination of the other work will be identified at the Preconstruction Conference.

SC-8.11 ***Evidence of Financial Arrangements***

Pursuant to Paragraph 8.11.A, the Project is to be funded in part with monies made available by the EPA's Clean Water State Revolving Fund and the Massachusetts Water Pollution Abatement Trust (the "Trust") and is subject to the approval by the MassDEP.

SC-11.01 ***Cost of the Work***

Add the following after subparagraph 11.01.A.1.a.

b. Per MassDEP DMS requirements:

1) mobilization shall not exceed 5 percent of the total Contract Price;

2) the Direct Labor Cost markup percentage applicable to change orders for this Contract is as included in Section 00 54 00; and

3) see Section 01 15 00 for limitations on financial participation by MassDEP DMS under the State Revolving Loan Fund Program for certain items.

SC-12.01 ***Change of Contract Price***

Add the following to Paragraph 12.01.A.

1. Change orders shall be processed in accordance with MassDEP DMS Policy Memorandum CG-10 included as an attachment to this Section and overhead and profit referenced shall be as follows for this Project.

   For items B(5) and C(5): 10%
   For items B(6) and C(6): 5%

2. Documentation required to substantiate quantities in change orders shall be in accordance with MassDEP DMS Policy Memorandum CG-16 included in Section 01 15 00.

Replace subparagraph 12.01.C.1 with the following per MassDEP DMS requirements:

1. the Direct Labor Cost markup percentage applicable to change orders for this Contract is as included in Section 00 54 00; and

SC-14.02 ***Progress Payments***

Add the following immediately after subparagraph 14.02.A.1.

a. Per MassDEP DMS requirements, the Contractor shall provide reports documenting the portion of Contract and subcontract dollars paid to DBEs, and Contractor's efforts to achieve the goals, with each application for payment submitted or at such greater intervals as specified by the Owner in accordance with Section 00 73 38. The Contractor shall require similar reports from its Subcontractors.

Insert the following language before ";or" at the end of subparagraph 14.02.D.1.c:

and deductions for Additional Work Fees defined the Agreement

SC-14.07 ***Final Payment***

Add the following to Paragraph 14.07.A.1.

a. Per MassDEP requirements, documentation required to substantiate quantities in the request for Final Payment shall be in accordance with MassDEP DMS Policy Memorandum CG-16 included as an attachment to Section 01 15 00.

ATTACHMENTS

A. DEP Diesel Retrofit Program (Appendix B of the Mass DEP DMS policies, pages DEP-DMS-P&S-19 & 20, 22 & 23)

B. AIS Guidance Information

C. MassDEP DMS Policy Memorandum CG-10 (pages DEP-DMS-P&S-7 through 13)

END OF SECTION

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APPENDIX – B
DIESEL RETROFIT PROGRAM

The Department of Environmental Protection ("DEP") has developed the Diesel Retrofit Program in response to increasing public health concerns with the emissions from diesel engines and vehicles.

Diesel Construction Equipment Standard

All diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract (hereinafter "Diesel Construction Equipment") must have the following pollution control device installed unless exempt as provided below:

1. Emission control technology verified by U.S. Environmental Protection Agency ("EPA") or the California Air Resources Board ("CARB") for use with non-road engines;
2. Emission control technology verified by EPA or CARB for use with on-road engines provided that such equipment is operated with diesel fuel that has no more than 15 parts per million sulfur content (i.e. Ultra Low Sulfur Diesel fuel); or
3. Emission control technology certified by the manufacturer that such technology meets or exceeds the emission reductions provided by on-road or off-road emission control technology verified by EPA or CARB, i.e. that a Diesel Oxidation Catalyst is achieving the following minimum emission reductions: particulate matter 20%; carbon monoxide 40%; volatile organic compounds 50%; or a Diesel Particulate Filter is achieving a minimum of 85% emission reductions for particulate matter.

Emission control devices, such as oxidation catalysts or particulate filters, shall be installed on the exhaust system side of the Diesel Construction Equipment. The Contractor shall be responsible to insure that the emissions control technology is operated, maintained, and serviced as recommended by the manufacturer.

For the latest up-to-date list of EPA verified-technologies, see:
http://www.epa.gov/otaq/retrofit/retroverifiedlist.htm
For the latest up-to-date list of CARB verified technologies, see:
http://www.arb.ca.gov/diesel/verdev/verifiedtechnologies/vt.htm

Exemptions

The following Diesel Construction Equipment shall be exempt from the standard above. The Contractor shall include such Diesel Construction Equipment in the required recordkeeping:

1. Diesel Construction Equipment not owned by the Contractor and used in the performance of the work under this Contract for 30 calendar days (cumulative days but not necessarily consecutive) or less;
2. Unless otherwise exempt, additional Diesel Construction Equipment originally not anticipated to be used under the Contract or used as permanent replacement after the work under the Contract has commenced, for 15 calendars days from the date such Diesel Construction Equipment is brought on site;

3. Diesel Construction Equipment with an engine that meets the EPA particulate matter (PM) Tier emission standards in effect at the start of the Contract for non-road diesel engines for the applicable engine power group (e.g., as of January 1, 2009, a piece of Diesel Construction Equipment with a Tier 3 engine is exempt from meeting the standard until the piece of Diesel Construction Equipment is available with a Tier 4 engine) provided that if such emissions standards are superseded during the Contract then such Diesel Construction Equipment must be retrofitted in accordance with the standards above prior to the end of the Contract;
4. A large crane (e.g. a sky crane or link belt crane which is responsible for critical lift operations) if such device would adversely affect the operation of the crane provided the Contractor submits to the municipality's project engineer written technical justification documenting the adverse impact on operation; and
5. Diesel Construction Equipment that the project engineer has determined is necessary to control a compelling emergency including but not limited to, the need for rescue vehicles or other equipment to prevent harm to human beings or additional equipment required to address a catastrophic emergency such as structure collapse or imminent collapse. After the compelling emergency is controlled, such non-compliant equipment must be removed from the Contract site and may not be used in further performance of the work under this Contract. Meeting Contract deadlines is not a compelling emergency.

Contractor Certification

Each bidder shall submit as part of its bid, the Statement of Intent to Comply. Within 10 days of being notified that it has been awarded a contract, the bidder and each of its Contractors and Subcontractors shall submit a Diesel Retrofit Program Contractor Certification. Each such Certification shall contain the following information for each piece of Diesel Construction Equipment:

1. Contractor or Subcontractor name;
2. Equipment type, make, model;
3. Vehicle Identification Number or VIN;
4. Engine model and year of manufacture;
5. Engine HP rating;
6. Emission Control Device (ECD) type (Diesel Oxidation Catalyst or Diesel Particulate Filter);
7. ECD make, model, and manufacturer;
8. ECD EPA or CARB Verification Number or manufacturer's certification that the DOC or DPF meets or exceeds emission reductions provided by similar emission control technology verified by EPA or CARB;
9. ECD installation date;
10. Type of fuel to be used; and
11. Whether the equipment is owned or rented.

Recordkeeping

Each Contractor and Subcontractor shall maintain detailed records of all Diesel Construction Equipment used under the Contract, including the dates and duration times the Diesel Construction Equipment is

used at the Contract site. Records shall be available for inspection by DEP. Each Contractor and Subcontractor shall notify DEP within 48 hours of any new Diesel Construction Equipment brought onto the Contract site.

For Diesel Construction Equipment that has an emissions control device with a manufacturer's certification, the Contractor shall maintain records of all supporting emissions test data and test procedures. If upon review the emissions reductions are not supported by the test data and test procedures, then the emissions control device may need to be replaced with a compliant retrofit device.

Project Regulatory Agreement

The following language shall be included section 4 (Covenants of the Borrower) of the municipality's Project Regulatory Agreement if it receives funds from the State Revolving Fund:

> The Borrower shall require each Contractor and Subcontractor to submit the Diesel Retrofit Program Contractor Certification to DEP and the Borrower prior to commencing work on the Project. The Borrower shall not allow any Contractor or Subcontractor to commence work at the Project site prior to submitting such Certification.

APPENDIX – B (cont.)

DIESEL RETROFIT PROGRAM CONTRACTOR CERTIFICATION

Each Contractor and its Subcontractor(s) must sign and submit this form to John Felix, 6th Floor, MassDEP, One Winter Street, Boston, MA 02108 and the Municipality within 10 days after the Contractor is notified that it is awarded the Contract.

Local Governmental Unit _____ **SRF Project No.** _____

Contract No. _____ **Contact Title** _____

Contractor _____

I, _____, an authorized signatory for _____, whose principal place of business is at _____ do hereby certify that any and all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract (hereinafter "Diesel Construction Equipment") have pollution control devices, such as oxidation catalysts or particulate filters, installed on the exhaust system side of the diesel combustion engine equipment in accordance with the Diesel Retrofit Program Standard.

I am submitting on behalf of _____ a list of all said Diesel Construction Equipment, labeled "Diesel Retrofit List," that will be used in connection with this Contract by _____. I hereby certify that the information on the attached Diesel Retrofit List is correct and accurate as of the date of signature. The List includes the following information for each piece of Diesel Construction Equipment:

1. Equipment type, make, model;
2. Vehicle Identification Number or VIN;
3. Engine model and year of manufacture;
4. Engine HP rating;
5. Emission Control Device ("ECD") type (Diesel Oxidation Catalyst or Diesel Particulate Filter);
6. ECD make, model, and manufacturer;
7. ECD EPA or CARB Verification Number or manufacturer's certification that the DOC or DPF meets or exceeds emission reductions provided by similar emission control technology verified by EPA or CARB;
8. ECD installation date;
9. Type of fuel to be used; and
10. Whether the equipment is owned or rented.

APPENDIX – B (cont.)

DIESEL RETROFIT PROGRAM CONTRACTOR CERTIFICATION

_____shall notify DEP within 48 hours of any new Diesel Construction Equipment brought onto the Contract site. _____shall maintain detailed records of all Diesel Construction Equipment used at the Contract site, including the dates and duration times the Diesel Construction Equipment is used at the Contract site. _____ shall make such records available for inspection by DEP. _____shall ensure that the emissions control technology for each piece of Diesel Construction Equipment is operated, maintained, and serviced as recommended by the manufacturer. _____ shall retrofit prior to the end of the Contract any Diesel Construction Equipment no longer exempt from meeting the Diesel Construction Equipment Standard under exemption 3 (because it had an engine that met the EPA particulate matter (PM) Tier emission standards currently in effect at the start of the Contract for non-road diesel engines for the applicable engine power group and such emissions standards were superseded during the Contract).

I acknowledge that this certificate is being furnished as a requirement under this Contract and is subject to applicable State and federal laws, both criminal and civil. Signed under pains and penalty of perjury on this date _____.

Signature_____

Name: _____

Title: _____

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ATTACHMENT 00 73 10 B

EXCERPTS FROM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

SEE http://water.epa.gov/grants_funding/aisrequirement.cfm

MAR 20 2014

OFFICE OF WATER

MEMORANDUM

SUBJECT: Implementation of American Iron and Steel provisions of P.L. 113-76, Consolidated Appropriations Act, 2014

FROM: For Andrew D. Sawyers, Director
Office of Wastewater Management (4201M)

Peter C. Grevatt, Director
Office of Ground Water and Drinking Water (4601M)

TO: Water Management Division Directors
Regions I - X

BEGINNING ON PAGE 5

Covered Iron and Steel Products

11) What is an iron or steel product?

For purposes of the CWSRF and DWSRF projects that must comply with the AIS requirement, an iron or steel product is one of the following made primarily of iron or steel that is permanently incorporated into the public water system or treatment works:

Lined or unlined pipes or fittings;
Manhole Covers;
Municipal Castings (defined in more detail below);
Hydrants;
Tanks;
Flanges;
Pipe clamps and restraints;
Valves;
Structural steel (defined in more detail below);
Reinforced precast concrete; and
Construction materials (defined in more detail below).

12) What does the term 'primarily iron or steel' mean?

'Primarily iron or steel' places constraints on the list of products above. For one of the listed products to be considered subject to the AIS requirements, it must be made of greater than 50% iron or steel, measured by cost. The cost should be based on the material costs.

13) Can you provide an example of how to perform a cost determination?

For example, the iron portion of a fire hydrant would likely be the bonnet, body and shoe, and the cost then would include the pouring and casting to create those components. The other material costs would include non-iron and steel internal workings of the fire hydrant (i.e., stem, coupling, valve, seals, etc). However, the assembly of the internal workings into the hydrant body would not be included in this cost calculation. If one of the listed products is not made primarily of iron or steel, United States (US) provenance is not required. An exception to this definition is reinforced precast concrete, which is addressed in a later question.

14) If a product is composed of more than 50% iron or steel, but is not listed in the above list of items, must the item be produced in the US? Alternatively, must the iron or steel in such a product be produced in the US?

The answer to both question is no. Only items on the above list must be produced in the US. Additionally, the iron or steel in a non-listed item can be sourced from outside the US.

15) What is the definition of steel?

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels.

16) What does 'produced in the United States' mean?

Production in the United States of the iron or steel products used in the project requires that all manufacturing processes, including application of coatings, must take place in the United States, with the exception of metallurgical processes involving refinement of steel additives. All manufacturing processes includes processes such as melting, refining, forming, rolling, drawing, finishing, fabricating and coating. Further, if a domestic iron and steel product is taken out of the US for any part of the manufacturing process, it becomes foreign source material. However, raw materials such as iron ore, limestone and iron and steel scrap are not covered by the AIS requirement, and the

material(s), if any, being applied as a coating are similarly not covered. Non-iron or steel components of an iron and steel product may come from non-US sources. For example, for products such as valves and hydrants, the individual non-iron and steel components do not have to be of domestic origin.

17) Are the raw materials used in the production of iron or steel required to come from US sources?

No. Raw materials, such as iron ore, limestone, scrap iron, and scrap steel, can come from non-US sources.

18) If an above listed item is primarily made of iron or steel, but is only at the construction site temporarily, must such an item be produced in the US?

No. Only the above listed products made primarily of iron or steel, permanently incorporated into the project must be produced in the US. For example trench boxes, scaffolding or equipment, which are removed from the project site upon completion of the project, are not required to be made of U.S. Iron or Steel.

19) What is the definition of 'municipal castings'?

Municipal castings are cast iron or steel infrastructure products that are melted and cast. They typically provide access, protection, or housing for components incorporated into utility owned drinking water, storm water, wastewater, and surface infrastructure. They are typically made of grey or ductile iron, or steel. Examples of municipal castings are:

Access Hatches;
Ballast Screen;
Benches (Iron or Steel);
Bollards;
Cast Bases;
Cast Iron Hinged Hatches, Square and Rectangular;
Cast Iron Riser Rings;
Catch Basin Inlet;
Cleanout/Monument Boxes;
Construction Covers and Frames;
Curb and Corner Guards;
Curb Openings;
Detectable Warning Plates;
Downspout Shoes (Boot, Inlet);
Drainage Grates, Frames and Curb Inlets;
Inlets;
Junction Boxes;
Lampposts;
Manhole Covers, Rings and Frames, Risers;

Meter Boxes;
Service Boxes;
Steel Hinged Hatches, Square and Rectangular;
Steel Riser Rings;
Trash receptacles;
Tree Grates;
Tree Guards;
Trench Grates; and
Valve Boxes, Covers and Risers.

20) What is 'structural steel'?

Structural steel is rolled flanged shapes, having at least one dimension of their cross-section three inches or greater, which are used in the construction of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes. Such shapes are designated as wide-flange shapes, standard I-beams, channels, angles, tees and zees. Other shapes include H-piles, sheet piling, tie plates, cross ties, and those for other special purposes.

21) What is a 'construction material' for purposes of the AIS requirement?

Construction materials are those articles, materials, or supplies made primarily of iron and steel, that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered "structural steel". This includes, but is not limited to, the following products: wire rod, bar, angles, concrete reinforcing bar, wire, wire cloth, wire rope and cables, tubing, framing, joists, trusses, fasteners (i.e., nuts and bolts), welding rods, decking, grating, railings, stairs, access ramps, fire escapes, ladders, wall panels, dome structures, roofing, ductwork, surface drains, cable hanging systems, manhole steps, fencing and fence tubing, guardrails, doors, and stationary screens.

22) What is not considered a 'construction material' for purposes of the AIS requirement?

Mechanical and electrical components, equipment and systems are not considered construction materials. Mechanical equipment is typically that which has motorized parts and/or is powered by a motor. Electrical equipment is typically any machine powered by electricity and includes components that are part of the electrical distribution system.

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators), mixers, gates, motorized screens (such as traveling screens), blowers/aeration equipment, compressors, meters, sensors, controls and switches, supervisory control and

data acquisition (SCADA), membrane bioreactor systems, membrane filtration systems, filters, clarifiers and clarifier mechanisms, rakes, grinders, disinfection systems, presses (including belt presses), conveyors, cranes, HVAC (excluding ductwork), water heaters, heat exchangers, generators, cabinetry and housings (such as electrical boxes/enclosures), lighting fixtures, electrical conduit, emergency life systems, metal office furniture, shelving, laboratory equipment, analytical instrumentation, and dewatering equipment.

23) If the iron or steel is produced in the US, may other steps in the manufacturing process take place outside of the US, such as assembly?

No. Production in the US of the iron or steel used in a listed product requires that all manufacturing processes must take place in the United States, except metallurgical processes involving refinement of steel additives.

24) What processes must occur in the US to be compliant with the AIS requirement for reinforced precast concrete?

While reinforced precast concrete may not be at least 50% iron or steel, in this particular case, the reinforcing bar and wire must be produced in the US and meet the same standards as for any other iron or steel product. Additionally, the casting of the concrete product must take place in the US. The cement and other raw materials used in concrete production are not required to be of domestic origin.

If the reinforced concrete is cast at the construction site, the reinforcing bar and wire are considered to be a construction material and must be produced in the US.

Compliance

25) How should an assistance recipient document compliance with the AIS requirement?

In order to ensure compliance with the AIS requirement, specific AIS contract language must be included in each contract, starting with the assistance agreement, all the way down to the purchase agreements. Sample language for assistance agreements and contracts can be found in Appendix 3 and 4.

EPA recommends the use of a step certification process, similar to one used by the Federal Highway Administration. The step certification process is a method to ensure that producers adhere to the AIS requirement and assistance recipients can verify that products comply with the AIS requirement. The process also establishes accountability and better enables States to take enforcement actions against violators.

Step certification creates a paper trail which documents the location of the manufacturing process involved with the production of steel and iron materials. A step certification is a process under which each handler (supplier, fabricator, manufacturer,

processor, etc) of the iron and steel products certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin. A certification can be quite simple. Typically, it includes the name of the manufacturer, the location of the manufacturing facility where the product or process took place (not its headquarters), a description of the product or item being delivered, and a signature by a manufacturer's responsible party. Attached, as Appendix 5, are sample certifications. These certifications should be collected and maintained by assistance recipients.

Sample certifications included in General Requirements

Alternatively, the final manufacturer that delivers the iron or steel product to the worksite, vendor, or contractor, may provide a certification asserting that all manufacturing processes occurred in the US. While this type of certification may be acceptable, it may not provide the same degree of assurance. Additional documentation may be needed if the certification is lacking important information. Step certification is the best practice.

Contractor shall assist the Owner with documentation to substantiate a waiver request if requested. For complete text of the process, see full EPA memorandum "American Iron and Steel Requirement Guidance (PDF)" available at

http://water.epa.gov/grants_funding/aisrequirement.cfm

Waiver Process

The statute permits EPA to issue waivers for a case or category of cases where EPA finds (1) that applying these requirements would be inconsistent with the public interest; (2) iron and steel products are not produced in the US in sufficient and reasonably available quantities and of a satisfactory quality; or (3) inclusion of iron and steel products produced in the US will increase the cost of the overall project by more than 25 percent.

In order to implement the AIS requirements, EPA has developed an approach to allow for effective and efficient implementation of the waiver process to allow projects to proceed in a timely manner. The framework described below will allow States, on behalf of the assistance recipients, to apply for waivers of the AIS requirement directly to EPA Headquarters. Only waiver requests received from states will be considered. Pursuant to the Act, EPA has the responsibility to make findings as to the issuance of waivers to the AIS requirements.

Definitions

The following terms are critical to the interpretation and implementation of the AIS requirements and apply to the process described in this memorandum:

Reasonably Available Quantity: The quantity of iron or steel products is available or will be available at the time needed and place needed, and in the proper form or specification as specified in the project plans and design.

Satisfactory Quality: The quality of iron or steel products, as specified in the project plans and designs.

Assistance Recipient: A borrower or grantee that receives funding from a State CWSRF or DWSRF program.

Step-By-Step Waiver Process

Application by Assistance Recipient

Each local entity that receives SRF water infrastructure financial assistance is required by section 436 of the Act to use American made iron and steel products in the construction of its project. However, the recipient may request a waiver. Until a waiver is granted by EPA, the AIS requirement stands, except as noted above with respect to municipalities covered by international agreements.

The waiver process begins with the SRF assistance recipient. In order to fulfill the AIS requirement, the assistance recipient must in good faith design the project (where applicable) and solicit bids for construction with American made iron and steel products. It is essential that the assistance recipient include the AIS terms in any request for proposals or solicitations for bids, and in all contracts (see Appendix 3 for sample construction contract language). The assistance recipient may receive a waiver at any point before, during, or after the bid process, if one or more of three conditions is met:

INCLUDED IN AGREEMENT

1. Applying the American Iron and Steel requirements of the Act would be inconsistent with the public interest;
2. Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
3. Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Proper and sufficient documentation must be provided by the assistance recipient. A checklist detailing the types of information required for a waiver to be processed is attached as Appendix 1.

OTHER Q&A – FROM EPA WEBSITE

American Iron & Steel (AIS) Requirement of the Consolidated Appropriations Act of 2014 (Public Law 113-76) Q&A Part 1: Valves and Hydrants

Q1: Does the AIS requirement of the Consolidated Appropriations Act of 2014 require minor, miscellaneous components within a covered valve or hydrant, such as nuts, bolts and washers, to be made in the U.S.?

A1: The definition of "iron and steel products" that must either be domestically produced or subject to a waiver in order to comply with the AIS requirement of the Consolidated Appropriations Act of 2014 includes valves and hydrants. Unlike many other of the "iron and steel products" that are listed in the definition, valves and hydrants are typically precision mechanical products with multiple fitted, operating parts and connections. Valves and hydrants, unlike most of the other listed products, contain other minor components, such as small washers, nuts, and bolts that are of unknown origin but are added to the valve or hydrant during the manufacturing process. For purposes of the 2014 AIS requirement, EPA considers only the significant iron and steel components of a covered valve or hydrant – the body, bonnet, shoe, stem, and wedge/disc/gate/ball – to be within the definition of "iron and steel products" that must either be made domestically, or otherwise must comply with the AIS requirement. The minor components represent a very small percentage of the iron and steel in the hydrants and valves that are defined as "iron and steel products." These minor components, which EPA has learned through our research are currently difficult to find domestically in sufficient quantity, such as minor nuts, bolts, and washers, are not required to be of U.S. origin.

Q2: Do the actuators/control systems attached to valves have to comply with the AIS requirement, or just the valve itself?

A2: The AIS requirement of the Consolidated Appropriations Act of 2014 includes valves in its definition of "iron and steel products" that recipients must make certain are either domestically made or subject to a waiver in order to comply with the AIS requirement. Actuators and control systems are not included in the definition. Only the valve itself is required to be either domestically produced or subject to a waiver in order to be compliant with the AIS requirement. Absent a waiver, EPA considers valves and hydrants to be domestically produced if the significant iron and steel components of a covered valve or hydrant – the body, bonnet, shoe, stem, and wedge/disc/gate/ball – if made of iron or steel, is produced in the U.S. See Q1 above for a discussion about minor components. The valves and actuators, while often purchased and shipped together, are two unique products that are manufactured separately and typically attached together during the final step of the process. Valves are included in the definition of "iron and steel products" in the AIS requirement. Actuators, whether manual, electric, hydraulic or pneumatic, are not listed as an "iron and steel product" under the AIS requirement of the Consolidated Appropriations Act of 2014, nor are they considered construction materials. Therefore, they do not need to be domestically produced in the U.S. in order to comply with the requirement.

Q3: Are electric powered motor operated valves excluded based on the valve being motorized equipment (i.e. electrical equipment)?

A3: No, electric powered motor operated valves are not excluded based on the valve being motorized equipment. The actuator, a motor that controls the valve, is considered a separate product, which is not

listed as an "iron and steel product" under the AIS requirement of the Consolidated Appropriations Act of 2014, nor is it considered a construction material. Therefore, the actuator does not need to be domestically produced in the U.S. in order to comply with the requirement. See Q2 for further clarification.

Q4: Based on EPA's AIS guidance dated March 20, 2014, gates are not considered construction materials and therefore do not have to be produced in the U.S. Does that include gate valves?

A4: No, valves are specifically listed in the Consolidated Appropriations Act of 2014 as an "iron and steel product" and therefore, absent a waiver, must be produced in the U.S. to be in compliance with the requirement if they are "primarily" iron and steel. Gates as referenced in the EPA March 20, 2014 guidance refer only to common sluice and slide gates, and not to gate valves.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF WATER

DECISION MEMORANDUM

SUBJECT: De Minimis Waiver of Section 436 of P.L. 113-76, Consolidated Appropriations Act (CAA), 2014

FROM: Nancy K. Stoner
Acting Assistant Administrator

The EPA is hereby granting a nationwide waiver pursuant to the "American Iron and Steel (AIS)" requirements of P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), section 436 under the authority of Section 436(b)(1) (public interest waiver) for de minimis incidental components of eligible water infrastructure projects. This action permits the use of products when they occur in de minimis incidental components of such projects funded by the Act that may otherwise be prohibited under section 436(a). Funds used for such de minimis incidental components cumulatively may comprise no more than a total of 5 percent of the total cost of the materials used in and incorporated into a project; the cost of an individual item may not exceed 1 percent of the total cost of the materials used in and incorporated into a project.

P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), includes an "American Iron and Steel" (AIS) requirement in section 436 that requires Clean Water State Revolving Loan Fund (CWSRF) and Drinking Water State Revolving Loan Fund (DWSRF) assistance recipients to use specific domestic iron and steel products that are produced in the United States if the project is funded through an assistance agreement executed beginning January 17, 2014 (enactment of the Act), through the end of Fiscal Year 2014, unless the agency determines it necessary to waive this requirement based on findings set forth in Section 436(b). The Act states, "[the requirements] shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency…finds that— (1) applying subsection (a) would be inconsistent with the public interest" 436(b)(1).

In implementing section 436 of the Act, the EPA must ensure that the section's requirements are applied consistent with congressional intent in adopting this section and in the broader context of the purposes, objectives, and other provisions applicable to projects funded under the SRF. Water infrastructure projects typically contain a relatively small number of high-cost components incorporated into the project. In bid solicitations for a project, these high-cost components are generally described in detail via project specific technical specifications. For these major components, utility owners and their contractors are generally familiar with the conditions of availability, the potential alternatives for each detailed specification, the approximate cost, and the country of manufacture of the available components.

Every water infrastructure project also involves the use of thousands of miscellaneous, generally low-cost components that are essential for, but incidental to, the construction and are incorporated into the physical structure of the project. For many of these incidental components, the country of manufacture and the availability of alternatives is not always readily or reasonably identifiable prior to procurement in the normal course of business; for other incidental components, the country of manufacture may be known but the miscellaneous character in conjunction with the low cost, individually and (in total) as typically procured in bulk, mark them as properly incidental. Examples of incidental components could include small washers, screws, fasteners (i.e., nuts and bolts), miscellaneous wire, corner bead, ancillary tube, etc. Examples of items that are clearly not incidental include significant process fittings (i.e., tees, elbows, flanges, and brackets), distribution system fittings and valves, force main valves, pipes for sewer collection and/or water distribution, treatment and storage tanks, large structural support structures, etc.

The EPA undertook multiple inquiries to identify the approximate scope of de minimis incidental components within water infrastructure projects during the implementation of the American Reinvestment and Recovery Act (ARRA) and its requirements (Buy American provisions, specifically). The inquiries and research conducted in 2009 applies suitably for the case today. In 2009, the EPA consulted informally with many major associations representing equipment manufacturers and suppliers, construction contractors, consulting engineers, and water and wastewater utilities, and performed targeted interviews with several well-established water infrastructure contractors and firms who work in a variety of project sizes, and regional and demographic settings to ask the following questions:

- What percentage of total project costs were consumables or incidental costs?

- What percentage of materials costs were consumables or incidental costs?

- Did these percentages vary by type of project (drinking water vs. wastewater treatment plant vs. pipe)?

The responses were consistent across the variety of settings and project types, and indicated that the percentage of total costs for drinking water or wastewater infrastructure projects represented by these incidental components is generally not in excess of 5 percent of the total cost of the materials used in and incorporated into a project. In drafting this waiver, the EPA has considered the de minimis proportion of project costs generally represented by each individual type of these incidental components within the many types of such components comprising those percentages, the fact that these types of incidental components are obtained by contractors in many different ways from many different sources, and the disproportionate cost and delay that would be imposed on projects if the EPA did not issue this waiver.

Assistance recipients who wish to use this waiver should in consultation with their contractors determine the items to be covered by this waiver and must retain relevant documentation (i.e., invoices) as to those items in their project files.

If you have any questions concerning the contents of this memorandum, please contact Timothy Connor, Chemical Engineer, Municipal Support Division, at connor.timothy@epa.gov or (202) 566-1059 or Kirsten Anderer, Environmental Engineer, Drinking Water Protection Division, at anderer.kirsten@epa.gov or (202) 564-3134.

Issued on: APR 15 2014

Approved by: _____

Nancy K. Stoner
Acting Assistant Administrator

September 10, 2014

American Iron & Steel (AIS) Requirement of the Consolidated Appropriations Act of 2014
(Public Law 113-76)

Q&A Part 2

PRODUCT QUESTIONS

1. **Q: Do all fasteners qualify for de minimis exemption?**

   A: No. There is no broad exemption for fasteners from the American Iron and Steel (AIS) requirements. Significant fasteners used in SRF projects are not subject to the de minimis waiver for projects and must comply with the AIS requirements. Significant fasteners include fasteners produced to industry standards (e.g., ASTM standards) and/or project specifications, special ordered or those of high value. When bulk purchase of unknown-origin fasteners that are of incidental use and small value are used on a project, they may fall under the national de minimis waiver for projects. The list of potential items could be varied, such as big-box/hardware-store-variety screws, nails, and staples. The key characteristics of the items that may qualify for the de minimis waiver would be items that are incidental to the project purpose (such as drywall screws) and not significant in value or purpose (such as common nails or brads). See the following: http://water.epa.gov/grants_funding/upload/Deminimis-Waiver-04-15-14.pdf.

   EPA also clarifies that minor components of two listed products – valves and hydrants -- may not need to meet the AIS requirements if the minor components compromise a very small quantity of minor, low-cost fasteners that are of unknown origin. See EPA's questions and answers on the subject at the following: http://water.epa.gov/grants_funding/upload/AIS-QandA-Part-1-Valves-and-Hydrants-final.pdf.

2. **Q: Does PCCP pipe have to be domestically produced?**

   A: Yes. Pre-stressed concrete cylinder pipe (PCCP) or other similar concrete cylinder pipes would be comparable to pre-cast concrete which is specifically listed in the Consolidated Appropriations Act of 2014 as a product subject to the AIS requirement.

3. **Q: If the iron or steel is made from recycled metals will the vendor/supplier have to provide a certification document certifying that the recycled metals are domestically produced?**

   A: No. Recycled source materials used in the production of iron and steel products do not have to come from the U.S. Iron or steel scrap, for instance, are considered raw materials that may come from anywhere. While certification is not required for the raw material, EPA does recommend that additional final processing of iron and steel be certified to have occurred in the U.S.

4. **Q: Do tanks used for filtration systems, if delivered to the construction site separately and then filled with filtration media onsite, have to be domestically produced?**

A: No. Tanks that are specifically designed to be filters, or as parts of a filtration system, do not have to be domestically produced because these parts are no longer simply tanks, even if the filter media has not been installed and will be installed at the project site, as is customary to do for shipping purposes. These parts have only one purpose which is to be housing for filters and cannot be used in another fashion.

5. **Q: Can a recipient use non-domestic flanged pipe?**

   A: No. While the Consolidated Appropriations Act of 2014 does not specifically mention flanged pipe, since it does mention both pipe and flanges, both products would need to be domestically produced. Therefore, flanged pipe would also need to be domestically produced.

6. **Q: Can a recipient use non-domestic couplings, expansion joints, and other similar pipe connectors?**

   A: No. These products would be considered specialty fittings, due to their additional functionality, but still categorized under the larger "fitting" categorization. Fittings are defined as a material that joins pipes together or connects to a pipe (AWWA, The Drinking Water Dictionary, 2000). Therefore, these products must comply with the AIS requirements and be produced domestically.

7. **Q: Can a recipient use non-domestic service saddles and tapping sleeves?**

   A: No. These products are necessary for pipe repair, to tap a water main, or to install a service or house connection. Therefore, they are included under the larger "pipe restraint" category which is a specifically identified product subject to the domestic preference in the Consolidated Appropriations Act of 2014.

8. **Q: The AIS guidance does not appear to cover reused items (i.e., existing pipe fittings, used storage tanks, reusing existing valves). How should reused items be addressed?**

   A: The AIS guidance does not address reuse of items. Reuse of items that would otherwise be covered by AIS is acceptable provided that the item(s) was originally purchased prior to January 17, 2014, the reused item(s) is not substantially altered from original form/function, and any restoration work that may be required does not include the replacement or addition of foreign iron or steel replacement parts. EPA recommends keeping a log of these reused items by including them on the assistance recipient's de minimis list, and stating therein that these items are reused products. The donation of new items (such as a manufacturer waiving cost for certain delivered items because of concerns regarding the origin of a new product) is not, however, considered reuse.

9. **Q: What does "time needed" mean in the AIS guidance, in reference to the definition of "Reasonably Available Quantity"?**

A: For considering whether a product would meet reasonably available quantity, "time needed" is based on the construction schedule. If the item is delayed and there is substantial impact on the overall construction schedule, this would not be according to the "time needed."

10. **Q: If a product is not specifically included on the list of AIS covered products, must it comply with AIS?**

    A: Possibly. The AIS requirements include a list of specifically covered products, one of which is construction materials, a broad category of potential products. For construction materials, EPA's AIS guidance includes a set of example items that it considers construction materials composed primarily of iron and steel and covered by the Act. This example list in the guidance is not an all-inclusive list of potential construction materials. However, the guidance also includes a list of items that EPA specifically does not consider construction materials, generally those of electrical or complex-mechanical nature. If a product is similar to the ones in the non-construction material list (and it is also not specifically listed by the Act), it is not a construction material. For all other items specifically included in the Act, coverage is generally self-evident.

11. **Q: If a listed iron and steel product is used as a part for an assembled product that is non-domestic, do the AIS requirements apply?**

    A: AIS requirements only apply to the final product as delivered to the work site and incorporated into the project. Other assemblies, such as a pumping assembly or a reverse osmosis package plant, are distinct products not listed and do not need to be made in the U.S. or composed of all U.S. parts. Therefore, for the case of a non-covered product used in a larger non-domestic assembly, the components, even if specifically listed in the Consolidated Appropriations Act, do not have to be domestically produced.

12. **Q: Is cast iron excluded from the AIS requirements?**

    A: No. Cast iron products that fall under the definition of iron and steel products must comply with the AIS requirements.

13. **Q: The guidance states that "construction materials" do not include mechanical equipment, but then identifies ductwork as a construction material. Please clarify.**

    A: Ductwork is not mechanical equipment, therefore it is considered a "construction material" and must comply with the AIS requirements.

14. **Q: Do "meters" mentioned in EPA's guidance as non-construction materials include both flow meters and water meters?**

    A: Yes. "Meters" includes any type of meter, including: flow meters, wholesale meters, and water meters/service connections.

15. **Q: Must coiled steel be domestic?**

    A: Yes. Coiled steel is an intermediate product used in the production of steel pipe and must come from a U.S. source or subject to a waiver in order to comply with the AIS requirements.

16. **Q: Are pig iron, direct reduced iron (DRI), and ingot considered raw materials?**

    A: No. These are considered intermediate products used in the production of iron or steel and must come from a U.S. source or subject to a waiver in order to comply with the AIS requirements.

17. **Q: Can assistance recipients rely on a marking that reads, "Made in the USA," as evidence that all processes took place in the U.S.?**

    A: No. This designation is not consistent with our requirements that all manufacturing processes of iron and steel products must take place in the U.S.

18. **Q: When determining what constitutes a product made "primarily" of iron or steel, who makes this determination?**

    A: The manufacturer will show if its product qualifies as primarily made of iron or steel. The recipient should expect the manufacturer to provide documentation/ certification that its product is AIS compliant.

19. **Q: Do aerators need to be produced domestically in order to comply with AIS?**

    A: No. Aerators, similar to pumps, are mechanical equipment that do not need to meet the AIS requirements. "Blowers/aeration equipment, compressors" are listed in EPA's guidance as non-construction materials.

20. **Q: Are Sluice and Slide Gates considered valves?**

    A: No. Valves are products that are generally encased / enclosed with a body, bonnet, and stem. Examples include enclosed butterfly, ball, globe, piston, check, wedge, and gate valves. Furthermore, "gates" (meaning sluice, slide or weir gates) are listed in EPA's guidance as non-construction materials.

AIS PROCESS QUESTIONS

21. **Q: Will notices of waiver applications be published in the federal register?**

    A: No. Applications for waivers will be published on EPA's website (http://water.epa.gov/grants_funding/aisrequirement.cfm**).** EPA will provide 15 days for open public comment, as noted on the website.

22. **Q: Will states be collecting the step certification paper trail, as presented in the AIS guidance?**

    A. No. Assistance recipients must maintain documentation of compliance with AIS. EPA recommends use of the step certification process. This process is a best practice and traces all manufacturing of iron and steel products to the U.S. If the process is used, the state does not have to collect the documentation. The documents must be kept by the assistance recipient and reviewed by the state during project reviews.

23. **Q: Why is it considered a best practice for states to conduct site visits, when it is the assistance recipient's responsibility to meet the AIS requirements?**

    A: It is both the assistance recipient's and the state's responsibility to ensure compliance with the AIS requirements. The state is the recipient of a federal grant and must comply with all grant conditions, including a condition requiring that the AIS requirements be adhered to. Therefore, it is recommended that states conduct site visits of projects during construction and review documentation demonstrating the assistance recipient's proof of compliance.

24. **Q: Please further define the state's role in the waiver process.**

    A: The state's role in the waiver process is to review any waiver requests submitted to the state in order to ensure that all necessary information has been provided by the assistance recipient prior to forwarding the request to EPA. If a state finds the request lacking, the state should work with the assistance recipient to help obtain complete information.

25. **Q: How much time does EPA have to evaluate the waiver during the evaluation step?**

    A: At a minimum, EPA is required to provide 15 days for open public comment. There is no specific deadline or time limit for EPA to review waiver requests. Each waiver request will come with its own specific details and circumstances and may require a different amount of time for review and analysis. For example, public interest waivers in general may take longer to review than availability waivers which are typically more straightforward. However, EPA understands that construction may be delayed while waiting for a waiver and will make every effort to review and issue decisions on waiver requests in a timely manner.

PROJECT QUESTIONS

26. **Q: What if a project is funded by another funding entity (i.e., United States Department of Agriculture – Rural Development) where AIS is not required and begins construction after January 17, 2014 but then applies to the SRF to refinance the project? Are they ineligible?**

A: The project is not ineligible. AIS requirements will apply to any construction that occurs after the assistance agreement is signed, through the end of construction. If construction is complete, there is no retroactive application of the AIS requirements.

27. **Q: If the assistance recipient can demonstrate through market research that the AIS requirement will exceed the 25 percent cost threshold, is the entire project exempt from the AIS requirement?**

    A: If the waiver application shows that the inclusion of American iron and steel products causes the entire cost of the project to increase by more the 25 percent, a waiver may be granted for the entirety of the project.

28. **Q: Can the recipient use non-SRF funds to pay for the non-compliant item.**

    A: No. It is not an acceptable to use non-SRF funds to pay for a non-compliant item. The Consolidated Appropriations Act of 2014 requires that all iron and steel products, no matter the source of funding, must be made in the U.S. if SRF funds are used in the project.

29. **Q: What constitutes "satisfactory quality" as defined in the AIS guidance, in reference to the availability waiver process.**

    A: "Satisfactory quality" means the product meets the project design specifications. A waiver may be granted if a recipient determines that the project plans and design would be compromised because there are no American made products available that meet the project design specifications.

30. **Q: The guidance states that the AIS requirement applies to any project "funded in whole or in part" by an SRF. Where is this in the Act?**

    A: The Act states that, "None of the funds made available by a … [State SRF program] … shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States." This sentence clearly states that no SRF program may use its funds for a project unless all of the iron and steel products used in the project are made in the U.S. This is true even if only $1 of SRF funding is used in the project.

31. **Q: There is always an expectation on the part of an assistance recipient that the construction phase of a planning and/or design only loan will be funded through the SRF. If the original planning and/or design only loan was executed prior to a January 17, 2014, does this mean the entire project will be exempt from the AIS requirement?**

    A: If the original loan includes construction, and was executed prior to January 17, 2014, then the AIS provision does not apply to the project. If the original loan was only for planning and/or design, then a written commitment or documented "expectation" is needed to show exemption from the

requirements. Appearance on a priority list in an Intended Use Plan along with written reasonable assurance from the state that the recipient will receive SRF funding for project construction could provide sufficient evidence of "expectation of funding".

32. **Q: What if there has been a change order or redesign requiring new plans and specifications to be approved and they were approved after January 17, 2014: does the project now have to comply with AIS?**

    A: In most cases, no. Change orders are typically small enough changes that the original plan and specification date will still hold true. For example, if a pipe alignment has to be changed for a block or two due to unforeseen conditions, but new plans and specifications had to be submitted for this section of the project, then that could be considered a minor change. However, if there has been a major redesign, perhaps the whole project had to be redesigned starting from scratch, then the new plans and specification approval date would apply.

33. **Q: What if the bids on a project with plans and specifications approved before January 17, 2014 but the loan is signed after January 17, 2014 come in low, and there is significant funding remaining in the loan agreement, so the community designs a second project with the remaining funds: does that project have to comply with the AIS requirements?**

    A: If the second project is closely related in purpose, place and time to the first project, then the second project would be exempt from the AIS requirements. It is the assistance recipient's responsibility (with state oversight) to show that a project is closely related, or not, in purpose, place and time.

34. **Q: What if the assistance agreement was signed after January 17, 2014, state approval of plans for the first phase of the project was in place prior to January 17, 2014, but state approval of the plans for the second phase of the project was received after January 17, 2014?**

    A: In such a case, the AIS provision would not apply to the first phase of the project. If the second phase of the project is considered the same project as the first phase, due to its close relation in purpose, place and time, the entire project may be exempt. It is the assistance recipient's responsibility (with state oversight) to show that phases of a project is closely related, or not, in purpose, place and time.

35. **Q: Do products purchased through procurement-only contracts have to be comply with AIS?**

    A: Yes. For projects funded by SRF, the products procured under any form of contract must comply with AIS. A procurement-only contract generally involves the bulk purchase of common items (such as pipe, concrete, and/or pumps) of independent timing from a set of planned projects. If products which are purchased through a procurement-only contract are being installed under another contract, the procurement-only contract would probably not be considered a separate project in purpose, place and time; and therefore, would have to comply with the AIS requirements.

POLICY MEMORANDUM NO. CG-10 **CHANGE ORDERS**

Executed change orders submitted to the Division for review and processing for financial assistance must be prepared on the attached Change Order Forms (CG-10, Attachment 1, pages A-1 & A-2) with a duplicate copy, calculation sheet(s) (CG-10, Attachment 2), and all other supporting documentation necessary for evaluation. Failure to comply with these instructions will result in delays in processing the change order and/or limited financial assistance. FORM IS INCLUDED AS C-006363A (or C-00639A)

M.G.L. c.44, s.31C requires that the auditor, accountant, or other municipal officer having similar duties must certify that adequate funding in an amount sufficient to cover the total cost of the change order has been made. Change orders will not be processed or approved until this certification is made on the face of the Change Order Form (CG-10 Attachment 1).

Payment of Change Orders:

Payment of all change orders shall be in accordance with the relevant provisions of Massachusetts General laws, Chapter 30, Section 39G for non-building construction and Section 39K for building construction.

Payment of change orders shall be made in accordance with one of the following three methods:

A. Existing unit prices as set forth in the contract; or
B. Agreed upon lump sum or unit prices; or
C. Time and materials

A. Payment for work for which there is a unit price in the contract:

Where the contract contains a unit price for work and the Engineer orders a change for work of the same kind as other work contained in the contract and is performed under similar physical conditions, the contractor may accept full and final payment at the contract unit price(s) for the acceptable quantities.

B. Payment for work or materials for which no price is contained in the contract:

If the Engineer directs, the contractor shall submit promptly in writing to the Engineer and offer to do the required work on a lump sum or unit price basis, as specified by the Engineer. The stated price, either lump sum or unit price, shall be divided so as to show that it is the sum of:

(1) The estimated cost of labor, plus
(2) Direct Labor Cost, plus
(3) Material and Freight Costs, plus
(4) Equipment Costs, plus
(5) An amount not to exceed 20% of the sum of items (1) through (4) for overhead and profit, plus (if applicable),
(6) In the case of work done by a subcontractor an amount not to exceed 7 ½ %, for the general contractor of the sum of items (1) through (4) for his overhead and profit, less, if applicable,
(7) Credits for work deleted from the contract.

C. Payment for work on a time and materials basis:

Unless an agreed lump sum and/or unit price is obtained from above and is so stated in the change price, the contractor shall accept as full payment for which no other agreement is contained in contract, and amount equal to:

(1) The estimated cost of Labor, plus
(2) Direct Labor Cost, plus
(3) Material and Freight Costs, plus
(4) Equipment Costs, plus
(5) An amount not to exceed 20% of the sum of items (1) through (4) for overhead and profit, plus (if applicable),
(6) In the case of work done by a subcontractor an amount not to exceed 7 ½ %, for the general contractor of the sum of items (1) through (4) for his overhead and profit, less, if applicable,
(7) Credits for work deleted from the contract.

Explanation of items (1) through (7) as outlined in "B" and "C":

(1) Labor – Only those workers employed on the project who are doing the extra work, including the foreman in charge, are allowable. General foremen, superintendents, or other supervisory personnel are considered to be included in the overhead markup as provided in items (5) and/or (6). Hourly labor rates in excess of those as listed in the contract wage rates (Federal or State, whichever applies) require documentation. As a minimum, an explanation and the appropriate copy of the certified payroll are required.

(2) Direct Labor Costs - These costs are limited to those which are required in the contract document. Coverage in excess of the contract provisions, secured by the contractor/subcontractor(s) at his option, are ineligible for financial assistance. The following list of typical direct labor charges is provided for your assistance and is in no way intended to be complete or all encompassing:

- Workman's Compensation
- Federal/State: Social Security Tax and Unemployment Tax;
- Health, Welfare and Pension Benefits; (this cost is included in the wage rates appearing in the Mass. Wage Rates of the contract specifications)
- Liability Insurance: Bodily Injury; Excess Umbrella; Property damage; Public Liability
- Blasters Insurance
- Builders Risk Insurance
- Experience Modification Insurance
- Surcharges

If applied to any required direct labor costs.

Following the Notice of Intent to Award, the Owner shall require the Low Bidder to submit the percentage to be used for the Direct Labor Cost markup, along with the breakdown of how it is calculated (this number shall be required and submitted to MassDEP before and Authorization to Award is issued by DMS). This documented direct labor cost may be adjusted upon the submission of new documentation which demonstrates both how and why it has changed.

(3) Material and Freight – Only those materials required as a result of the change order and reasonable freight charges for delivery of same are allowable.

(4) Equipment – Only the equipment required as a result of the change order is allowable. Equipment rental rates shall be governed by the current Nielson/Dataquest Rental Rate bluebook for Construction Equipment (the "Bluebook"). In determining the rental rate the following shall apply:

(a) For equipment already on the project – the monthly prorated rental rate by the hourly use shall be applicable;
(b) For equipment not on the project the daily rate, the weekly rate, or monthly rate will prevail, whichever will prove to be most cost effective. Small tools and manual equipment are examples of costs not allowable under this item. These costs are considered to be included in the overhead markup as provided in items (5) and/or (6) (1 month (normal use) = 176 hours)

(5) & (6) Overhead and Profit – All other costs not previously mentioned are considered to be included in this item, be it for the general contractor or subcontractor(s).

(7) Credits – Work deleted, material and equipment removed from the contractor, stored and/or returned shall be credited to the cost of the change order, less costs.

The Contractor shall furnish itemized statements of the cost of the work ordered and shall give the Engineer access to all accounts, bills and vouchers relating thereto; and unless the Contractor shall furnish such itemized statements, and access to all accounts, bills and vouchers, he shall not be entitled to payment for any items of extra work for which such information is sought by the Engineer. Deviations from any of the above will be reviewed for financial assistance on a case-by-case basis.

The change order will be prepared in such manner as to clearly separate Eligible and Ineligible Costs.

CHANGE ORDER FORM

SRF Number _____
Public Entity _____
Contract Number _____
Change Order Number _____

Contract Amount (As Bid) $ _____

Net Change in Contract Price (this change order) $ _____

Total Adjusted Contract Price (including this and all other change orders) $ _____

This change order extends the time to complete the work by _____ calendar days.

The extended completion date is _____

This change order checked by _____ _____
(Chief) Resident Engineer Date

This change order is requested by: _____

This change order is recommended by: _____

_____ _____ _____
Consultant Engineer P.E. Number Date

The undersigned agree to the terms of the change order.

_____ _____
Contractor Date

_____ _____
Owner Date

Certification of Appropriation under M.G.L. c.44, §31C: Adequate funding in an amount sufficient to cover the total cost of this change order is available.

By: _____ _____
Certification Officer (Auditor, accountant, treasurer) Date

Do not write below: this space reserved for STATE AGENCY APPROVAL

DEP/DMS

CHANGE ORDER FORM (Continued)

Public Entity _____

SRF No: _____ Contract No. _____ Change Order No. _____

Contract Title: _____

Owner's Name: _____

Owner's Address: _____

Contractor's Name: _____

Contractor's Address: _____

Description of Change

_____
_____
_____
_____
_____
_____
_____
_____

Reason for Change

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

CALCULATION SHEET

(1) Labor

Foreman	10 hrs @ $10.00/hr.	$ 100.00	
Engineer	10 hrs @ 8.50/hr	85.00	
Operator	10 hrs @ 9.50/hr	95.00	
Laborers	24 hrs @ 7.00/hr	168.00	
			$448.00

(2) Direct Labor Cost (use the agreed upon Direct Labor Cost)

*	(30)% of $448	
*	(Used for example purposes only)	134.00

(3) Materials & Freight

150 l.f. of 12" pipe @ $2.00/l.f.	$ 300.00	
15 v.f. precast SMH	1,700.00	
Freight (slip # _____ Enclosed)	25.00	
		2,025.00

(4) Equipment

1 Backhoe 10 hrs @ $80.00/hr	$ 800.00	
1 Truck-crane 10 hrs @ $100.00/hr	1,000.00	
		1,800.00
Total (Items 1 through 4)		4,407.00

(5) 20% markup for Overhead, Profit

20% of $4,407	881.00

(6) 7 ½% markup for general contractor (if subcontractor is involved)

7 ½% of $4,407	331.00

(7) Credits (deductibles) - 323.00

Total Cost $ 5,296.00

Reminder: Provide support documentation as necessary i.e. vouchers, correspondence, Calculation, photographs, reports …….

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SECTION 00 73 19

HEALTH AND SAFETY REQUIREMENTS

Contractor shall comply with the following minimum requirements and is solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

A. Code of Federal Regulations, Chapter XVII-Occupational Safety and Health Administration (OSHA), Department of Labor, Title 29, Part 1926, Safety and Health Regulations for Construction

1. Contractor shall strictly comply with the Hazard Communication Standard 1910.1200 regulated by OSHA, including providing and maintaining Safety Data Sheets, labeling of hazardous substances, and providing required protective equipment and training and instruction to personnel on the Site including Owner and Engineer's personnel.

B. ANSI/ASSE A10 series of safety construction standards including the "Manual of Accident Prevention In Construction" published by The Associated General Contractors of America

C. Protection of personnel and equipment under electric lines: comply with the AASHTO Guide on Occupational Safety on Highway Construction Projects, Subpart N, 1926.550, relating to construction equipment clearances at overhead electric lines especially during operations using large vehicles.

D. Pursuant to *MGL Chapter 30, Section 39M and 39S*, all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins Work, and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee. Any employee found on a Work Site subject to this section without documentation of successful completion of a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration shall be subject to immediate removal.

E. This Project is also subject to the following.

- MGL Chapter 82, *The Laying Out, Alteration, Relocation and Discontinuance Of Public Ways, And Specific Repairs Thereon, Section 40:*

  Section 40 Definitions
  Section 40A Excavations; notice
  Section 40B Designation of location of underground facilities
  Section 40C Excavator's responsibility to maintain designation markings; damage caused by excavator
  Section 40D Local laws requiring excavation permits; public ways

- MGL Chapter 82A, *Excavation and Trench Safety*

  Section 1 Unattended open trenches; safety hazards; rules and regulations; fines
  Section 2 Trench excavating permits; permits issued by board or officer; certificate of insurance; fees
  Section 3 Form of trench excavation permits; required statements
  Section 4 Definitions
  Section 5 Additional requirements

- MGL Chapter 149

  Section 6C Health and safety of general public and asbestos workers; rules and regulations
  Section 18A Sanitary and safety conditions; tools
  Section 18B Confined spaces; ventilation
  Section 18C Power transmission equipment
  Section 18D Ropes, hooks and cranes; use and operation
  Section 18E Safety precautions in dangerous undertakings
  Section 18F Explosives
  Section 18G Industrial truck and internal combustion equipment
  Section 129A Shoring Trenches for local governments

- Massachusetts Department of Labor and Industries, Division of Occupational Safety (Chapter 454 CMR 10.00 et seq.)

- Massachusetts Department of Public Safety "*Excavation and Trench Safety*" (Chapter 520 CMR 14.00 et seq.)

END OF SECTION

SECTION 00 73 37

EQUAL EMPLOYMENT OPPORTUNITY/ AFFIRMATIVE ACTION REQUIREMENTS (STANDARD FEDERAL)

The content of this Section does not represent or reflect all applicable Laws and Regulations and may only include excerpts and portions of certain Laws and Regulations. Other provisions required by statute shall be deemed to be so included and incorporated herein. Contractor is solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

A. The Contractor shall comply with all provisions of Executive Order No. 11246 as amended, and of the rules, Regulations, and relevant orders of the Secretary of Labor as applicable, and additional provisions for federally-assisted construction contracts, including those required by 41 CFR 60 and 48 CFR 52.

B. In the event of the Contractor's noncompliance with any of such rules, Regulations, or orders, the Contract may be cancelled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further contracts in accordance with procedures authorized in Executive Order No. 11246 as amended, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 as amended, or by rule, Regulation, or order of the Secretary of Labor, or as otherwise provided by Law.

C. The Contractor shall include the applicable provisions of this Section in every subcontract or Purchase Order unless exempted by rules, Regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 as amended, so that such provisions shall be binding upon each Subcontractor or vendor or Supplier.

D. The Contractor shall comply with the DBE requirements applicable to the Contract, if any, as may be included in Section 00 73 38.

E. Contractor shall have submitted required related documents and certifications with its Bid, if any, and shall obtain signed copies of such documents and certifications from each Subcontractor and Supplier at Notice of Award, which shall be incorporated into the Contract at Section 00 54 00.

ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR Data is current as of November 12, 2013

Title 41: Public Contracts and Property Management
PART 60-1—OBLIGATIONS OF CONTRACTORS AND SUBCONTRACTORS

Subpart A—Preliminary Matters; Equal Opportunity Clause; Compliance Reports

Contents

Back to Top

§60-1.1 Purpose and application.

The purpose of the regulations in this part is to achieve the aims of parts II, III, and IV of Executive Order 11246 for the promotion and insuring of equal opportunity for all persons, without regard to race, color, religion, sex, or national origin, employed or seeking employment with Government contractors or with contractors performing under federally assisted construction contracts. The regulations in this part apply to all contracting agencies of the Government and to contractors and subcontractors who perform under Government contracts, to the extent set forth in this part. The regulations in this part also apply to all agencies of the Government administering programs involving Federal financial assistance which may include a construction contract, and to all contractors and subcontractors performing under construction contracts which are related to any such programs. The procedures set forth in the regulations in this part govern all disputes relative to a contractor's compliance with his obligations under the equal opportunity clause regardless of whether or not his contract contains a "Disputes" clause. Failure of a contractor or applicant to comply with any provision of the regulations in this part shall be grounds for the imposition of any or all of the sanctions authorized by the order. The regulations in this part do not apply to any action taken to effect compliance with respect to employment practices subject to title VI of the Civil Rights Act of 1964. The rights and remedies of the Government hereunder are not exclusive and do not affect rights and remedies provided elsewhere by law, regulation, or contract; neither do the regulations limit the exercise by the Secretary or Government agencies of powers not herein specifically set forth, but granted to them by the order.

§60-1.4 Equal opportunity clause.

During the performance of this contract, the contractor agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.

(3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The contrator will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: *Provided, however,* That in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.

§60-1.7 Reports and other required information.

(a) *Requirements for prime contractors and subcontractors.* (1) Each prime contractor and subcontractor shall file annually, on or before the September 30, complete and accurate reports on Standard Form 100 (EEO-1) promulgated jointly by the Office of Federal Contract Compliance Programs, the Equal Employment Opportunity Commission and Plans for Progress or such form as may hereafter be promulgated in its place if such prime contractor or subcontractor (i) is not exempt from the provisions of these regulations in accordance with §60-1.5; (ii) has 50 or more employees; (iii) is a prime contractor or first tier subcontractor; and (iv) has a contract, subcontract or purchase order amounting to $50,000 or more or serves as a depository of Government funds in any amount, or is a financial institution which is an issuing and paying agent for U.S. savings bonds and savings notes: *Provided,* That any subcontractor below the first tier which performs construction work at the site of construction shall be required to file such a report if it meets requirements of paragraphs (a)(1) (i), (ii), and (iv) of this section.

(2) Each person required by §60-1.7(a)(1) to submit reports shall file such a report with the contracting or administering agency within 30 days after the award to him of a contract or subcontract, unless such person has submitted such a report within 12 months preceding the date of the award. Subsequent reports shall be submitted annually in accordance with §60-1.7(a)(1), or at such other intervals as the Deputy Assistant Secretary may require. The Deputy Assistant Secretary may extend the time for filing any report.

(3) The Deputy Assistant Secretary or the applicant, on their own motions, may require a contractor to keep employment or other records and to furnish, in the form requested, within reasonable limits, such information as the Deputy Assistant Secretary or the applicant deems necessary for the administration of the order.

(4) Failure to file timely, complete and accurate reports as required constitutes noncompliance with the prime contractor's or subcontractor's obligations under the equal opportunity clause and is ground for the imposition by the Deputy Assistant Secretary, an applicant, prime contractor or subcontractor, of any sanctions as authorized by the order and the regulations in this part.

§60-1.8 Segregated facilities.

To comply with its obligations under the Order, a contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensuring that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. This obligation extends to all contracts containing the equal opportunity clause regardless of the amount of the contract. The term "facilities," as used in this section, means waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, wash rooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees; *Provided,* That separate or single-user restrooms and necessary dressing or sleeping areas shall be provided to assure privacy between the sexes.

ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR Data is current as of November 8, 2013

Title 48: Federal Acquisition Regulations System
PART 52—SOLICITATION PROVISIONS AND CONTRACT CLAUSES
Subpart 52.2—Text of Provisions and Clauses

52.222-26 Equal Opportunity.

As prescribed in 22.810(e), insert the following clause:

EQUAL OPPORTUNITY (MAR 2007)

(a) *Definition. United States,* as used in this clause, means the 50 States, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, the U.S. Virgin Islands, and Wake Island.

(b)(1) If, during any 12-month period (including the 12 months preceding the award of this contract), the Contractor has been or is awarded nonexempt Federal contracts and/or subcontracts that have an aggregate value in excess of $10,000, the Contractor shall comply with this clause, except for work performed outside the United States by employees who were not recruited within the United States. Upon request, the Contractor shall provide information necessary to determine the applicability of this clause.

(2) If the Contractor is a religious corporation, association, educational institution, or society, the requirements of this clause do not apply with respect to the employment of individuals of a particular religion to perform work connected with the carrying on of the Contractor's activities (41 CFR 60-1.5).

(c)(1) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. However, it shall not be a violation of this clause for the Contractor to extend a publicly announced preference in employment to Indians living on or near an Indian reservation, in connection with employment opportunities on or near an Indian reservation, as permitted by 41 CFR 60-1.5.

(2) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. This shall include, but not be limited to, (i) employment, (ii) upgrading, (iii) demotion, (iv) transfer, (v) recruitment or recruitment advertising, (vi) layoff or termination, (vii) rates of pay or other forms of compensation, and (viii) selection for training, including apprenticeship.

(3) The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this clause.

(4) The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(5) The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.

(6) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(7) The Contractor shall furnish to the contracting agency all information required by Executive Order 11246, as amended, and by the rules, regulations, and orders of the Secretary of Labor. The Contractor shall also file Standard Form 100 (EEO-1), or any successor form, as prescribed in 41 CFR part 60-1. Unless the Contractor has filed within the 12 months preceding the date of contract award, the Contractor shall, within 30 days after

contract award, apply to either the regional Office of Federal Contract Compliance Programs (OFCCP) or the local office of the Equal Employment Opportunity Commission for the necessary forms.

(8) The Contractor shall permit access to its premises, during normal business hours, by the contracting agency or the OFCCP for the purpose of conducting on-site compliance evaluations and complaint investigations. The Contractor shall permit the Government to inspect and copy any books, accounts, records (including computerized records), and other material that may be relevant to the matter under investigation and pertinent to compliance with Executive Order 11246, as amended, and rules and regulations that implement the Executive Order.

(9) If the OFCCP determines that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts, under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended; in the rules, regulations, and orders of the Secretary of Labor; or as otherwise provided by law.

(10) The Contractor shall include the terms and conditions of this clause in every subcontract or purchase order that is not exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor.

(11) The Contractor shall take such action with respect to any subcontract or purchase order as the contracting officer may direct as a means of enforcing these terms and conditions, including sanctions for noncompliance; *provided*, that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of any direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

(d) Notwithstanding any other clause in this contract, disputes relative to this clause will be governed by the procedures in 41 CFR 60-1.1.

(End of clause)

Alternate I (FEB 1999). As prescribed in 22.810(e), add the following as a preamble to the clause:

Notice. The following terms of this clause are waived for this contract: ___ [*Contracting Officer shall list terms*].

[48 FR 42478, Sept. 19, 1983, as amended at 63 FR 70286, Dec. 18, 1998; 67 FR 13067, Mar. 20, 2002; 72 FR 13588, Mar. 22, 2007]

For questions or comments regarding e-CFR editorial content, features, or design, email ecfr@nara.gov.
For questions concerning e-CFR programming and delivery issues, email webteam@gpo.gov.

Joint Reporting Committee
- Equal Employment Opportunity Commission
- Office of Federal Contract Compliance Programs (Labor)

EQUAL EMPLOYMENT OPPORTUNITY
EMPLOYER INFORMATION REPORT EEO—1

Standard Form 100 (Rev. 3/97)
O.M.B. No. 3046-0007
EXPIRES 10/31/99
100-214

Section A—TYPE OF REPORT
Refer to instructions for number and types of reports to be filed.

1. Indicate by marking in the appropriate box the type of reporting unit for which this copy of the form is submitted (MARK ONLY ONE BOX).

(1) ☐ Single-establishment Employer Report

Multi-establishment Employer:
(2) ☐ Consolidated Report (Required)
(3) ☐ Headquarters Unit Report (Required)
(4) ☐ Individual Establishment Report (submit one for each establishment with 50 or more employees)
(5) ☐ Special Report

2. Total number of reports being filed by this Company (Answer on Consolidated Report only) _____

Section B—COMPANY IDENTIFICATION (*To be answered by all employers*) — OFFICE USE ONLY

1. Parent Company
a. Name of parent company (owns or controls establishment in item 2) omit if same as label — a.

Address (Number and street) — b.

City or town | State | ZIP code — c.

2. Establishment for which this report is filed. (Omit if same as label)
a. Name of establishment — d.

Address (Number and street) | City or Town | County | State | ZIP code — e.

b. Employer Identification No. (IRS 9-DIGIT TAX NUMBER) — f.

c. Was an EEO–1 report filed for this establishment last year? ☐ Yes ☐ No

Section C—EMPLOYERS WHO ARE REQUIRED TO FILE (*To be answered by all employers*)

☐ Yes ☐ No 1. Does the entire company have at least 100 employees in the payroll period for which you are reporting?

☐ Yes ☐ No 2. Is your company affiliated through common ownership and/or centralized management with other entities in an enterprise with a total employment of 100 or more?

☐ Yes ☐ No 3. Does the company or any of its establishments (a) have 50 or more employees AND (b) is not exempt as provided by 41 CFR 60–1.5, AND either (1) is a prime government contractor or first-tier subcontractor, and has a contract, subcontract, or purchase order amounting to $50,000 or more, or (2) serves as a depository of Government funds in any amount or is a financial institution which is an issuing and paying agent for U.S. Savings Bonds and Savings Notes?

If the response to question C–3 is yes, please enter your Dun and Bradstreet identification number (If you have one): ☐☐☐☐☐☐☐☐☐

NOTE: If the answer is yes to questions 1, 2, or 3, complete the entire form, otherwise skip to Section G.

SF 100 Page 2

Section D—EMPLOYMENT DATA

Employment at this establishment—Report all permanent full-time and part-time employees including apprentices and on-the-job trainees unless specifically excluded as set forth in the instructions. Enter the appropriate figures on all lines and in all columns. Blank spaces will be considered as zeros.

JOB CATEGORIES		NUMBER OF EMPLOYEES										
			MALE					FEMALE				
		OVERALL TOTALS (SUM OF COL. B THRU K)	WHITE (NOT OF HISPANIC ORIGIN)	BLACK (NOT OF HISPANIC ORIGIN)	HISPANIC	ASIAN OR PACIFIC ISLANDER	AMERICAN INDIAN OR ALASKAN NATIVE	WHITE (NOT OF HISPANIC ORIGIN)	BLACK (NOT OF HISPANIC ORIGIN)	HISPANIC	ASIAN OR PACIFIC ISLANDER	AMERICAN INDIAN OR ALASKAN NATIVE
		A	B	C	D	E	F	G	H	I	J	K
Officials and Managers	1											
Professionals	2											
Technicians	3											
Sales Workers	4											
Office and Clerical	5											
Craft Workers (Skilled)	6											
Operatives (Semi-Skilled)	7											
Laborers (Unskilled)	8											
Service Workers	9											
TOTAL	10											
Total employment reported in previous EEO-1 report	11											

NOTE: Omit questions 1 and 2 on the Consolidated Report.

1. Date(s) of payroll period used:

2. Does this establishment employ apprentices?
1 ☐ Yes 2 ☐ No

Section E—ESTABLISHMENT INFORMATION *(Omit on the Consolidated Report)*

1. What is the major activity of this establishment? (Be specific, i.e., manufacturing steel castings, retail grocer, wholesale plumbing supplies, title insurance, etc. Include the specific type of product or type of service provided, as well as the principal business or industrial activity.)

OFFICE USE ONLY

g.

Section F—REMARKS

Use this item to give any identification data appearing on last report which differs from that given above, explain major changes in composition of reporting units and other pertinent information.

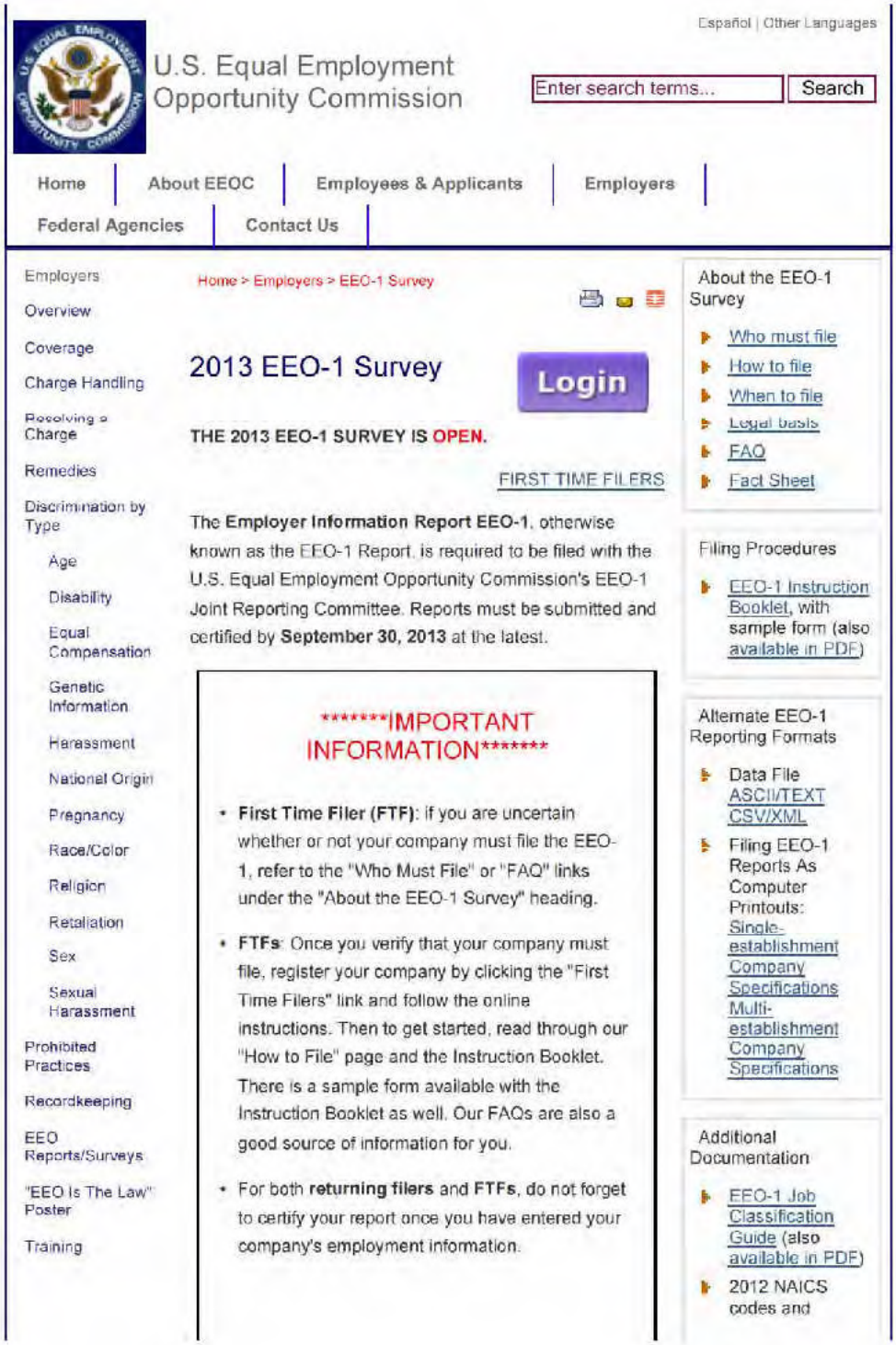
Section G—CERTIFICATION *(See Instructions G)*

Check one
1 ☐ All reports are accurate and were prepared in accordance with the instructions (check on consolidated only)
2 ☐ This report is accurate and was prepared in accordance with the instructions.

Name of Certifying Official	Title	Signature	Date

Name of person to contact regarding this report (Type or print)	Address (Number and Street)			
Title	City and State	ZIP Code	Telephone Number (Including Area Code)	Extension

All reports and information obtained from individual reports will be kept confidential as required by Section 709(e) of Title VII.
WILLFULLY FALSE STATEMENTS ON THIS REPORT ARE PUNISHABLE BY LAW, U.S. CODE, TITLE 18, SECTION 1001.



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Home | About EEOC | Employees & Applicants | Employers | Federal Agencies | Contact Us

Employers
Overview
Coverage
Charge Handling
Receiving a Charge
Remedies
Discrimination by Type
Age
Disability
Equal Compensation
Genetic Information
Harassment
National Origin
Pregnancy
Race/Color
Religion
Retaliation
Sex
Sexual Harassment
Prohibited Practices
Recordkeeping
EEO Reports/Surveys
"EEO Is The Law" Poster
Training

Home > Employers > EEO-1 Survey

2013 EEO-1 Survey

Login

THE 2013 EEO-1 SURVEY IS OPEN.

FIRST TIME FILERS

The **Employer Information Report EEO-1**, otherwise known as the EEO-1 Report, is required to be filed with the U.S. Equal Employment Opportunity Commission's EEO-1 Joint Reporting Committee. Reports must be submitted and certified by **September 30, 2013** at the latest.

*******IMPORTANT INFORMATION*******

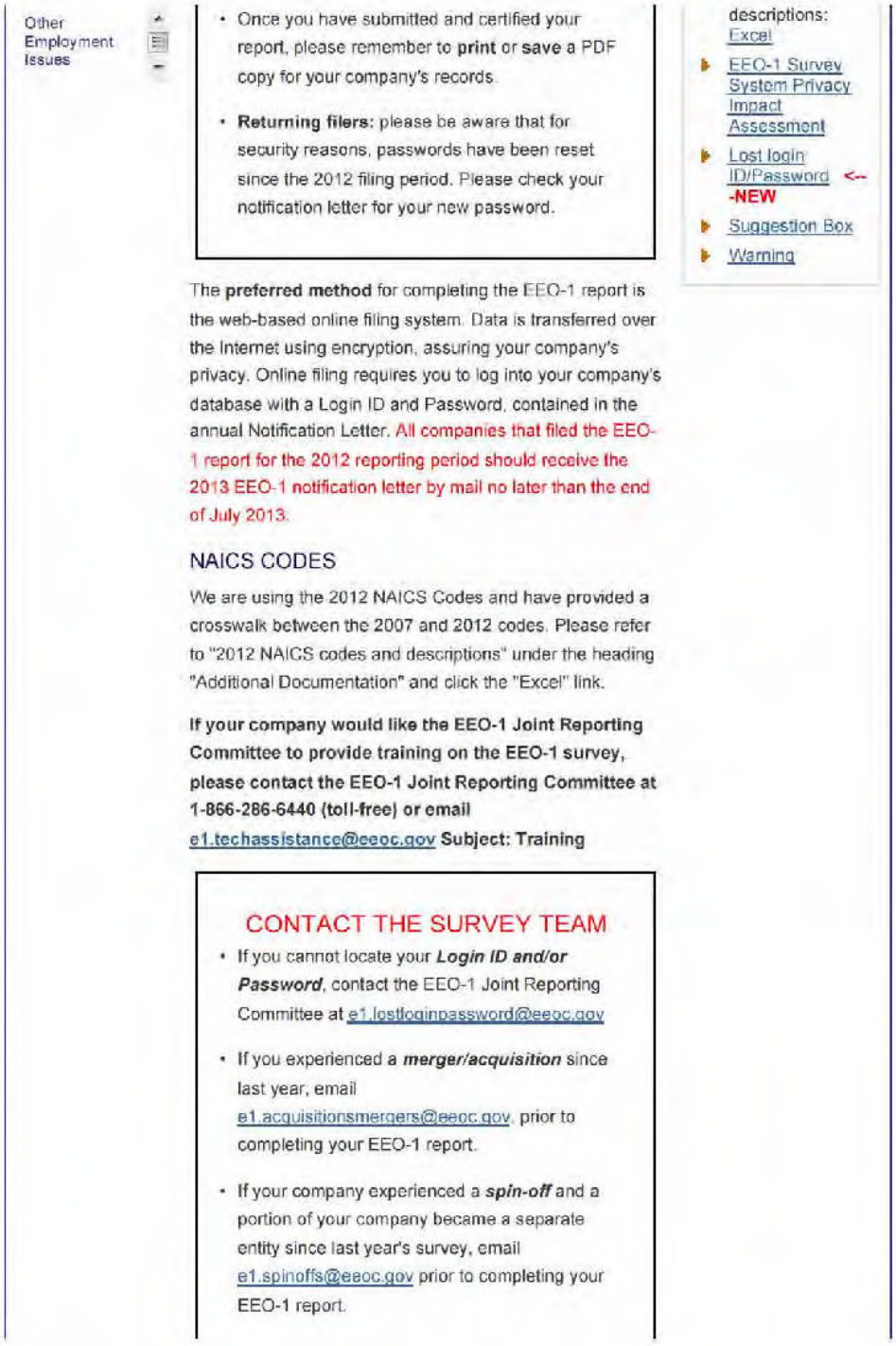
- **First Time Filer (FTF)**: If you are uncertain whether or not your company must file the EEO-1, refer to the "Who Must File" or "FAQ" links under the "About the EEO-1 Survey" heading.
- **FTFs**: Once you verify that your company must file, register your company by clicking the "First Time Filers" link and follow the online instructions. Then to get started, read through our "How to File" page and the Instruction Booklet. There is a sample form available with the Instruction Booklet as well. Our FAQs are also a good source of information for you.
- For both **returning filers** and **FTFs**, do not forget to certify your report once you have entered your company's employment information.

About the EEO-1 Survey
- Who must file
- How to file
- When to file
- Legal basis
- FAQ
- Fact Sheet

Filing Procedures
- EEO-1 Instruction Booklet, with sample form (also available in PDF)

Alternate EEO-1 Reporting Formats
- Data File ASCII/TEXT CSV/XML
- Filing EEO-1 Reports As Computer Printouts: Single-establishment Company Specifications Multi-establishment Company Specifications

Additional Documentation
- EEO-1 Job Classification Guide (also available in PDF)
- 2012 NAICS codes and



Other Employment Issues

- Once you have submitted and certified your report, please remember to **print** or **save** a PDF copy for your company's records.
- **Returning filers:** please be aware that for security reasons, passwords have been reset since the 2012 filing period. Please check your notification letter for your new password.

The **preferred method** for completing the EEO-1 report is the web-based online filing system. Data is transferred over the Internet using encryption, assuring your company's privacy. Online filing requires you to log into your company's database with a Login ID and Password, contained in the annual Notification Letter. All companies that filed the EEO-1 report for the 2012 reporting period should receive the 2013 EEO-1 notification letter by mail no later than the end of July 2013.

NAICS CODES

We are using the 2012 NAICS Codes and have provided a crosswalk between the 2007 and 2012 codes. Please refer to "2012 NAICS codes and descriptions" under the heading "Additional Documentation" and click the "Excel" link.

If your company would like the EEO-1 Joint Reporting Committee to provide training on the EEO-1 survey, please contact the EEO-1 Joint Reporting Committee at 1-866-286-6440 (toll-free) or email e1.techassistance@eeoc.gov Subject: Training

CONTACT THE SURVEY TEAM

- If you cannot locate your ***Login ID and/or Password***, contact the EEO-1 Joint Reporting Committee at e1.lostloginpassword@eeoc.gov
- If you experienced a ***merger/acquisition*** since last year, email e1.acquisitionsmergers@eeoc.gov, prior to completing your EEO-1 report.
- If your company experienced a ***spin-off*** and a portion of your company became a separate entity since last year's survey, email e1.spinoffs@eeoc.gov prior to completing your EEO-1 report.

descriptions: Excel

- EEO-1 Survey System Privacy Impact Assessment
- Lost login ID/Password <-- **-NEW**
- Suggestion Box
- Warning

- If you receive a ***warning message*** while attempting to file your company's report, email e1.warning@eeoc.gov or call the Surveys Division of the EEOC.

Further questions may be addressed to:

EEOC - Surveys Division
131 M Street, NE - Room 4SW22G
Washington, D.C. 20507
Phone: 1-877-392-4647 or 1-866-286-6440
Fax: 202-663-7185
Email: e1.techassistance@eeoc.gov

** If your company would like training on the EEO-1 survey, please contact the EEO-1 Joint Reporting Committee at 1-866-286-6440 (toll-free) or email e1.techassistance@eeoc.gov Subject: Training

The EEO-1 Joint Reporting Committee would like your feedback. If you have suggestions or comments regarding the EEO-1 Survey please send an email to: E1.Suggestionbox@eeoc.gov.

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ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR Data is current as of November 5, 2013

Title 41: Public Contracts and Property Management

PART 60-4—CONSTRUCTION CONTRACTORS—AFFIRMATIVE ACTION REQUIREMENTS

Contents

AUTHORITY: Secs. 201, 202, 205, 211, 301, 302, and 303 of E.O. 11246, as amended, 30 FR 12319; 32 FR 14303, as amended by E.O. 12086.

SOURCE: 43 FR 49254, Oct. 20, 1978, unless otherwise noted.

Back to Top

§60-4.1 Scope and application.

This part applies to all contractors and subcontractors which hold any Federal or federally assisted construction contract in excess of $10,000. The regulations in this part are applicable to all of a construction contractor's or subcontractor's construction employees who are engaged in on site contruction including those construction employees who work on a non-Federal or nonfederally assisted construction site. This part also establishes procedures which all Federal contracting officers and all applicants, as applicable, shall follow in soliciting for and awarding Federal or federally assisted construction contracts. Procedures also are established which administering agencies shall follow in making any grant, contract, loan, insurance, or guarantee involving federally assisted construction which is not exempt from the requirements of Executive Order 11246, as amended.

In addition, this part applies to construction work performed by construction contractors and subcontractors for Federal nonconstruction contractors and subcontractors if the construction work is necessary in whole or in part to the performance of a nonconstruction contract or subcontract.

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS
(EXECUTIVE ORDER 11246)

1. As used in these specifications:

a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

d. "Minority" includes:

(i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted constuction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the FEDERAL REGISTER in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newpaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

(b) The notice set forth in 41 CFR 60-4.2 and the specifications set forth in 41 CFR 60-4.3 replace the New Form for Federal Equal Employment Opportunity Bid Conditions for Federal and Federally Assisted Construction published at 41 FR 32482 and commonly known as the Model Federal EEO Bid Conditions, and the New Form shall not be used after the regulations in 41 CFR part 60-4 become effective.

§60-4.7 Effect on other regulations.

The regulations in this part are in addition to the regulations contained in this chapter which apply to construction contractors and subcontractors generally. See particularly, 41 CFR 60-1.4 (a), (b), (c), (d), and (e); 60-1.5; 60-1.7; 60-1.8; 60-1.26; 60-1.29; 60-1.30; 60-1.32; 60-1.41; 60-1.42; 60-1.43; and 41 CFR part 60-3; part 60-20; part 60-30; part 60-40; and part 60-50.

§60-4.9 Incorporation by operation of the order.

By operation of the order, the equal opportunity clause contained in §60-1.4, the Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246) contained in §60-4.2, and the Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246) contained in §60-4.3 shall be deemed to be a part of every solicitation or of every contract and subcontract, as appropriate, required by the order and the regulations in this chapter to include such clauses whether or not they are physically incorporated in such solicitation or contract and whether or not the contract is written.

ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR Data is current as of November 8, 2013

Title 48: Federal Acquisition Regulations System
PART 52—SOLICITATION PROVISIONS AND CONTRACT CLAUSES
Subpart 52.2—Text of Provisions and Clauses

52.222-27 Affirmative Action Compliance Requirements for Construction.

As prescribed in 22.810(f), insert the following clause:

AFFIRMATIVE ACTION COMPLIANCE REQUIREMENTS FOR CONSTRUCTION (FEB 1999)

(a) *Definitions.*

Covered area, as used in this clause, means the geographical area described in the solicitation for this contract.

Deputy Assistant Secretary, as used in this clause, means the Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, or a designee.

Employer identification number, as used in this clause, means the Federal Social Security number used on the employer's quarterly Federaltax return, U.S. Treasury Department Form 941.

Minority, as used in this clause, means—

(1) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

(2) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands);

(3) Black (all persons having origins in any of the black African racial groups not of Hispanic origin); and

(4) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race).

(b) If the Contractor, or a subcontractor at any tier, subcontracts a portion of the work involving any construction trade, each such subcontract in excess of $10,000 shall include this clause and the Notice containing the goals for minority and female participation stated in the solicitation for this contract.

(c) If the Contractor is participating in a Hometown Plan (41 CFR 60-4) approved by the U.S. Department of Labor in a covered area, either individually or through an association, its affirmative action obligations on all work in the plan area (including goals) shall comply with the plan for those trades that have unions participating in the plan. Contractors must be able to demonstrate participation in, and compliance with, the provisions of the plan. Each Contractor or subcontractor participating in an approved plan is also required to comply with its obligations under the Equal Opportunity clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good-faith performance by other Contractors or subcontractors toward a goal in an approved plan does not excuse any Contractor's or subcontractor's failure to make good-faith efforts to achieve the plan's goals.

(d) The Contractor shall implement the affirmative action procedures in subparagraphs (g)(1) through (16) of this clause. The goals stated in the solicitation for this contract are expressed as percentages of the total hours of employment and training of minority and female utilization that the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. If the Contractor performs

construction work in a geographical area located outside of the covered area, it shall apply the goals established for the geographical area where that work is actually performed. The Contractor is expected to make substantially uniform progress toward its goals in each craft.

(e) Neither the terms and conditions of any collective bargaining agreement, nor the failure by a union with which the Contractor has a collective bargaining agreement, to refer minorities or women shall excuse the Contractor's obligations under this clause, Executive Order 11246, as amended, or the regulations thereunder.

(f) In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

(g) The Contractor shall take affirmative action to ensure equal employment opportunity. The evaluation of the Contractor's compliance with this clause shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and implement affirmative action steps at least as extensive as the following:

(1) Ensure a working environment free of harassment, intimidation, and coercion at all sites and in all facilities where the Contractor's employees are assigned to work. The Contractor, if possible, will assign two or more women to each construction project. The Contractor shall ensure that foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at these sites or facilities.

(2) Establish and maintain a current list of sources for minority and female recruitment. Provide written notification to minority and female recruitment sources and community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

(3) Establish and maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant, referrals of minorities or females from unions, recruitment sources, or community organizations, and the action taken with respect to each individual. If an individual was sent to the union hiring hall for referral and not referred back to the Contractor by the union or, if referred back, not employed by the Contractor, this shall be documented in the file, along with whatever additional actions the Contractor may have taken.

(4) Immediately notify the Deputy Assistant Secretary when the union or unions with which the Contractor has a collective bargaining agreement has not referred back to the Contractor a minority or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

(5) Develop on-the-job training opportunities and/or participate in training programs for the area that expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under subparagraph (g)(2) of this clause.

(6) Disseminate the Contractor's equal employment policy by—

(i) Providing notice of the policy to unions and to training, recruitment, and outreach programs, and requesting their cooperation in assisting the Contractor in meeting its contract obligations;

(ii) Including the policy in any policy manual and in collective bargaining agreements;

(iii) Publicizing the policy in the company newspaper, annual report, etc.;

(iv) Reviewing the policy with all management personnel and with all minority and female employees at least once a year; and

(v) Posting the policy on bulletin boards accessible to employees at each location where construction work is performed.

(7) Review, at least annually, the Contractor's equal employment policy and affirmative action obligations with all employees having responsibility for hiring, assignment, layoff, termination, or other employment decisions. Conduct review of this policy with all on-site supervisory personnel before initiating construction work

at a job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

(8) Disseminate the Contractor's equal employment policy externally by including it in any advertising in the news media, specifically including minority and female news media. Provide written notification to, and discuss this policy with, other Contractors and subcontractors with which the Contractor does or anticipates doing business.

(9) Direct recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students, and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than 1 month before the date for acceptance of applications for apprenticeship or training by any recruitment source, send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

(10) Encourage present minority and female employees to recruit minority persons and women. Where reasonable, provide after-school, summer, and vacation employment to minority and female youth both on the site and in other areas of the Contractor's workforce.

(11) Validate all tests and other selection requirements where required under 41 CFR 60-3.

(12) Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities. Encourage these employees to seek or to prepare for, through appropriate training, etc., opportunities for promotion.

(13) Ensure that seniority practices, job classifications, work assignments, and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment-related activities to ensure that the Contractor's obligations under this contract are being carried out.

(14) Ensure that all facilities and company activities are nonsegregated except that separate or single-user rest rooms and necessary dressing or sleeping areas shall be provided to assure privacy between the sexes.

(15) Maintain a record of solicitations for subcontracts for minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

(16) Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's equal employment policy and affirmative action obligations.

(h) The Contractor is encouraged to participate in voluntary associations that may assist in fulfilling one or more of the affirmative action obligations contained in subparagraphs (g)(1) through (16) of this clause. The efforts of a contractor association, joint contractor-union, contractor-community, or similar group of which the contractor is a member and participant may be asserted as fulfilling one or more of its obligations under subparagraphs (g)(1) through (16) of this clause, provided the Contractor—

(1) Actively participates in the group;

(2) Makes every effort to ensure that the group has a positive impact on the employment of minorities and women in the industry;

(3) Ensures that concrete benefits of the program are reflected in the Contractor's minority and female workforce participation;

(4) Makes a good-faith effort to meet its individual goals and timetables; and

(5) Can provide access to documentation that demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply is the Contractor's, and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

(i) A single goal for minorities and a separate single goal for women shall be established. The Contractor is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and nonminority. Consequently, the Contractor may be in violation of Executive Order 11246, as amended, if a particular group is employed in a substantially disparate manner.

(j) The Contractor shall not use goals or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

(k) The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts under Executive Order 11246, as amended.

(l) The Contractor shall carry out such sanctions and penalties for violation of this clause and of the Equal Opportunity clause, including suspension, termination, and cancellation of existing subcontracts, as may be imposed or ordered under Executive Order 11246, as amended, and its implementing regulations, by the OFCCP. Any failure to carry out these sanctions and penalties as ordered shall be a violation of this clause and Executive Order 11246, as amended.

(m) The Contractor in fulfilling its obligations under this clause shall implement affirmative action procedures at least as extensive as those prescribed in paragraph (g) of this clause, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of Executive Order 11246, as amended, the implementing regulations, or this clause, the Deputy Assistant Secretary shall take action as prescribed in 41 CFR 60-4.8.

(n) The Contractor shall designate a responsible official to—

(1) Monitor all employment-related activity to ensure that the Contractor's equal employment policy is being carried out;

(2) Submit reports as may be required by the Government; and

(3) Keep records that shall at least include for each employee the name, address, telephone number, construction trade, union affiliation (if any), employee identification number, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; *however*, to the degree that existing records satisfy this requirement, separate records are not required to be maintained.

(o) Nothing contained herein shall be construed as a limitation upon the application of other laws that establish different standards of compliance or upon the requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

(End of clause)

[48 FR 42478, Sept. 19, 1983, as amended at 55 FR 38518, Sept. 18, 1990; 63 FR 70286, Dec. 18, 1998]

For questions or comments regarding e-CFR editorial content, features, or design, email ecfr@nara.gov.
For questions concerning e-CFR programming and delivery issues, email webteam@gpo.gov.

END OF SECTION

SECTION 00 73 38

D/MBE & D/WBE REQUIREMENTS

This Project is subject to the following. "Special Provisions for Disadvantaged Business Enterprises" of the Massachusetts Department of Environmental Protection Division of Municipal Services, April 2014.

DISADVANTAGED BUSINESS ENTERPRISE PROGRAM BACKGROUND

In May 2008 a United States Environmental Protection Agency (EPA) rule became effective that changed the Minority Business Enterprise (MBE) and Women Business Enterprise (WBE) Program to a Disadvantaged Business Enterprise (DBE) Program.

For firms to qualify under the old MBE/WBE program they needed to be socially disadvantaged and had to be certified by the Supplier Diversity Office (SDO). Under the new DBE rule, the firms must be both **socially** and **economically** disadvantaged, citizens of the United States, and certified as a DBE. Women and certain minorities are presumed to be socially disadvantaged. The economic disadvantage is measured by the owner's initial and continuing personal net worth of less than $1,320,000.

Because the Clean Water Act requires the use of MBEs and WBEs, these firms will still be utilized in the State Revolving Fund (SRF) Loan Program, but they must also be certified as DBEs.

SDO will continue to be the certifying agency for the SRF program. SDO certifies firms under the federal Department of Transportation program, which is acceptable for use in the SRF program. An additional form has been added to the DBE package to verify that the DBEs are owned or controlled by United States citizens.

I. CONTRACT GOALS

The fair share goals for disadvantaged business enterprise (DBE) participation for this Contract are a minimum of **3.40 percent Disadvantaged Minority Business Enterprise (D/MBE)** participation and **3.80 percent Disadvantaged Women Business Enterprise (D/WBE)** participation, applicable to the total dollar amount paid for the construction Contract. The Contractor shall take all affirmative steps necessary to achieve this goal, and shall provide reports documenting the portion of Contract and subcontract dollars paid to DBEs, and its efforts to achieve the goals, with each invoice submitted or at such greater intervals as specified by the Owner. The Contractor shall require similar reports from its Subcontractors.

II. DEFINITIONS

For the purpose of these provisions, the following terms are defined as follows:

A. Awarding Authority – Entity that awards a prime contract under a State Revolving Fund loan. Also "Owner".

B. Bidder - Any individual, partnership, joint venture, corporation, or firm submitting a price, directly or through an authorized representative, for the purpose of performing construction or construction related activities under a contract.

C. Certified DBE – A DBE certified by the United States Small Business Administration, under its 8(a) Business Development Program (13 CFR part 124, subpart A) or its Small Disadvantaged Business Program (13 CFR part 124, subpart B); The United States Department of Transportation (DOT), under its regulations for Participation by DBSs in DOT programs (49 CFR parts 23 and 26); or SDO in accordance with 40 CFR part 33; provided that the certification meets the U.S. citizenship requirement under 40 CFR §33.202 or §33.203.

D. Compliance Unit - A subdivision of MassDEP's Affirmative Action Office designated to ensure compliance under these provisions.

E. Contractor - Any business that contracts or subcontracts for construction, demolition, renovation, survey, or maintenance work in the various classifications customarily used in work and that is acting in this capacity under the subject Contract.

F. Construction Related Services - Those services performed at the Work Site ancillary to, and/or in support of, the construction work, such as hauling, trucking, equipment operation, surveying or other technical services, etc. For the purposes hereof, supply and delivery of materials (e.g. pre-cast concrete elements) to the Site by a Supplier who has manufactured those goods, or substantially altered them before re-sales shall be considered as "Construction Related Services".

G. Construction Work - The activities at the Work Site, or labor and use of materials in the performance of constructing, reconstructing, erecting, demolishing, altering, installing, disassembling, excavating, etc., all or part of the work required by the Contract Documents.

H. Disadvantaged Business Enterprise (DBE) - An entity owned or controlled by a socially and economically disadvantaged individual as described by Public Law 102-389 (42 U.S.C. 4370d) or an entity owned and controlled by a socially and economically disadvantaged individual as described by Title X of the Clean Air Act Amendments of 1990 (42 U.S.C. 7601 note); a Small Business Enterprise (SBE); a Small Business in a Rural Area (SBRA); or a Labor Surplus Area Firm

(LAF), a Historically Underutilized Business (HUB) Zone Small Business Concern, or a concern under a successor program.

I. Equipment Rental Firm - A firm that owns equipment and assumes actual and contractual responsibility for renting said equipment to perform a useful function of the work of the Contract consistent with normal industry practice.

J. Good Faith Efforts – The race and/or gender neutral measures described in 40 CFR 33, subpart C.

K. HUBZone - A historically underutilized business zone, which is an area located within one or more qualified census tracts, qualified metropolitan counties, or lands within the external boundaries of an Indian reservation.

L. HUBZone small business concern - A small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.

M. Joint Venture - An agreement between SDO certified DBE and a non-DBE or non-DBE controlled enterprise.

1. A pairing of companies will be considered a DBE joint venture if the SDO certified DBE which is part of the relationship has more than 51% of the profits that are derived from that project.

2. A joint venture between a certified DBE Subcontractor and a non DBE Subcontractor, in which the DBE for that proportion of the joint venture's contract equal to the DBE participation in the joint venture.

3. Whenever a general Bid is filed by a joint venture with a certified DBE participant in the joint venture that does not exercise more than 51% control over management and profits, that joint venture shall be entitled to credit as a DBE for that portion of the joint venture's contract equal to the DBE participation in the joint venture.

N. Labor surplus area firm (LSAF) - A concern that together with its first-tier Subcontractors will perform substantially in labor surplus areas (as identified by the Department of Labor in accordance with 20 CFR part 654). Performance is substantially in labor surplus areas if the costs incurred under the Contract on account of manufacturing, production or performance of appropriate services in labor surplus areas exceed 50 percent of the Contract Price.

O. Letter of Intent – Certified document signed by the principal(s) of the DBE with respect to the Work to be performed under the Contract.

P. Local Government Unit (LGU) – A city, town, or municipal district which applies for a loan under the Water Pollution Abatement Trust Program. Also "Owner".

Q. Material Supplier – A vendor or Supplier certified by SDO as a DBE in sales to supply industry from an established place of business or source of supply, and that vendor.

1. Manufactures goods from raw materials, or substantially utilizes them in the work, or substantially alters them before resale, entitling the general Contractor to DBE credit for 100% of the purchase order; or

2. Provides and maintains a storage facility for materials utilized in the Work, entitling the general Contractor to DBE credit for 10% of the purchase order.

R. Minority and Women Business Enterprise (M/WBE) – Any business concern certified by the SDO as a bona-fide M/WBE. A bona-fide M/WBE is a business whose minority group/women ownership interests are real, which have at least 51% ownership and control over management and operation.

S. Percent of Total Contract Price – Is the percentage to be paid to the DBE for Work they perform, as compared to the total Contract Price.

T. Recipient - An agency, person or political subdivision which has been awarded or received financial assistance by the Trust or MassDEP. Also "Owner".

U. Small business, small business concern or small business enterprise (SBE) - A concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding, and qualified as a small business under the criteria and size standards in 13 CFR part 121.

V. Small business in a rural area (SBRA) - A small business operating in an area identified as a rural county with a code 6-9 in the Rural-Urban continuum Classification Code developed by the United States Department of Agriculture in 1980.

W. SDO – The Supplier Diversity Office.

X. Subcontractor – A company, firm, joint venture, or individual who enters into an agreement with the Contractor to provide services pursuant to an award of financial assistance.

Y. Total Contract Price – The total amount of compensation to be paid for all materials, Work or services rendered in the performance of the Contract.

Z. Trust – The Massachusetts Water Pollution Abatement Trust established by M.G.L. c.29.

III. DISADVANTAGED BUSINESS ENTERPRISES PARTICIPATION

A. Reporting Requirements

1. The Contractor's utilization of certified DBEs will be documented based upon submittal of the LGU's monthly Payment Requisitions as reported on Form-2000. The Form-2000 form will show all certified DBEs performing work on the Project regardless of any billing activity for that month. For auditing and accounting purposes, the Contractor periodically may be required to submit copies of canceled checks verifying that payments have been made to the certified DBE as listed on the schedule. The Contractor may also be required to submit current schedules on utilization of all DBEs to indicate when their services will commence and be billed for.

2. During the life of the Contract, the Contractor's fulfillment of the percentage requirements in Part I shall be determined with reference to the Contract Price as follows:

   a. If the price in the Contract executed exceeds the base Bid price (e.g., because an alternate was selected or because unit prices were used in awarding the Contract), the Contractor shall submit for approval by MassDEP a revised Schedule of Participation by certified DBEs satisfying the percentage requirements and such other information concerning additional DBE participation as may be requested by MassDEP.

   b. If the Contract price increases after execution due to change orders or other adjustments, MassDEP may require the Contractor to subcontract additional work or to purchase additional goods and services from certified DBEs up to the percentages stated in Part I.

IV. COMPLIANCE

A. The Contractor shall not perform with its own organization, or subcontract to any other primary or Subcontractor any Work designated for the named certified DBEs on the Schedule of Participation (Form EEO-DEP-190) submitted by the Contractor prior to award without the approval of MassDEP.

B. A Contractor's compliance with the percentage requirement in Part I shall continue to be determined by reference to the required percentage of the total Contract Price as stated in Part I even though the total of actual Contract payments may be greater or less than the Bid price.

C. If the Contractor for reasons beyond its control cannot comply with Schedule of Participation provided with its Bid, the Contractor must submit to MassDEP as soon as it is aware of the deficiency, the reason for its inability to comply. Proposed revisions to the Schedule of Participation stating how the Contractor intends to meet its obligations under these conditions must be submitted within ten (10) working days of notification.

D. If the Contractor is becomes aware by any means that that DBE is no longer certified, the Contractor shall immediately notify MassDEP. The Contractor shall use good faith efforts to retain a substitute certified DBE.

E. If a certified DBE listed in the Schedule of Participation fails to obtain a performance or payment bond requested by the Contractor, said failure shall not entitle the Contractor to avoid the requirements of Part I or the Schedule of Participation. The Contractor shall not change the certified DBE listed in its Schedule of Participation at the time of the award or make any other such substitutions without the written approval of MassDEP.

V. SANCTIONS

A. If the Contractor does not comply with the terms of these Special Provisions, the Awarding Authority may (1) suspend any payment for the Work that should have been performed by a certified DBE pursuant to the Schedule of Participation, or (2) require specific performance of the Contractor's obligation by requiring the Contractor to subcontract with a DBE for any contract or specialty item at the Contract Price established for that item in the Bid submitted by the Contractor.

B. To the extent that the Contractor has not complied with the terms of these Special Provisions, the Awarding Authority may retain in connection with Estimates and Payments, an amount determined by multiplying the Contractor Price by the percentages in Section I, less the amount paid to DBE's for Work performed under the Contract and any payments already suspended under V.A above.

C. The Awarding Authority may suspend, terminate or cancel this Contract, in whole or in part, or may call upon the Contractor's surety to perform all terms and conditions in the Contract, unless the Contractor is able to demonstrate his compliance with the terms of these Special Provisions, and further deny to the Contractor, the right to participate in any future contracts awarded by the Awarding Authority for a period of up to three years.

D. In any proceeding involving the imposition of sanctions by the Awarding Authority, no sanctions shall be imposed if the Awarding Authority finds that the Contractor has taken every possible measure to comply with these Special Provisions or that some other justifiable reason exists for waiving these Special Provisions in whole or in part.

E. The Contract shall provide such information as is necessary in the judgment of the Awarding Authority to ascertain its compliance with the terms of these Special Provisions.

F. A Contractor shall have the right to request suspension of any sanctions imposed under this section upon demonstrating that he is in compliance with these Special Provisions.

END OF SECTION

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DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF MUNICIPAL SERVICES

SCHEDULE OF PARTICIPATION FOR SRF CONSTRUCTION

Project Title: **Project Location:**

Disadvantaged Minority Business Enterprise Participation in the SRF Loan Work

Name & Address of D/MBE	Nature of Participation	Dollar Value of Participation
1.		
2.		
3.		
	Total D/MBE Commitment:	$
Percentage D/MBE Participation = (Total D/MBE Commitment) / (Bid Price) =		%

Disadvantaged Women Business Enterprise Participation in the SRF Loan Work

Name & Address of D/WBE	Nature of Participation	Dollar Value of Participation
1.		
2.		
3.		
	Total D/WBE Commitment:	$
Percentage D/WBE Participation = (Total D/WBE Commitment) / (Bid Price) =		%

The Bidder agrees to furnish implementation reports as required by MassDEP to indicate the D/MBEs and D/WBE(s) which it has used or intends to use. Breach of this commitment constitutes a breach of the contract.

Name of Bidder: _____

Date: _____ By: _____
Signature

NOTE: Participation of a DBE may be counted in only their certified category; the same dollar participation cannot be used in computing the percentage of D/MBE participation and again of D/WBE participation.

June 2012 EEO-DEP-190C

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DBE CERTIFICATION OF UNITED STATES CITIZENSHIP

For the SRF program, under the EPA Disadvantage Business Enterprise (DBE) Rule, a DBE must be owned or controlled by a socially and economically disadvantaged person that is also a **citizen of the United States** (*See* 40 CFR 33.202). "Ownership" is defined at 13 CFR 124.105 and "control" is defined at 13 CFR 124.106.

DBEs are certified for the SRF program through the Supplier Diversity Office using the federal Department of Transportation (DOT) DBE rules. EPA allows the use of DBEs certified under the DOT rules as long as they are also United States citizens. To ensure compliance with the EPA rule, MassDEP must verify United States citizenship through the completion of the following form for each DBE used on the project.

SRF Project Number _____

Contract Number _____

Contract Title _____

DBE Subcontractor _____

The undersigned, on behalf of the above named DBE subcontractor, hereby certifies that the DBE firm is either owned or controlled by a person or persons that are citizens of the United States.

_____
Printed Name and Title of DBE Signatory

_____
DBE Signature

_____
Date

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DISADVANTABED BUSINESS ENTERPRISE PROGRAM
DBE SUBCONTRACTOR PARTICIPATION FORM

The United States Environmental Protection Agency (EPA) requires that this form be provided to all subcontractors on the project. At the option of the subcontractor, this form may be filled out and submitted directly to the EPA DBE Coordinator.

NAME OF SUBCONTRACTOR	PROJECT NAME
ADDRESS	CONTRACT NO.
TELEPHONE NO.	E-MAIL ADDRESS
PRIME CONTRACTOR NAME:	

Please use the space below to report any concerns regarding the above EPA-funded project (e.g., reason for termination by prime contractor, late payment, etc.).

_____

_____

_____

_____

_____

CONTRACT ITEM NO.	ITEM OF WORK OR DESCRIPTION OF SERVICES RECEIVED FROM THE PRIME CONTRACTOR	AMOUNT SUBCONTRACTOR WAS PAID BY PRIME CONTRACTOR

_____ _____

Subcontractor Signature Title/Date

Equivalent to EPA form 6100-2

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REQUEST FOR WAIVER FOR SRF CONSTRUCTION

Upon exhausting all known sources and making every possible effort to meet the minimum requirements for DBE participation, the Bidder may seek relief either partially or entirely from these requirements by submitting a completed waiver package by the close of business on the third business day after notification by the LGU. Failure to comply with this process shall be cause to reject the bid thereby rendering the Bidder not eligible for award of the contract.

General Information

Project Title: _____ Project Location: _____

Bid Opening (time/date) _____

Bidder: _____

Mailing Address: _____

Contact Person: _____ Telephone No. ( ) _____ Ext. _____

Minimum Requirements

The bidder must demonstrate that good faith efforts were undertaken to comply with the percentage goals as specified. The firm seeking relief must show that such efforts were taken appropriately in advance of the time set for opening bid proposals to allow adequate time for response(s) by submitting the following:

A. A detailed record of the effort made to contact and negotiate with disadvantaged minority and/or woman owned businesses, including:

1. names, addresses, telephone numbers and contact dates of all such companies contacted;

2. copies of written notice(s) which were sent to DBE potential subcontractors prior to bid opening;

3. a detailed statement as to why each subcontractor contacted (i) was not willing to do the job or (ii) was not qualified to perform the work as solicited; and

4. in the case(s) where a negotiated price could not be reached the bidder should detail what efforts were made to reach an agreement on a competitive price.

5. copies of advertisements, dated not less than ten (10) days prior to bid opening, as appearing in general publications, trade-oriented publications, and applicable minority/women-focused media detailing the opportunities for participation;

June 2012

EEO-DEP-490C
(Page 1)

B. MassDEP may require the bidder to produce such additional information as it deems appropriate.

C. No later than fifteen (15) days after submission of all required information and documentation, MassDEP shall make a determination, in writing, whether the waiver request is granted and shall provide that determination to the bidder and Awarding Authority. If the waiver request is denied, the facts upon which a denial is based will be set forth in writing.

CERTIFICATION

The undersigned herewith certifies that the above information and appropriate attachments are true and accurate to the best of my knowledge and that I have been authorized to act on behalf of the bidder in this matter.

_____ _____

(authorized original signature) DATE

June 2012

EEO-DEP-490C
(Page 2)

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF MUNICIPAL SERVICES

STATE REVOLVING FUND LOAN PROGRAM – SCHEDULE OF SUBCONTRACTOR PARTICIPATION

Local Governmental Unit _____

Project Name _____

SRF Identification Number _____

General Contractor _____

Contract Value _____

The United States Environmental Protection Agency (EPA) requires that all SRF borrowers develop and maintain a list of all MBE/WBE and non MBE/WBE subcontractors on the project.

This form must be completed and returned to MassDEP within 90 days of award of the contract.

Subcontractor	Point of Contact	Mailing Address	Telephone Number	E-Mail Address	MBE	WBE	DBE	Subcontract Value

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SECTION 00 73 43

WAGE RATE REQUIREMENTS

The content of this Section does not represent or reflect all applicable Laws and Regulations and may only include excerpts and portions of certain Laws and Regulations. Other provisions required by statute shall be deemed to be so included and incorporated herein. Contractor is solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

The Project is subject to minimum wage rates as issued by the Executive Office of Labor and Workforce Development, Department of Labor Standards and the requirements of MGL Chapter 149, Sections 26, 27 and 27A to 27H. Wage Determination Schedules are included in Section 00 73 46 . Pursuant to MGL Chapter 149, Section 34B, wages paid to reserve police officers shall be the same prevailing rate of wage paid to regular police officers at the location of the Project. This Project is also subject to Federal Minimum Wage Rates determined by the United States Department of Labor under the Davis-Bacon Act.

1.01 State Requirements

Submit required records and statements of compliance in accordance with MGL Chapter 149, Section 27B using the latest Weekly Payroll and Compliance forms available on the following website. Copies included in this section are for information only.

http://www.mass.gov/lwd/labor-standards/prevailing-wage-program

WEEKLY PAYROLL RECORDS REPORT & STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form is available from the Department of Labor Standards (DLS) at www.mass.gov/dols/pw and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

On a weekly basis, every contractor and subcontractor is required to submit a certified copy of their weekly payroll records to the awarding authority; this includes the payroll forms and the Statement of Compliance form. The certified payroll records must be submitted either by regular mail or by e-mail to the awarding authority. Once collected, the awarding authority is required to preserve those records for three years from the date of completion of the project.

Each such contractor and subcontractor shall furnish weekly **and** within 15 days after completion of its portion of the work, to the awarding authority directly by first-class mail or e-mail, a statement, executed by the contractor, subcontractor or by any authorized officer thereof who supervised the payment of wages, this form, accompanied by their payroll:

STATEMENT OF COMPLIANCE

_____, 20_____

I,_____,_____
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by _____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____
Title _____

05/14

MASSACHUSETTS WEEKLY CERTIFIED PAYROLL REPORT FORM

Company's Name:	Address:	Phone No.:	Payroll No.:

Employer's Signature:	Title:	Contract No:	Tax Payer ID Number	Work Week Ending:

Awarding Authority's Name:	Public Works Project Name:	Public Works Project Location:	Min. Wage Rate Sheet Number

General / Prime Contractor's Name:	Subcontractor's Name:	"Employer" Hourly Fringe Benefit Contributions

Employee Name & Complete Address	Work Classification	Employee is OSHA 10 certified (?)	Appr. Rate (%)	Hours Worked							Project Hours (A)	All Other Hours	Hourly Base Wage (B)	Health & Welfare Insurance (C)	ERISA Pension Plan (D)	(B+C+D+E)	(A x F)		Check No. (H)
				Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.						Supp. Unemp. (E)	Total Hourly Prev. Wage (F)	Total Gross Wages	Project Gross Wages	

Are all apprentice employees identified above currently registered with the MA DLS's Division of Apprentice Standards? YES ☐ NO ☐

For all apprentices performing work during the reporting period, attach a copy of the apprentice identification card issued by the Massachusetts Department of Labor Standards / Division of Apprentice Standards. No apprentices are identified above ☐

NOTE: Pursuant to MGL c. 149, s. 27B, every contractor and subcontractor is required to submit a **true and accurate** copy of their certified weekly payroll records to the awarding authority by first-class mail or e-mail. In addition, each weekly payroll must be accompanied by a statement of compliance signed by the employer. Failure to comply may result in the commencement of a criminal action or the issuance of a civil citation.

Date Received by Awarding Authority
/ /

Page _____ of _____

1.02 U.S. Department of Labor Requirements

Additional information and forms can be obtained from the following website.

www.wdol.gov

eCFR — Code of Federal Regulations Page 1 of 3

ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR Data is current as of November 8, 2013

Title 48: Federal Acquisition Regulations System
PART 52—SOLICITATION PROVISIONS AND CONTRACT CLAUSES
Subpart 52.2—Text of Provisions and Clauses

52.222-6 Davis-Bacon Act.

As prescribed in 22.407(a), insert the following clause:

DAVIS-BACON ACT (JUL 2005)

(a) *Definition—Site of the work*—(1) Means—

(i) *The primary site of the work*. The physical place or places where the construction called for in the contract will remain when work on it is completed; and

(ii) *The secondary site of the work, if any*. Any other site where a significant portion of the building or work is constructed, provided that such site is—

(A) Located in the United States; and

(B) Established specifically for the performance of the contract or project;

(2) Except as provided in paragraph (3) of this definition, includes any fabrication plants, mobile factories, batch plants, borrow pits, job headquarters, tool yards, etc., provided—

(i) They are dedicated exclusively, or nearly so, to performance of the contract or project; and

(ii) They are adjacent or virtually adjacent to the "primary site of the work" as defined in paragraph (a)(1)(i), or the "secondary site of the work" as defined in paragraph (a)(1)(ii) of this definition;

(3) Does not include permanent home offices, branch plant establishments, fabrication plants, or tool yards of a Contractor or subcontractor whose locations and continuance in operation are determined wholly without regard to a particular Federal contract or project. In addition, fabrication plants, batch plants, borrow pits, job headquarters, yards, etc., of a commercial or material supplier which are established by a supplier of materials for the project before opening of bids and not on the Project site, are not included in the "site of the work." Such permanent, previously established facilities are not a part of the "site of the work" even if the operations for a period of time may be dedicated exclusively or nearly so, to the performance of a contract.

(b)(1) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, or as may be incorporated for a secondary site of the work, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Any wage determination incorporated for a secondary site of the work shall be effective from the first day on which work under the contract was performed at that site and shall be incorporated without any adjustment in contract price or estimated cost. Laborers employed by the construction Contractor or construction subcontractor that are transporting portions of the building or work between the secondary site of the work and the primary site of the work shall be paid in accordance with the wage determination applicable to the primary site of the work.

http://www.ecfr.gov/cgi-bin/text-idx?SID=9d4296e6baac49c6f55c93fa38f415e0&node=4... 11/13/2013

(2) Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (e) of this clause; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such period.

(3) Such laborers and mechanics shall be paid not less than the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in the clause entitled Apprentices and Trainees. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

(4) The wage determination (including any additional classifications and wage rates conformed under paragraph (c) of this clause) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the primary site of the work and the secondary site of the work, if any, in a prominent and accessible place where it can be easily seen by the workers.

(c)(1) The Contracting Officer shall require that any class of laborers or mechanics, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination.

(ii) The classification is utilized in the area by the construction industry.

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(iv) With respect to helpers, such a classification prevails in the area in which the work is performed.

(2) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator or an authorized representative will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(3) In the event the Contractor, the laborers or mechanics to be employed in the classification, or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator of the Wage and Hour Division for Determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits, where appropriate) determined pursuant to subparagraphs (c)(2) and (c)(3) of this clause shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(d) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(e) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; *provided*, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR Data is current as of November 12, 2013

Title 29: Labor

PART 5—LABOR STANDARDS PROVISIONS APPLICABLE TO CONTRACTS COVERING FEDERALLY FINANCED AND ASSISTED CONSTRUCTION (ALSO LABOR STANDARDS PROVISIONS APPLICABLE TO NONCONSTRUCTION CONTRACTS SUBJECT TO THE CONTRACT WORK HOURS AND SAFETY STANDARDS ACT)

Contents

AUTHORITY: 5 U.S.C. 301; R.S. 161, 64 Stat. 1267; Reorganization Plan No. 14 of 1950, 5 U.S.C. appendix; 40 U.S.C. 3141 *et seq.*; 40 U.S.C. 3145; 40 U.S.C. 3148; 40 U.S.C. 3701 *et seq.*; and the laws listed in 5.1(a) of this part; Secretary's Order 01-2008; and Employment Standards Order No. 2001-01.

FROM SECTION 5.5

(1) *Minimum wages.* (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(*1*) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(*2*) The classification is utilized in the area by the construction industry; and

(*3*) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) *Withholding*. The (write in name of Federal Agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased

(3) *Payrolls and basic records*. (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls

submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (*e.g.*, the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at *http://www.dol.gov/esa/whd/forms/wh347instr.htm* or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(*1*) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(*2*) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(*3*) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the (write the name of the agency) or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) *Apprentices and trainees*—(i) *Apprentices.* Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an

apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) *Trainees*. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) *Equal employment opportunity*. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) *Compliance with Copeland Act requirements*. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) *Subcontracts*. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be

responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) *Contract termination: debarment.* A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) *Compliance with Davis-Bacon and Related Act requirements.* All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) *Disputes concerning labor standards.* Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) *Certification of eligibility.* (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) *Contract Work Hours and Safety Standards Act.* The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by §5.5(a) or4.6 of part 4 of this title. As used in this paragraph, the terms *laborers* and *mechanics* include watchmen and guards.

(1) *Overtime requirements.* No contractor or subcontractor contracting for any part of the conract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) *Withholding for unpaid wages and liquidated damages.* The (write in the name of the Federal agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted

contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in §5.1, the Agency Head shall cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Agency Head shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

(The information collection, recordkeeping, and reporting requirements contained in the following paragraphs of this section were approved by the Office of Management and Budget:

Paragraph	OMB Control Number
(a)(1)(ii)(B)	1215-0140
(a)(1)(ii)(C)	1215-0140
(a)(1)(iv)	1215-0140
(a)(3)(i)	1215-0140,
	1215-0017
(a)(3)(ii)(A)	1215-0149
(c)	1215-0140,
	1215-0017

[48 FR 19540, Apr. 29, 1983, as amended at 51 FR 12265, Apr. 9, 1986; 55 FR 50150, Dec. 4, 1990; 57 FR 28776, June 26, 1992; 58 FR 58955, Nov. 5, 1993; 61 FR 40716, Aug. 5, 1996; 65 FR 69693, Nov. 20, 2000; 73 FR 77511, Dec. 19, 2008]

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Title 29: Labor

PART 3—CONTRACTORS AND SUBCONTRACTORS ON PUBLIC BUILDING OR PUBLIC WORK FINANCED IN WHOLE OR IN PART BY LOANS OR GRANTS FROM THE UNITED STATES

Contents

AUTHORITY: R.S. 161, sec. 2, 48 Stat. 848; Reorg. Plan No. 14 of 1950, 64 Stat. 1267; 5 U.S.C. 301; 40 U.S.C. 3145; Secretary's Order 01-2008; and Employment Standards Order No. 2001-01.

SOURCE: 29 FR 97, Jan. 4, 1964, unless otherwise noted.

Back to Top

§3.1 Purpose and scope.

This part prescribes "anti-kickback" regulations under section 2 of the Act of June 13, 1934, as amended (40 U.S.C. 276c), popularly known as the Copeland Act. This part applies to any contract which is subject to Federal wage standards and which is for the construction, prosecution, completion, or repair of public buildings, public works or buildings or works financed in whole or in part by loans or grants from the United States. The part is intended to aid in the enforcement of the minimum wage provisions of the Davis-Bacon Act and the various statutes dealing with federally assisted construction that contain similar minimum wage provisions, including those provisions which are not subject to Reorganization Plan No. 14 (e.g., the College Housing Act of 1950, the Federal Water Pollution Control Act, and the Housing Act of 1959), and in the enforcement of the overtime provisions of the Contract Work Hours Standards Act whenever they are applicable to construction work. The part details the obligation of contractors and subcontractors relative to the weekly submission of statements regarding the wages paid on work covered thereby; sets forth the circumstances and procedures governing the making of payroll deductions from the wages of those employed on such work; and delineates the methods of payment permissible on such work.

Back to Top

§3.2 Definitions.

As used in the regulations in this part:

(a) The terms *building* or *work* generally include construction activity as distinguished from manufacturing, furnishing of materials, or servicing and maintenance work. The terms include, without limitation, buildings, structures, and improvements of all types, such as bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, powerlines, pumping stations, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals; dredging, shoring, scaffolding, drilling, blasting, excavating, clearing, and landscaping. Unless conducted in connection with and at the site of such a building or work as is described in the foregoing sentence, the manufacture or furnishing of materials, articles, supplies, or equipment (whether or not a Federal or State agency acquires title to such materials, articles, supplies, or equipment during the course of the manufacture or furnishing, or owns the materials from which they are manufactured or furnished) is not a *building* or *work* within the meaning of the regulations in this part.

(b) The terms *construction, prosecution, completion*, or *repair* mean all types of work done on a particular building or work at the site thereof, including, without limitation, altering, remodeling, painting and decorating, the transporting of materials and supplies to or from the building or work by the employees of the construction contractor or construction subcontractor, and the manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the building or work, by persons employed at the site by the contractor or subcontractor.

(c) The terms *public building* or *public work* include building or work for whose construction, prosecution, completion, or repair, as defined above, a Federal agency is a contracting party, regardless of whether title thereof is in a Federal agency.

(d) The term *building or work financed in whole or in part by loans or grants from the United States* includes building or work for whose construction, prosecution, completion, or repair, as defined above, payment or part payment is made directly or indirectly from funds provided by loans or grants by a Federal agency. The term includes building or work for which the Federal assistance granted is in the form of loan guarantees or insurance.

(e) Every person paid by a contractor or subcontractor in any manner for his labor in the construction, prosecution, completion, or repair of a public building or public work or building or work financed in whole or in part by loans or grants from the United States is *employed* and receiving *wages*, regardless of any contractual relationship alleged to exist between him and the real employer.

(f) The term *any affiliated person* includes a spouse, child, parent, or other close relative of the contractor or subcontractor; a partner or officer of the contractor or subcontractor; a corporation closely connected with the contractor or subcontractor as parent, subsidiary, or otherwise, and an officer or agent of such corporation.

(g) The term *Federal agency* means the United States, the District of Columbia, and all executive departments, independent establishments, administrative agencies, and instrumentalities of the United States and of the District of Columbia, including corporations, all or substantially all of the stock of which is beneficially owned by the United States, by the District of Columbia, or any of the foregoing departments, establishments, agencies, and instrumentalities.

[29 FR 97, Jan. 4, 1964, as amended at 38 FR 32575, Nov. 27, 1973]

Back to Top

§3.3 Weekly statement with respect to payment of wages.

(a) As used in this section, the term *employee* shall not apply to persons in classifications higher than that of laborer or mechanic and those who are the immediate supervisors of such employees.

(b) Each contractor or subcontractor engaged in the construction, prosecution, completion, or repair of any public building or public work, or building or work financed in whole or in part by loans or grants from the United States, shall furnish each week a statement with respect to the wages paid each of its employees engaged on work covered by this part 3 and part 5 of this title during the

preceding weekly payroll period. This statement shall be executed by the contractor or subcontractor or by an authorized officer or employee of the contractor or subcontractor who supervises the payment of wages, and shall be on the back of Form WH 347, "Payroll (For Contractors Optional Use)" or on any form with identical wording. Copies of Form WH 347 may be obtained from the Government contracting or sponsoring agency or from the Wage and Hour Division Web site at *http://www.dol.gov/esa/whd/forms/wh347instr.htm* or its successor site.

(c) The requirements of this section shall not apply to any contract of $2,000 or less.

(d) Upon a written finding by the head of a Federal agency, the Secretary of Labor may provide reasonable limitations, variations, tolerances, and exemptions from the requirements of this section subject to such conditions as the Secretary of Labor may specify.

[29 FR 97, Jan. 4, 1964, as amended at 33 FR 10186, July 17, 1968; 47 FR 23679, May 28, 1982; 73 FR 77511, Dec. 19, 2008]

Back to Top

§3.4 Submission of weekly statements and the preservation and inspection of weekly payroll records.

(a) Each weekly statement required under §3.3 shall be delivered by the contractor or subcontractor, within seven days after the regular payment date of the payroll period, to a representative of a Federal or State agency in charge at the site of the building or work, or, if there is no representative of a Federal or State agency at the site of the building or work, the statement shall be mailed by the contractor or subcontractor, within such time, to a Federal or State agency contracting for or financing the building or work. After such examination and check as may be made, such statement, or a copy thereof, shall be kept available, or shall be transmitted together with a report of any violation, in accordance with applicable procedures prescribed by the United States Department of Labor.

(b) Each contractor or subcontractor shall preserve his weekly payroll records for a period of three years from date of completion of the contract. The payroll records shall set out accurately and completely the name and address of each laborer and mechanic, his correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid. Such payroll records shall be made available at all times for inspection by the contracting officer or his authorized representative, and by authorized representatives of the Department of Labor.

(Reporting and recordkeeping requirements in paragraph (b) have been approved by the Office of Management and Budget under control number 1215-0017)

[29 FR 97, Jan. 4, 1964, as amended at 47 FR 145, Jan. 5, 1982]

Back to Top

§3.5 Payroll deductions permissible without application to or approval of the Secretary of Labor.

Deductions made under the circumstances or in the situations described in the paragraphs of this section may be made without application to and approval of the Secretary of Labor:

(a) Any deduction made in compliance with the requirements of Federal, State, or local law, such as Federal or State withholding income taxes and Federal social security taxes.

(b) Any deduction of sums previously paid to the employee as a bona fide prepayment of wages when such prepayment is made without discount or interest. A *bona fide prepayment of wages* is considered to have been made only when cash or its equivalent has been advanced to the person employed in such manner as to give him complete freedom of disposition of the advanced funds.

(c) Any deduction of amounts required by court process to be paid to another, unless the deduction is in favor of the contractor, subcontractor, or any affiliated person, or when collusion or collaboration exists.

(d) Any deduction constituting a contribution on behalf of the person employed to funds established by the employer or representatives of employees, or both, for the purpose of providing, either from principal or income, or both, medical or hospital care, pensions or annuities on retirement, death benefits, compensation for injuries, illness, accidents, sickness, or disability, or for insurance to provide any of the foregoing, or unemployment benefits, vacation pay, savings accounts, or similar payments for the benefit of employees, their families and dependents: *Provided, however,* That the following standards are met:

(1) The deduction is not otherwise prohibited by law;

(2) It is either:

(i) Voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of or for the continuation of employment, or

(ii) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees;

(3) No profit or other benefit is otherwise obtained, directly or indirectly, by the contractor or subcontractor or any affiliated person in the form of commission, dividend, or otherwise; and

(4) The deductions shall serve the convenience and interest of the employee.

(e) Any deduction contributing toward the purchase of United States Defense Stamps and Bonds when voluntarily authorized by the employee.

(f) Any deduction requested by the employee to enable him to repay loans to or to purchase shares in credit unions organized and operated in accordance with Federal and State credit union statutes.

(g) Any deduction voluntarily authorized by the employee for the making of contributions to governmental or quasi-governmental agencies, such as the American Red Cross.

(h) Any deduction voluntarily authorized by the employee for the making of contributions to Community Chests, United Givers Funds, and similar charitable organizations.

(i) Any deductions to pay regular union initiation fees and membership dues, not including fines or special assessments: *Provided, however,* That a collective bargaining agreement between the contractor or subcontractor and representatives of its employees provides for such deductions and the deductions are not otherwise prohibited by law.

(j) Any deduction not more than for the "reasonable cost" of board, lodging, or other facilities meeting the requirements of section 3(m) of the Fair Labor Standards Act of 1938, as amended, and part 531 of this title. When such a deduction is made the additional records required under §516.25(a) of this title shall be kept.

(k) Any deduction for the cost of safety equipment of nominal value purchased by the employee as his own property for his personal protection in his work, such as safety shoes, safety glasses, safety gloves, and hard hats, if such equipment is not required by law to be furnished by the employer, if such deduction is not violative of the Fair Labor Standards Act or prohibited by other law, if the cost on which the deduction is based does not exceed the actual cost to the employer where the equipment is purchased from him and does not include any direct or indirect monetary return to the employer where the equipment is purchased from a third person, and if the deduction is either

(1) Voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of employment or its continuance; or

(2) Provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees.

[29 FR 97, Jan. 4, 1964, as amended at 36 FR 9770, May 28, 1971]

Back to Top

§3.6 Payroll deductions permissible with the approval of the Secretary of Labor.

Any contractor or subcontractor may apply to the Secretary of Labor for permission to make any deduction not permitted under §3.5. The Secretary may grant permission whenever he finds that:

(a) The contractor, subcontractor, or any affiliated person does not make a profit or benefit directly or indirectly from the deduction either in the form of a commission, dividend, or otherwise;

(b) The deduction is not otherwise prohibited by law;

(c) The deduction is either (1) voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of employment or its continuance, or (2) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees; and

(d) The deduction serves the convenience and interest of the employee.

Back to Top

§3.7 Applications for the approval of the Secretary of Labor.

Any application for the making of payroll deductions under §3.6 shall comply with the requirements prescribed in the following paragraphs of this section:

(a) The application shall be in writing and shall be addressed to the Secretary of Labor.

(b) The application need not identify the contract or contracts under which the work in question is to be performed. Permission will be given for deductions on all current and future contracts of the applicant for a period of 1 year. A renewal of permission to make such payroll deduction will be granted upon the submission of an application which makes reference to the original application, recites the date of the Secretary of Labor's approval of such deductions, states affirmatively that there is continued compliance with the standards set forth in the provisions of §3.6, and specifies any conditions which have changed in regard to the payroll deductions.

(c) The application shall state affirmatively that there is compliance with the standards set forth in the provisions of §3.6. The affirmation shall be accompanied by a full statement of the facts indicating such compliance.

(d) The application shall include a description of the proposed deduction, the purpose to be served thereby, and the classes of laborers or mechanics from whose wages the proposed deduction would be made.

(e) The application shall state the name and business of any third person to whom any funds obtained from the proposed deductions are to be transmitted and the affiliation of such person, if any, with the applicant.

[29 FR 97, Jan. 4, 1964, as amended at 36 FR 9771, May 28, 1971]

Back to Top

§3.8 Action by the Secretary of Labor upon applications.

The Secretary of Labor shall decide whether or not the requested deduction is permissible under provisions of §3.6; and shall notify the applicant in writing of his decision.

Back to Top

§3.9 Prohibited payroll deductions.

Deductions not elsewhere provided for by this part and which are not found to be permissible under §3.6 are prohibited.

Back to Top

§3.10 Methods of payment of wages.

The payment of wages shall be by cash, negotiable instruments payable on demand, or the additional forms of compensation for which deductions are permissible under this part. No other methods of payment shall be recognized on work subject to the Copeland Act.

Back to Top

§3.11 Regulations part of contract.

All contracts made with respect to the construction, prosecution, completion, or repair of any public building or public work or building or work financed in whole or in part by loans or grants from the United States covered by the regulations in this part shall expressly bind the contractor or subcontractor to comply with such of the regulations in this part as may be applicable. In this regard, see §5.5(a) of this subtitle.

Back to Top

END OF SECTION

1.01 State Requirements

The Official Website of the Executive Office of Labor and Workforce Development (EOLWD)

Labor and Workforce Development

Home › Labor Standards › Prevailing Wage Program › A Guide to the MA Prevailing Wage Law for...

A Guide to the MA Prevailing Wage Law for Awarding Authorities

A Guide to the MA Prevailing Wage Law for Awarding Authorities

Prevailing Wage for Awarding Authorities

What is the Prevailing Wage Law?

The Massachusetts Prevailing Wage Law, G.L. c. 149, §§ 26 - 27, c. 5, § 1, c. 71, § 7A and c. 121B, § 29B ("The Prevailing Wage Law") establishes minimum wage rates for workers on public construction projects, workers engaged in school bus transportation, operators of vehicles and equipment engaged by public entities for public works purposes (including solid waste and recycling), workers engaged by employers which provide janitorial services for state buildings, office moving services, and for certain employees of housing authorities. These different prevailing wage law requirements are discussed below.

The Massachusetts Executive Office of Labor and Workforce Development, Department of Labor Standards (DLS) is the agency responsible for issuing prevailing wage rate sheets and administering the Prevailing Wage Law. The Massachusetts Attorney General's Fair Labor Practices Division is responsible for enforcing the law. If contractors fail to comply with any provision of the Prevailing Wage Law or if you believe a contractor is not paying prevailing wages, you should contact the Attorney General's Fair Labor Division at (617) 727-3465.

What are the types of activities to which the Prevailing Wage Law applies?

Following is a list of the different Prevailing Wage Law requirements and links to a more detailed discussion of each of them.

- Public construction work, including additions and alterations to public buildings, soil explorations, test borings, and demolition. Public Construction, G.L. c. 149, §§26-27D.
- Use of trucks, vehicles, and other equipment to perform public works functions. Trucks, Vehicles, and Other Equipment Performing Public Works Functions (Non-Construction), G.L. c. 149, §27F.
- Moving office furniture and fixtures. Moving Office Furniture and Fixtures, G.L. c. 149, §27G.
- Cleaning state office buildings or buildings leased by the state. State Cleaning Contracts, G.L. c.149, §27H.
- Transportation of students to public schools, including charter schools, in towns with a population greater than 16,000 School Bus Transportation G.L. c. 71, §7A.
- Prevailing wages are also set for certain housing authority employees such as maintenance workers, laborers, and mechanics. G.L. c. 121B, §29B.

PUBLIC CONSTRUCTION
G.L. c. 149, §§27-27D

Before soliciting bids for any public construction project, an awarding authority must obtain a prevailing wage rate sheet from DLS. DLS has standardized forms that awarding authorities must use to request prevailing wage rates. Awarding authorities must complete an online prevailing wage request at www.mass.gov/dols/pw. In the rare instance where an awarding authority does not have access to the internet, the awarding authority must call DLS at 617-626-6953 to receive instructions on mailing a hard copy request form.

Once the awarding authority receives the prevailing wage schedule for a particular project, it must include the rate sheet in its invitation for bids. If the project does not require an invitation for bids (for example, if the project will cost less than $10,000) the awarding authority must make sure that anyone who is providing a price or estimate for the construction project has a copy of the prevailing wage rate sheet for that project. Once a contractor has been selected, the prevailing wage rate sheet is made a part of the contract for that project.

Each prevailing wage rate sheet applies only to the public construction project for which it is issued. The prevailing wage rates for each construction project are in effect for 90 days from the date of issue. Projects not bid within 90 days of the issued rates will require the awarding authority to request new prevailing wage rates. Once a project has been bid, the prevailing wage rate will apply for the duration of any contracts which result from that bid, except in the case of multi-year projects. For projects lasting more than one year, the awarding authority must request annual updates to the wage schedules (see FAQs below for more information on annual updates).

New rates must be obtained from the Department of Labor Standards each time an invitation for bids is issued for a construction project. An awarding authority must obtain prevailing wage rates for every public construction project, regardless of the dollar amount of the contract or whether it must actually be bid.

During the construction project, it is the awarding authority's responsibility to monitor contractors' compliance with the prevailing wage law. Weekly payroll records must be collected from all contractors and kept on file. Weekly payroll report forms are available on DLS' website. These weekly payroll records must be maintained by the awarding authority for three years following final payment on the construction project. Contractors and subcontractors are required to submit weekly payroll records to the awarding authority by first class or electronic mail. A statement of compliance must accompany each weekly payroll submittal. A sample certified payroll report form and statement of compliance are available from DLS at www.mass.gov/dols/pw.

WEEKLY PAYROLL RECORDS REPORT
& STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form is available from the Department of Labor Standards (DLS) at www.mass.gov/dols/pw and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

On a weekly basis, every contractor and subcontractor is required to submit a certified copy of their weekly payroll records to the awarding authority; this includes the payroll forms and the Statement of Compliance form. The certified payroll records must be submitted either by regular mail or by e-mail to the awarding authority. Once collected, the awarding authority is required to preserve those records for three years from the date of completion of the project.

Each such contractor and subcontractor shall furnish weekly **and** within 15 days after completion of its portion of the work, to the awarding authority directly by first-class mail or e-mail, a statement, executed by the contractor, subcontractor or by any authorized officer thereof who supervised the payment of wages, this form, accompanied by their payroll:

STATEMENT OF COMPLIANCE

_____, 20_____

I,_____,_____
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by

_____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____

Title _____

MASSACHUSETTS WEEKLY CERTIFIED PAYROLL REPORT FORM

Company's Name:	Address:	Phone No.:	Payroll No.:

Employer's Signature:	Title:	Contract No:	Tax Payer ID Number	Work Week Ending:

Awarding Authority's Name:	Public Works Project Name:	Public Works Project Location:	Min. Wage Rate Sheet Number

General / Prime Contractor's Name:	Subcontractor's Name:		"Employer" Hourly Fringe Benefit Contributions				
						(B+C+D+E)	(A x F)

Employee Name & Complete Address	Work Classification:	Employee is OSHA 10 certified (?)	Appr. Rate (%)	Hours Worked							Project Hours (A)	Hourly Base Wage (B)	Health & Welfare Insurance (C)	ERISA Pension Plan (D)	Supp. Unemp. (E)	Total Hourly Prev. Wage (F)	Project Gross Wages	Check No. (H)
				Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.	All Other Hours						Total Gross Wages	

Are all apprentice employees identified above currently registered with the MA DLS's Division of Apprentice Standards? YES ☐ NO ☐

For all apprentices performing work during the reporting period, attach a copy of the apprentice identification card issued by the Massachusetts Department of Labor Standards / Division of Apprentice Standards. No apprentices are identified above ☐

NOTE: Pursuant to MGL c. 149, s. 27B, every contractor and subcontractor is required to submit a **true and accurate** copy of their certified weekly payroll records to the awarding authority by first-class mail or e-mail. In addition, each weekly payroll must be accompanied by a statement of compliance signed by the employer. Failure to comply may result in the commencement of a criminal action or the issuance of a civil citation.

Date Received by Awarding Authority
/ /

1.01 U.S. Department of Labor

Additional information and forms can be obtained from the following website.

www.wdol.gov

ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR Data is current as of November 8, 2013

Title 48: Federal Acquisition Regulations System
PART 52—SOLICITATION PROVISIONS AND CONTRACT CLAUSES
Subpart 52.2—Text of Provisions and Clauses

52.222-6 Davis-Bacon Act.

As prescribed in 22.407(a), insert the following clause:

DAVIS-BACON ACT (JUL 2005)

(a) *Definition—Site of the work*—(1) Means—

(i) *The primary site of the work.* The physical place or places where the construction called for in the contract will remain when work on it is completed; and

(ii) *The secondary site of the work, if any.* Any other site where a significant portion of the building or work is constructed, provided that such site is—

(A) Located in the United States; and

(B) Established specifically for the performance of the contract or project;

(2) Except as provided in paragraph (3) of this definition, includes any fabrication plants, mobile factories, batch plants, borrow pits, job headquarters, tool yards, etc., provided—

(i) They are dedicated exclusively, or nearly so, to performance of the contract or project; and

(ii) They are adjacent or virtually adjacent to the "primary site of the work" as defined in paragraph (a)(1)(i), or the "secondary site of the work" as defined in paragraph (a)(1)(ii) of this definition;

(3) Does not include permanent home offices, branch plant establishments, fabrication plants, or tool yards of a Contractor or subcontractor whose locations and continuance in operation are determined wholly without regard to a particular Federal contract or project. In addition, fabrication plants, batch plants, borrow pits, job headquarters, yards, etc., of a commercial or material supplier which are established by a supplier of materials for the project before opening of bids and not on the Project site, are not included in the "site of the work." Such permanent, previously established facilities are not a part of the "site of the work" even if the operations for a period of time may be dedicated exclusively or nearly so, to the performance of a contract.

(b)(1) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, or as may be incorporated for a secondary site of the work, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Any wage determination incorporated for a secondary site of the work shall be effective from the first day on which work under the contract was performed at that site and shall be incorporated without any adjustment in contract price or estimated cost. Laborers employed by the construction Contractor or construction subcontractor that are transporting portions of the building or work between the secondary site of the work and the primary site of the work shall be paid in accordance with the wage determination applicable to the primary site of the work.

(2) Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (e) of this clause; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such period.

(3) Such laborers and mechanics shall be paid not less than the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in the clause entitled Apprentices and Trainees. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

(4) The wage determination (including any additional classifications and wage rates conformed under paragraph (c) of this clause) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the primary site of the work and the secondary site of the work, if any, in a prominent and accessible place where it can be easily seen by the workers.

(c)(1) The Contracting Officer shall require that any class of laborers or mechanics, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination.

(ii) The classification is utilized in the area by the construction industry.

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(iv) With respect to helpers, such a classification prevails in the area in which the work is performed.

(2) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator or an authorized representative will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(3) In the event the Contractor, the laborers or mechanics to be employed in the classification, or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator of the Wage and Hour Division for Determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits, where appropriate) determined pursuant to subparagraphs (c)(2) and (c)(3) of this clause shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(d) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(e) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; *provided*, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR Data is current as of November 12, 2013

Title 29: Labor

PART 5—LABOR STANDARDS PROVISIONS APPLICABLE TO CONTRACTS COVERING FEDERALLY FINANCED AND ASSISTED CONSTRUCTION (ALSO LABOR STANDARDS PROVISIONS APPLICABLE TO NONCONSTRUCTION CONTRACTS SUBJECT TO THE CONTRACT WORK HOURS AND SAFETY STANDARDS ACT)

Contents

AUTHORITY: 5 U.S.C. 301; R.S. 161, 64 Stat. 1267; Reorganization Plan No. 14 of 1950, 5 U.S.C. appendix; 40 U.S.C. 3141 *et seq.;* 40 U.S.C. 3145; 40 U.S.C. 3148; 40 U.S.C. 3701 *et seq.;* and the laws listed in 5.1(a) of this part; Secretary's Order 01-2008; and Employment Standards Order No. 2001-01.

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FROM SECTION 5.5

(1) *Minimum wages.* (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(*1*) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(*2*) The classification is utilized in the area by the construction industry; and

(*3*) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) *Withholding.* The (write in name of Federal Agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) *Payrolls and basic records.* (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls

submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (*e.g.*, the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at *http://www.dol.gov/esa/whd/forms/wh347instr.htm* or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(*1*) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(*2*) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(*3*) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the (write the name of the agency) or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) *Apprentices and trainees*—(i) *Apprentices.* Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an

apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) *Trainees*. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) *Equal employment opportunity.* The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) *Compliance with Copeland Act requirements*. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) *Subcontracts*. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be

responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) *Contract termination: debarment.* A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) *Compliance with Davis-Bacon and Related Act requirements.* All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) *Disputes concerning labor standards.* Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) *Certification of eligibility.* (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) *Contract Work Hours and Safety Standards Act.* The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by §5.5(a) or4.6 of part 4 of this title. As used in this paragraph, the terms *laborers* and *mechanics* include watchmen and guards.

(1) *Overtime requirements.* No contractor or subcontractor contracting for any part of the conract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) *Withholding for unpaid wages and liquidated damages.* The (write in the name of the Federal agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted

contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in §5.1, the Agency Head shall cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Agency Head shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

(The information collection, recordkeeping, and reporting requirements contained in the following paragraphs of this section were approved by the Office of Management and Budget:

Paragraph	OMB Control Number
(a)(1)(ii)(B)	1215-0140
(a)(1)(ii)(C)	1215-0140
(a)(1)(iv)	1215-0140
(a)(3)(i)	1215-0140,
	1215-0017
(a)(3)(ii)(A)	1215-0149
(c)	1215-0140,
	1215-0017

[48 FR 19540, Apr. 29, 1983, as amended at 51 FR 12265, Apr. 9, 1986; 55 FR 50150, Dec. 4, 1990; 57 FR 28776, June 26, 1992; 58 FR 58955, Nov. 5, 1993; 61 FR 40716, Aug. 5, 1996; 65 FR 69693, Nov. 20, 2000; 73 FR 77511, Dec. 19, 2008]

ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR Data is current as of November 12, 2013

Title 29: Labor

PART 3—CONTRACTORS AND SUBCONTRACTORS ON PUBLIC BUILDING OR PUBLIC WORK FINANCED IN WHOLE OR IN PART BY LOANS OR GRANTS FROM THE UNITED STATES

Contents

AUTHORITY: R.S. 161, sec. 2, 48 Stat. 848; Reorg. Plan No. 14 of 1950, 64 Stat. 1267; 5 U.S.C. 301; 40 U.S.C. 3145; Secretary's Order 01-2008; and Employment Standards Order No. 2001-01.

SOURCE: 29 FR 97, Jan. 4, 1964, unless otherwise noted.

Back to Top

§3.1 Purpose and scope.

This part prescribes "anti-kickback" regulations under section 2 of the Act of June 13, 1934, as amended (40 U.S.C. 276c), popularly known as the Copeland Act. This part applies to any contract which is subject to Federal wage standards and which is for the construction, prosecution, completion, or repair of public buildings, public works or buildings or works financed in whole or in part by loans or grants from the United States. The part is intended to aid in the enforcement of the minimum wage provisions of the Davis-Bacon Act and the various statutes dealing with federally assisted construction that contain similar minimum wage provisions, including those provisions which are not subject to Reorganization Plan No. 14 (e.g., the College Housing Act of 1950, the Federal Water Pollution Control Act, and the Housing Act of 1959), and in the enforcement of the overtime provisions of the Contract Work Hours Standards Act whenever they are applicable to construction work. The part details the obligation of contractors and subcontractors relative to the weekly submission of statements regarding the wages paid on work covered thereby; sets forth the circumstances and procedures governing the making of payroll deductions from the wages of those employed on such work; and delineates the methods of payment permissible on such work.

Back to Top

§3.2 Definitions.

As used in the regulations in this part:

(a) The terms *building* or *work* generally include construction activity as distinguished from manufacturing, furnishing of materials, or servicing and maintenance work. The terms include, without limitation, buildings, structures, and improvements of all types, such as bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, powerlines, pumping stations, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals; dredging, shoring, scaffolding, drilling, blasting, excavating, clearing, and landscaping. Unless conducted in connection with and at the site of such a building or work as is described in the foregoing sentence, the manufacture or furnishing of materials, articles, supplies, or equipment (whether or not a Federal or State agency acquires title to such materials, articles, supplies, or equipment during the course of the manufacture or furnishing, or owns the materials from which they are manufactured or furnished) is not a *building* or *work* within the meaning of the regulations in this part.

(b) The terms *construction, prosecution, completion,* or *repair* mean all types of work done on a particular building or work at the site thereof, including, without limitation, altering, remodeling, painting and decorating, the transporting of materials and supplies to or from the building or work by the employees of the construction contractor or construction subcontractor, and the manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the building or work, by persons employed at the site by the contractor or subcontractor.

(c) The terms *public building* or *public work* include building or work for whose construction, prosecution, completion, or repair, as defined above, a Federal agency is a contracting party, regardless of whether title thereof is in a Federal agency.

(d) The term *building or work financed in whole or in part by loans or grants from the United States* includes building or work for whose construction, prosecution, completion, or repair, as defined above, payment or part payment is made directly or indirectly from funds provided by loans or grants by a Federal agency. The term includes building or work for which the Federal assistance granted is in the form of loan guarantees or insurance.

(e) Every person paid by a contractor or subcontractor in any manner for his labor in the construction, prosecution, completion, or repair of a public building or public work or building or work financed in whole or in part by loans or grants from the United States is *employed* and receiving *wages*, regardless of any contractual relationship alleged to exist between him and the real employer.

(f) The term *any affiliated person* includes a spouse, child, parent, or other close relative of the contractor or subcontractor; a partner or officer of the contractor or subcontractor; a corporation closely connected with the contractor or subcontractor as parent, subsidiary, or otherwise, and an officer or agent of such corporation.

(g) The term *Federal agency* means the United States, the District of Columbia, and all executive departments, independent establishments, administrative agencies, and instrumentalities of the United States and of the District of Columbia, including corporations, all or substantially all of the stock of which is beneficially owned by the United States, by the District of Columbia, or any of the foregoing departments, establishments, agencies, and instrumentalities.

[29 FR 97, Jan. 4, 1964, as amended at 38 FR 32575, Nov. 27, 1973]

Back to Top

§3.3 Weekly statement with respect to payment of wages.

(a) As used in this section, the term *employee* shall not apply to persons in classifications higher than that of laborer or mechanic and those who are the immediate supervisors of such employees.

(b) Each contractor or subcontractor engaged in the construction, prosecution, completion, or repair of any public building or public work, or building or work financed in whole or in part by loans or grants from the United States, shall furnish each week a statement with respect to the wages paid each of its employees engaged on work covered by this part 3 and part 5 of this title during the

preceding weekly payroll period. This statement shall be executed by the contractor or subcontractor or by an authorized officer or employee of the contractor or subcontractor who supervises the payment of wages, and shall be on the back of Form WH 347, "Payroll (For Contractors Optional Use)" or on any form with identical wording. Copies of Form WH 347 may be obtained from the Government contracting or sponsoring agency or from the Wage and Hour Division Web site at *http://www.dol.gov/esa/whd/forms/wh347instr.htm* or its successor site.

(c) The requirements of this section shall not apply to any contract of $2,000 or less.

(d) Upon a written finding by the head of a Federal agency, the Secretary of Labor may provide reasonable limitations, variations, tolerances, and exemptions from the requirements of this section subject to such conditions as the Secretary of Labor may specify.

[29 FR 97, Jan. 4, 1964, as amended at 33 FR 10186, July 17, 1968; 47 FR 23679, May 28, 1982; 73 FR 77511, Dec. 19, 2008]

Back to Top

§3.4 Submission of weekly statements and the preservation and inspection of weekly payroll records.

(a) Each weekly statement required under §3 3 shall be delivered by the contractor or subcontractor, within seven days after the regular payment date of the payroll period, to a representative of a Federal or State agency in charge at the site of the building or work, or, if there is no representative of a Federal or State agency at the site of the building or work, the statement shall be mailed by the contractor or subcontractor, within such time, to a Federal or State agency contracting for or financing the building or work. After such examination and check as may be made, such statement, or a copy thereof, shall be kept available, or shall be transmitted together with a report of any violation, in accordance with applicable procedures prescribed by the United States Department of Labor.

(b) Each contractor or subcontractor shall preserve his weekly payroll records for a period of three years from date of completion of the contract. The payroll records shall set out accurately and completely the name and address of each laborer and mechanic, his correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid. Such payroll records shall be made available at all times for inspection by the contracting officer or his authorized representative, and by authorized representatives of the Department of Labor.

(Reporting and recordkeeping requirements in paragraph (b) have been approved by the Office of Management and Budget under control number 1215-0017)

[29 FR 97, Jan. 4, 1964, as amended at 47 FR 145, Jan. 5, 1982]

Back to Top

§3.5 Payroll deductions permissible without application to or approval of the Secretary of Labor.

Deductions made under the circumstances or in the situations described in the paragraphs of this section may be made without application to and approval of the Secretary of Labor:

(a) Any deduction made in compliance with the requirements of Federal, State, or local law, such as Federal or State withholding income taxes and Federal social security taxes.

(b) Any deduction of sums previously paid to the employee as a bona fide prepayment of wages when such prepayment is made without discount or interest. A *bona fide prepayment of wages* is considered to have been made only when cash or its equivalent has been advanced to the person employed in such manner as to give him complete freedom of disposition of the advanced funds.

(c) Any deduction of amounts required by court process to be paid to another, unless the deduction is in favor of the contractor, subcontractor, or any affiliated person, or when collusion or collaboration exists.

(d) Any deduction constituting a contribution on behalf of the person employed to funds established by the employer or representatives of employees, or both, for the purpose of providing either from principal or income, or both, medical or hospital care, pensions or annuities on retirement, death benefits, compensation for injuries, illness, accidents, sickness, or disability, or for insurance to provide any of the foregoing, or unemployment benefits, vacation pay, savings accounts, or similar payments for the benefit of employees, their families and dependents: *Provided, however,* That the following standards are met:

(1) The deduction is not otherwise prohibited by law;

(2) It is either:

(i) Voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of or for the continuation of employment, or

(ii) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees;

(3) No profit or other benefit is otherwise obtained, directly or indirectly, by the contractor or subcontractor or any affiliated person in the form of commission, dividend, or otherwise; and

(4) The deductions shall serve the convenience and interest of the employee.

(e) Any deduction contributing toward the purchase of United States Defense Stamps and Bonds when voluntarily authorized by the employee.

(f) Any deduction requested by the employee to enable him to repay loans to or to purchase shares in credit unions organized and operated in accordance with Federal and State credit union statutes.

(g) Any deduction voluntarily authorized by the employee for the making of contributions to governmental or quasi-governmental agencies, such as the American Red Cross.

(h) Any deduction voluntarily authorized by the employee for the making of contributions to Community Chests, United Givers Funds, and similar charitable organizations.

(i) Any deductions to pay regular union initiation fees and membership dues, not including fines or special assessments: *Provided, however,* That a collective bargaining agreement between the contractor or subcontractor and representatives of its employees provides for such deductions and the deductions are not otherwise prohibited by law.

(j) Any deduction not more than for the "reasonable cost" of board, lodging, or other facilities meeting the requirements of section 3(m) of the Fair Labor Standards Act of 1938, as amended, and part 531 of this title. When such a deduction is made the additional records required under §516.25(a) of this title shall be kept.

(k) Any deduction for the cost of safety equipment of nominal value purchased by the employee as his own property for his personal protection in his work, such as safety shoes, safety glasses, safety gloves, and hard hats, if such equipment is not required by law to be furnished by the employer, if such deduction is not violative of the Fair Labor Standards Act or prohibited by other law, if the cost on which the deduction is based does not exceed the actual cost to the employer where the equipment is purchased from him and does not include any direct or indirect monetary return to the employer where the equipment is purchased from a third person, and if the deduction is either

(1) Voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of employment or its continuance; or

(2) Provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees.

[29 FR 97, Jan. 4, 1964, as amended at 36 FR 9770, May 28, 1971]

Back to Top

§3.6 Payroll deductions permissible with the approval of the Secretary of Labor.

Any contractor or subcontractor may apply to the Secretary of Labor for permission to make any deduction not permitted under §3.5. The Secretary may grant permission whenever he finds that:

(a) The contractor, subcontractor, or any affiliated person does not make a profit or benefit directly or indirectly from the deduction either in the form of a commission, dividend, or otherwise;

(b) The deduction is not otherwise prohibited by law;

(c) The deduction is either (1) voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of employment or its continuance, or (2) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees; and

(d) The deduction serves the convenience and interest of the employee.

Back to Top

§3.7 Applications for the approval of the Secretary of Labor.

Any application for the making of payroll deductions under §3.6 shall comply with the requirements prescribed in the following paragraphs of this section:

(a) The application shall be in writing and shall be addressed to the Secretary of Labor.

(b) The application need not identify the contract or contracts under which the work in question is to be performed. Permission will be given for deductions on all current and future contracts of the applicant for a period of 1 year. A renewal of permission to make such payroll deduction will be granted upon the submission of an application which makes reference to the original application, recites the date of the Secretary of Labor's approval of such deductions, states affirmatively that there is continued compliance with the standards set forth in the provisions of §3.6, and specifies any conditions which have changed in regard to the payroll deductions.

(c) The application shall state affirmatively that there is compliance with the standards set forth in the provisions of §3.6. The affirmation shall be accompanied by a full statement of the facts indicating such compliance.

(d) The application shall include a description of the proposed deduction, the purpose to be served thereby, and the classes of laborers or mechanics from whose wages the proposed deduction would be made.

(e) The application shall state the name and business of any third person to whom any funds obtained from the proposed deductions are to be transmitted and the affiliation of such person, if any, with the applicant.

[29 FR 97, Jan. 4, 1964, as amended at 36 FR 9771, May 28, 1971]

Back to Top

§3.8 Action by the Secretary of Labor upon applications.

The Secretary of Labor shall decide whether or not the requested deduction is permissible under provisions of §3.6; and shall notify the applicant in writing of his decision.

Back to Top

§3.9 Prohibited payroll deductions.

Deductions not elsewhere provided for by this part and which are not found to be permissible under §3.6 are prohibited.

Back to Top

§3.10 Methods of payment of wages.

The payment of wages shall be by cash, negotiable instruments payable on demand, or the additional forms of compensation for which deductions are permissible under this part. No other methods of payment shall be recognized on work subject to the Copeland Act.

Back to Top

§3.11 Regulations part of contract.

All contracts made with respect to the construction, prosecution, completion, or repair of any public building or public work or building or work financed in whole or in part by loans or grants from the United States covered by the regulations in this part shall expressly bind the contractor or subcontractor to comply with such of the regulations in this part as may be applicable. In this regard, see §5.5(a) of this subtitle.

Back to Top

SECTION 00 73 46

WAGE DETERMINATION SCHEDULE

The Project is subject to the following wage rates (included in this section) in accordance with the requirements included in Section 00 73 43. In case of discrepancy between Federal and state wage rates, the higher wage rates shall apply.

- Minimum wage rates as issued by the Executive Office of Labor and Workforce Development, Department of Labor Standards pursuant to MGL Chapter 149, Sections 26, 27 and 27A to 27H
- Federal minimum wage rates as determined by the United States Department of Labor under the Davis-Bacon Act

END OF SECTION

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General Decision Number: MA140001 11/28/2014 MA1

Superseded General Decision Number: MA20130001

State: Massachusetts

Construction Type: Building

Counties: Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk and Suffolk Counties in Massachusetts.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes and apartments up to and including 4 stories)

Modification Number	Publication Date
0	01/03/2014
1	01/31/2014
2	03/07/2014
3	03/28/2014
4	05/09/2014
5	06/06/2014
6	06/13/2014
7	07/18/2014
8	08/01/2014
9	08/15/2014
10	09/05/2014
11	10/17/2014
12	11/28/2014

ASBE0006-001 09/01/2014

	Rates	Fringes
Insulator/asbestos worker Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems		
(ZONE A)	$ 43.31	24.15
(ZONE B)	$ 38.98	24.15

ZONES:

ZONE A
BARNSTABLE COUNTY (Brewster, Chatham, Dennis, Eastham, Harwich, Orleans, Provincetown, Truro, Wellfleet, Yarmouth) BRISTOL COUNTY (Easton), MIDDLESEX COUNTY, and NORFOLK COUNTY (Avon, Braintree, Brookline, Canton, Cohasset, Dedham, Dover, Foxborough, Holbrook, Medfield, Medway, Millis, Milton, Needham, Norfolk, Norwood, Quincy, Randolph, Sharon, Stoughton, Walpole, Wellesley, Westwood, Weymouth)

ZONE B
BARNSTABLE COUNTY (Barnstable, Bourne, Falmouth, Mashpee, Sandwich), BRISTOL COUNTY (All cities except Easton), and NORFOLK COUNTY (Bellingham, Franklin, Plainville)

ASBE0006-002 06/01/2014

BARNSTABLE (Brewster, Chatham, Dennis, Eastham, Harwich, Orleans, Provincetown, Truro, Wellfleet and Yarmouth); BRISTOL (Easton); ESSEX; MIDDLESEX; NORFOLK (Avon, Braintree, Brookline, Canton, Cohasset, Dedham, Dover, Foxboro, Holbrook, Hull, Medfield, Medway, Millis, Milton, Needham, Norfolk, Norwood, Quincy, Randolph, Sharon Stoughton, Walpole, Wellesley, Westwood, and Weymouth) AND SUFFOLK COUNTIES

	Rates	Fringes
HAZARDOUS MATERIAL HANDLER (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems whether they contain asbestos or not)	$ 30.68	17.40

ASBE0006-010 09/01/2014

BARNSTABLE (Barnstable, Bourne, Falmouth, Mashpee and Sandwich); BRISTOL (Acushnet, Attleboro city, Berkeley, Dartmouth, Dighton, Fairhaven, Fall river City, Freetown, Marion, Mansfield, New Bedford City, North Attleboro, Norton, Raynham, Rehoboth, Seekonk, Somerset, Swansea, Taunton City and Westport); DUKES; NANTUCKET; NORFOLK (Bellingham, Franklin, Plainville, and Wrentham); PLYMOUTH (Lakeville, Mattapoisett, Middleboro, Rochester and Wareham)

	Rates	Fringes
Insulator/asbestos worker (Includes the application of all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.)	$ 38.98	24.15

BOIL0029-001 10/01/2009

	Rates	Fringes
BOILERMAKER	$ 38.25	17.04

BRMA0001-008 09/01/2013

FOXBORO CHAPTER
BRISTOL (Attleboro, Berkley, Dighton, Mansfield, North Attleboro, Norton, Raynham, Rehoboth, Seekonk, Taunton) AND NORFOLK (Bellingham, Canton, Dedham, Foxboro, Franklin, Norfolk, Norwood, Plainville, Sharon, Walpole, Westrwood, Wrentham) COUNTIES

	Rates	Fringes
Bricklayer, Cement Mason,		

	Rates	Fringes
Plasterer	$ 45.96	29.74

BRMA0001-009 09/01/2013

LOWELL CHAPTER
MIDDLESEX (Acton, Asby, Ayer, Bedford, Billerica, Boxboro, Carlisle, Chemsford, Dracut, Dunstble, Ft. Denvens, Groton, Littleton, Lowell, North Acton, Pepperell, Shirley, South Acton, Tewksbury, Townsend, Tyngsboro, West Acton, Westford, Wilmington)

	Rates	Fringes
Bricklayer and plasterer	$ 45.96	29.74

BRMA0001-010 09/01/2013

LOWELL CHAPTER
MIDDLESEX (Ashland, Framingham, Holliston, Hopkinton, Hudson, Maynard, Natick, Sherbvorn, Stow); and NORFOLK (Medfield, Medway,Millis)

	Rates	Fringes
BRICKLAYER	$ 45.96	29.74

BRMA0003-001 08/01/2014

	Rates	Fringes
Marble & Tile Finisher	$ 37.37	27.20
Marble, Tile & Terrazzo Workers	$ 49.00	28.72
TERRAZZO FINISHER	$ 47.90	28.55

BRMA0003-003 08/01/2014

BOSTON CHAPTER
MIDDLESEX (Arlington, Cambridge, Everett, Malden, Medford, Melrose, Somerville); NORFOLK (Brookline, Milton); and SUFFOLK

	Rates	Fringes
BRICKLAYER	$ 48.96	28.77

BRMA0003-006 08/01/2014

LYNN CHAPTER
ESSEX (Amesbury, Andover, Beverly, Boxford, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipsewich, Lawrence, Lynn, Lynnfield, Manchester, Marblehead, Merrimac, Methuen, Middleton, Nahant, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salisbury, Salem, Saugus, Swampscott, Topsfield Wakefield, Wenham, West Newbury); and MIDDLESEX (Reading, North Reading, Wakefield)

	Rates	Fringes
Bricklayer, cement mason and		

plasterer.....$ 48.96 28.77

BRMA0003-007 08/01/2014

WALTHAM CHAPTER
MIDDLESEX (Belmont, Burlington, Concord, Lexington, Lincoln, Stoneham, Sudbury, Waltham, Watertown, Wayland, Weston, Winchester, Woburn)

	Rates	Fringes
Bricklayer and plasterer	$ 48.96	28.77

BRMA0003-008 08/01/2014

NEWTON CHAPTER
MIDDLESEX (Newton) and NORFOLK (Dover, Needham, Wellesley)

	Rates	Fringes
Bricklayer, cement mason and plasterer	$ 48.96	28.77

BRMA0003-009 08/01/2014

NEW BEDFORD
BARNSTABLE; BRISTOL (Acushnet, Darmouth, Farhaven, Fall River, Freetown, New Bedford, Somerset, Swansea, Westport); DUKES; and NANTUCKET COUNTIES

	Rates	Fringes
Bricklayer, cement mason and plasterer	$ 48.96	28.77

BRMA0003-010 08/01/2014

QUINCY CHAPTER
NORFOLK COUNTY (Avon, Braintree, Cohasset, Holbrook, Quincy, Randolph, Soughton, Weymouth)

	Rates	Fringes
Bricklayer, cement mason and plasterer	$ 48.96	28.77

CARP0026-001 09/01/2013

BRISTOL (Attleborough, North Attleborough); ESSEX; MIDDLESEX (Except Belmont, Cambridge, Everett, Malden, Medford, Somerville); AND NORFOLK (Bellingham, Canton, Foxboro, Franklin, Medfield, Medway, Millis, Needham, Norfolk, Norwood, Plainville, Sharon, Walpole, Wellesley, Westwood, Wrentham)

	Rates	Fringes
CARPENTER	$ 34.28	26.06

CARP0033-001 09/01/2013

MIDDLESEX (Belmont, Cambridge, Everett, Malden, Medford, Somerville); NORFOLK (Brookline, Dedham, Milton); and SUFFOLK

	Rates	Fringes
CARPENTER	$ 40.10	26.56

CARP0056-011 08/01/2013

SUFFOLK (All of County); and those areas of BARNSTABLE, BRISTOL, ESSEX, MIDDLESEX & NORFOLK COUNTIES situated inside Boston Beltway (I-495) and North of Cape Cod Canal. ALL of DUKES AND NANTUCKET COUNTIES

	Rates	Fringes
PILEDRIVERMAN	$ 40.10	28.57

CARP0056-012 08/01/2013

The areas of BARNSTABLE, BRISTOL, and NORFOLK COUNTIES situated OUTSIDE Boston Beltway (I-495) and South of Cape Cod Canal

	Rates	Fringes
PILEDRIVERMAN	$ 40.10	28.57

CARP0056-013 08/01/2013

Those areas of ESSEX and MIDDLESEX COUNTIES situated OUTSIDE Boston Beltway (I-495)

	Rates	Fringes
PILEDRIVERMAN	$ 40.10	28.57

CARP0424-003 09/01/2013

NORFOLK COUNTY (Braintree, Cohassett, Scituate, Weymouth, Quincy)

	Rates	Fringes
CARPENTER	$ 34.28	26.06

* CARP0624-005 09/01/2014

DUKES; NANTUCKET

	Rates	Fringes
CARPENTER	$ 35.35	26.31

* CARP0624-007 03/01/2013

BARNSTABLE; BRISTOL (Except Attleboro & North Attleboro); AND

NORFOLK (Avon, Holbrook, Randolph, Stoughton) COUNTIES

	Rates	Fringes
CARPENTER	$ 33.92	26.20

CARP1121-001 04/01/2014

	Rates	Fringes
MILLWRIGHT	$ 35.73	26.81

* CARP2168-001 09/01/2014

MIDDLESEX (Belmont, Cambridge, Everett, Malden, Medford, Somerville); NORFOLK (Brookline, Dedham, Milton); and SUFFOLK

	Rates	Fringes
FLOOR LAYER: Carpet	$ 40.40	27.61

* CARP2168-004 09/01/2014

BRISTOL; ESSEX; MIDDLESEX (Except Belmont, Cambridge, Everett, Malden, Medford, Somerville); Remainder of Norfolk County

	Rates	Fringes
FLOOR LAYER: Carpet	$ 40.40	27.61

* CARP2168-005 09/01/2014

BARNSTABALE; DUKES; AND NANTUCKET

	Rates	Fringes
FLOOR LAYER: Carpet	$ 40.40	27.61

ELEC0096-001 06/01/2014

MIDDLESEX (Ashby, Ashland, Ayer, Ft. Devens, Groton, Hopkinton, Hudson, Marlboro, Pepperell, Shirley, Stow, Townsend)

	Rates	Fringes
ELECTRICIAN	$ 38.12	11%+17.03
Teledata System Installer	$ 25.86	3%+17.37

ELEC0099-001 06/01/2014

BRISTOL (Attleboro, North Attleboro, Seekonk)

	Rates	Fringes
ELECTRICIAN	$ 34.83	61.56%
Teledata System Installer	$ 25.56	14.26%+13.57

ELEC0103-001 03/01/2014

ESSEX; MIDDLESEX (Excluding Ashby, Ashland, Ayer, Ft. Devens, Groton, Hopkinton, Hudson, Marlboro, Pepperell, Shirley, Stow, Townsend); NORFOLK (Excluding Avon, Holbrook, Plainville, Randolph, Stoughton) SUFFOLK

	Rates	Fringes
Teledata System Installer	$ 33.34	26.50

ELEC0103-002 09/01/2013

ESSEX (Amesbury, Andover, Boxford, Georgetown, Groveland, Haverhill, Lawrence, Merrimac, Methuen, Newbury, Newburyport, North Andover, Rowley, Salisbury, West Newbury); MIDDLESEX (Bedford, Billerica, Boxboro, Burlington, Carlisle, Chelmsford, Dracut, Dunstable littleton, Lowell, North Reading, Tewksbury, Tyngsboro, Westford, Wilmington)

	Rates	Fringes
ELECTRICIAN	$ 43.96	28.04

ELEC0103-004 09/01/2013

ESSEX (Beverly, Danvers, Essex, Gloucester, Hamilton, Ipswich, Manchester, Marblehead, Middleton, Peabody, Rockport, Salem, Topsfield, Wenham)

	Rates	Fringes
ELECTRICIAN	$ 43.96	28.04

ELEC0103-005 09/01/2013

ESSEX (Lynn, Lynnfield, Nahant, Saugus, Swampscott); MIDDLESEX (Acton, Arlington, Belmont, Cambridge, Concord, Everett, Framingham, Holliston, Lexington, Lincoln, Malden, Maynard, Medford, Melrose, Natick, Newton, Reading, Sherborn, Somerville, Stoneham, Sudbury, Wakefield, Waltham, Watertown, Wayland, Weston, Winchester, Woburn); NORFOLK (Bellingham, Braintree, Brookline, Canton, Cohasset, Dedham, Dover, Foxboro, Frankloin, Medfield, Medway, Millis, Milton, Needham, Norfolk, Norwood, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth, Wrentham); PLYMOUTH (Hingham and Hull);SUFFOLK

	Rates	Fringes
ELECTRICIAN	$ 43.96	28.04

ELEC0104-001 09/03/2012

	Rates	Fringes
Line Construction:		
Cableman	$ 41.97	19.08+A
Equipment Operator	$ 35.67	17.54+A
Groundman	$ 23.08	11.85+A
Lineman	$ 41.97	19.08+A

A. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Christmas Day and Columbus Day, provided the employee has been employed 5 working days prior to any one of the listed holidays.

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* ELEC0223-005 09/01/2014

BARNSTABLE; BRISTOL (Except Attleboro, North Attleboro, Seekonk); DUKES; NANTUCKET AND NORFOLK (Avon, Halbrook, Plainville, Randolph, Stoughton)

	Rates	Fringes
ELECTRICIAN	$ 37.31	27.75%+9.70

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* ELEC0223-006 09/01/2014

BARNSTABLE; BRISTOL (Except Attleboro, North Attleboro, Seekonk); DUKES; NANTUCKET AND NORFOLK (Avon, Halbrook, Plainville, Randolph, Stoughton)

	Rates	Fringes
Teledata System Installer	$ 37.31	27.75%+9.70

ELEV0004-001 01/01/2014

	Rates	Fringes
ELEVATOR MECHANIC	$ 52.32	26.785+a

FOOTNOTE FOR ELEVATOR MECHANICS:

A. 6% under 5 years based on regular hourly rate for all hours worked. 8% over 5 years based on regular hourly rate for all hours worked.

Eight paid holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Friday after Thanksgiving Day and Christmas Day.

ENGI0004-001 06/01/2014

	Rates	Fringes
Power equipment operators:		
Group 1	$ 41.49	25.04+A
Group 2	$ 41.10	25.04+A
Group 3	$ 28.80	25.04+A
Group 4	$ 34.59	25.04+A
Group 5	$ 21.48	25.04+A
Group 6	$ 25.03	25.04+A

FOOTNOTE FOR POWER EQUIPMENT OPERATORS:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Labor Day, Memorial Day, Independence Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day, Christmas Day

HOURLY PREMIUM FOR BOOM LENGTHS (Including Jib):
Over 150 ft. +2.12
Over 185 ft. +3.72
Over 210 ft. +5.23
Over 250 ft. +7.92
Over 295 ft. +10.97
Over 350 ft. +12.76

POWER EQUIPMENT OPERATORS CLASSIFICATIONS
Group 1: Crane; shovel; truck crane; cherry picker; dragline; trench hoe; backhoe; three drum machine; derrick; pile driver; elevator tower; hoist; gradall; shovel dozer; front end loader; fork lift; suger; boring machine; rotaryu drill; post hole hammer; post hole digger; pumpcrete machine; asphalt plant (on site); concrete batching and/or mixing plant (on site); crusher plant (on site); paving concrete mixer; timber jack
Group 2: Sonic or vibratory hammer; grader; scraper; tandem scraper; concrete pump; bulldozer; tractor; york rake; mulching machine; portable steam boiler; portable steam generator; roller; spreader; tamper (self propelled or tractor drawn); asphalt paver; mechanic - maintenance; paving screed machine; stationary steam boiler; paving concrete finishing machine; cal truck; ballast regulator; switch tamper; rail anchor machine; tire truck
Group 3: Pumps (1-3 grouped); compressor; welding machine (1-3 grouped); generator; concrete vibrator; heater (power driven 1- 5); well point system (operating); syphon-pulsometer; concrete mixer; valves controlling permanent plant air or steam; conveyor; Jackson type tamper; single diaphragm pump; lighting plant
Group 4: Assistant engineer (fireman)
Group 5: Oiler (other than truck cranes and gradalls)
Group 6: Oiler (on truck cranes and gradalls) stant engineer (on truck crane and gradall)

IRON0007-006 03/16/2014

AREA 1: BRISTOL (Easton); ESSEX (Beverly Gloucester, Lynn,Lynnfield, Manchester, Marblehead Nahant, Salem, Saugus, Swampscott); MIDDLESEX (Arlington, Bedford, Belmont, Burlington, Cambridge, Concord, Everett, Framingham, Lexington, Lincoln, Malden, Maynard, Medford, Melrose, Natick, Newton, Reading, Sherborn, Somerville, Stoneham, Sudbury, Wakefield, Waltham, Watertown, Wayland, Weston, Winchester, Woburn); NORFOLK (Except Medway); SUFFOLK

AREA 2: ESSEX (Amesbury, Andover, Boxford, Danvers, Essex, Georgetown, Hamilton, Haverhill, Ipswich, Lawrence, Merrimac, Methuen, Newbury, Newburyport, North Andover, Rockport, Rowley, Salisbury, Topsfield, Wenham, West Newbury); MIDDLESEX (Action, Billericia, Carlisle, Chelmsford, Dracut, Dunstable, Groton, Groveland, Littleton, Lowell, Middleton, North Reading, Pepperell, Tewksbury, Tyngsboro, Westford, Wilmington)

	Rates	Fringes
Ironworkers:		
AREA 1	$ 41.19	27.80
AREA 2	$ 36.78	27.80

IRON0007-010 03/16/2014

MIDDLESEX (Ashby, Ashland, Ayer, Boxboro, Holliston, Hopkinton, Hudson, Marlboro, Shirley, Stow, Townsend); NORFOLK (Medway)

	Rates	Fringes
IRONWORKER	$ 40.89	27.80

IRON0037-005 03/16/2014

BARNSTABLE; BRISTOL (Acushnet, Attleboro, Berkley, Dartmouth, Dighton, Fairhaven, Fall River, Freetown, Mansfield, New Bedford, North Attleboro, Norton, Raynham, Rehoboth, Seekonk, Somerset, Swansea, Taunton, Westport); DUKES; NANTUCKET; NORFOLK (Billingham, Franklin, Plainville, Wrentham)

	Rates	Fringes
IRONWORKER	$ 33.56	22.77

LABO0014-001 06/01/2011

	Rates	Fringes
Plasterer tender BARNSTABLE, BRISTOL, DUKES, ESSEX, NANTUCKET, MIDDLESEX (with the exception of Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop and Woburn); NORFOLK (with the exception of Brookline Dedham and Milton) COUNTIES.	$ 28.60	19.00
SUFFOLK COUNTY (Boston, Chelsea, Revere, Winthrop, Deer Island, Nut Island); MIDDLESEX COUNTY (Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop and Woburn only); NORFOLK COUNTY (Brookline, Dedham, and Milton only)	$ 31.05	19.90

LABO0022-009 12/01/2012

SUFFOLK COUNTY (Boston, Chelsea, Revere, Winthrop, Deer & Nut Islands); MIDDLESEX COUNTY (Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop, and Woburn only); NORFOLK COUNTY (Brookline, Dedham, and Milton only)

	Rates	Fringes
Laborers:		
Group 1	$ 32.30	20.40
Group 2	$ 32.55	20.40
Group 3	$ 33.05	20.40
Group 4	$ 33.30	20.40
Group 5	$ 33.05	20.40
Group 6	$ 34.30	20.40
Group 7	$ 20.50	20.40

LABORERS CLASSIFICATIONS

GROUP 1: Laborers; Carpenter Tenders

GROUP 2: Jackhammer operator; pavement breaker; asphalt raker carbide core drilling machine; chain saw operator; pipelayer; barco type jumping tampers; laser beam; concrete pump; mason tender; motorized mortar mixer; ride-on motorized buggy; fence and beam rail erector

GROUP 3: Air track, block paver; rammer; curb setter, hydraulic and similar self-powered drills

GROUP 4: Blaster; powderman

GROUP 5: Pre-cast floor and roof plank erector

GROUP 6: Asbestos removal laborers/haz-mat laborers

GROUP 7: Flaggers

LABO0022-010 12/01/2012

Counties of BARNSTABLE; BRISTOL; DUKES; ESSEX; NANTUCKET; MIDDLESEX (with the exception of Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Somerville, Stoneham, Wakfield, Winchester, Winthrop and Woburn); NORFOLK (with the exception of Brookline, Dedham and Milton)

	Rates	Fringes
Laborers:		
Group 1	$ 29.60	19.50
Group 2	$ 29.85	19.50
Group 3	$ 30.35	19.50
Group 4	$ 30.60	19.50
Group 5	$ 30.35	19.50
Group 6	$ 31.60	19.50

LABORERS CLASSIFICATIONS

GROUP 1: Laborers; Carpenter Tenders

GROUP 2: Jackhammer operator; pavement breaker; asphalt raker carbide core drilling machine; chain saw operator; pipelayer; barco type jumping tampers; laser beam; concrete pump; mason tender; motorized mortar mixer; ride-on

motorized buggy; fence and beam rail erector

GROUP 3: Air track, block paver; hammer; curb setter, hydraulic and similar self-powered drills

GROUP 4: Blaster; powderman

GROUP 5: Pre-cast floor and roof plank erector

GROUP 6: Asbestos removal laborers/haz-mat laborers

LABO1421-004 06/01/2014

BARNSTABLE, BRISTOL, DUKES, ESSEX, MIDDLESEX, NANTUCKET NORFOLK AND SUFFOLK COUNTIES

	Rates	Fringes
Laborers: (Wrecking)		
Group 1	$ 34.25	20.85
Group 2	$ 35.00	20.85
Group 3	$ 35.25	20.85
Group 4	$ 30.25	20.85
Group 5	$ 33.35	20.85
Group 6	$ 34.25	20.85

Group 1: Adzeman, Wrecking Laborer.
Group 2: Burners, Jackhammers.
Group 3: Small Backhoes, Loaders on tracks, Bobcat Type Loaders, Hydraulic "Brock" Type Hammer Operators, Concrete Cutting Saws.
Group 4: Yardman (Salvage Yard Only).
Group 5: Yardman, Burners, Sawyers.
Group 6: Asbestos, Lead Paint, Toxic and Hazardous Waste.

PAIN0011-007 06/01/2014

BARNSTABLE, BRISTOL, DUKES, AND NANTUCKET COUNTIES

	Rates	Fringes
GLAZIER	$ 34.58	18.55+A

FOOTNOTE:
A. PAID HOLIDAY: LABOR DAY (provided employee has worked any part of the week prior to Labor Day and any part of the week after Labor Day)

PAIN0035-004 07/01/2014

BARNSTABLE; BRISTOL; ESSEX; NANTUCKET; DUKES; COUNTIES; REMAINDER OF NORFOLK; MIDDLESEX AND SUFFOLK COUNTIES

	Rates	Fringes
Painters:		
NEW CONSTRUCTION:		
Brush, Taper	$ 35.86	25.50

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      Spray, Sandblast.....$ 37.26            25.50
     REPAINT:
      Brush, Taper.........$ 33.92            25.50
      Spray, Sandblast.....$ 35.32            25.50
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 PAIN0035-013 07/01/2014

MIDDLESEX (Cambridge, Everett, Malden, Medford, Somerville)
SUFFOLK COUNTY (Boston, Chelsea) NORFOLK COUNTY (Brookline)


                                  Rates          Fringes

Painters:
     NEW CONSTRUCTION:
      Brush, Taper.........$ 41.65            25.505
      Spray, Sandblast.....$ 43.05            25.505
     REPAINT:
      Brush, Taper.........$ 39.71            25.505
      Spray, Sandblast.....$ 41.11            25.505
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 PAIN0035-020 07/01/2014

ESSEX; MIDDLESEX; NORFOLK; SUFFOLK

                                  Rates          Fringes

GLAZIER..................$ 35.86               25.50
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 PLAS0534-001 07/01/2014

ESSEX; MIDDLESEX; NORFOLK AND SUFFOLK COUNTY

                                  Rates          Fringes

CEMENT MASON/CONCRETE FINISHER...$ 37.25            32.26
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 PLAS0534-004 07/01/2014

MIDDLESEX; NORFOLK AND SUFFOLK COUNTIES

                                  Rates          Fringes

PLASTERER................$ 37.25               32.26
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 PLUM0004-001 03/01/2013

MIDDLESEX (Ashby, Ayer-West of Greenville branch of Boston and
Maine Railroad, Ft. Devens, Groton, Shirley, Townsend)


                                  Rates          Fringes

Plumbers and Pipefitters.....$ 40.01            24.21
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 PLUM0012-005 09/01/2013

ESSEX (Ames, Andover, Beverly, Boxford, Byfield, Danvers,
Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill,
Ipswich, Lawrence, Manchester, Marblehead, Merrimac, Methuem,
Middleton, Newbury, Newburyport, North Andover, Peabody,
Rockport, Rowley, Salem, Salisbury, Topsfield, Wenham, West
Newbury)
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	Rates	Fringes
PLUMBER	$ 44.98	24.56

PLUM0012-007 09/01/2013

ESSEX (Lynn, Lynnfield, Nahant, Saugus, and Swampscott); MIDDLESEX (Acton, Arlington, Ashford, Ayer-except west of Greenville Branch of Boston & Maine Rail Road, Bedford, Belmont, Billerica, Boxboro, Burlington, Cambridge, Carlise, Chelmsford, Concord, Dracut, Dunstable, Everett, Framingham, Hudson, Holliiston, Hopkinton, Lexington, Lincoln, Littleton, Lowell, Malden, Marlboro, Maynard, Medford, Melrose, Natick, Newton, North Reading, Pepperell, Reading, Sherborn, Somerville, Stoneham, Stow, Sudbury, Tewksbury, Tyngsboro, Wakefield, Watham, Watertown, Wayland, Westford, Wilmington, Winchester and Woburn), NORFOLK (Bellingham, Braintree, Brookline, Canton, Cohasset, Dedham, Dover, Foxboro, Franklin, Medford, Medway, Millis, Milton, Needham, Norfolk, Norwood, Plainville, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth and Wrentham); PLYMOUTH (Hingham, Hull, Scituate); SUFFOLK; WORCESTER (Hopedale and Southboro)

	Rates	Fringes
PLUMBER	$ 49.06	24.56

PLUM0051-004 03/01/2014

BARNSTABLE; BRISTOL; DUKES; NANTUCKET; AND NORFOLK (Avon, Holbrook, Randolph, Stoughton) COUNTIES

	Rates	Fringes
Plumbers and Pipefitters	$ 35.51	27.32

PLUM0537-005 09/01/2013

ESSEX (Ames, Andover, Beverly, Boxford, Byfield, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence, Lynn, Lynnfield, Manchester, Marblehead, Merrimac, Methuem, Middleton, Nahant, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salem, Salisbury, Saugus, Swampscott,Topsfield, Wenham, West Newbury); MIDDLESEX (Acton, Arlington, Ashford, Ayer-except west of Greenville Branch of Boston & Maine Rail Road, Bedford, Belmont, Billerica, Boxboro, Burlington, Cambridge, Carlise, Chelmsford, Concord, Dracut, Dunstable, Everett, Framingham, Hudson, Holliiston, Hopkinton, Lexington, Lincoln, Littleton, Lowell, Malden, Marlboro, Maynard, Medford, Melrose, Natick, Newton, North Reading, Pepperell, Reading, Sherborn, Somerville, Stoneham, Stow, Sudbury, Tewksbury, Tyngsboro, Wakefield, Watham, Watertown, Wayland, Westford, Wilmington, Winchester and Woburn), NORFOLK (Bellingham, Braintree, Brookline, Canton, Cohasset, Dedham, Dover, Foxboro, Franklin, Medford, Medway, Millis, Milton, Needham, Norfolk, Norwood, Plainville, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth and Wrentham); PLYMOUTH (Hingham, Hull, Scituate); SUFFOLK; WORCHESTER (Hopedale and Southboro)

	Rates	Fringes
PIPEFITTER	$ 47.94	26.51

ROOF0033-001 08/01/2014

	Rates	Fringes
Roofers:		
All Tear-off and/or removal of any types of roofing and all spudding, sweeping, vacuuming and/or cleanup of any and all areas of any type where a roof is to be relaid	$ 39.21	22.92

SFMA0550-001 01/01/2014

BRISTOL (Portion within 35 mile radius from Boston City Hall; ESSEX; MIDDLESEX (Except Ashby, Townsend, and portions of Pepperell and Shirley beyond 35 mile radius from Boston City Hall); NORFOLK; PLYMOUTH (Portion within 35 mile radius of Boston City Hall); SUFFOLK

	Rates	Fringes
SPRINKLER FITTER	$ 53.33	22.08

SFMA0550-002 01/01/2014

BRISTOL (Seekonk, Swansea, and Somerset)

	Rates	Fringes
SPRINKLER FITTER	$ 39.40	21.05+a

a. PAID HOLIDAYS: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

SFMA0669-001 01/01/2014

BARNSTABLE; BRISTOL (Beyond 35 mile radius of Boston City Hall); DUKES; MIDDLESEX (Ashby, Townsend, portions of Pepperell and Shirley beyond 35 mile radius of Boston City Hall); NANTUCKET; PLYMOUTH (Beyond 35 mile radius of Boston City Hall)

	Rates	Fringes
SPRINKLER FITTER	$ 39.40	21.05

SHEE0017-003 02/01/2012

BRISTOL (Attleboro, Berkley, Easton, Mansfield, North Attleboro, Norton, Raynham, Taunton); ESSEX; MIDDLESEX; NORFOLK; PLYMOUTH (except except Marion, Mattapoisett,

Rochester, Wareham); SUFFOLK

	Rates	Fringes
Sheet metal worker	$ 40.79	28.83

SHEE0017-007 02/01/2012

BARNSTABLE; BRISTOL (Acushnet, Assonet, Dartmouth, Dighton, Fairhaven, Fall River, Freetown, New Bedford, Rehoboth, Seeekonk, Somerset, Swansea, Westport); DUKES; AND NANTUCKET

	Rates	Fringes
Sheet metal worker	$ 40.79	28.83

TEAM0379-001 08/01/2013

	Rates	Fringes
Truck drivers:		
Group 1	$ 30.78	18.37+A+B
Group 2	$ 30.95	18.37+A+B
Group 3	$ 31.02	18.37+A+B
Group 4	$ 31.14	18.37+A+B
Group 5	$ 31.24	18.37+A+B
Group 6	$ 31.53	I8.37+A+B
Group 7	$ 31.82	18.37+A+B

POWER TRUCKS $.25 DIFFERENTIAL BY AXLE
TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE
HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM

TRUCK DRIVERS CLASSIFICATIONS

Group 1: Station wagons; panel trucks; and pickup trucks

Group 2: Two axle equipment; & forklift operator

Group 3: Three axle equipment and tireman

Group 4: Four and Five Axle equipment

Group 5: Specialized earth moving equipment under 35 tons other than conventional type trucks; low bed; vachual; mechanics, paving restoration equipment

Group 6: Specialized earth moving equipment over 35 tons

Group 7: Trailers for earth moving equipment (double hookup)

FOOTNOTES:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day and Christmas Day

B. PAID VACATION: Employees with 4 months to 1 year of

service receive 1/2 day's pay per month; 1 week vacation for 1 - 5 years of service; 2 weeks vacation for 5 - 10 years of service; and 3 weeks vacation for more than 10 years of service

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the

survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

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THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

DEVAL L. PATRICK
Governor

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

RACHEL KAPRIELIAN
Secretary
HEATHER E. ROWE
Director

Awarding Authority: City of Lowell

Contract Number: 224802.20 **City/Town:** LOWELL

Description of Work: New booster pumping station and demolish existing station. Miscellaneous mechanical, HVAC, electrical, instrumentation and controls, and structural work at the raw water PS and treatment plant.

Job Location: 815 Pawtucket Blvd, Lowell, MA

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **If an apprentice rate is not listed on the prevailing wage schedule for the trade in which an apprentice is registered with the DAS, the apprentice must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

Issue Date: 09/05/2014 **Wage Request Number:** 20140905-010

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2014	$31.30	$9.91	$8.80	$0.00	$50.01
	12/01/2014	$31.30	$9.91	$9.33	$0.00	$50.54
	06/01/2015	$31.65	$9.91	$9.33	$0.00	$50.89
	08/01/2015	$31.65	$10.41	$9.33	$0.00	$51.39
	12/01/2015	$31.65	$10.41	$10.08	$0.00	$52.14
	06/01/2016	$32.15	$10.41	$10.08	$0.00	$52.64
	08/01/2016	$32.15	$10.91	$10.08	$0.00	$53.14
	12/01/2016	$32.15	$10.91	$10.89	$0.00	$53.95
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2014	$31.37	$9.91	$8.80	$0.00	$50.08
	12/01/2014	$31.37	$9.91	$9.33	$0.00	$50.61
	06/01/2015	$31.72	$9.91	$9.33	$0.00	$50.96
	08/01/2015	$31.72	$10.41	$9.33	$0.00	$51.46
	12/01/2015	$31.72	$10.41	$10.08	$0.00	$52.21
	06/01/2016	$32.22	$10.41	$10.08	$0.00	$52.71
	08/01/2016	$32.22	$10.91	$10.08	$0.00	$53.21
	12/01/2016	$32.22	$10.91	$10.89	$0.00	$54.02
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2014	$31.49	$9.91	$8.80	$0.00	$50.20
	12/01/2014	$31.49	$9.91	$9.33	$0.00	$50.73
	06/01/2015	$31.84	$9.91	$9.33	$0.00	$51.08
	08/01/2015	$31.84	$10.41	$9.33	$0.00	$51.58
	12/01/2015	$31.84	$10.41	$10.08	$0.00	$52.33
	06/01/2016	$32.34	$10.41	$10.08	$0.00	$52.83
	08/01/2016	$32.34	$10.91	$10.08	$0.00	$53.33
	12/01/2016	$32.34	$10.91	$10.89	$0.00	$54.14
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2014	$87.36	$9.80	$18.17	$0.00	$115.33
	08/01/2015	$90.51	$9.80	$18.17	$0.00	$118.48
AIR TRACK OPERATOR *LABORERS - ZONE 2*	06/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	12/01/2014	$31.60	$7.30	$12.10	$0.00	$51.00
	06/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	12/01/2015	$32.60	$7.30	$12.10	$0.00	$52.00
	06/01/2016	$33.10	$7.30	$12.10	$0.00	$52.50
	12/01/2016	$33.85	$7.30	$12.10	$0.00	$53.25
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	06/01/2014	$31.58	$10.40	$5.95	$0.00	$47.93
	12/01/2014	$32.48	$10.40	$5.95	$0.00	$48.83
	06/01/2015	$33.43	$10.40	$5.95	$0.00	$49.78
	12/01/2015	$34.38	$10.40	$5.95	$0.00	$50.73
ASPHALT RAKER *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.49	$10.00	$14.20	$0.00	$65.69
	12/01/2014	$42.49	$10.00	$14.20	$0.00	$66.69
	06/01/2015	$43.24	$10.00	$14.20	$0.00	$67.44
	12/01/2015	$44.49	$10.00	$14.20	$0.00	$68.69
	06/01/2016	$45.24	$10.00	$14.20	$0.00	$69.44
	12/01/2016	$46.49	$10.00	$14.20	$0.00	$70.69
	06/01/2017	$47.49	$10.00	$14.20	$0.00	$71.69
	12/01/2017	$48.49	$10.00	$14.20	$0.00	$72.69
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.49	$10.00	$14.20	$0.00	$65.69
	12/01/2014	$42.49	$10.00	$14.20	$0.00	$66.69
	06/01/2015	$43.24	$10.00	$14.20	$0.00	$67.44
	12/01/2015	$44.49	$10.00	$14.20	$0.00	$68.69
	06/01/2016	$45.24	$10.00	$14.20	$0.00	$69.44
	12/01/2016	$46.49	$10.00	$14.20	$0.00	$70.69
	06/01/2017	$47.49	$10.00	$14.20	$0.00	$71.69
	12/01/2017	$48.49	$10.00	$14.20	$0.00	$72.69
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	06/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	12/01/2014	$31.60	$7.30	$12.10	$0.00	$51.00
	06/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	12/01/2015	$32.60	$7.30	$12.10	$0.00	$52.00
	06/01/2016	$33.10	$7.30	$12.10	$0.00	$52.50
	12/01/2016	$33.85	$7.30	$12.10	$0.00	$53.25
For apprentice rates see "Apprentice- LABORER"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2010	$37.70	$6.97	$11.18	$0.00	$55.85

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2010

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$24.51	$6.97	$11.18	$0.00	$42.66
2	65	$24.51	$6.97	$11.18	$0.00	$42.66
3	70	$26.39	$6.97	$11.18	$0.00	$44.54
4	75	$28.28	$6.97	$11.18	$0.00	$46.43
5	80	$30.16	$6.97	$11.18	$0.00	$48.31
6	85	$32.05	$6.97	$11.18	$0.00	$50.20
7	90	$33.93	$6.97	$11.18	$0.00	$52.08
8	95	$35.82	$6.97	$11.18	$0.00	$53.97

Notes:

Apprentice to Journeyworker Ratio:1:5

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (LOWELL)*	09/01/2014	$46.86	$10.18	$17.62	$0.00	$74.66
	03/01/2015	$47.42	$10.18	$17.62	$0.00	$75.22
	09/01/2015	$48.32	$10.18	$17.69	$0.00	$76.19
	03/01/2016	$48.89	$10.18	$17.69	$0.00	$76.76
	09/01/2016	$49.79	$10.18	$17.77	$0.00	$77.74
	03/01/2017	$50.36	$10.18	$17.77	$0.00	$78.31

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Lowell*

Effective Date - 09/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.43	$10.18	$17.62	$0.00	$51.23
2	60	$28.12	$10.18	$17.62	$0.00	$55.92
3	70	$32.80	$10.18	$17.62	$0.00	$60.60
4	80	$37.49	$10.18	$17.62	$0.00	$65.29
5	90	$42.17	$10.18	$17.62	$0.00	$69.97

Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.71	$10.18	$17.62	$0.00	$51.51
2	60	$28.45	$10.18	$17.62	$0.00	$56.25
3	70	$33.19	$10.18	$17.62	$0.00	$60.99
4	80	$37.94	$10.18	$17.62	$0.00	$65.74
5	90	$42.68	$10.18	$17.62	$0.00	$70.48

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/GRADER/SCRAPER	06/01/2014	$41.10	$10.00	$14.20	$0.00	$65.30
OPERATING ENGINEERS LOCAL 4	12/01/2014	$42.09	$10.00	$14.20	$0.00	$66.29
	06/01/2015	$42.83	$10.00	$14.20	$0.00	$67.03
	12/01/2015	$44.07	$10.00	$14.20	$0.00	$68.27
	06/01/2016	$44.82	$10.00	$14.20	$0.00	$69.02
	12/01/2016	$46.05	$10.00	$14.20	$0.00	$70.25
	06/01/2017	$47.04	$10.00	$14.20	$0.00	$71.24
	12/01/2017	$48.03	$10.00	$14.20	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN	06/01/2014	$35.20	$7.30	$12.90	$0.00	$55.40
LABORERS - FOUNDATION AND MARINE	12/01/2014	$35.95	$7.30	$12.90	$0.00	$56.15
	06/01/2015	$36.70	$7.30	$12.90	$0.00	$56.90
	12/01/2015	$37.45	$7.30	$12.90	$0.00	$57.65
	06/01/2016	$38.20	$7.30	$12.90	$0.00	$58.40
	12/01/2016	$39.20	$7.30	$12.90	$0.00	$59.40
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER	06/01/2014	$34.05	$7.30	$12.90	$0.00	$54.25
LABORERS - FOUNDATION AND MARINE	12/01/2014	$34.80	$7.30	$12.90	$0.00	$55.00
	06/01/2015	$35.55	$7.30	$12.90	$0.00	$55.75
	12/01/2015	$36.30	$7.30	$12.90	$0.00	$56.50
	06/01/2016	$37.05	$7.30	$12.90	$0.00	$57.25
	12/01/2016	$38.05	$7.30	$12.90	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN	06/01/2014	$34.05	$7.30	$12.90	$0.00	$54.25
LABORERS - FOUNDATION AND MARINE	12/01/2014	$34.80	$7.30	$12.90	$0.00	$55.00
	06/01/2015	$35.55	$7.30	$12.90	$0.00	$55.75
	12/01/2015	$36.30	$7.30	$12.90	$0.00	$56.50
	06/01/2016	$37.05	$7.30	$12.90	$0.00	$57.25
	12/01/2016	$38.05	$7.30	$12.90	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
LABORERS - ZONE 2	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
CARPENTER	09/01/2014	$35.35	$9.80	$16.11	$0.00	$61.26
CARPENTERS -ZONE 2 (Eastern Massachusetts)	03/01/2015	$36.12	$9.80	$16.11	$0.00	$62.03

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 09/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.68	$9.80	$1.57	$0.00	$29.05
2	60	$21.21	$9.80	$1.57	$0.00	$32.58
3	70	$24.75	$9.80	$11.40	$0.00	$45.95
4	75	$26.51	$9.80	$11.40	$0.00	$47.71
5	80	$28.28	$9.80	$12.97	$0.00	$51.05
6	80	$28.28	$9.80	$12.97	$0.00	$51.05
7	90	$31.82	$9.80	$14.54	$0.00	$56.16
8	90	$31.82	$9.80	$14.54	$0.00	$56.16

Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.06	$9.80	$1.57	$0.00	$29.43
2	60	$21.67	$9.80	$1.57	$0.00	$33.04
3	70	$25.28	$9.80	$11.40	$0.00	$46.48
4	75	$27.09	$9.80	$11.40	$0.00	$48.29
5	80	$28.90	$9.80	$12.97	$0.00	$51.67
6	80	$28.90	$9.80	$12.97	$0.00	$51.67
7	90	$32.51	$9.80	$14.54	$0.00	$56.85
8	90	$32.51	$9.80	$14.54	$0.00	$56.85

Notes:

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (LOWELL)*	07/01/2014	$40.12	$10.90	$18.71	$1.30	$71.03
	01/01/2015	$40.80	$10.90	$18.71	$1.30	$71.71
	07/01/2015	$41.63	$10.90	$18.71	$1.30	$72.54
	01/01/2016	$42.32	$10.90	$18.71	$1.30	$73.23

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CEMENT MASONRY/PLASTERING - Lowell*

Effective Date - 07/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.06	$10.90	$12.21	$1.30	$44.47
2	60	$24.07	$10.90	$13.71	$1.30	$49.98
3	65	$26.08	$10.90	$14.71	$1.30	$52.99
4	70	$28.08	$10.90	$15.71	$1.30	$55.99
5	75	$30.09	$10.90	$16.71	$1.30	$59.00
6	80	$32.10	$10.90	$17.71	$1.30	$62.01
7	90	$36.11	$10.90	$18.71	$1.30	$67.02

Effective Date - 01/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.40	$10.90	$12.21	$1.30	$44.81
2	60	$24.48	$10.90	$13.71	$1.30	$50.39
3	65	$26.52	$10.90	$14.71	$1.30	$53.43
4	70	$28.56	$10.90	$15.71	$1.30	$56.47
5	75	$30.60	$10.90	$16.71	$1.30	$59.51
6	80	$32.64	$10.90	$17.71	$1.30	$62.55
7	90	$36.72	$10.90	$18.71	$1.30	$67.63

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75

For apprentice rates see "Apprentice- LABORER"

CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$42.49	$10.00	$14.20	$0.00	$66.69
	12/01/2014	$43.49	$10.00	$14.20	$0.00	$67.69
	06/01/2015	$44.24	$10.00	$14.20	$0.00	$68.44
	12/01/2015	$45.49	$10.00	$14.20	$0.00	$69.69
	06/01/2016	$46.24	$10.00	$14.20	$0.00	$70.44
	12/01/2016	$47.49	$10.00	$14.20	$0.00	$71.69
	06/01/2017	$48.49	$10.00	$14.20	$0.00	$72.69
	12/01/2017	$49.49	$10.00	$14.20	$0.00	$73.69

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$28.80	$10.00	$14.20	$0.00	$53.00
	12/01/2014	$29.50	$10.00	$14.20	$0.00	$53.70
	06/01/2015	$30.02	$10.00	$14.20	$0.00	$54.22
	12/01/2015	$30.89	$10.00	$14.20	$0.00	$55.09
	06/01/2016	$31.41	$10.00	$14.20	$0.00	$55.61
	12/01/2016	$32.28	$10.00	$14.20	$0.00	$56.48
	06/01/2017	$32.97	$10.00	$14.20	$0.00	$57.17
	12/01/2017	$33.66	$10.00	$14.20	$0.00	$57.86
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2014	$46.76	$7.85	$16.10	$0.00	$70.71
	01/01/2015	$47.66	$7.85	$16.10	$0.00	$71.61
	07/01/2015	$48.56	$7.85	$16.10	$0.00	$72.51
	01/01/2016	$49.51	$7.85	$16.10	$0.00	$73.46
	07/01/2016	$50.46	$7.85	$16.10	$0.00	$74.41
	01/01/2017	$51.41	$7.85	$16.10	$0.00	$75.36

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.38	$7.85	$0.00	$0.00	$31.23
2	55	$25.72	$7.85	$3.66	$0.00	$37.23
3	60	$28.06	$7.85	$3.99	$0.00	$39.90
4	65	$30.39	$7.85	$4.32	$0.00	$42.56
5	70	$32.73	$7.85	$14.11	$0.00	$54.69
6	75	$35.07	$7.85	$14.44	$0.00	$57.36
7	80	$37.41	$7.85	$14.77	$0.00	$60.03
8	90	$42.08	$7.85	$15.44	$0.00	$65.37

Effective Date - 01/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.83	$7.85	$0.00	$0.00	$31.68
2	55	$26.21	$7.85	$3.66	$0.00	$37.72
3	60	$28.60	$7.85	$3.99	$0.00	$40.44
4	65	$30.98	$7.85	$4.32	$0.00	$43.15
5	70	$33.36	$7.85	$14.11	$0.00	$55.32
6	75	$35.75	$7.85	$14.44	$0.00	$58.04
7	80	$38.13	$7.85	$14.77	$0.00	$60.75
8	90	$42.89	$7.85	$15.44	$0.00	$66.18

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: ADZEMAN *LABORERS - ZONE 2*	06/01/2014	$34.25	$7.30	$12.70	$0.00	$54.25
	12/01/2014	$35.00	$7.30	$12.70	$0.00	$55.00
	06/01/2015	$35.75	$7.30	$12.70	$0.00	$55.75
	12/01/2015	$36.50	$7.30	$12.70	$0.00	$56.50
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	06/01/2014	$35.25	$7.30	$12.70	$0.00	$55.25
	12/01/2014	$36.00	$7.30	$12.70	$0.00	$56.00
	06/01/2015	$36.75	$7.30	$12.70	$0.00	$56.75
	12/01/2015	$37.50	$7.30	$12.70	$0.00	$57.50
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 2*	06/01/2014	$35.00	$7.30	$12.70	$0.00	$55.00
	12/01/2014	$35.75	$7.30	$12.70	$0.00	$55.75
	06/01/2015	$36.50	$7.30	$12.70	$0.00	$56.50
	12/01/2015	$37.25	$7.30	$12.70	$0.00	$57.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	06/01/2014	$35.25	$7.30	$12.70	$0.00	$55.25
	12/01/2014	$36.00	$7.30	$12.70	$0.00	$56.00
	06/01/2015	$36.75	$7.30	$12.70	$0.00	$56.75
	12/01/2015	$37.50	$7.30	$12.70	$0.00	$57.50
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	06/01/2014	$35.00	$7.30	$12.70	$0.00	$55.00
	12/01/2014	$35.75	$7.30	$12.70	$0.00	$55.75
	06/01/2015	$36.50	$7.30	$12.70	$0.00	$56.50
	12/01/2015	$37.25	$7.30	$12.70	$0.00	$57.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	06/01/2014	$34.25	$7.30	$12.70	$0.00	$54.25
	12/01/2014	$35.00	$7.30	$12.70	$0.00	$55.00
	06/01/2015	$35.75	$7.30	$12.70	$0.00	$55.75
	12/01/2015	$36.50	$7.30	$12.70	$0.00	$56.50
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.10	$10.00	$14.20	$0.00	$65.30
	12/01/2014	$42.09	$10.00	$14.20	$0.00	$66.29
	06/01/2015	$42.83	$10.00	$14.20	$0.00	$67.03
	12/01/2015	$44.07	$10.00	$14.20	$0.00	$68.27
	06/01/2016	$44.82	$10.00	$14.20	$0.00	$69.02
	12/01/2016	$46.05	$10.00	$14.20	$0.00	$70.25
	06/01/2017	$47.04	$10.00	$14.20	$0.00	$71.24
	12/01/2017	$48.03	$10.00	$14.20	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2014	$58.24	$9.80	$18.17	$0.00	$86.21
	08/01/2015	$60.34	$9.80	$18.17	$0.00	$88.31
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2014	$41.60	$9.80	$18.17	$0.00	$69.57
	08/01/2015	$43.10	$9.80	$18.17	$0.00	$71.07
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2014	$62.40	$9.80	$18.17	$0.00	$90.37
	08/01/2015	$64.65	$9.80	$18.17	$0.00	$92.62
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2014	$87.36	$9.80	$18.17	$0.00	$115.33
	08/01/2015	$90.51	$9.80	$18.17	$0.00	$118.48

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DRAWBRIDGE OPERATOR (Construction) *ELECTRICIANS LOCAL 103*	09/01/2014	$44.79	$13.00	$15.04	$0.00	$72.83
	03/01/2015	$45.17	$13.00	$15.40	$0.00	$73.57
	09/01/2015	$46.13	$13.00	$15.43	$0.00	$74.56
	03/01/2016	$47.08	$13.00	$15.46	$0.00	$75.54
For apprentice rates see "Apprentice- ELECTRICIAN"						
ELECTRICIAN *ELECTRICIANS LOCAL 103*	09/01/2014	$44.79	$13.00	$15.04	$0.00	$72.83
	03/01/2015	$45.17	$13.00	$15.40	$0.00	$73.57
	09/01/2015	$46.13	$13.00	$15.43	$0.00	$74.56
	03/01/2016	$47.08	$13.00	$15.46	$0.00	$75.54

Apprentice - *ELECTRICIAN - Local 103*

Effective Date - 09/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.92	$13.00	$0.54	$0.00	$31.46
2	40	$17.92	$13.00	$0.54	$0.00	$31.46
3	45	$20.16	$13.00	$11.33	$0.00	$44.49
4	45	$20.16	$13.00	$11.33	$0.00	$44.49
5	50	$22.40	$13.00	$11.67	$0.00	$47.07
6	55	$24.63	$13.00	$12.01	$0.00	$49.64
7	60	$26.87	$13.00	$12.35	$0.00	$52.22
8	65	$29.11	$13.00	$12.68	$0.00	$54.79
9	70	$31.35	$13.00	$13.02	$0.00	$57.37
10	75	$33.59	$13.00	$13.36	$0.00	$59.95

Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.07	$13.00	$0.54	$0.00	$31.61
2	40	$18.07	$13.00	$0.54	$0.00	$31.61
3	45	$20.33	$13.00	$11.63	$0.00	$44.96
4	45	$20.33	$13.00	$11.63	$0.00	$44.96
5	50	$22.59	$13.00	$11.97	$0.00	$47.56
6	55	$24.84	$13.00	$12.32	$0.00	$50.16
7	60	$27.10	$13.00	$12.66	$0.00	$52.76
8	65	$29.36	$13.00	$13.00	$0.00	$55.36
9	70	$31.62	$13.00	$13.34	$0.00	$57.96
10	75	$33.88	$13.00	$13.69	$0.00	$60.57

Notes: :

App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2012	$52.45	$8.78	$6.96	$0.00	$68.19

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2012

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.23	$8.78	$0.00	$0.00	$35.01
2	55	$28.85	$8.78	$6.96	$0.00	$44.59
3	65	$34.09	$8.78	$6.96	$0.00	$49.83
4	70	$36.72	$8.78	$6.96	$0.00	$52.46
5	80	$41.96	$8.78	$6.96	$0.00	$57.70

Notes:
Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2012	$38.59	$8.78	$6.96	$0.00	$54.33
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2014	$38.87	$10.00	$14.18	$0.00	$63.05
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2014	$40.29	$10.00	$14.18	$0.00	$64.47
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2014	$20.92	$10.00	$14.18	$0.00	$45.10
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 103*	09/01/2014	$44.79	$13.00	$15.04	$0.00	$72.83
	03/01/2015	$45.17	$13.00	$15.40	$0.00	$73.57
	09/01/2015	$46.13	$13.00	$15.43	$0.00	$74.56
	03/01/2016	$47.08	$13.00	$15.46	$0.00	$75.54
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING*ELECTRICIANS LOCAL 103*	09/01/2014	$33.59	$13.00	$13.36	$0.00	$59.95
	03/01/2015	$33.88	$13.00	$13.70	$0.00	$60.58
	09/01/2015	$34.60	$13.00	$13.72	$0.00	$61.32
	03/01/2016	$35.31	$13.00	$13.74	$0.00	$62.05
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$34.59	$10.00	$14.20	$0.00	$58.79
	12/01/2014	$35.43	$10.00	$14.20	$0.00	$59.63
	06/01/2015	$36.05	$10.00	$14.20	$0.00	$60.25
	12/01/2015	$37.10	$10.00	$14.20	$0.00	$61.30
	06/01/2016	$37.72	$10.00	$14.20	$0.00	$61.92
	12/01/2016	$38.76	$10.00	$14.20	$0.00	$62.96
	06/01/2017	$39.60	$10.00	$14.20	$0.00	$63.80
	12/01/2017	$40.43	$10.00	$14.20	$0.00	$64.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER *LABORERS - ZONE 2*	06/01/2014	$20.50	$7.30	$12.10	$0.00	$39.90
	12/01/2014	$20.50	$7.30	$12.10	$0.00	$39.90
	06/01/2015	$20.50	$7.30	$12.10	$0.00	$39.90
	12/01/2015	$20.50	$7.30	$12.10	$0.00	$39.90
	06/01/2016	$20.50	$7.30	$12.10	$0.00	$39.90
	12/01/2016	$20.50	$7.30	$12.10	$0.00	$39.90
For apprentice rates see "Apprentice- LABORER"						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	09/01/2014	$40.40	$9.80	$17.21	$0.00	$67.41

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 09/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.20	$9.80	$1.79	$0.00	$31.79
2	55	$22.22	$9.80	$1.79	$0.00	$33.81
3	60	$24.24	$9.80	$11.84	$0.00	$45.88
4	65	$26.26	$9.80	$11.84	$0.00	$47.90
5	70	$28.28	$9.80	$13.63	$0.00	$51.71
6	75	$30.30	$9.80	$13.63	$0.00	$53.73
7	80	$32.32	$9.80	$15.42	$0.00	$57.54
8	85	$34.34	$9.80	$15.42	$0.00	$59.56

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.49	$10.00	$14.20	$0.00	$65.69
	12/01/2014	$42.49	$10.00	$14.20	$0.00	$66.69
	06/01/2015	$43.24	$10.00	$14.20	$0.00	$67.44
	12/01/2015	$44.49	$10.00	$14.20	$0.00	$68.69
	06/01/2016	$45.24	$10.00	$14.20	$0.00	$69.44
	12/01/2016	$46.49	$10.00	$14.20	$0.00	$70.69
	06/01/2017	$47.49	$10.00	$14.20	$0.00	$71.69
	12/01/2017	$48.49	$10.00	$14.20	$0.00	$72.69
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$28.80	$10.00	$14.20	$0.00	$53.00
	12/01/2014	$29.50	$10.00	$14.20	$0.00	$53.70
	06/01/2015	$30.02	$10.00	$14.20	$0.00	$54.22
	12/01/2015	$30.89	$10.00	$14.20	$0.00	$55.09
	06/01/2016	$31.41	$10.00	$14.20	$0.00	$55.61
	12/01/2016	$32.28	$10.00	$14.20	$0.00	$56.48
	06/01/2017	$32.97	$10.00	$14.20	$0.00	$57.17
	12/01/2017	$33.66	$10.00	$14.20	$0.00	$57.86
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	07/01/2014	$36.26	$7.85	$16.10	$0.00	$60.21
	01/01/2015	$37.16	$7.85	$16.10	$0.00	$61.11
	07/01/2015	$38.06	$7.85	$16.10	$0.00	$62.01
	01/01/2016	$39.01	$7.85	$16.10	$0.00	$62.96
	07/01/2016	$39.96	$7.85	$16.10	$0.00	$63.91
	01/01/2017	$40.91	$7.85	$16.10	$0.00	$64.86

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 07/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.13	$7.85	$0.00	$0.00	$25.98
2	55	$19.94	$7.85	$3.66	$0.00	$31.45
3	60	$21.76	$7.85	$3.99	$0.00	$33.60
4	65	$23.57	$7.85	$4.32	$0.00	$35.74
5	70	$25.38	$7.85	$14.11	$0.00	$47.34
6	75	$27.20	$7.85	$14.44	$0.00	$49.49
7	80	$29.01	$7.85	$14.77	$0.00	$51.63
8	90	$32.63	$7.85	$15.44	$0.00	$55.92

Effective Date - 01/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.58	$7.85	$0.00	$0.00	$26.43
2	55	$20.44	$7.85	$3.66	$0.00	$31.95
3	60	$22.30	$7.85	$3.99	$0.00	$34.14
4	65	$24.15	$7.85	$4.32	$0.00	$36.32
5	70	$26.01	$7.85	$14.11	$0.00	$47.97
6	75	$27.87	$7.85	$14.44	$0.00	$50.16
7	80	$29.73	$7.85	$14.77	$0.00	$52.35
8	90	$33.44	$7.85	$15.44	$0.00	$56.73

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.49	$10.00	$14.20	$0.00	$65.69
	12/01/2014	$42.49	$10.00	$14.20	$0.00	$66.69
	06/01/2015	$43.24	$10.00	$14.20	$0.00	$67.44
	12/01/2015	$44.49	$10.00	$14.20	$0.00	$68.69
	06/01/2016	$45.24	$10.00	$14.20	$0.00	$69.44
	12/01/2016	$46.49	$10.00	$14.20	$0.00	$70.69
	06/01/2017	$47.49	$10.00	$14.20	$0.00	$71.69
	12/01/2017	$48.49	$10.00	$14.20	$0.00	$72.69

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 06/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.82	$10.00	$0.00	$0.00	$32.82
2	60	$24.89	$10.00	$14.18	$0.00	$49.07
3	65	$26.97	$10.00	$14.18	$0.00	$51.15
4	70	$29.04	$10.00	$14.18	$0.00	$53.22
5	75	$31.12	$10.00	$14.18	$0.00	$55.30
6	80	$33.19	$10.00	$14.18	$0.00	$57.37
7	85	$35.27	$10.00	$14.18	$0.00	$59.45
8	90	$37.34	$10.00	$14.18	$0.00	$61.52

Effective Date - 12/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$23.37	$10.00	$0.00	$0.00	$33.37
2	60	$25.49	$10.00	$14.18	$0.00	$49.67
3	65	$27.62	$10.00	$14.18	$0.00	$51.80
4	70	$29.74	$10.00	$14.18	$0.00	$53.92
5	75	$31.87	$10.00	$14.18	$0.00	$56.05
6	80	$33.99	$10.00	$14.18	$0.00	$58.17
7	85	$36.12	$10.00	$14.18	$0.00	$60.30
8	90	$38.24	$10.00	$14.18	$0.00	$62.42

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2014	$42.79	$9.82	$20.54	$2.19	$75.34
	02/01/2015	$43.69	$9.82	$20.54	$2.19	$76.24
	08/01/2015	$44.69	$9.82	$20.54	$2.19	$77.24
	02/01/2016	$45.69	$9.82	$20.54	$2.19	$78.24
	08/01/2016	$46.84	$9.82	$20.54	$2.19	$79.39
	02/01/2017	$47.94	$9.82	$20.54	$2.19	$80.49
	08/01/2017	$49.04	$9.82	$20.54	$2.19	$81.59
	02/01/2018	$50.19	$9.82	$20.54	$2.19	$82.74

For apprentice rates see "Apprentice- SHEET METAL WORKER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 103*	09/01/2014	$44.79	$13.00	$15.04	$0.00	$72.83
	03/01/2015	$45.17	$13.00	$15.40	$0.00	$73.57
	09/01/2015	$46.13	$13.00	$15.43	$0.00	$74.56
	03/01/2016	$47.08	$13.00	$15.46	$0.00	$75.54
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2014	$42.79	$9.82	$20.54	$2.19	$75.34
	02/01/2015	$43.69	$9.82	$20.54	$2.19	$76.24
	08/01/2015	$44.69	$9.82	$20.54	$2.19	$77.24
	02/01/2016	$45.69	$9.82	$20.54	$2.19	$78.24
	08/01/2016	$46.84	$9.82	$20.54	$2.19	$79.39
	02/01/2017	$47.94	$9.82	$20.54	$2.19	$80.49
	08/01/2017	$49.04	$9.82	$20.54	$2.19	$81.59
	02/01/2018	$50.19	$9.82	$20.54	$2.19	$82.74
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PIPEFITTERS LOCAL 537*	09/01/2014	$48.69	$9.20	$16.64	$0.00	$74.53
	03/01/2015	$49.69	$9.20	$16.64	$0.00	$75.53
	09/01/2015	$50.69	$9.20	$16.64	$0.00	$76.53
	03/01/2016	$51.69	$9.20	$16.64	$0.00	$77.53
	09/01/2016	$52.69	$9.20	$16.64	$0.00	$78.53
	03/01/2017	$53.69	$9.20	$16.64	$0.00	$79.53
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PIPEFITTERS LOCAL 537*	09/01/2014	$48.69	$9.20	$16.64	$0.00	$74.53
	03/01/2015	$49.69	$9.20	$16.64	$0.00	$75.53
	09/01/2015	$50.69	$9.20	$16.64	$0.00	$76.53
	03/01/2016	$51.69	$9.20	$16.64	$0.00	$77.53
	09/01/2016	$52.69	$9.20	$16.64	$0.00	$78.53
	03/01/2017	$53.69	$9.20	$16.64	$0.00	$79.53
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 2*	06/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	12/01/2014	$31.60	$7.30	$12.10	$0.00	$51.00
	06/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	12/01/2015	$32.60	$7.30	$12.10	$0.00	$52.00
	06/01/2016	$33.10	$7.30	$12.10	$0.00	$52.50
	12/01/2016	$33.85	$7.30	$12.10	$0.00	$53.25
For apprentice rates see "Apprentice- LABORER"						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2014	$44.11	$10.95	$12.10	$0.00	$67.16

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston*

Effective Date - 09/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.06	$10.95	$9.00	$0.00	$42.01
2	60	$26.47	$10.95	$9.62	$0.00	$47.04
3	70	$30.88	$10.95	$10.24	$0.00	$52.07
4	80	$35.29	$10.95	$10.86	$0.00	$57.10

Notes:
Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (LAWRENCE AREA)*	03/16/2014	$36.78	$7.70	$19.25	$0.00	$63.73

Apprentice - *IRONWORKER - Local 7 Lawrence*

Effective Date - 03/16/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$22.07	$7.70	$19.25	$0.00	$49.02
2	70	$25.75	$7.70	$19.25	$0.00	$52.70
3	75	$27.59	$7.70	$19.25	$0.00	$54.54
4	80	$29.42	$7.70	$19.25	$0.00	$56.37
5	85	$31.26	$7.70	$19.25	$0.00	$58.21
6	90	$33.10	$7.70	$19.25	$0.00	$60.05

Notes:
Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75

For apprentice rates see "Apprentice- LABORER"

LABORER *LABORERS - ZONE 2*	06/01/2014	$30.35	$7.30	$12.10	$0.00	$49.75
	12/01/2014	$30.85	$7.30	$12.10	$0.00	$50.25
	06/01/2015	$31.35	$7.30	$12.10	$0.00	$50.75
	12/01/2015	$31.85	$7.30	$12.10	$0.00	$51.25
	06/01/2016	$32.35	$7.30	$12.10	$0.00	$51.75
	12/01/2016	$33.10	$7.30	$12.10	$0.00	$52.50

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 2*

Effective Date - 06/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$18.21	$7.30	$12.10	$0.00	$37.61
2	70	$21.25	$7.30	$12.10	$0.00	$40.65
3	80	$24.28	$7.30	$12.10	$0.00	$43.68
4	90	$27.32	$7.30	$12.10	$0.00	$46.72

Effective Date - 12/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$18.51	$7.30	$12.10	$0.00	$37.91
2	70	$21.60	$7.30	$12.10	$0.00	$41.00
3	80	$24.68	$7.30	$12.10	$0.00	$44.08
4	90	$27.77	$7.30	$12.10	$0.00	$47.17

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	06/01/2014	$30.35	$7.30	$12.10	$0.00	$49.75
	12/01/2014	$30.85	$7.30	$12.10	$0.00	$50.25
	06/01/2015	$31.35	$7.30	$12.10	$0.00	$50.75
	12/01/2015	$31.85	$7.30	$12.10	$0.00	$51.25
	06/01/2016	$32.35	$7.30	$12.10	$0.00	$51.75
	12/01/2016	$33.10	$7.30	$12.10	$0.00	$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	06/01/2014	$30.35	$7.30	$12.10	$0.00	$49.75
	12/01/2014	$30.85	$7.30	$12.10	$0.00	$50.25
	06/01/2015	$31.35	$7.30	$12.10	$0.00	$50.75
	12/01/2015	$31.85	$7.30	$12.10	$0.00	$51.25
	06/01/2016	$32.35	$7.30	$12.10	$0.00	$51.75
	12/01/2016	$33.10	$7.30	$12.10	$0.00	$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	06/01/2014	$30.55	$7.30	$12.05	$0.00	$49.90
	12/01/2014	$31.05	$7.30	$12.05	$0.00	$50.40
	06/01/2015	$31.55	$7.30	$12.05	$0.00	$50.90
	12/01/2015	$32.05	$7.30	$12.05	$0.00	$51.40
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	06/01/2014	$30.35	$7.30	$12.10	$0.00	$49.75
	12/01/2014	$30.85	$7.30	$12.10	$0.00	$50.25
	06/01/2015	$31.35	$7.30	$12.10	$0.00	$50.75
	12/01/2015	$31.85	$7.30	$12.10	$0.00	$51.25
	06/01/2016	$32.35	$7.30	$12.10	$0.00	$51.75
	12/01/2016	$33.10	$7.30	$12.10	$0.00	$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	06/01/2014	$30.35	$7.30	$12.10	$0.00	$49.75
	12/01/2014	$30.85	$7.30	$12.10	$0.00	$50.25
	06/01/2015	$31.35	$7.30	$12.10	$0.00	$50.75
	12/01/2015	$31.85	$7.30	$12.10	$0.00	$51.25
	06/01/2016	$32.35	$7.30	$12.10	$0.00	$51.75
	12/01/2016	$33.10	$7.30	$12.10	$0.00	$52.50
This classification applies to all tree work associated with the removal of standing trees, and trimming and removal of branches and limbs when the work is not done for a utility company for the purpose of operation, maintenance or repair of utility company equipment. For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2014	$37.37	$10.18	$16.90	$0.00	$64.45
	02/01/2015	$37.82	$10.18	$16.90	$0.00	$64.90
	08/01/2015	$38.53	$10.18	$16.97	$0.00	$65.68
	02/01/2016	$38.98	$10.18	$16.97	$0.00	$66.13
	08/01/2016	$39.68	$10.18	$17.05	$0.00	$66.91
	02/01/2017	$40.14	$10.18	$17.05	$0.00	$67.37

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 08/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.69	$10.18	$16.90	$0.00	$45.77
2	60	$22.42	$10.18	$16.90	$0.00	$49.50
3	70	$26.16	$10.18	$16.90	$0.00	$53.24
4	80	$29.90	$10.18	$16.90	$0.00	$56.98
5	90	$33.63	$10.18	$16.90	$0.00	$60.71

Effective Date - 02/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.91	$10.18	$16.90	$0.00	$45.99
2	60	$22.69	$10.18	$16.90	$0.00	$49.77
3	70	$26.47	$10.18	$16.90	$0.00	$53.55
4	80	$30.26	$10.18	$16.90	$0.00	$57.34
5	90	$34.04	$10.18	$16.90	$0.00	$61.12

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2014	$49.00	$10.18	$18.22	$0.00	$77.40
	02/01/2015	$49.56	$10.18	$18.22	$0.00	$77.96
	08/01/2015	$50.46	$10.18	$18.29	$0.00	$78.93
	02/01/2016	$51.03	$10.18	$18.29	$0.00	$79.50
	08/01/2016	$51.93	$10.18	$18.37	$0.00	$80.48
	02/01/2017	$52.50	$10.18	$18.37	$0.00	$81.05

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 08/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.50	$10.18	$18.22	$0.00	$52.90
2	60	$29.40	$10.18	$18.22	$0.00	$57.80
3	70	$34.30	$10.18	$18.22	$0.00	$62.70
4	80	$39.20	$10.18	$18.22	$0.00	$67.60
5	90	$44.10	$10.18	$18.22	$0.00	$72.50

Effective Date - 02/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.78	$10.18	$18.22	$0.00	$53.18
2	60	$29.74	$10.18	$18.22	$0.00	$58.14
3	70	$34.69	$10.18	$18.22	$0.00	$63.09
4	80	$39.65	$10.18	$18.22	$0.00	$68.05
5	90	$44.60	$10.18	$18.22	$0.00	$73.00

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.10	$10.00	$14.20	$0.00	$65.30
	12/01/2014	$42.09	$10.00	$14.20	$0.00	$66.29
	06/01/2015	$42.83	$10.00	$14.20	$0.00	$67.03
	12/01/2015	$44.07	$10.00	$14.20	$0.00	$68.27
	06/01/2016	$44.82	$10.00	$14.20	$0.00	$69.02
	12/01/2016	$46.05	$10.00	$14.20	$0.00	$70.25
	06/01/2017	$47.04	$10.00	$14.20	$0.00	$71.24
	12/01/2017	$48.03	$10.00	$14.20	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.10	$10.00	$14.20	$0.00	$65.30
	12/01/2014	$42.09	$10.00	$14.20	$0.00	$66.29
	06/01/2015	$42.83	$10.00	$14.20	$0.00	$67.03
	12/01/2015	$44.07	$10.00	$14.20	$0.00	$68.27
	06/01/2016	$44.82	$10.00	$14.20	$0.00	$69.02
	12/01/2016	$46.05	$10.00	$14.20	$0.00	$70.25
	06/01/2017	$47.04	$10.00	$14.20	$0.00	$71.24
	12/01/2017	$48.03	$10.00	$14.20	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	04/01/2014	$33.16	$9.80	$16.21	$0.00	$59.17
	10/01/2014	$33.92	$9.80	$16.21	$0.00	$59.93
	04/01/2015	$34.69	$9.80	$16.21	$0.00	$60.70

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 04/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$18.24	$9.80	$4.48	$0.00	$32.52
2	65	$21.55	$9.80	$13.36	$0.00	$44.71
3	75	$24.87	$9.80	$14.18	$0.00	$48.85
4	85	$28.19	$9.80	$14.99	$0.00	$52.98

Effective Date - 10/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$18.66	$9.80	$4.48	$0.00	$32.94
2	65	$22.05	$9.80	$13.36	$0.00	$45.21
3	75	$25.44	$9.80	$14.18	$0.00	$49.42
4	85	$28.83	$9.80	$14.99	$0.00	$53.62

Notes:

Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$21.48	$10.00	$14.20	$0.00	$45.68
	12/01/2014	$22.00	$10.00	$14.20	$0.00	$46.20
	06/01/2015	$22.38	$10.00	$14.20	$0.00	$46.58
	12/01/2015	$23.03	$10.00	$14.20	$0.00	$47.23
	06/01/2016	$23.42	$10.00	$14.20	$0.00	$47.62
	12/01/2016	$24.07	$10.00	$14.20	$0.00	$48.27
	06/01/2017	$24.58	$10.00	$14.20	$0.00	$48.78
	12/01/2017	$25.10	$10.00	$14.20	$0.00	$49.30
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$25.03	$10.00	$14.20	$0.00	$49.23
	12/01/2014	$25.64	$10.00	$14.20	$0.00	$49.84
	06/01/2015	$26.09	$10.00	$14.20	$0.00	$50.29
	12/01/2015	$26.84	$10.00	$14.20	$0.00	$51.04
	06/01/2016	$27.30	$10.00	$14.20	$0.00	$51.50
	12/01/2016	$28.05	$10.00	$14.20	$0.00	$52.25
	06/01/2017	$28.65	$10.00	$14.20	$0.00	$52.85
	12/01/2017	$29.26	$10.00	$14.20	$0.00	$53.46
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.10	$10.00	$14.20	$0.00	$65.30
	12/01/2014	$42.09	$10.00	$14.20	$0.00	$66.29
	06/01/2015	$42.83	$10.00	$14.20	$0.00	$67.03
	12/01/2015	$44.07	$10.00	$14.20	$0.00	$68.27
	06/01/2016	$44.82	$10.00	$14.20	$0.00	$69.02
	12/01/2016	$46.05	$10.00	$14.20	$0.00	$70.25
	06/01/2017	$47.04	$10.00	$14.20	$0.00	$71.24
	12/01/2017	$48.03	$10.00	$14.20	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2014	$46.76	$7.85	$16.10	$0.00	$70.71
	01/01/2015	$47.66	$7.85	$16.10	$0.00	$71.61
	07/01/2015	$48.56	$7.85	$16.10	$0.00	$72.51
	01/01/2016	$49.51	$7.85	$16.10	$0.00	$73.46
	07/01/2016	$50.46	$7.85	$16.10	$0.00	$74.41
	01/01/2017	$51.41	$7.85	$16.10	$0.00	$75.36

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.38	$7.85	$0.00	$0.00	$31.23
2	55	$25.72	$7.85	$3.66	$0.00	$37.23
3	60	$28.06	$7.85	$3.99	$0.00	$39.90
4	65	$30.39	$7.85	$4.32	$0.00	$42.56
5	70	$32.73	$7.85	$14.11	$0.00	$54.69
6	75	$35.07	$7.85	$14.44	$0.00	$57.36
7	80	$37.41	$7.85	$14.77	$0.00	$60.03
8	90	$42.08	$7.85	$15.44	$0.00	$65.37

Effective Date - 01/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.83	$7.85	$0.00	$0.00	$31.68
2	55	$26.21	$7.85	$3.66	$0.00	$37.72
3	60	$28.60	$7.85	$3.99	$0.00	$40.44
4	65	$30.98	$7.85	$4.32	$0.00	$43.15
5	70	$33.36	$7.85	$14.11	$0.00	$55.32
6	75	$35.75	$7.85	$14.44	$0.00	$58.04
7	80	$38.13	$7.85	$14.77	$0.00	$60.75
8	90	$42.89	$7.85	$15.44	$0.00	$66.18

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, NEW) *	07/01/2014	$37.66	$7.85	$16.10	$0.00	$61.61
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2015	$38.56	$7.85	$16.10	$0.00	$62.51
	07/01/2015	$39.46	$7.85	$16.10	$0.00	$63.41
	01/01/2016	$40.41	$7.85	$16.10	$0.00	$64.36
	07/01/2016	$41.36	$7.85	$16.10	$0.00	$65.31
	01/01/2017	$42.31	$7.85	$16.10	$0.00	$66.26

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 07/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.83	$7.85	$0.00	$0.00	$26.68
2	55	$20.71	$7.85	$3.66	$0.00	$32.22
3	60	$22.60	$7.85	$3.99	$0.00	$34.44
4	65	$24.48	$7.85	$4.32	$0.00	$36.65
5	70	$26.36	$7.85	$14.11	$0.00	$48.32
6	75	$28.25	$7.85	$14.44	$0.00	$50.54
7	80	$30.13	$7.85	$14.77	$0.00	$52.75
8	90	$33.89	$7.85	$15.44	$0.00	$57.18

Effective Date - 01/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.28	$7.85	$0.00	$0.00	$27.13
2	55	$21.21	$7.85	$3.66	$0.00	$32.72
3	60	$23.14	$7.85	$3.99	$0.00	$34.98
4	65	$25.06	$7.85	$4.32	$0.00	$37.23
5	70	$26.99	$7.85	$14.11	$0.00	$48.95
6	75	$28.92	$7.85	$14.44	$0.00	$51.21
7	80	$30.85	$7.85	$14.77	$0.00	$53.47
8	90	$34.70	$7.85	$15.44	$0.00	$57.99

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2014	$35.72	$7.85	$16.10	$0.00	$59.67
	01/01/2015	$36.62	$7.85	$16.10	$0.00	$60.57
	07/01/2015	$37.52	$7.85	$16.10	$0.00	$61.47
	01/01/2016	$38.47	$7.85	$16.10	$0.00	$62.42
	07/01/2016	$39.42	$7.85	$16.10	$0.00	$63.37
	01/01/2017	$40.37	$7.85	$16.10	$0.00	$64.32

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 07/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.86	$7.85	$0.00	$0.00	$25.71
2	55	$19.65	$7.85	$3.66	$0.00	$31.16
3	60	$21.43	$7.85	$3.99	$0.00	$33.27
4	65	$23.22	$7.85	$4.32	$0.00	$35.39
5	70	$25.00	$7.85	$14.11	$0.00	$46.96
6	75	$26.79	$7.85	$14.44	$0.00	$49.08
7	80	$28.58	$7.85	$14.77	$0.00	$51.20
8	90	$32.15	$7.85	$15.44	$0.00	$55.44

Effective Date - 01/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.31	$7.85	$0.00	$0.00	$26.16
2	55	$20.14	$7.85	$3.66	$0.00	$31.65
3	60	$21.97	$7.85	$3.99	$0.00	$33.81
4	65	$23.80	$7.85	$4.32	$0.00	$35.97
5	70	$25.63	$7.85	$14.11	$0.00	$47.59
6	75	$27.47	$7.85	$14.44	$0.00	$49.76
7	80	$29.30	$7.85	$14.77	$0.00	$51.92
8	90	$32.96	$7.85	$15.44	$0.00	$56.25

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (TRAFFIC MARKINGS) *LABORERS - ZONE 2*	06/01/2014	$30.35	$7.30	$12.10	$0.00	$49.75
	12/01/2014	$30.85	$7.30	$12.10	$0.00	$50.25
	06/01/2015	$31.35	$7.30	$12.10	$0.00	$50.75
	12/01/2015	$31.85	$7.30	$12.10	$0.00	$51.25
	06/01/2016	$32.35	$7.30	$12.10	$0.00	$51.75
	12/01/2016	$33.10	$7.30	$12.10	$0.00	$52.50
For Apprentice rates see "Apprentice- LABORER"						
PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	07/01/2014	$36.26	$7.85	$16.10	$0.00	$60.21
	01/01/2015	$37.16	$7.85	$16.10	$0.00	$61.11
	07/01/2015	$38.06	$7.85	$16.10	$0.00	$62.01
	01/01/2016	$39.01	$7.85	$16.10	$0.00	$62.96
	07/01/2016	$39.96	$7.85	$16.10	$0.00	$63.91
	01/01/2017	$40.91	$7.85	$16.10	$0.00	$64.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 07/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.13	$7.85	$0.00	$0.00	$25.98
2	55	$19.94	$7.85	$3.66	$0.00	$31.45
3	60	$21.76	$7.85	$3.99	$0.00	$33.60
4	65	$23.57	$7.85	$4.32	$0.00	$35.74
5	70	$25.38	$7.85	$14.11	$0.00	$47.34
6	75	$27.20	$7.85	$14.44	$0.00	$49.49
7	80	$29.01	$7.85	$14.77	$0.00	$51.63
8	90	$32.63	$7.85	$15.44	$0.00	$55.92

Effective Date - 01/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.58	$7.85	$0.00	$0.00	$26.43
2	55	$20.44	$7.85	$3.66	$0.00	$31.95
3	60	$22.30	$7.85	$3.99	$0.00	$34.14
4	65	$24.15	$7.85	$4.32	$0.00	$36.32
5	70	$26.01	$7.85	$14.11	$0.00	$47.97
6	75	$27.87	$7.85	$14.44	$0.00	$50.16
7	80	$29.73	$7.85	$14.77	$0.00	$52.35
8	90	$33.44	$7.85	$15.44	$0.00	$56.73

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2014	$34.32	$7.85	$16.10	$0.00	$58.27
	01/01/2015	$35.22	$7.85	$16.10	$0.00	$59.17
	07/01/2015	$36.12	$7.85	$16.10	$0.00	$60.07
	01/01/2016	$37.07	$7.85	$16.10	$0.00	$61.02
	07/01/2016	$38.02	$7.85	$16.10	$0.00	$61.97
	01/01/2017	$38.97	$7.85	$16.10	$0.00	$62.92

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 07/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.16	$7.85	$0.00	$0.00	$25.01
2	55	$18.88	$7.85	$3.66	$0.00	$30.39
3	60	$20.59	$7.85	$3.99	$0.00	$32.43
4	65	$22.31	$7.85	$4.32	$0.00	$34.48
5	70	$24.02	$7.85	$14.11	$0.00	$45.98
6	75	$25.74	$7.85	$14.44	$0.00	$48.03
7	80	$27.46	$7.85	$14.77	$0.00	$50.08
8	90	$30.89	$7.85	$15.44	$0.00	$54.18

Effective Date - 01/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.61	$7.85	$0.00	$0.00	$25.46
2	55	$19.37	$7.85	$3.66	$0.00	$30.88
3	60	$21.13	$7.85	$3.99	$0.00	$32.97
4	65	$22.89	$7.85	$4.32	$0.00	$35.06
5	70	$24.65	$7.85	$14.11	$0.00	$46.61
6	75	$26.42	$7.85	$14.44	$0.00	$48.71
7	80	$28.18	$7.85	$14.77	$0.00	$50.80
8	90	$31.70	$7.85	$15.44	$0.00	$54.99

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2012	$30.28	$9.07	$8.00	$0.00	$47.35
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2014	$41.60	$9.80	$18.17	$0.00	$69.57
	08/01/2015	$43.10	$9.80	$18.17	$0.00	$71.07
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2014	$41.60	$9.80	$18.17	$0.00	$69.57
	08/01/2015	$43.10	$9.80	$18.17	$0.00	$71.07

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 1*

Effective Date - 08/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.80	$9.80	$18.17	$0.00	$48.77
2	60	$24.96	$9.80	$18.17	$0.00	$52.93
3	70	$29.12	$9.80	$18.17	$0.00	$57.09
4	75	$31.20	$9.80	$18.17	$0.00	$59.17
5	80	$33.28	$9.80	$18.17	$0.00	$61.25
6	80	$33.28	$9.80	$18.17	$0.00	$61.25
7	90	$37.44	$9.80	$18.17	$0.00	$65.41
8	90	$37.44	$9.80	$18.17	$0.00	$65.41

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.55	$9.80	$18.17	$0.00	$49.52
2	60	$25.86	$9.80	$18.17	$0.00	$53.83
3	70	$30.17	$9.80	$18.17	$0.00	$58.14
4	75	$32.33	$9.80	$18.17	$0.00	$60.30
5	80	$34.48	$9.80	$18.17	$0.00	$62.45
6	80	$34.48	$9.80	$18.17	$0.00	$62.45
7	90	$38.79	$9.80	$18.17	$0.00	$66.76
8	90	$38.79	$9.80	$18.17	$0.00	$66.76

Notes:

Apprentice to Journeyworker Ratio:1:3

PIPEFITTER & STEAMFITTER *PIPEFITTERS LOCAL 537*	09/01/2014	$48.69	$9.20	$16.64	$0.00	$74.53
	03/01/2015	$49.69	$9.20	$16.64	$0.00	$75.53
	09/01/2015	$50.69	$9.20	$16.64	$0.00	$76.53
	03/01/2016	$51.69	$9.20	$16.64	$0.00	$77.53
	09/01/2016	$52.69	$9.20	$16.64	$0.00	$78.53
	03/01/2017	$53.69	$9.20	$16.64	$0.00	$79.53

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PIPEFITTER - Local 537*

Effective Date - 09/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$19.48	$9.20	$7.50	$0.00	$36.18
2	45	$21.91	$9.20	$16.64	$0.00	$47.75
3	60	$29.21	$9.20	$16.64	$0.00	$55.05
4	70	$34.08	$9.20	$16.64	$0.00	$59.92
5	80	$38.95	$9.20	$16.64	$0.00	$64.79

Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$19.88	$9.20	$7.50	$0.00	$36.58
2	45	$22.36	$9.20	$16.64	$0.00	$48.20
3	60	$29.81	$9.20	$16.64	$0.00	$55.65
4	70	$34.78	$9.20	$16.64	$0.00	$60.62
5	80	$39.75	$9.20	$16.64	$0.00	$65.59

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.

Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

PIPELAYER *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
PLUMBERS & GASFITTERS *PLUMBERS & GASFITTERS LOCAL 12*	09/01/2014	$49.66	$10.32	$14.54	$0.00	$74.52
	03/01/2015	$50.66	$10.32	$14.54	$0.00	$75.52
	09/01/2015	$51.66	$10.32	$14.54	$0.00	$76.52
	03/01/2016	$52.81	$10.32	$14.54	$0.00	$77.67
	09/01/2016	$53.86	$10.32	$14.54	$0.00	$78.72
	03/01/2017	$54.86	$10.32	$14.54	$0.00	$79.72

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PLUMBER/GASFITTER - Local 12*

Effective Date - 09/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$17.38	$10.32	$5.42	$0.00	$33.12
2	40	$19.86	$10.32	$6.13	$0.00	$36.31
3	55	$27.31	$10.32	$8.23	$0.00	$45.86
4	65	$32.28	$10.32	$9.64	$0.00	$52.24
5	75	$37.25	$10.32	$11.04	$0.00	$58.61

Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$17.73	$10.32	$5.42	$0.00	$33.47
2	40	$20.26	$10.32	$6.11	$0.00	$36.69
3	55	$27.86	$10.32	$8.22	$0.00	$46.40
4	65	$32.93	$10.32	$9.62	$0.00	$52.87
5	75	$38.00	$10.32	$11.03	$0.00	$59.35

Notes:
** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic$55.42 Step5 with lic$61.79

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) *PIPEFITTERS LOCAL 537*	09/01/2014	$48.69	$9.20	$16.64	$0.00	$74.53
	03/01/2015	$49.69	$9.20	$16.64	$0.00	$75.53
	09/01/2015	$50.69	$9.20	$16.64	$0.00	$76.53
	03/01/2016	$51.69	$9.20	$16.64	$0.00	$77.53
	09/01/2016	$52.69	$9.20	$16.64	$0.00	$78.53
	03/01/2017	$53.69	$9.20	$16.64	$0.00	$79.53
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER *LABORERS - ZONE 2*	06/01/2014	$31.35	$7.30	$12.10	$0.00	$50.75
	12/01/2014	$31.85	$7.30	$12.10	$0.00	$51.25
	06/01/2015	$32.35	$7.30	$12.10	$0.00	$51.75
	12/01/2015	$32.85	$7.30	$12.10	$0.00	$52.25
	06/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
	12/01/2016	$34.10	$7.30	$12.10	$0.00	$53.50
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.49	$10.00	$14.20	$0.00	$65.69
	12/01/2014	$42.49	$10.00	$14.20	$0.00	$66.69
	06/01/2015	$43.24	$10.00	$14.20	$0.00	$67.44
	12/01/2015	$44.49	$10.00	$14.20	$0.00	$68.69
	06/01/2016	$45.24	$10.00	$14.20	$0.00	$69.44
	12/01/2016	$46.49	$10.00	$14.20	$0.00	$70.69
	06/01/2017	$47.49	$10.00	$14.20	$0.00	$71.69
	12/01/2017	$48.49	$10.00	$14.20	$0.00	$72.69
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.49	$10.00	$14.20	$0.00	$65.69
	12/01/2014	$42.49	$10.00	$14.20	$0.00	$66.69
	06/01/2015	$43.24	$10.00	$14.20	$0.00	$67.44
	12/01/2015	$44.49	$10.00	$14.20	$0.00	$68.69
	06/01/2016	$45.24	$10.00	$14.20	$0.00	$69.44
	12/01/2016	$46.49	$10.00	$14.20	$0.00	$70.69
	06/01/2017	$47.49	$10.00	$14.20	$0.00	$71.69
	12/01/2017	$48.49	$10.00	$14.20	$0.00	$72.69
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$28.80	$10.00	$14.20	$0.00	$53.00
	12/01/2014	$29.50	$10.00	$14.20	$0.00	$53.70
	06/01/2015	$30.02	$10.00	$14.20	$0.00	$54.22
	12/01/2015	$30.89	$10.00	$14.20	$0.00	$55.09
	06/01/2016	$31.41	$10.00	$14.20	$0.00	$55.61
	12/01/2016	$32.28	$10.00	$14.20	$0.00	$56.48
	06/01/2017	$32.97	$10.00	$14.20	$0.00	$57.17
	12/01/2017	$33.66	$10.00	$14.20	$0.00	$57.86
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS LOCAL 49*	05/01/2010	$22.88	$6.97	$3.94	$0.00	$33.79
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.10	$10.00	$14.20	$0.00	$65.30
	12/01/2014	$42.09	$10.00	$14.20	$0.00	$66.29
	06/01/2015	$42.83	$10.00	$14.20	$0.00	$67.03
	12/01/2015	$44.07	$10.00	$14.20	$0.00	$68.27
	06/01/2016	$44.82	$10.00	$14.20	$0.00	$69.02
	12/01/2016	$46.05	$10.00	$14.20	$0.00	$70.25
	06/01/2017	$47.04	$10.00	$14.20	$0.00	$71.24
	12/01/2017	$48.03	$10.00	$14.20	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RESIDENTIAL WOOD FRAME (All Other Work) *CARPENTERS -ZONE 2 (Residential Wood)*	04/01/2011	$24.24	$8.67	$15.51	$0.00	$48.42
RESIDENTIAL WOOD FRAME CARPENTER ** ** The Residential Wood Frame Carpenter classification applies only to the construction of new, wood frame residences that do not exceed four stories including the basement.*CARPENTERS -ZONE 2 (Residential Wood)*	05/01/2011	$24.24	$6.34	$6.23	$0.00	$36.81

As of 9/1/09 Carpentry work on wood-frame residential WEATHERIZATION projects shall be paid the RESIDENTIAL WOOD FRAME CARPENTER rate.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER (Residential Wood Frame) - Zone 2*

Effective Date - 05/01/2011

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.54	$6.34	$0.00	$0.00	$20.88
2	60	$14.54	$6.34	$6.23	$0.00	$27.11
3	65	$15.76	$6.34	$6.23	$0.00	$28.33
4	70	$16.97	$6.34	$6.23	$0.00	$29.54
5	75	$18.18	$6.34	$6.23	$0.00	$30.75
6	80	$19.39	$6.34	$6.23	$0.00	$31.96
7	85	$20.60	$6.34	$6.23	$0.00	$33.17
8	90	$21.82	$6.34	$6.23	$0.00	$34.39

Notes:

Apprentice to Journeyworker Ratio:1:5

RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.10	$10.00	$14.20	$0.00	$65.30
	12/01/2014	$42.09	$10.00	$14.20	$0.00	$66.29
	06/01/2015	$42.83	$10.00	$14.20	$0.00	$67.03
	12/01/2015	$44.07	$10.00	$14.20	$0.00	$68.27
	06/01/2016	$44.82	$10.00	$14.20	$0.00	$69.02
	12/01/2016	$46.05	$10.00	$14.20	$0.00	$70.25
	06/01/2017	$47.04	$10.00	$14.20	$0.00	$71.24
	12/01/2017	$48.03	$10.00	$14.20	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	08/01/2014	$39.21	$10.50	$11.60	$0.00	$61.31
	02/01/2015	$40.11	$10.50	$11.60	$0.00	$62.21
	08/01/2015	$41.01	$10.50	$11.60	$0.00	$63.11
	02/01/2016	$41.91	$10.50	$11.60	$0.00	$64.01

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ROOFER - Local 33*

Effective Date - 08/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.61	$10.50	$3.38	$0.00	$33.49
2	60	$23.53	$10.50	$11.60	$0.00	$45.63
3	65	$25.49	$10.50	$11.60	$0.00	$47.59
4	75	$29.41	$10.50	$11.60	$0.00	$51.51
5	85	$33.33	$10.50	$11.60	$0.00	$55.43

Effective Date - 02/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.06	$10.50	$3.38	$0.00	$33.94
2	60	$24.07	$10.50	$11.60	$0.00	$46.17
3	65	$26.07	$10.50	$11.60	$0.00	$48.17
4	75	$30.08	$10.50	$11.60	$0.00	$52.18
5	85	$34.09	$10.50	$11.60	$0.00	$56.19

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	08/01/2014	$39.46	$10.50	$11.60	$0.00	$61.56
	02/01/2015	$40.36	$10.50	$11.60	$0.00	$62.46
	08/01/2015	$41.26	$10.50	$11.60	$0.00	$63.36
	02/01/2016	$42.16	$10.50	$11.60	$0.00	$64.26
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2014	$42.79	$9.82	$20.54	$2.19	$75.34
	02/01/2015	$43.69	$9.82	$20.54	$2.19	$76.24
	08/01/2015	$44.69	$9.82	$20.54	$2.19	$77.24
	02/01/2016	$45.69	$9.82	$20.54	$2.19	$78.24
	08/01/2016	$46.84	$9.82	$20.54	$2.19	$79.39
	02/01/2017	$47.94	$9.82	$20.54	$2.19	$80.49
	08/01/2017	$49.04	$9.82	$20.54	$2.19	$81.59
	02/01/2018	$50.19	$9.82	$20.54	$2.19	$82.74

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 08/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.12	$9.82	$4.58	$0.00	$31.52
2	40	$17.12	$9.82	$4.58	$0.00	$31.52
3	45	$19.26	$9.82	$9.09	$1.15	$39.32
4	45	$19.26	$9.82	$9.09	$1.15	$39.32
5	50	$21.40	$9.82	$9.91	$1.23	$42.36
6	50	$21.40	$9.82	$10.16	$1.24	$42.62
7	60	$25.67	$9.82	$11.55	$1.41	$48.45
8	65	$27.81	$9.82	$12.38	$1.50	$51.51
9	75	$32.09	$9.82	$14.02	$1.68	$57.61
10	85	$36.37	$9.82	$15.16	$1.84	$63.19

Effective Date - 02/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.48	$9.82	$4.58	$0.00	$31.88
2	40	$17.48	$9.82	$4.58	$0.00	$31.88
3	45	$19.66	$9.82	$9.09	$1.16	$39.73
4	45	$19.66	$9.82	$9.09	$1.16	$39.73
5	50	$21.85	$9.82	$9.91	$1.25	$42.83
6	50	$21.85	$9.82	$10.16	$1.25	$43.08
7	60	$26.21	$9.82	$11.55	$1.43	$49.01
8	65	$28.40	$9.82	$12.38	$1.52	$52.12
9	75	$32.77	$9.82	$14.02	$1.70	$58.31
10	85	$37.14	$9.82	$15.16	$1.86	$63.98

Notes:
Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SIGN ERECTOR *PAINTERS LOCAL 35 - ZONE 2*	06/01/2013	$25.81	$7.07	$7.05	$0.00	$39.93

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SIGN ERECTOR - Local 35 Zone 2*

Effective Date - 06/01/2013

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$12.91	$7.07	$0.00	$0.00	$19.98
2	55	$14.20	$7.07	$2.45	$0.00	$23.72
3	60	$15.49	$7.07	$2.45	$0.00	$25.01
4	65	$16.78	$7.07	$2.45	$0.00	$26.30
5	70	$18.07	$7.07	$7.05	$0.00	$32.19
6	75	$19.36	$7.07	$7.05	$0.00	$33.48
7	80	$20.65	$7.07	$7.05	$0.00	$34.77
8	85	$21.94	$7.07	$7.05	$0.00	$36.06
9	90	$23.23	$7.07	$7.05	$0.00	$37.35

Notes:
Steps are 4 mos.

Apprentice to Journeyworker Ratio:1:1

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2014	$31.59	$9.91	$8.80	$0.00	$50.30
	12/01/2014	$31.59	$9.91	$9.33	$0.00	$50.83
	06/01/2015	$31.94	$9.91	$9.33	$0.00	$51.18
	08/01/2015	$31.94	$10.41	$9.33	$0.00	$51.68
	12/01/2015	$31.94	$10.41	$10.08	$0.00	$52.43
	06/01/2016	$32.44	$10.41	$10.08	$0.00	$52.93
	08/01/2016	$32.44	$10.91	$10.08	$0.00	$53.43
	12/01/2016	$32.44	$10.91	$10.89	$0.00	$54.24
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2014	$31.88	$9.91	$8.80	$0.00	$50.59
	12/01/2014	$31.88	$9.91	$9.33	$0.00	$51.12
	06/01/2015	$32.23	$9.91	$9.33	$0.00	$51.47
	08/01/2015	$32.23	$10.41	$9.33	$0.00	$51.97
	12/01/2015	$32.23	$10.41	$10.08	$0.00	$52.72
	06/01/2016	$32.73	$10.41	$10.08	$0.00	$53.22
	08/01/2016	$32.73	$10.91	$10.08	$0.00	$53.72
	12/01/2016	$32.73	$10.91	$10.89	$0.00	$54.53
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	03/01/2014	$53.58	$8.42	$13.60	$0.00	$75.60
	10/01/2014	$54.73	$8.42	$13.60	$0.00	$76.75
	01/01/2015	$54.73	$8.42	$13.75	$0.00	$76.90
	03/01/2015	$55.73	$8.42	$13.75	$0.00	$77.90
	10/01/2015	$56.88	$8.42	$13.75	$0.00	$79.05
	01/01/2016	$56.88	$8.67	$13.90	$0.00	$79.45
	03/01/2016	$57.88	$8.67	$13.90	$0.00	$80.45
	10/01/2016	$59.03	$8.67	$13.90	$0.00	$81.60
	03/01/2017	$60.03	$8.67	$13.90	$0.00	$82.60

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 03/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$18.75	$8.42	$8.25	$0.00	$35.42
2	40	$21.43	$8.42	$8.25	$0.00	$38.10
3	45	$24.11	$8.42	$8.25	$0.00	$40.78
4	50	$26.79	$8.42	$8.25	$0.00	$43.46
5	55	$29.47	$8.42	$8.25	$0.00	$46.14
6	60	$32.15	$8.42	$8.25	$0.00	$48.82
7	65	$34.83	$8.42	$8.25	$0.00	$51.50
8	70	$37.51	$8.42	$8.25	$0.00	$54.18
9	75	$40.19	$8.42	$8.25	$0.00	$56.86
10	80	$42.86	$8.42	$8.25	$0.00	$59.53

Effective Date - 10/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$19.16	$8.42	$8.25	$0.00	$35.83
2	40	$21.89	$8.42	$8.25	$0.00	$38.56
3	45	$24.63	$8.42	$8.25	$0.00	$41.30
4	50	$27.37	$8.42	$8.25	$0.00	$44.04
5	55	$30.10	$8.42	$8.25	$0.00	$46.77
6	60	$32.84	$8.42	$8.25	$0.00	$49.51
7	65	$35.57	$8.42	$8.25	$0.00	$52.24
8	70	$38.31	$8.42	$8.25	$0.00	$54.98
9	75	$41.05	$8.42	$8.25	$0.00	$57.72
10	80	$43.78	$8.42	$8.25	$0.00	$60.45

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.10	$10.00	$14.20	$0.00	$65.30
	12/01/2014	$42.09	$10.00	$14.20	$0.00	$66.29
	06/01/2015	$42.83	$10.00	$14.20	$0.00	$67.03
	12/01/2015	$44.07	$10.00	$14.20	$0.00	$68.27
	06/01/2016	$44.82	$10.00	$14.20	$0.00	$69.02
	12/01/2016	$46.05	$10.00	$14.20	$0.00	$70.25
	06/01/2017	$47.04	$10.00	$14.20	$0.00	$71.24
	12/01/2017	$48.03	$10.00	$14.20	$0.00	$72.23

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.10	$10.00	$14.20	$0.00	$65.30
	12/01/2014	$42.09	$10.00	$14.20	$0.00	$66.29
	06/01/2015	$42.83	$10.00	$14.20	$0.00	$67.03
	12/01/2015	$44.07	$10.00	$14.20	$0.00	$68.27
	06/01/2016	$44.82	$10.00	$14.20	$0.00	$69.02
	12/01/2016	$46.05	$10.00	$14.20	$0.00	$70.25
	06/01/2017	$47.04	$10.00	$14.20	$0.00	$71.24
	12/01/2017	$48.03	$10.00	$14.20	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 103*	09/01/2014	$33.59	$13.00	$13.36	$0.00	$59.95
	03/01/2015	$33.88	$13.00	$13.70	$0.00	$60.58
	09/01/2015	$34.60	$13.00	$13.72	$0.00	$61.32
	03/01/2016	$35.31	$13.00	$13.74	$0.00	$62.05

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 103*

Effective Date - 09/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$13.44	$13.00	$0.40	$0.00	$26.84
2	40	$13.44	$13.00	$0.40	$0.00	$26.84
3	45	$15.12	$13.00	$10.57	$0.00	$38.69
4	45	$15.12	$13.00	$10.57	$0.00	$38.69
5	50	$16.80	$13.00	$10.83	$0.00	$40.63
6	55	$18.47	$13.00	$11.08	$0.00	$42.55
7	60	$20.15	$13.00	$11.33	$0.00	$44.48
8	65	$21.83	$13.00	$11.59	$0.00	$46.42
9	70	$23.51	$13.00	$11.85	$0.00	$48.36
10	75	$25.19	$13.00	$12.10	$0.00	$50.29

Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$13.55	$13.00	$0.41	$0.00	$26.96
2	40	$13.55	$13.00	$0.41	$0.00	$26.96
3	45	$15.25	$13.00	$10.87	$0.00	$39.12
4	45	$15.25	$13.00	$10.87	$0.00	$39.12
5	50	$16.94	$13.00	$11.13	$0.00	$41.07
6	55	$18.63	$13.00	$11.38	$0.00	$43.01
7	60	$20.33	$13.00	$11.64	$0.00	$44.97
8	65	$22.02	$13.00	$11.89	$0.00	$46.91
9	70	$23.72	$13.00	$12.15	$0.00	$48.87
10	75	$25.41	$13.00	$12.41	$0.00	$50.82

Notes:

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2014	$47.90	$10.18	$18.22	$0.00	$76.30
	02/01/2015	$48.46	$10.18	$18.22	$0.00	$76.86
	08/01/2015	$49.36	$10.18	$18.29	$0.00	$77.83
	02/01/2016	$49.93	$10.18	$18.29	$0.00	$78.40
	08/01/2016	$50.83	$10.18	$18.37	$0.00	$79.38
	02/01/2017	$51.40	$10.18	$18.37	$0.00	$79.95

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 08/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.95	$10.18	$18.22	$0.00	$52.35
2	60	$28.74	$10.18	$18.22	$0.00	$57.14
3	70	$33.53	$10.18	$18.22	$0.00	$61.93
4	80	$38.32	$10.18	$18.22	$0.00	$66.72
5	90	$43.11	$10.18	$18.22	$0.00	$71.51

Effective Date - 02/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.23	$10.18	$18.22	$0.00	$52.63
2	60	$29.08	$10.18	$18.22	$0.00	$57.48
3	70	$33.92	$10.18	$18.22	$0.00	$62.32
4	80	$38.77	$10.18	$18.22	$0.00	$67.17
5	90	$43.61	$10.18	$18.22	$0.00	$72.01

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	06/01/2014	$35.45	$7.30	$12.90	$0.00	$55.65
	12/01/2014	$36.20	$7.30	$12.90	$0.00	$56.40
	06/01/2015	$36.95	$7.30	$12.90	$0.00	$57.15
	12/01/2015	$37.70	$7.30	$12.90	$0.00	$57.90
	06/01/2016	$38.45	$7.30	$12.90	$0.00	$58.65
	12/01/2016	$39.45	$7.30	$12.90	$0.00	$59.65

For apprentice rates see "Apprentice- LABORER"

TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	06/01/2014	$34.17	$7.30	$12.90	$0.00	$54.37
	12/01/2014	$34.92	$7.30	$12.90	$0.00	$55.12
	06/01/2015	$35.67	$7.30	$12.90	$0.00	$55.87
	12/01/2015	$36.42	$7.30	$12.90	$0.00	$56.62
	06/01/2016	$37.17	$7.30	$12.90	$0.00	$57.37
	12/01/2016	$38.17	$7.30	$12.90	$0.00	$58.37

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2014	$34.05	$7.30	$12.90	$0.00	$54.25
	12/01/2014	$34.80	$7.30	$12.90	$0.00	$55.00
	06/01/2015	$35.55	$7.30	$12.90	$0.00	$55.75
	12/01/2015	$36.30	$7.30	$12.90	$0.00	$56.50
	06/01/2016	$37.05	$7.30	$12.90	$0.00	$57.25
	12/01/2016	$38.05	$7.30	$12.90	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.10	$10.00	$14.20	$0.00	$65.30
	12/01/2014	$42.09	$10.00	$14.20	$0.00	$66.29
	06/01/2015	$42.83	$10.00	$14.20	$0.00	$67.03
	12/01/2015	$44.07	$10.00	$14.20	$0.00	$68.27
	06/01/2016	$44.82	$10.00	$14.20	$0.00	$69.02
	12/01/2016	$46.05	$10.00	$14.20	$0.00	$70.25
	06/01/2017	$47.04	$10.00	$14.20	$0.00	$71.24
	12/01/2017	$48.03	$10.00	$14.20	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2014	$32.17	$9.91	$8.80	$0.00	$50.88
	12/01/2014	$32.17	$9.91	$9.33	$0.00	$51.41
	06/01/2015	$32.52	$9.91	$9.33	$0.00	$51.76
	08/01/2015	$32.52	$10.41	$9.33	$0.00	$52.26
	12/01/2015	$32.52	$10.41	$10.08	$0.00	$53.01
	06/01/2016	$33.02	$10.41	$10.08	$0.00	$53.51
	08/01/2016	$33.02	$10.91	$10.08	$0.00	$54.01
	12/01/2016	$33.02	$10.91	$10.89	$0.00	$54.82
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	06/01/2014	$46.33	$7.30	$13.30	$0.00	$66.93
	12/01/2014	$47.08	$7.30	$13.30	$0.00	$67.68
	06/01/2015	$47.83	$7.30	$13.30	$0.00	$68.43
	12/01/2015	$48.58	$7.30	$13.30	$0.00	$69.18
	06/01/2016	$49.33	$7.30	$13.30	$0.00	$69.93
	12/01/2016	$50.33	$7.30	$13.30	$0.00	$70.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	06/01/2014	$48.33	$7.30	$13.30	$0.00	$68.93
	12/01/2014	$49.08	$7.30	$13.30	$0.00	$69.68
	06/01/2015	$49.83	$7.30	$13.30	$0.00	$70.43
	12/01/2015	$50.58	$7.30	$13.30	$0.00	$71.18
	06/01/2016	$51.33	$7.30	$13.30	$0.00	$71.93
	12/01/2016	$52.33	$7.30	$13.30	$0.00	$72.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	06/01/2014	$38.40	$7.30	$13.30	$0.00	$59.00
	12/01/2014	$39.15	$7.30	$13.30	$0.00	$59.75
	06/01/2015	$39.90	$7.30	$13.30	$0.00	$60.50
	12/01/2015	$40.65	$7.30	$13.30	$0.00	$61.25
	06/01/2016	$41.40	$7.30	$13.30	$0.00	$62.00
	12/01/2016	$42.40	$7.30	$13.30	$0.00	$63.00
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	06/01/2014	$40.40	$7.30	$13.30	$0.00	$61.00
	12/01/2014	$41.15	$7.30	$13.30	$0.00	$61.75
	06/01/2015	$41.90	$7.30	$13.30	$0.00	$62.50
	12/01/2015	$42.65	$7.30	$13.30	$0.00	$63.25
	06/01/2016	$43.40	$7.30	$13.30	$0.00	$64.00
	12/01/2016	$44.40	$7.30	$13.30	$0.00	$65.00
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2014	$31.59	$9.91	$8.80	$0.00	$50.30
	12/01/2014	$31.59	$9.91	$9.33	$0.00	$50.83
	06/01/2015	$31.94	$9.91	$9.33	$0.00	$51.18
	08/01/2015	$31.94	$10.41	$9.33	$0.00	$51.68
	12/01/2015	$31.94	$10.41	$10.08	$0.00	$52.43
	06/01/2016	$32.44	$10.41	$10.08	$0.00	$52.93
	08/01/2016	$32.44	$10.91	$10.08	$0.00	$53.43
	12/01/2016	$32.44	$10.91	$10.89	$0.00	$54.24
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2014	$30.60	$7.30	$12.10	$0.00	$50.00
	12/01/2014	$31.10	$7.30	$12.10	$0.00	$50.50
	06/01/2015	$31.60	$7.30	$12.10	$0.00	$51.00
	12/01/2015	$32.10	$7.30	$12.10	$0.00	$51.50
	06/01/2016	$32.60	$7.30	$12.10	$0.00	$52.00
	12/01/2016	$33.35	$7.30	$12.10	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2014	$41.49	$10.00	$14.20	$0.00	$65.69
	12/01/2014	$42.49	$10.00	$14.20	$0.00	$66.69
	06/01/2015	$43.24	$10.00	$14.20	$0.00	$67.44
	12/01/2015	$44.49	$10.00	$14.20	$0.00	$68.69
	06/01/2016	$45.24	$10.00	$14.20	$0.00	$69.44
	12/01/2016	$46.49	$10.00	$14.20	$0.00	$70.69
	06/01/2017	$47.49	$10.00	$14.20	$0.00	$71.69
	12/01/2017	$48.49	$10.00	$14.20	$0.00	$72.69
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & GASFITTERS LOCAL 12*	09/01/2014	$49.66	$10.32	$14.54	$0.00	$74.52
	03/01/2015	$50.66	$10.32	$14.54	$0.00	$75.52
	09/01/2015	$51.66	$10.32	$14.54	$0.00	$76.52
	03/01/2016	$52.81	$10.32	$14.54	$0.00	$77.67
	09/01/2016	$53.86	$10.32	$14.54	$0.00	$78.72
	03/01/2017	$54.86	$10.32	$14.54	$0.00	$79.72
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	09/01/2013	$25.66	$8.70	$4.48	$0.00	$38.84
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	09/01/2013	$36.55	$8.70	$6.58	$0.00	$51.83
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	09/01/2013	$29.94	$8.70	$6.05	$0.00	$44.69
For apprentice rates see "Apprentice- LINEMAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	09/01/2013	$23.52	$8.70	$5.24	$0.00	$37.46
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	09/01/2013	$36.35	$8.70	$9.43	$0.00	$54.48
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	09/01/2013	$32.08	$8.70	$6.59	$0.00	$47.37
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	09/01/2013	$23.52	$8.70	$3.72	$0.00	$35.94
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	09/01/2013	$19.25	$8.70	$2.85	$0.00	$30.80
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	09/01/2013	$42.77	$8.70	$11.78	$0.00	$63.25

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 09/01/2013

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$25.66	$8.70	$4.24	$0.00	$38.60
2	65	$27.80	$8.70	$4.71	$0.00	$41.21
3	70	$29.94	$8.70	$5.43	$0.00	$44.07
4	75	$32.08	$8.70	$6.16	$0.00	$46.94
5	80	$34.22	$8.70	$6.88	$0.00	$49.80
6	85	$36.35	$8.70	$7.62	$0.00	$52.67
7	90	$38.49	$8.70	$8.83	$0.00	$56.02

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	07/16/2012	$26.33	$4.18	$2.79	$0.00	$33.30
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	07/16/2012	$24.78	$4.18	$2.74	$0.00	$31.70
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	07/16/2012	$24.78	$4.18	$2.74	$0.00	$31.70
TREE TRIMMER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is not on the ground. This classification does not apply to wholesale tree removal.	01/29/2012	$17.18	$3.37	$0.00	$0.00	$20.55
TREE TRIMMER GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is on the ground. This classification does not apply to wholesale tree removal.	01/29/2012	$15.15	$3.37	$0.00	$0.00	$18.52

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours) unless otherwise specified.

* Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof.
** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

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SECTION 00 73 73

STATUTORY REQUIREMENTS

GENERAL

A. The address system used herein is the same as the address system used in the Standard General and Supplementary Conditions, with the prefix "SC" added thereto. Additional terms used in this Section have the meanings stated below, which are applicable to both the singular and plural thereof.

B. The Project is specifically subject to the provisions of the Massachusetts General Laws ("MGL") and Federal Laws.

C. The contents of this Section do not represent or reflect all applicable Laws and Regulations and may only include excerpts and portions of certain Laws and Regulations. Other provisions required by statute shall be deemed to be so included and incorporated herein. Contractor is solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

SC-1.01.A.15 ***Contractor:*** **Add the following language at the end of the definition.**

Also referred to as "*general Contractor*" in applicable statutory provisions which may be used interchangeably and shall have the same meaning.

SC-1.01.A.29 ***Owner:*** Add the following language at the end of the definition.

Owner may also be referred to as "*Awarding Authority*" or "*contracting authority*" in applicable statutory provisions which may be used interchangeably and shall have the same meaning.

SC-1.01.A.42 ***Specifications:*** Add the following language at the end of the definition.

Specifications are also directed to the designated trade Sub-Bidders or Subcontractors for filed sub-Bid Work pursuant to MGL Chapter 149, Section 44F, *Plans and specifications; sub-bids; form; contents.*

SC-1.01.B ***Additional Terms:*** Add the following new definition.

7. *material or Material* -- As used in MGL Chapter 30, Section 39M Contracts for construction and materials; manner of awarding, regarding items equal to those specified, the word "material" shall mean and include any article, assembly, system, included in the Work, or any component part thereof.

SC-4.03 ***Differing Subsurface or Physical Conditions:*** Delete Paragraph 4.03.B in its entirety and insert the following in its place.

B. Pursuant to MGL Chapter 30, Section 39N *Construction contracts; equitable adjustment in contract price for differing subsurface or latent physical conditions*, if, during the progress of the Work, the Contractor or the Awarding Authority discovers that the actual subsurface or latent physical conditions encountered at the Site differ substantially or materially from those shown on the Plans or indicated in the Contract Documents either the Contractor or the contracting authority may request an equitable adjustment in the Contract Price of the Contract applying to Work affected by the differing Site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a Contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the Plans or indicated in the Contract Documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Plans and Contract Documents and are of such a nature as to cause an increase or decrease in the cost of performance of the Work or a change in the construction methods required for the performance of the Work which results in an increase or decrease in the cost of the Work, the contracting authority shall make an equitable adjustment in the Contract Price and the Contract shall be modified in writing accordingly.

SC-5.01 ***Performance, Payment, and Other Bonds:*** Add the following new paragraphs immediately after Paragraph 5.01.A.

1. Pursuant to MGL Chapter 30, Section 39A *Construction contracts for public ways, airports or public works; truck rentals; security for payment*; and MGL Chapter 149, Section 29 *Bonds for payment for labor, materials, rentals or transportation charges (et al)*; the required payment bond shall also cover payment by the Contractor and Subcontractors for the rental or hire of dump trucks and "the rental or hire of vehicles, steam shovels, rollers propelled by steam or other power, concrete mixers, tools and other appliances and equipment employed in such construction," and for payment of transportation charges directly related to such rental or hire. Such security for payment of transportation charges shall be incorporated by appropriate reference thereto as an additional obligation or condition in the required bonds.

2. In addition, such bonds shall cover payment by Contractor and Subcontractors of any sums due trustees or other persons authorized to collect such payments from the Contractor or Subcontractors, for health and welfare plans, supplementary unemployment benefit plans and other fringe benefits which are payable in cash and provided for in collective bargaining agreements between organized labor and the Contractor or Subcontractors;

SC-5.02 ***Licensed Sureties and Insurers:*** Add the following new paragraphs immediately after Paragraph 5.02.A.

1. Pursuant to MGL Chapter 149, Section 29D *Surety company; bonds,* every performance bond and every payment bond issued for any construction work in the Commonwealth shall be the bond of a surety company organized pursuant to Section 105 of MGL Chapter 175 or of a surety company authorized to do business in the Commonwealth under the provisions of section 106 of said Chapter 175 and be approved by the U.S. Department of Treasury and are acceptable as sureties and reinsurers on federal bonds under Title 31 of the United States Code, sections 9304 to 9308.

2. If there is more than one surety company, the surety companies shall be jointly and severally liable.

SC-5.04 ***Contractor's Insurance:***

Add the following language at the end of Paragraph 5.04.A.1.

, pursuant to MGL Chapter 149, Section 34A, *Contracts for public works; workers' compensation insurance; breach of contract; enforcement and violation of statute;*

Add the following language at the end of Paragraph 5.04.C.1,

, in compliance with MGL Chapter 152

SC-6.02 ***Labor; Working Hours:***

Add the following new paragraphs immediately after Paragraph 6.02.A.1.

2. Pursuant to MGL Chapter 30, Section 39S, *Contracts for construction; requirements,* Contractor shall furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work.

3. Pursuant to MGL Chapter 149, Section 26 *Public works; preference to veterans and citizens; wages,* preference shall be given to citizens of the Commonwealth of Massachusetts, citizens of the town or city where the Project is located, veterans and service-disabled veterans, and citizens of the United States.

4. The Contractor shall not participate in or cooperate with an international boycott, as defined in Section 999 (b)(3) and (4) of the Internal Revenue Code, as amended , or engage in conduct declared to be unlawful by MGL Chapter 151E, *Prohibition Of Certain Discrimination By Businesses,* Section 2.

5. Any Work involving the removal, containment, or encapsulation of Asbestos or material containing Asbestos may only be performed by a licensed contractor in accordance with the provisions of MGL Chapter 149, Sections 6A-6E, applicable Laws and Regulations, and requirements as may be included in the Specifications and Drawings.

6. Sheet metal work must be performed by a contractor licensed in accordance with 271 CMR 1.00, et seq., governing licensing, permitting, and sheet metal work in Massachusetts.

Add the following new paragraph immediately after Paragraph 6.02.B.

1. MGL Chapter 149, Section 30 *Eight hour day and six day week; emergencies; work on highways,* and Section 34 *Public contracts; stipulation as to hours and days of work; void contracts,* apply to this Project which limits work hours of those employed on public construction to 8 hours in any one day or 48 hours in any one week or 6 days in any one week, except in cases of emergency.

SC-6.05 ***Substitutes and "Or-Equals":*** Add the following language at the end of Paragraph 6.05.A.

The provisions of MGL Chapter 30, Section 39M, subsection (b) also applies to this Paragraph.

SC-6.06 ***Concerning Subcontractors, Suppliers, and Others*****:**

Add the following language at the end of Paragraph 6.06.F.

, except as indicated in the Specifications and Drawings for filed sub-Bid Work pursuant to MGL Chapter 149, Section 44F, *Plans and specifications; sub-bids; form; contents.*

Add the following new paragraph immediately after Paragraph 6.06.G.2.

3. The form of subcontract for filed sub-Bid Work shall be in accordance with MGL Chapter 149, Section 44F, subsection (4)(c), a copy of which is included as an attachment to this Section. This form may be supplemented by other provisions required by Laws and Regulations.

SC-6.10 *Taxes*: Add the following new paragraph immediately after Paragraph 6.10.A.

1. MGL Chapter 64H, Section 6 *Exemptions,* subsection (f) exempts from Massachusetts sales tax, building materials and supplies to be used in the Project, and Contractor shall not include any amount therefor. The words "building materials and supplies" shall include all materials and supplies consumed, employed or expended in the construction, reconstruction, alteration, remodeling or repair of any building, structure, public highway, bridge, or other such public work, as well as such materials and supplies physically incorporated therein. Said words shall also include rental charges for construction vehicles, equipment and machinery rented specifically for use on the Project Site, or while being used exclusively for the transportation of materials for the Project.

SC-6.12 *Record Documents*: Add the following new paragraphs immediately after Paragraph 6.12.A.

B. Subject to the provisions of MGL Chapter 266, Section 67C, *Capital facility construction projects, etc.; false entries in records; penalties,* and pursuant to MGL Chapter 30, Section 39R *Definitions; contract provisions; management and financial statements; enforcement:*

1. the Contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and until the expiration of six years after final payment, the office of inspector general, and the commissioner of capital asset management and maintenance shall have the right to examine any books, documents, papers or records of the Contractor or of his Subcontractors that directly pertain to, and involve transactions relating to, the Contractor or his Subcontractors; and

2. the Contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the Awarding Authority and included in Section 00 54 00, including in his description the date of the change and reasons therefor, and shall accompany said description with a letter from the Contractor's independent certified public accountant approving or otherwise commenting on the changes.

3. The Contractor shall annually file with the commissioner of capital asset management and maintenance during the term of the Contract, a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the Awarding Authority upon request.

4. Contractor's failure to satisfy any of the requirements of this section of the MGL may be grounds for debarment pursuant to MGL Chapter 149, Section 44C, *Suspension or debarment of contractors*.

SC-9.08 ***Decisions on Requirements of Contract Documents and Acceptability of Work:*** In Paragraph 9.08.B, replace "with reasonable promptness" with "within 30 days pursuant to MGL Chapter 30, Section 39P, *Contracts for construction and materials; awarding authority's decisions on interpretation of specifications, etc.; time limit; notice"*.

SC-10.01 ***Authorized Changes in the Work***: Add the following paragraph immediately after Paragraph 10.01.A.

5. Changes to the Work are subject to the requirements *of* MGL Chapter 30, Section 39I, *Deviations from plans and specifications*.

SC-10.05 ***Claims*****:** Add the following paragraph immediately after Paragraph 10.05.G.

H. Presentation of false, fictitious, or fraudulent Claims is subject to the provisions of MGL Chapter 266, Section 67B, *Presentation of false claims*.

SC-11.01. ***Cost of the Work***:

Pursuant to subparagraph 11.01.A.1.a, prevailing wage requirements are included in Sections 00 73 43 and 00 73 46.

Add the following new paragraph immediately after Paragraph 11.01.A.5.d.

1) The Project is exempt from sales tax as set forth in SC-6.10.

SC-14.02. *Progress Payments*

Add the following new paragraph immediately after subparagraph 14.02.A.1.a:

b. Pursuant to MGL Chapter 30, Section 39S, *Contracts for construction; requirements***,** provide certification for each employee employed at the Work Site of successful completion of a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins Work.

Add the following new paragraphs immediately after Paragraph 14.02.D.3.

E. The following provisions regarding payment are required by MGL Chapter 30, Section 39K *Public building construction contracts; payments.* Provisions referencing "periodic estimate" and "periodic payment" shall be considered Progress Payments per Paragraph 14.02. However, the Engineer will perform some of indicated actions on behalf of the Awarding Authority as its representative, consistent with the role and responsibilities defined in the Standard General and Supplementary Conditions and Additional Supplementary Conditions, and the forms listed in Section 00 60 00 and included in the Contract Documents will be utilized.

1. Within 15 days (30 days in the case of the commonwealth, including local housing authorities) after receipt from the Contractor, at the place designated by the Awarding Authority if such a place is so designated, of a periodic estimate requesting payment of the amount due for the preceding month, the Awarding Authority will make a periodic payment to the Contractor for the work performed during the preceding month and for the materials not incorporated in the work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the Contractor has title or to which a Subcontractor has title and has authorized the Contractor to transfer title to the Awarding Authority, upon certification by the Contractor that he is the lawful owner and that the materials are free from all encumbrances, but less (1) a retention based on its estimate of the fair value of its claims against the Contractor and less (2) a retention for direct payments to Subcontractors based on demands for same in accordance with the provisions of MGL Chapter 30, Section 39F and less (3) a retention not exceeding 5 per cent of the approved amount of the periodic payment. If the Awarding Authority fails to make payment as herein provided, there shall be added to each such payment daily interest at the rate of 3 percentage points above the rediscount rate than charged by the Federal Reserve Bank of Boston commencing on the first day after said payment is due and continuing until the payment is delivered or mailed to the Contractor; provided, that no interest shall be due, in any event, on the amount due on a periodic estimate for final payment until 15

days (24 days in the case of the commonwealth) after receipt of such a periodic estimate from the Contractor, at the place designated by the Awarding Authority if such a place is so designated. The Contractor agrees to pay to each Subcontractor a portion of any such interest paid in accordance with the amount due each Subcontractor.

F. The following provisions regarding payment to Subcontractors are required by MGL Chapter 30, Section 39F *Construction contracts; assignment and subrogation; subcontractor defined; enforcement of claim for direct payment; deposit, reduction of disputed amounts.* These provisions shall be included in any subcontract in connection with Work under the Contract Documents.

1. The Engineer will perform some of indicated actions on behalf of the Awarding Authority as its representative, consistent with the role and responsibilities defined in the Standard General and Supplementary Conditions and Additional Supplementary Conditions, if any.

   a. Forthwith after the general Contractor receives payment on account of a periodic estimate, the general Contractor shall pay to each Subcontractor the amount paid for the labor performed and the materials furnished by that Subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the Subcontractor by the general Contractor.

   b. Not later than the 65th day after each Subcontractor substantially completes his Work in accordance with the Plans and Specifications, the entire balance due under the subcontract less amounts retained by the Awarding Authority as the estimated cost of completing the incomplete and unsatisfactory items of Work, shall be due the Subcontractor; and the Awarding Authority shall pay that amount to the general Contractor. The general Contractor shall forthwith pay to the Subcontractor the full amount received from the Awarding Authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the Subcontractor by the general Contractor.

   c. Each payment made by the Awarding Authority to the general Contractor pursuant to subparagraphs (a) and (b) above for the labor performed and the materials furnished by a Subcontractor shall be made to the general Contractor for the account of that Subcontractor; and the Awarding Authority shall take reasonable steps to compel the general Contractor to make each such payment to each such Subcontractor. If the Awarding Authority has received a demand for direct payment from a Subcontractor for any amount which has already been included in a payment to the general Contractor or which is to be included in a payment to the

general Contractor for payment to the Subcontractor as provided in subparagraphs (a) and (b) above, the Awarding Authority shall act upon the demand as provided in this section of the MGL.

d. If, within 70 days after the Subcontractor has substantially completed the subcontract Work, the Subcontractor has not received from the general Contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general Contractor, less any amount retained by the Awarding Authority as the estimated cost of completing the incomplete and unsatisfactory items of Work, the Subcontractor may demand direct payment of that balance from the Awarding Authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the Awarding Authority, and a copy shall be delivered to or sent by certified mail to the general Contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the Subcontractor has substantially completed the subcontract work. Within 10 days after the Subcontractor has delivered or so mailed the demand to the Awarding Authority and delivered or so mailed a copy to the general Contractor, the general Contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the Awarding Authority and a copy shall be delivered to or sent by certified mail to the Subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general Contractor and of the amount due for each Claim made by the general Contractor against the Subcontractor.

e. Within 15 days after receipt of the demand by the Awarding Authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the Awarding Authority shall make direct payment to the Subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general Contractor, less any amount (i) retained by the Awarding Authority as the estimated cost of completing the incomplete or unsatisfactory items of Work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general Contractor in the sworn reply; provided, that the Awarding Authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The Awarding

Authority shall make further direct payments to the Subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

f. The Awarding Authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) above in an interest-bearing joint account in the names of the general Contractor and the Subcontractor in a bank in Massachusetts selected by the Awarding Authority or agreed upon by the general Contractor and the Subcontractor and shall notify the general Contractor and the Subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general Contractor and the Subcontractor or as determined by decree of a court of competent jurisdiction.

g. All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (f) above shall be made out of amounts payable to the general Contractor at the time of receipt of a demand for direct payment from a Subcontractor and out of amounts which later become payable to the general Contractor and in the order of receipt of such demands from Subcontractors. All direct payments shall discharge the obligation of the Awarding Authority to the general Contractor to the extent of such payment.

h. The Awarding Authority shall deduct from payments to a general Contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f) above, are sufficient to satisfy all unpaid balances of demands for direct payment received from Subcontractors. All such amounts shall be earmarked for such direct payments, and the Subcontractors shall have a right in such deductions prior to any Claims against such amounts by creditors of the general Contractor.

i. If the Subcontractor does not receive payment as provided in subparagraph (a) or if the general Contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the Subcontractor and the Subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (a), the Subcontractor may demand direct payment by following the procedure in subparagraph (d) and the general Contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the Subcontractor performed or furnished the labor and materials for which the Subcontractor seeks payment

shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the general Contractor. Thereafter the Awarding Authority shall proceed as provided in subparagraph (e), (f), (g) and (h).

SC-14.04 ***Substantial Completion:*** Add the following new paragraph immediately after Paragraph 14.04.E.

F. Additional provisions covering Substantial Completion included in MGL Chapter 30, Section 39K *Public building construction contracts; payments* apply to this Project. However, the Engineer will perform some of indicated actions on behalf of the Awarding Authority as its representative, consistent with the role and responsibilities defined in the Standard General and Supplementary Conditions and Additional Supplementary Conditions if any, and the forms listed in Section 00 60 00 and included in the Contract Documents will be utilized.

SC 14.07 ***Final Payment:*** Add the following new paragraph immediately after Paragraph 14.07.C.1.

D. The following provisions regarding final payment and completion of the Work are required by MGL Chapter 30, 39K *Public building construction contracts; payments*, however, the Engineer will perform some of indicated actions on behalf of the Awarding Authority as its representative, consistent with the role and responsibilities defined in the Standard General and Supplementary Conditions and Additional Supplementary Conditions if any, and the forms listed in Section 00 60 00 and included in the Contract Documents will be utilized.

1. After the receipt of a periodic estimate requesting final payment and within 65 days after (a) the Contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the Awarding Authority, less than one per cent of the original contract price, or (b) the Contractor substantially completes the work and the Awarding Authority takes possession for occupancy, whichever occurs first, the Awarding Authority shall pay the Contractor the entire balance due on the contract less (1) a retention based on its estimate of the fair value of its claims against the Contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (2) a retention for direct payments to Subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, or based on the record of payments by the Contractor to the Subcontractors under this contract if such record of payment indicates that the Contractor has not paid Subcontractors as provided in MGL Chapter 30, Section 39F. If the Awarding Authority fails to make payment as herein provided, there shall be added to each such payment daily interest at the rate of 3 percentage points above the rediscount rate than charged by the Federal Reserve Bank of Boston commencing on the first day after

said payment is due and continuing until the payment is delivered or mailed to the Contractor; provided, that no interest shall be due, in any event, on the amount due on a periodic estimate for final payment until 15 days (24 days in the case of the commonwealth) after receipt of such a periodic estimate from the Contractor, at the place designated by the Awarding Authority if such a place is so designated. The Contractor agrees to pay to each Subcontractor a portion of any such interest paid in accordance with the amount due each Subcontractor.

SC-15.01 ***Owner May Suspend Work:*** Add the following new paragraphs immediately after Paragraph 15.01.A.

1. Pursuant to MGL Chapter 30, Section 39O, *Contracts for construction and materials; suspension, delay or interruption due to order of awarding authority; adjustment in contract price; written claim*, the Awarding Authority may order the general Contractor in writing to suspend, delay, or interrupt all or any part of the Work for such period of time as it may determine to be appropriate for the convenience of the Awarding Authority; provided however, that if there is a suspension, delay or interruption for 15 days or more or due to a failure of the Awarding Authority to act within the time specified in the Contract, the Awarding Authority shall make an adjustment in the Contract Price for any increase in the cost of performance of the Contract but shall not include any profit to the general Contractor on such increase; and provided further, that the Awarding Authority shall not make any adjustment in the Contract Price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this Contract provides for an equitable adjustment of the Contract Price under any other Contract provisions.

2. The general Contractor must submit the amount of a Claim under provision 1 above to the Awarding Authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under the Contract and, except for costs due to a suspension order, the Awarding Authority shall not approve any costs in the Claim incurred more than 20 days before the general Contractor notified the Awarding Authority in writing of the act or failure to act involved in the Claim.

3. In the event a suspension, delay, interruption or failure to act of the Awarding Authority increases the cost of performance to any Subcontractor, that Subcontractor shall have the same rights against the general Contractor for payment for an increase in the cost of his performance as provisions 1 and 2 above give the general Contractor against the Awarding Authority, but nothing in provisions 1 and 2 above shall in any way change, modify or alter any other rights which the general Contractor or the Subcontractor may have against each other.

SC-17.05 Controlling Law: Add the following new paragraphs immediately after Paragraph 17.05.A.

1. This Contract is subject to all Laws and Regulations of the United States of America (including the U.S. Code of Federal Regulations), the Commonwealth of Massachusetts and other public authorities, and all amendments thereto. Where any requirements contained herein do not conform to or are inconsistent with such Laws and Regulations to which the Contract is subject or by which it is governed, such Laws and Regulations shall have precedence over any matters set forth herein.

2. The Project is specifically subject to MGL Chapters 30 and 149 for contracts awarded pursuant to MGL Chapter 149, Sections 44A-44H.

3. This Project is also subject to the Environmental Protection Agency's (EPA) Drinking Water State Revolving Fund (SRF) program requirements, Department of Environmental Protection ("MassDEP"), Division of Municipal Services ("DMS") SRF provisions and policies, other Project specific regulations and requirements, and Federal Law.

4. Statutes, regulations, and portions and summaries thereof which are set forth or referred to in the Contract Documents shall be construed to include all amendments thereto in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids). The Owner and Engineer make no representation as to and assume no responsibility for the correctness or completeness of such statutory matters referred to or set forth herein.

5. Any provision in violation of the foregoing shall be deemed null, void and of no effect. Where conflicts with Laws and Regulations exist, the more stringent requirement shall apply.

ATTACHMENTS

A. Form of Subcontract for Filed Sub-Bid Work

END OF SECTION

MAc149

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FORM OF SUBCONTRACT FOR FILE SUB-BID WORK

SUBCONTRACT

THIS AGREEMENT MADE THIS _____ DAY OF _____, (insert year)by and between _____ a corporation organized and existing under the laws of _____ an individual doing business as _____ hereinafter called the "Contractor" and _____ a corporation organized and existing under the laws of _____ an individual doing business as _____ hereinafter called the "Subcontractor".

WITNESSETH that the Contractor and the Subcontractor for the considerations hereafter named, agree as follows:

1. The Subcontractor agrees to furnish all labor and materials required for the completion of all work specified in Section No. _____ of the specifications for

_____

(Name of Sub-Trade) and the plans referred to therein and addenda No. _____, _____, _____, and _____ for the

_____

_____

(complete title of the project and the project number taken from the title page of the specifications)

all as prepared by _____

(Name of Architect or Engineer)

for the sum of _____ ($_____) and the Contractor agrees to pay the Subcontractor said sum for said work. This price includes the following alternates (and other items set forth in the sub-bid): Alternate No(s). _____, _____, _____, _____, _____, _____, _____, _____, _____, _____, _____, _____, _____, _____

(a) The Subcontractor agrees to be bound to the Contractor by the terms of the hereinbefore described plans; specifications (including all general conditions stated therein) and addenda No. , and , and , and to assume to the Contractor all the obligations and responsibilities that the Contractor by those documents assumes tothe

_____

(Awarding Authority) hereinafter called the "Awarding Authority", except to the extent that provisions contained therein are by their terms or by law applicable only to the Contractor.

(b) The Contractor agrees to be bound to the Subcontractor by the terms of the hereinbefore described documents and to assume to the Subcontractor all the obligations and responsibilities that the Awarding Authority by the terms of the hereinbefore described documents assumes to the Contractor, except to the extent that provisions contained therein are by their terms or by law applicable only to the Awarding Authority.

2. The Contractor agrees to begin, prosecute and complete the entire work specified by the Awarding Authority in an orderly manner so that the Subcontractor will be able to begin, prosecute and complete the work described in this subcontract; and, in consideration thereof, upon notice from the Contractor, either oral or in writing, the Subcontractor agrees to begin, prosecute and complete the work described in this Subcontract in an orderly manner and with due consideration to the date or time specified by the Awarding Authority for the completion of the entire work.

3. The Subcontractor agrees to furnish to the Contractor within a reasonable time after the execution of this subcontract, evidence of workers' compensation insurance as required by law and evidence of public liability and property damage insurance of the type and in limits required to be furnished to the Awarding Authority by the Contractor.

4. The Contractor agrees that no claim for services rendered or materials furnished by the Contractor to the Subcontractor shall be valid unless written notice thereof is given by the Contractor to the Subcontractor during the first ten (10) days of the calendar month following that in which the claim originated.

5. This agreement is contingent upon the execution of a general contract between the Contractor and the Awarding Authority for the complete work.

IN WITNESS WHEREOF, the parties hereto have executed this agreement the date and year first above-written.

SEAL

ATTEST _____

_____

(Name of Subcontractor)

By _____

SEAL

ATTEST _____ _____

(Name of Contractor)

By _____

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Project Description

B. Description of the Work

C. Work Sequence and Coordination

D. Special Requirements

1.02 PROJECT DESCRIPTION

A. The Project includes roofing, painting, heating, ventilating and air-conditioning (HVAC), electrical, masonry, and elevators work as well as architectural, instrumentation and controls, site/civil, mechanical work, and hazardous materials assessment and abatement at various locations in Lowell.

1.03 DESCRIPTION OF THE WORK

A. Work Site locations

1. Raw Water Pump Station, 1194 Pawtucket Blvd, Lowell, MA 01854

2. Water Treatment Plant, 815 Pawtucket Blvd, Lowell, MA 01854

3. Stackpole Street Pump Station, 178 Stackpole St, Lowell, MA 01852

4. Water main improvements at the following locations

   a. 1600 VFW Highway, Lowell, MA 01850

   b. Durant Street, Lowell, MA 01850

B. The Work includes labor, material and equipment, and services required for construction, testing, and commissioning of the Project in accordance with the Contract Documents and as more specifically described in the Specifications and Drawings and includes, but is not limited to, the following principal features.

1. Raw Water Pump Station

    a. Conduct a hazardous material assessment.

    b. Conduct hazardous material abatement if authorized.

    c. Demolish and cap existing deteriorating parapet wall.

    d. Reroof RWPS with new membrane roof with tapered insulation to roof drains.

    e. Remove and replace main entrance door lintel.

    f. Reroof canopy roof at loading dock with new membrane roofing with tapered insulation sloping to a scupper and downspout.

    g. Grout and repoint all exterior cracking.

    h. Pressure wash exterior and replace signage lettering.

    i. Plaster and stucco the front and side facades of the building.

    j. Remove and dispose of existing bituminous pavement and subbase and replace with new pavement and subbase.

    k. Replace exterior lighting on the front face of the building.

    l. Replace existing turbimeter.

2. Water Treatment Plant

    a. Replace the existing raw water flow meters and associated flow control valves.

    b. Replace existing turbidimeters and associated sample pumps.

    c. Replace the rooftop air handling units with new energy efficient units.

    d. Replace single zone HVAC system with a multiple zone system.

    e. Install Building Automation System (BAS) to control the new HVAC system.

    f. Install a new uninterruptible power system (UPS). This will include migrating all PLC stations, network and other equipment off the local battery packs to a new station-wide UPS that will need to be networked into SCADA for monitoring

    g. Install new vertical wheelchair lift.

3. Stackpole Street Pump Station

    a. Install new prefabricated booster pumping station.

    b. Conduct hazardous material abatement.

    c. Demolish old station.

d. Install new instrumentation and radio panel.

4. Water Main Improvements

a. 1600 VFW Highway, Lowell, MA 01850

1) Install a line stop and gate valve on the low service water main located North of the Merrimack River and South of the VFW Highway (Route 110).

b. Durant Street, Lowell, MA 01850

1) Install a tapping sleeve, valve and hydrant on Durant Street.

C. Existing conditions and Site data: per the Drawings and Section 01 15 00.

1.04 WORK SEQUENCE AND COORDINATION

A. Coordination

1. Ensure that facilities and water system flows are maintained and remain in service at all times unless otherwise noted.

a. Obtain written approval of the Engineer for shutdowns. Notify Engineer a minimum of two weeks prior to any required shutdowns.

b. Prepare a Shutdown Plan for each requested shutdown indicating what existing valves must be operated by Owner personnel during the shutdown.

1) Perform Work requiring shutdowns at the Stackpole Street Pump Station only between the hours of 7:00PM and 3:00AM.

2) Perform Work requiring shutdowns at the Raw Water Pump Station or the Water Treatment Plant between the hours of 8:00PM and 4:00AM.

c. Coordinate Work with the City and provide public notice, as required.

2. Maintain access to facilities for the Owner throughout the Project.

B. Sequence

1. Sequence Work to minimize shutdowns and reflect sequencing in the construction schedule.

2. Stackpole Street Pump Station

a. Work required before beginning Work on the new pump station

1) Relocate and reconnect existing generator to existing pump station including removal and disposal of existing equipment pads.

2) Complete phase 1 of water main upgrades.

3) After completing phase 1, complete phase 2 of water main upgrades.

4) After completion of phase 1 and phase 2 of water main upgrades and completion of existing generator relocation, construct, test, and make ready for operation two temporary 12-inch piping connections to existing pump station. Provide that construction is complete, tested, and approved from connections to existing system to the isolation valves closest to the existing pump station.

5) After testing temporary piping and after receipt of written approval of the Engineer, make final temporary piping connections to the existing 12-inch cast iron suction and discharge piping at the existing pump station and construct new suction piping connection to existing 30-inch cast iron main to the 12-inch isolation valve.

b. Work which cannot be performed until after the new Stackpole Street Pumping Station has been constructed, tested, approved and is operational.

1) Connect standby power to new pump station.

2) Remove temporary 12-inch piping connections.

3) Conduct hazardous material abatement.

4) Demolish existing pump station, transformer, equipment pad, and 8-inch suction and discharge piping and metering vault.

3. Raw Water Pump Station

   a. Work required before roof Work

      1) Conduct a hazardous materials assessment and prepare and submit a written report per Section 02 26 00.

      2) Conduct hazardous material abatement if authorized.

   b. Complete exterior Work at the Raw Water Pump Station by August 31, 2015.

1.05 SPECIAL PROJECT REQUIREMENTS

A. Coordinate through the Town Manager's office to obtain permits referenced in Section 01 15 00.

END OF SECTION

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SECTION 01 11 20

SUMMARY OF FILED SUB-BID REQUIREMENTS

This Contract is subject to the provisions of MGL Chapter 149, Sections 44A through 44H, inclusive.

Pursuant to MGL Chapter 149, section 44F(1)(a), the estimate for each of the following classes of Work exceeds $20,000, separate sub-Bids must be filed, and the Work for these classes of Work has been segregated and is as identified in the Filed Sub-Bid Requirements included in this Section.

roofing
painting
heating, ventilating and air-conditioning
electrical work (including direct electrical radiation for heating)
masonry
elevators

END OF SECTION

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ROOFING
FILED SUB-BID REQUIREMENTS

A. The Work covered by the Specifications and Drawings listed below requires a filed sub-Bid in accordance with MGL c149, §44A through 44J, inclusive, as amended.

B. The Contracting Requirements in Division 00 and the General Requirements in Division 01 apply to the Work of this Section(s).

C. Examine all Drawings and Specifications for requirements that affect the Work of this Section(s).

D. Coordinate the Work of this Section(s) with related Work of other trades and cooperate with such trades to assure the steady progress of the Work under the Contract Documents.

E. The term "Contractor" in this Section(s) and all referenced Drawings and Specifications shall mean the Roofing Iron Subcontractor except where "General Contractor" is specified.

F. The Work under the Roofing sub-Bid is specified in the following Specification sections:

Section 07 50 00 Membrane Roofing
Section 07 60 00 Flashing and Sheet Metal

and on the following Drawings:

S-001, S-101, S-102, S-103, S-104, S-105

This listing of Drawings shall not limit the responsibility of the Masonry Subcontractor to determine the full extent of the Work required by the complete set of Drawings.

G. Requirements for Submitting Sub-Bids

1. Sub-Bids for Work under this Section shall comply with the requirements of MGL c149, §44F.

2. Sub-Bids shall be filed on the forms furnished by the Awarding Authority in the Bidding Requirements in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and in accordance with the procedures and requirements set forth in the Bidding Requirements.

H. Sub sub-Bids are required for the following Work per paragraph E of the Form for Sub-Bid - Roofing which is customarily performed under subcontract with the Roofing Subcontractor.

NONE

END OF SECTION

PAINTING
FILED SUB-BID REQUIREMENTS

A. The Work covered by the Specifications and Drawings listed below requires a filed sub-Bid in accordance with MGL c149, §44A through 44J, inclusive, as amended.

B. The Contracting Requirements in Division 00 and the General Requirements in Division 01 apply to the Work of this Section(s).

C. Examine all Drawings and Specifications for requirements that affect the Work of this Section(s).

D. Coordinate the Work of this Section(s) with related Work of other trades and cooperate with such trades to assure the steady progress of the Work under the Contract Documents.

E. The term "Contractor" in this Section(s) and all referenced Drawings and Specifications shall mean the Painting Subcontractor except where "General Contractor" is specified.

F. The Work under the Painting sub-Bid is specified in the following Specification sections:

Section 09 90 00 Painting and Coating

and on the following Drawings:

All C (Civil) series Drawings
All S (Structural) series Drawings
All M (Mechanical) series Drawings
All H (HVAC) series Drawings

This listing of Drawings shall not limit the responsibility of the Painting Subcontractor to determine the full extent of the Work required by the complete set of Drawings.

G. Requirements for Submitting Sub-Bids

1. Sub-Bids for Work under this Section shall comply with the requirements of MGL c149, §44F.

2. Sub-Bids shall be filed on the forms furnished by the Awarding Authority in the Bidding Requirements in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and in accordance with the procedures and requirements set forth in the Bidding Requirements.

H. Sub sub-Bids are required for the following Work per paragraph E of the Form for Sub-Bid – Painting which is customarily performed under subcontract with the Painting Subcontractor.

NONE

END OF SECTION

HEATING, VENTILATION AND AIR-CONDITIONING
FILED SUB-BID REQUIREMENTS

A. The Work covered by the Specifications and Drawings listed below requires a filed sub-Bid in accordance with MGL c149, §44A through 44J, inclusive, as amended.

B. The Contracting Requirements in Division 00 and the General Requirements in Division 01 apply to the Work of this Section(s).

C. Examine all Drawings and Specifications for requirements that affect the Work of this Section(s).

D. Coordinate the Work of this Section(s) with related Work of other trades and cooperate with such trades to assure the steady progress of the Work under the Contract Documents.

E. The term "Contractor" in this Section(s) and all referenced Drawings and Specifications shall mean the Heating, Ventilation And Air-Conditioning Subcontractor except where "General Contractor" is specified.

F. The Work under the Heating, Ventilation And Air-Conditioning sub-Bid is specified in the following Specification sections:

23 05 00 Common Work Results for HVAC
23 05 10 HVAC Demolition
23 05 15 Mechanical Identification
23 05 19 Meters and Gauges for HVAC Piping
23 05 23 General-Duty Valves for HVAC Piping
23 05 29 Hangers and Supports for HVAC Piping and Equipment
23 05 93 Testing, Adjusting and Balancing for HVAC
23 07 00 HVAC Insulation
23 09 00 HVAC Control System
23 09 93 Control Sequences for Automatic Temperature Control
23 21 13 Hydronic Piping
23 21 23 Hydronic Pumps
23 30 00 HVAC Air Distribution
23 31 13 Metal Ducts
23 36 00 Air Terminal Units
23 74 00 Packaged Outdoor HVAC Equipment

and on the following Drawings:

All H (HVAC) series Drawings

This listing of Drawings shall not limit the responsibility of the Heating, Ventilation and Air-Conditioning Subcontractor to determine the full extent of the Work required by the complete set of Drawings.

G. Requirements for Submitting Sub-Bids

1. Sub-Bids for Work under this Section shall comply with the requirements of MGL c149, §44F.

2. Sub-Bids shall be filed on the forms furnished by the Awarding Authority in the Bidding Requirements in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and in accordance with the procedures and requirements set forth in the Bidding Requirements.

H. Sub sub-Bids are required for the following Work per paragraph E of the Form for Sub-Bid – Heating, Ventilation And Air-Conditioning which is customarily performed under subcontract with the Heating, Ventilation And Air-Conditioning Subcontractor.

NONE

END OF SECTION

ELECTRICAL
FILED SUB-BID REQUIREMENTS

I. The Work covered by the Specifications and Drawings listed below requires a filed sub-Bid in accordance with MGL c149, §44A through 44J, inclusive, as amended.

J. The Contracting Requirements in Division 00 and the General Requirements in Division 01 apply to the Work of this Section(s).

K. Examine all Drawings and Specifications for requirements that affect the Work of this Section(s).

L. Coordinate the Work of this Section(s) with related Work of other trades and cooperate with such trades to assure the steady progress of the Work under the Contract Documents.

M. The term "Contractor" in this Section(s) and all referenced Drawings and Specifications shall mean the Electrical Subcontractor except where "General Contractor" is specified.

N. The Work under the Electrical sub-Bid is specified in the following Specification sections:

26 05 00 - Common Work Results for Electrical
26 05 19 - Low-Voltage Electrical Power Conductors and Cables
26 05 26 - Grounding and Bonding for Electrical Systems
26 05 34 - Raceways, Boxes and Supporting Devices
26 05 43 - Underground Ducts and Raceways for Electrical Systems
26 21 00 - Low-Voltage Electrical Service Entrance
26 27 00 - Low-Voltage distribution Equipment
26 27 26 - Wiring Devices
26 28 16 - Enclosed Switches & Circuit Breakers
26 29 13 - Enclosed Controllers
26 29 23 - Variable Frequency Motor Controllers
26 32 13.13 - Automatic Transfer Switch
26 33 63 - Uninterruptible Power Supply
26 50 00 - Lighting

and on the following Drawings:

All E (Electrical) series Drawings

This listing of Drawings shall not limit the responsibility of the Electrical Subcontractor to determine the full extent of the Work required by the complete set of Drawings.

1. Sub-Bids for Work under this Section shall comply with the requirements of MGL c149, §44F.

2. Sub-Bids shall be filed on the forms furnished by the Awarding Authority in the Bidding Requirements in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and in accordance with the procedures and requirements set forth in the Bidding Requirements.

O. Sub sub-Bids are required for the following Work per paragraph E of the Form for Sub-Bid – Electrical which is customarily performed under subcontract with the Electrical Subcontractor.

NONE

END OF SECTION

MASONRY WORK
FILED SUB-BID REQUIREMENTS

A. The Work covered by the Specifications and Drawings listed below requires a filed sub-Bid in accordance with MGL c149, §44A through 44J, inclusive, as amended.

B. The Contracting Requirements in Division 00 and the General Requirements in Division 01 apply to the Work of this Section(s).

C. Examine all Drawings and Specifications for requirements that affect the Work of this Section(s).

D. Coordinate the Work of this Section(s) with related Work of other trades and cooperate with such trades to assure the steady progress of the Work under the Contract Documents.

E. The term "Contractor" in this Section(s) and all referenced Drawings and Specifications shall mean the Masonry Subcontractor except where "General Contractor" is specified.

F. The Work under the Masonry sub-Bid is specified in the following Specification sections:

04 20 00 Unit Masonry
07 19 00 Water Repellents
09 24 23 Cement Stucco

and on the following Drawings:

All A (Architectural) series drawings
All S (Structural) series drawings

This listing of Drawings shall not limit the responsibility of the Electrical Subcontractor to determine the full extent of the Work required by the complete set of Drawings.

G. Requirements for Submitting Sub-Bids

1. Sub-Bids for Work under this Section shall comply with the requirements of MGL c149, §44F.

2. Sub-Bids shall be filed on the forms furnished by the Awarding Authority in the Bidding Requirements in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and in accordance with the procedures and requirements set forth in the Bidding Requirements.

H. Sub sub-Bids are required for the following Work per paragraph E of the Form for Sub-Bid – Masonry which is customarily performed under subcontract with the Masonry Subcontractor.

NONE

END OF SECTION

ELEVATORS (SRF INELIGIBLE)
FILED SUB-BID REQUIREMENTS

A. The Work covered by the Specifications and Drawings listed below requires a filed sub-Bid in accordance with MGL c149, §44A through 44J, inclusive, as amended.

B. The Contracting Requirements in Division 00 and other General Requirements in Division 01 apply to the Work covered by the Specifications and Drawings listed below. Requirements of the American Iron and Steel act do not apply to Work completed as part of this filed sub-Bid.

C. Examine all Drawings and Specifications for requirements that affect the Work identified.

D. Coordinate the Work covered by the Specifications and Drawings listed below with related Work of other trades and cooperate with such trades to assure the steady progress of all Work under the Contract Documents.

E. The term "Contractor" used herein and in Specifications and Drawings listed below shall mean the Elevators Subcontractor except where "General Contractor" is used.

F. The Work under the Elevators sub-Bid is specified in the following Specification sections:

Section 14 42 00 Wheelchair Lifts

and on the following Drawings:

S-201

This listing of Drawings shall not limit the responsibility of the Elevators Subcontractor to determine the full extent of the Work required by the complete set of Drawings.

G. Requirements for Submitting Sub-Bids

1. Sub-Bids for Work covered by the Specifications and Drawings listed above shall comply with the requirements of MGL c149, §44F.

2. Sub-Bids shall be filed on the forms furnished by the Awarding Authority in the Bidding Requirements in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and in accordance with the procedures and requirements set forth in the Bidding Requirements.

H. Sub sub-Bids are required for the following Work per paragraph E of the Form for Sub-Bid - Elevators which is customarily performed under subcontract with the Elevators Subcontractor.

NONE

END OF SECTION

SECTION 01 15 00

SPECIFIC PROJECT REQUIREMENTS AND PROCEDURES

The following supplement the requirements and procedures of Sections 01 15 30, 01 50 00, and 01 70 00 using the same titles, headings, and paragraph numbers to which the supplement applies.

Certain provisions required by Laws and Regulations may be referenced. Contractor is responsible to determine and obtain applicable Laws and Regulations and to review and interpret the full text of such Laws and Regulations.

SECTION 01 15 30 - PAYMENT AND ADMINISTRATIVE PROCEDURES AND QUALITY REQUIREMENTS

1.02 PAYMENT PROCEDURES

Pursuant to Paragraph A. **Schedule of Values,** subparagraph 1., delineate SRF Eligible and Non Eligible items per MassDEP-DMS requirements.

Pursuant to Paragraph B. **Payment Procedures**, submit the following specific items.

- Certified Payroll documentation per statutory requirements
- Copy of cashed check paid and copy of receipts for Traffic Police Details invoices paid showing: the Project name; the officers' names; location of assignment; date of assignment; hours of assignment; and number of hours being invoiced

Pursuant to Paragraph C. **Change Procedures**, comply with MassDEP-DMS requirements for change orders in Section 00 73 10 utilizing the SRF Change Order form included as form C-006363A (in addition to the Project Change Order Form C-006363) and substantiate quantities for change orders per MassDEP-DMS Policy Memorandum CG-16 included as an attachment to this Section.

Pursuant to Paragraph D. **Measurement and Payment Procedures** comply with the following per MassDEP-DMS.

- Documentation required to substantiate Final Payment: per MassDEP-DMS Policy Memorandum CG-16 included as an attachment to this Section.

- The following items have limitations on financial participation under the State Revolving Loan Fund Program. See the following MassDEP-DMS Policy Memoranda included as attachments to this Section.

  Permits – applicable portion of CG-2
  Mobilization – CG-7
  Pavement – CG-8
  Rock Excavation – CG-14
  Traffic Police – CG-15

1.03 ADMINISTRATIVE REQUIREMENTS

Pursuant to Paragraph A. **Project Management and Coordination; Meetings**,

subparagraph 1., **the Project contact list** will be provided at the Preconstruction Meeting.

subparagraph 4, **identify documents** and items for the Project as follows.

Contract No. 2-DWSRF #3531
Water System Improvements – City of Lowell, MA

Pursuant to Paragraph B. **Documentation of Progress**,

subparagraph 1. **Progress Schedules**, reflect special sequencing required in Section 01 11 00.

subparagraph 4. **Reports**, submit the following additional reports.

- Updates to the Construction Operations Plan approved pursuant to SC 2.07 of Section 00 73 10 when it is modified

Pursuant to Paragraph C. **Submittal Procedures**, subparagraph 1., address submittals as follows.

Engineer:
Woodard & Curran
40 Shattuck Road - Suite 110
Andover, MA 01810
Attn: Nate Little
Phone: (978) 557-8150
Email: nlittle@woodardcurran.com

add the following new subparagraph for compliance with the AIS Requirements of the SRF Program outlined in Section 00 73 10.

9. Certification of Compliance with AIS Requirement: Except for SRF ineligible items, submit Step Certification (preferred) or General Certification for equipment and material provided for the Project.

1.04 QUALITY REQUIREMENTS

Pursuant to Paragraph A. **Reference Standards and Regulatory Requirements**, specific requirements applicable to the Project include the following.

- Order of Conditions, executed July 2013 – MassDEP File No. 206-0707 included as an attachment to this section.
- Order of Conditions, executed February 2014 – MassDEP File No. 206-0722 included as an attachment to this section.
- Comply with the Massachusetts Department of Transportation - Highway Division's (referred to as "MassDOT") Construction Specifications (including Interim Supplemental Specifications and Supplemental Specifications), Construction Details (including Standard Drawings), and Design Guides as incorporated into the Specifications and Drawings, and as may be modified therein or superseded by the Owner's requirements through the direction of the Engineer.
- Specific sections of the MassDOT documents are referenced in the Specifications and Drawings. References to "Department" in the MassDOT documents shall mean Owner or Resident Project Representative for this Project. See MassDOT Highway Division website listing of documents included as an attachment to this Section.

  www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms

Pursuant to Paragraph B. **Qualifications**, additional requirements include the following specialty experience.

- Regular and active engagement in the sewer and water infrastructure construction business for a minimum of 5 years
- Workers trained by qualified representative in polyethylene pipe butt-fusion and recommended methods for new pipe connections
- General Bidders must be certified by the Commonwealth of Massachusetts Division of Capital Asset Management and Maintenance (DCAMM) for sewage and water treatment plants and pumping stations.
- Any Work involving the removal, containment, or encapsulation of Asbestos or material containing Asbestos may only be performed by a licensed contractor per Section 00 73 73.

- Sheet metal work must be performed by a contractor licensed per Section 00 73 73.

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

1.02 TEMPORARY CONSTRUCTION FACILITIES

Pursuant to Paragraph B, **Protection of Work**, comply with the following additional requirements of MGL Chapter 149, Sections 44F(1) and 44G.

- Contractor shall furnish and install weather protection to provide for adequate heat in the area so protected during the months of November through March. Per DCAMM, "weather protection," means temporary protection of that Work adversely affected by moisture, wind and cold. Weather protection shall be achieved by covering, enclosing and/or heating working areas such that a minimum temperature of 40 degrees Fahrenheit is maintained at the working surface during the months of November through March in order to permit construction to be carried on during such period in accordance with the Progress Schedule.

- After the building or portion thereof is completely enclosed by either permanent construction or substantial temporary materials having a resistance comparable to the specified permanent construction, the Contractor shall provide heat therein of not less than 55 degrees F. nor more than 75 degrees F. The foregoing provisions do not supersede any specific requirements for methods of construction, curing of materials and the like. Such weather protection shall be consistent with the Progress Schedule, shall permit the continuous progress of the Work necessary to maintain an orderly and efficient sequence of construction operations, shall include one thermometer for every 2,000 square feet of floor space or fraction thereof, shall be subject to the Approval of the Awarding Authority, and shall meet such additional requirements as may be specified by Awarding Authority.

Pursuant to Paragraph I. **Project Identification**, display signs as required by MassDEP with the information shown on an attachment to this section that identifies the Project's MassDEP file number DWSRF #3531.

1.04 TEMPORARY CONTROLS

Pursuant to Paragraph B. **Water Control and Dewatering**, comply with the following additional requirements.

- MassDEP requirements

Pursuant to Paragraph C. **Erosion and Sediment Control**, comply with the following additional requirements.

- Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, prepared by the MassDEP

Pursuant to Paragraph F. **Traffic Regulation**,

subparagraph 1. regarding a **plan for traffic control**, also submit a schedule of road closures/detours and obtain a road closure and road blockage permit for every location where Work is being performed. Detours and street closures are subject to the approval of the Lowell City Engineer who will strictly control the periods when traffic is being detoured or streets can be closed.

subparagraph 2. regarding the **MUTCD**, comply with the following additional requirements.

- Applicable portions of the "Massachusetts Amendments to the 2009 Manual on Uniform Traffic Control Devices and the Standard Municipal Traffic Code" published by the Massachusetts Department of Transportation Highway Division

subparagraph 4. regarding **use of police officers**, comply with the following additional requirements.

- Coordinate schedule of police details with Owner which will be direct billed to the Owner per Section 01 20 25.
- Relevant provisions of Section 7.00 of the MassDOT Standard Specifications and Supplements, and the following.
  - The intent of posting police details is to ensure public safety and protection of property through appropriate traffic control. Police personnel are not to be employed as watchmen to protect the Contractor's equipment and materials.
  - All uniformed traffic police personnel required for traffic control for construction shall be authorized by Owner's Safety Officer and/or the Engineer.
  - Payment will be made by Owner for uniformed traffic police only.
  - Submit a forecast weekly traffic police detail schedule, at least 72 hours prior to the start of the Work describing: the nature and location of the Work, the number of police personnel, the estimated number of police hours required for each location, and justification for each uniformed officer being requested. Payment to the police for work under this Contract shall be in accordance with the Massachusetts General Laws, Chapter 149, Section 34B and paid directly by Owner.
  - If uniformed police have been arranged to work, and weather or some other situation prohibits the Work, notify the Police Department Detail before 5:30 a.m. on the day of intended Work to cancel the work order. Unless the work order is canceled in time, the Contractor shall be charged at the rate of

minimum four hours for each officer included in the detail and shall be fully responsible for payment of all charges thus incurred.

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

1.02 OVERALL EXECUTION REQUIREMENTS

Pursuant to Paragraph A. **Coordination**,

- Coordinate permitting through the City of Lowell.
- Coordinate with Owner and Engineer prior to performing any Work that will impact the treatment plant or pump station. Refer to Section 01 11 00 for requirements for maintaining operation of facilities and special sequencing.

Pursuant to Paragraph B. **Existing Conditions**,

subparagraph 2. regarding **subsurface/physical conditions**, the reports identified in SC-4.02 of Section 00 73 10 are included as an attachment to this section.

subparagraph 3. regarding **underground utilities**, comply with the following additional requirements.

- Contact DIGSAFE (www.digsafe.com) by dialing 811.

subparagraph 5. regarding **Hazardous Environmental Conditions**, the reports identified in SC-4.06 of Section 00 73 10 and is included as an attachment to this section.

ATTACHMENTS

A. DEP-DMS Policy Memorandum CG-16

B. DEP-DMS Policy Memoranda CG-2, CG-7, CG-8, CG-14, and CG-15

C. AIS Certifications

D. List of MassDOT Highway Division documents

E. Geotechnical Report

F. Notice of Intent and Order of Conditions

G. City of Lowell Zoning Board of Appeals Special Permit

H. City of Lowell Draft Driveway Permit Application (Contractor to submit final application and obtain Driveway Permit)

I. Project Sign

J. Asbestos and Lead Inspection Report for Stackpole Street Pump Station

K. MassDOT Access Permit

L. Geotechnical Report for ADA Lift Area

END OF SECTION

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POLICY MEMORANDUM NO. CG-16 **DOCUMENTATION REQUIRED TO SUBSTANTIATE CONTRACT QUANITITES**

Unit	Documentation required
Acres (A)	Location, station, offset and calculations. Location = Street right-of-way, etc; Station = Point on Baseline; Offset = Distance left or right of Baseline
Cubic Yard (C.Y.)	Location, stations, widths, depths, calculations and Cross sections as necessary
Each (Ea.)	Location, station, and offset.
Gallon (Gal.)	Location, stations, calculations (if appropriate) and delivery slips.
Hour (Hr.)	Hours and location.
Linear Feet (L.F.)	Location, stations, and offsets.
Month (Mo.)	Location, period of time and calculations if applicable.

1000 Foot Board Measure (MFBM)	Location, stations, offset, elevations, grade, and calculations. Attach invoices where applicable.
Pound (Lb.)	Locations, stations, and calculations (if applicable). Attach Delivery weight slips.
Square Feet (S.F.)	Locations, stations and calculations
Square Yard (S.Y.)	Locations, stations and calculations
Ton	Locations, stations and calculations (if applicable). Attach Delivery weight slips.
Vertical Feet (V.F.)	Locations, stations, elevations, and offsets.

Note:

1. All of the above, that apply must be submitted with a final payment request or change order as applicable.
2. Where in place measurement is not possible or practical, delivery slips may be used to substantiate quantities.
3. Change orders – See CG-10 in which some of the above may be applicable in justifying materials, equipment and labor.
4. When necessary, itemized quantities must be separated into eligible and non-eligible units with separate calculations to justify eligible costs.
5. Overruns and underruns of any specific item shall be explained with an appropriate sentence or paragraph.
6. On all quantities, units of payment shall be maintained at the project site and shall be updated daily so that upon field inspection by the C.O.E., EPA or DMS, the quantities paid to date can be substantiated.
7. In the case of unforeseen conditions, photos should be submitted with the applicable item in addition to the recommended documentation.
8. Documentation of units of payment shall be clearly legible and cross referenced to the applicable sheets of the record drawings.
9. For record drawings policy, please see CG-4.

DMS Policies 1 through 16 Approved By:

Steven J. McCurdy
Division of Municipal Services

POLICY MEMORANDUM NO. CG-2 **PERMITS**

The owner shall be responsible for identifying and obtaining all federal, state, local and railroad permits required by the nature and location of construction, including but not limited to building construction permits and permits for street and highway cuts and openings, and all such permits shall be listed in a separate permits section of the contract documents. To the extent possible, such permits shall be obtained by the owner prior to the solicitation of bids for construction, and copies of all permits so obtained shall be included in the said permits section. The status of the application for each permit, including the permit conditions, and costs, not obtained prior to the solicitation of bids shall also be indicated in the contract documents permits section. The Division may refuse to approve financial assistance for construction unless and until it has received from the owner sufficient assurances that all necessary permits have been or will be obtained prior to the commencement of construction.

The contractor shall be responsible for obtaining all permits required of his equipment, work force, or particular operations (such as blasting) in the performance of the contract and not otherwise specified in ~~the two preceding paragraphs as~~ to be obtained by the owner. These permit fees shall be paid by the contractor.

The owner shall be responsible for the payment of all other permit fees required by the construction. **per paragraph 6.08 of the Standard General and Supplementary Conditions, if any**

The following permits shall not be eligible for financial participation by the Department of Environmental Protection (DEP).

- Permits and insurance for construction in railroads' rights of way;
- Building permits;
- Permits for opening public streets and other public or municipal rights of way;
- Permits for the use of explosives;
- Permits for the disposal of waste materials;
- Permits and fees for connecting to municipal utilities.

Permits required by extraordinary circumstances and not specifically excluded from eligibility above may be eligible for DEP participation. For such permits to be so eligible, the owner or his representative must notify the DEP project engineer in advance of obtaining such permit and receive from the engineer specific agreement that such permit will be eligible for DEP participation. Eligibility for such participation will not be made retroactively.

Additional costs which result from interruptions of construction or extensions of contract time resulting from the owner's or the contractor's failure to obtain the necessary permits may be ineligible for participation.

For Sewer Pipe Installations

POLICY MEMORANDUM NO. CG-7 **BREAKDOWN OF BID ITEMS**

The following items shall, where applicable, be listed separately in the bid documents.

1. Mobilization

2. Pavement
   a. Municipal
      i. temporary
      ii. permanent
   b. State
      i. temporary
      ii. permanent

3. Concrete cradle or encasement (to be identified where applicable)

4. Rock-Excavation

5. Wood or steel sheeting left in place

6. Excavation of unsuitable materials below grade.

7. Select and/or borrow material

8. Dewatering

9. Special Dewatering (coffer dam)

Mobilization costs are the costs of initiating the contract, exclusive of the cost of materials. Payment for mobilization shall be a lump sum at the price bid for this item in the proposal and shall be payable when the contractor is operational on the site. For purposes of this policy, "operational" shall mean the substantial commencement of work on site.

The lump sum price bid for mobilization shall not exceed five per centum (5%) of the total amount of the bid.

Over new Sewer trenches

POLICY MEMORANDUM NO. CG-8 **PAVEMENT**

All roads and trenches therein shall be refilled and repaved in accordance with specifications provided by the owner in the contract documents. Please note that this policy may be excludable on federally assisted projects where bid alternative items may be required (i.e. trench width vs. full width pavement). You are advised to seek project specific clarification.

Loan eligibility shall be limited to the following:

A. Where the depth of the pipe invert is 0 to 8', the maximum pavement widths which shall be eligible for financial assistance are as follows:

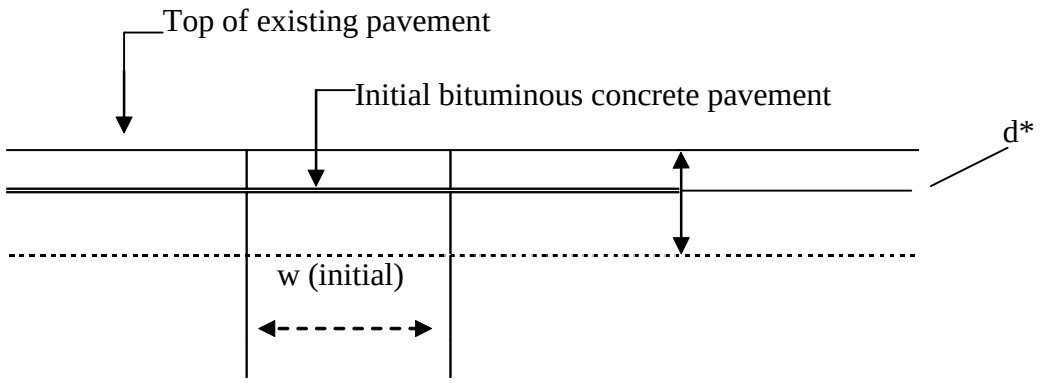
Nominal Pipe Diameter	Maximum Eligible Widths	
	Initial Pavement	Permanent Trench
0-24"	6'-6"	8'-6"

Where the nominal pipe diameter is greater than 24" the maximum eligible width for initial re-paving shall be the nominal diameter of the pipe plus four (4) feet, and for permanent trench re-paving the maximum eligible width shall be the nominal pipe diameter plus six (6) feet.

B. For each additional four (4) feet (or fraction thereof) of pipe invert depth, add three feet to the eligible width limits stated in paragraph A.

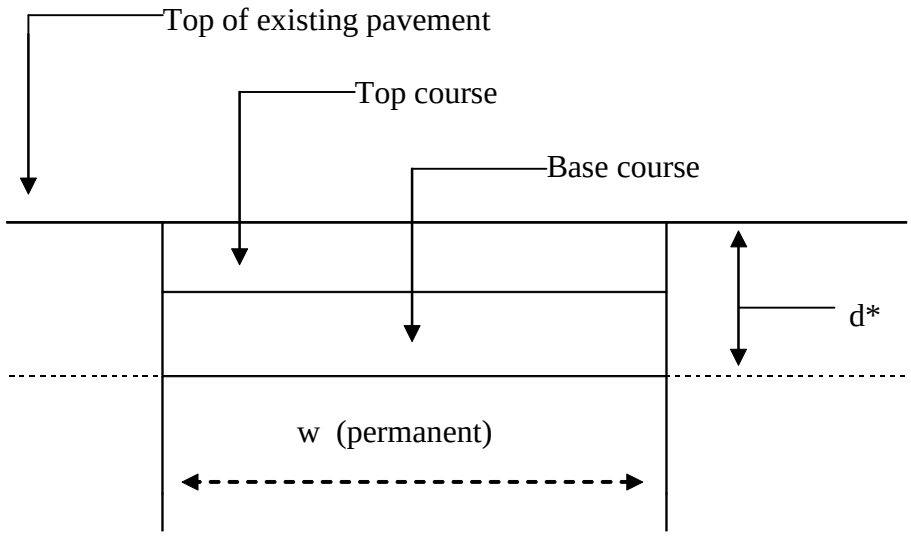
At the design phase of a project the owner has the option to elect either Initial Pavement with Option I (Permanent Trench replacement) or Initial with Option II (curb to curb over initial)

Initial Pavement



d*= depth of existing pavement to a maximum of 3 inches (see general notes #3)
w = maximum eligible Initial pavement width as described in paragraphs "A" & "B" on page DEP-DMS-CG's-P4.

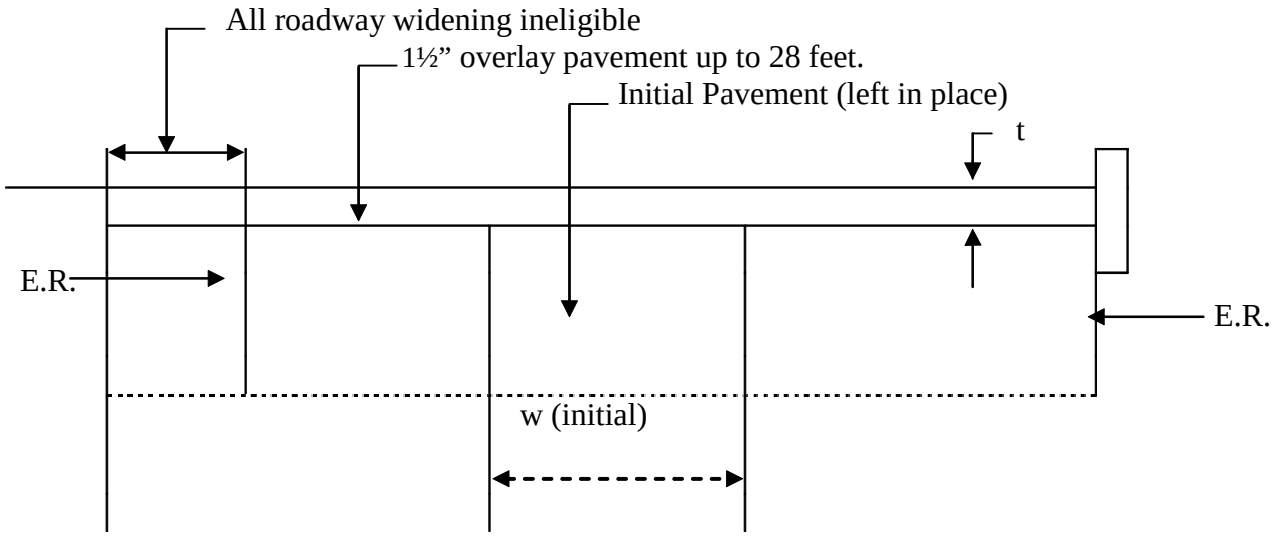
OPTION I Permanent Trench Pavement



d*= depth of existing pavement trench to a maximum of 3 inches (see general notes #3)
w = maximum eligible permanent pavement width as described in paragraphs "A" & "B". equals initial width plus 2 feet and includes:

- x Cutting edges for the permanent trench
- x Removal of initial patch plus two feet of existing pavement
- x Fine grading/compacting gravel
- x Placement of Permanent Trench pavement in two courses.

OPTION II Curb to Curb Pavement (overlay pavement for roadways up to 28 feet)



E.R.= edge of existing paved roadway
t = one and one half inch (1½") overlay of bituminous concrete pavement

GENERAL NOTES:

1. Repavement of settled areas and crown restoration within the trench limits shall be the responsibility of the contractor.
2. Leveling outside the trench limits shall be the responsibility of the owner.
3. Sewer trench re-fill and pavement re-paving on public ways under the jurisdiction of the Massachusetts Department of Public Works, the Metropolitan District Commission, or other such agency shall be in accordance with permit(s) issued therefore by that Department or Commission, as the case may be.
4. The Division will consider requests for increase in the participating pay limits defined in paragraphs A and B, when such increases are, in the Division's opinion, reasonable. Such requests should be documented in writing and submitted to the Division in a timely manner.
5. Projects which deviate from the above options are required to seek Division review and approval.

POLICY MEMORANDUM NO. CG-14 **PAYMENT FOR ROCK EXCAVATION**

There shall be in the contract documents a separate pay item for rock excavation. For such purposes, "rock" shall mean igneous, sedimentary, metamorphic, and conglomerate rock, which for excavation must be drilled, blasted, broken, or ripped by power tools. Boulders and concrete structures one cubic yard or greater, however removed, are included within this definition of rock for payment purposes. At the option of the owner or his representative a separate pay item for boulders, concrete structures, or concrete road base may be used.

Depth From Ground Surface To Invert Pipe	Pay Width (Nominal Pipe Diameter)	
	0-24"	Over 24"
* 0 – 12'	5'0"	D+3'0"
* Over 12' – 20'	7'0"	D+5'

Engineer's plans and specifications shall establish pay limits below pipe and structures.

- See CG-14 Attachment #1 (typical cross section)

Payment width for depths over twenty feet (20') shall be determined on a case-by-case basis consistent with the foregoing chart.

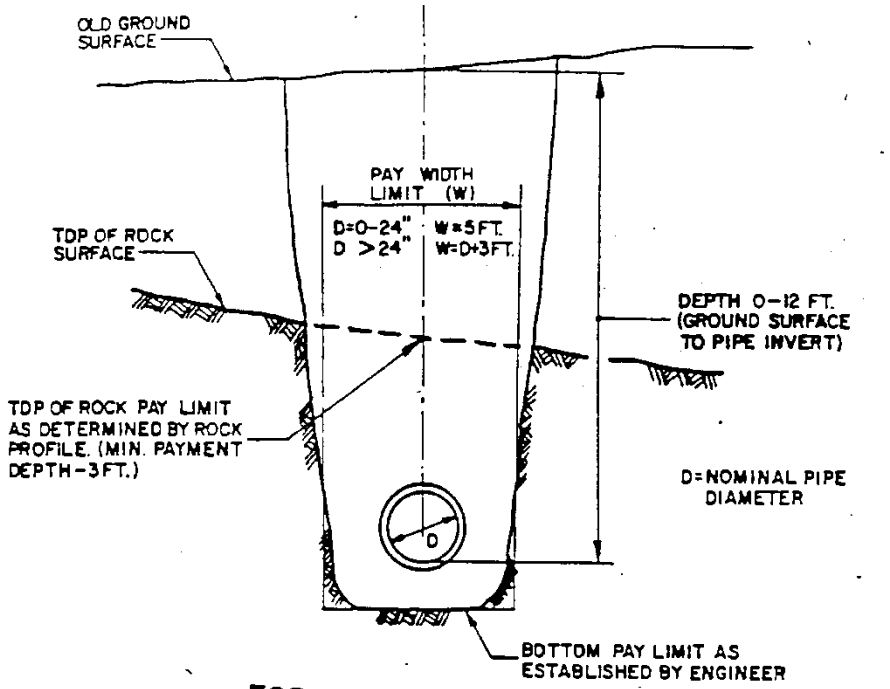
The pay limit for rock removal outside proposed manholes shall commence one foot (1') outside the widest dimension of the structure of shall be the maximum connecting trench width, whichever is greater.

Payment depth for rock which is encountered in a trench shall be no less than three feet (3') when removal can be accomplished only by drilling and blasting or by use of jack (air or hydraulic) hammers.

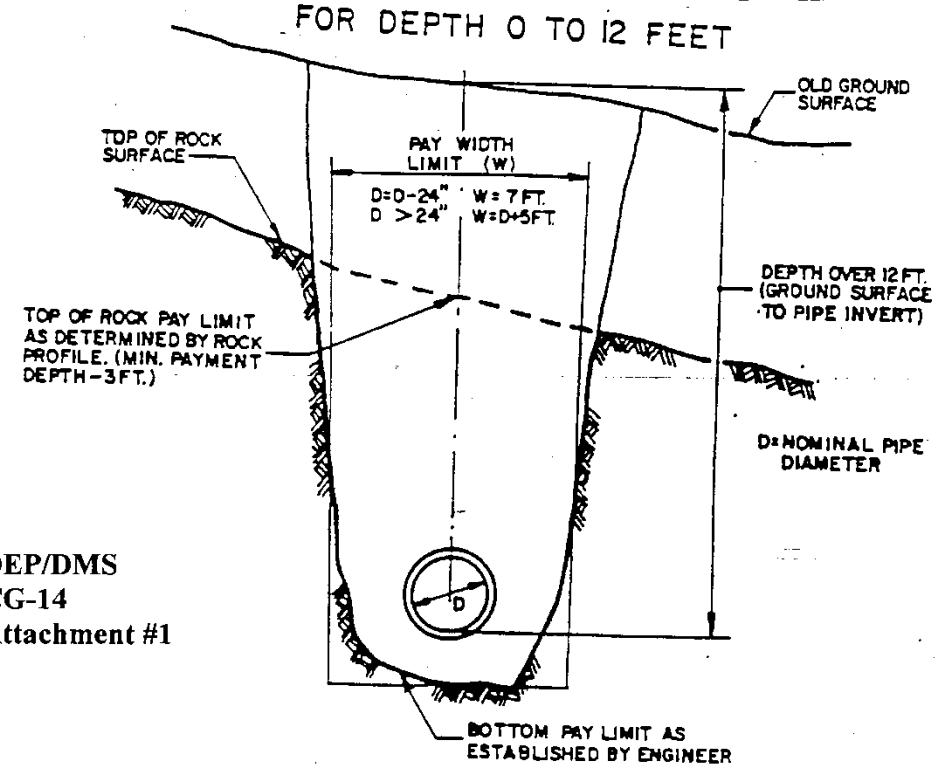
Payment for rock removed, using the same or equal equipment as utilized for normal trench excavation, shall be limited to the actual depth removed within the limits established by the contract documents.

Boulders encountered within the pay limits of excavation, whose volume is one cubic yard or greater, part of which extends outside said limits shall be paid in accordance with the actual volume excavated.

CG-14 ROCK EXCAVATION



FOR DEPTH 0 TO 12 FEET



FOR DEPTH OVER 12 FEET AND UP TO 20 FEET

DEP/DMS
CG-14
Attachment #1

POLICY MEMORANDUM NO. CG-15 **TRAFFIC POLICE**

The reasonable costs for police details required for traffic control on a construction project which receives financial assistance shall be considered as an eligible administrative cost. A police detail item shall not be included as a bid item in the contract documents.

"Police" as used in this memorandum includes local, county, capital, state, regular and auxiliary police.

Owner's Responsibility

It shall be the owner's responsibility to submit in writing the hourly rate of pay to be established for detailed traffic police and each change in rate during the course of the project. It is the owner's responsibility to arrange, document and pay for such police details. The owner or its representative shall meet with the police chief or other officer in charge of police detail duty to review contract needs. The owner shall maintain a daily record of the following:

a. Officer's name
b. Hours worked
c. Location of assignment
d. Hourly rate

The following information is provided as a sample letter of STEP CERTIFICATION (preferred) for AIS Requirement compliance. Documentation must be provided on company letterhead.

Date

OWNER
Owner Address
City, State Zip

Subject: American Iron and Steel Certification for [INSERT PROJECT NAME]

I, (company representative), certify that that the [INSERT melting, bending, coating, galvanizing, cutting, etc.] process for [manufacturing or fabricating] the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.
Item, Products and/or Materials:

[LIST ITEMS]

Such process took place at the following location:

[INSERT DETAIL]

If any of the above compliance statements change while providing products and/or material to this Project, we will immediately notify the (prime Contractor and) the Engineer.

Signed by company representative

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The following information is provided as a sample letter of GENERAL CERTIFICATION for AIS Reqiurement compliance. Documentation must be provided on company letterhead.

Date

OWNER
Owner Address
City, State Zip

Subject: American Iron and Steel Certification for [INSERT PROJECT NAME]

I, (company representative), certify that the following products and/or materials shipped/provided to the subject Project are in full compliance with the American Iron and Steel Requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

[LIST ITEMS]

Such process took place at the following location:

[INSERT DETAIL]

If any of the above compliance statements change while providing products and/or material to this Project, we will immediately notify (the prime Contractor and) the Engineer.

Signed by company representative

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Construction Details
Design Guides
Project Management Guides
Right of Way Brochures
Highway Access Permits
Miscellaneous Publications

Construction Specifications

Title	Date	File Type/Size
Standard Specification for Highways and Bridges (English Edition)	1988	HTML
Standard Specifications for Highways and Bridges (Metric Edition)	1995	PDF | 2.49ME
Supplemental Specifications to the Standard Specifications for Highways and Bridges	6/15/2012	PDF | 1.6MB
Interim Supplemental Specifications	1/25/2013	PDF | 86KB
Price Adjustments	Updated Monthly	View Pages
Superseded Publications		
Supplemental Specifications to the 1988 Standard Specifications for Highways and Bridges (Combined English and Metric Edition) (Combined English and Metric Edition)	2/25/2010	PDF | 1MB
Supplemental Specifications to the 1988 Standard Specifications for Highways and Bridges (English Edition)	6/6/2006	PDF | 1.73ME
Supplemental Specifications to the 1995 Standard Specifications for Highways and Bridges (Metric Edition)	6/6/2006	PDF | 1.41mb

Construction Details

Title	Date	File Type/Size
2012 Construction Standard Details	March 2012	PDF | 27MB
2012 Construction Standard Details: Drawing History Index	2012	PDF | 119KB
Notes on Walks and Wheelchair Ramps for Designers and Construction Engineers	March 2012	PDF | 140KB
Traffic Management Plans and Detail Drawings		HTML link
Standard Drawings for Signs and Supports	1990	PDF | 7MB
Standard Drawings for Traffic Signals and Highway Lighting	1968	PDF | 3.25ME
Superseded Publications		
2010 Construction Standard Details (English Edition)	2010	PDF | 13MB
Metric/English Supplemental Drawings Supplement to the 1996 Metric Edition of the Construction and Traffic Standard Details and the 1977	Apr 2003	PDF | 5.6MB
Mass. Department of Public Works Construction Standards		
Construction and Traffic Standard Details (Metric Edition)	1996	PDF | 7.8MB
1966 Construction Standards 1st Edition (Obsolete)	May 1966	PDF | 10MB

http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms.aspx

Design Guides

Title	Date	File Type/Size
Project Development & Design Guide	2006	HTML
2009 LRFD Bridge Manual	Oct 2009	HTML
2005 Bridge Manual, Revised August 2007	Aug 2007	HTML
CAD Standards		HTML
Manual on Uniform Traffic Control Devices		FHWA Link
Massachusetts Amendments to the 2009 Manual on Uniform Traffic Control Devices and the Standard Municipal Traffic Code	May 2012	PDF | 1.9MB
Right of Way Manual	03/30/2012	PDF | 12.2ME
Survey Manual	1996	PDF | 1MB
Historic Parkway Preservation Treatment Guidelines (DCR)	Mar 2007	PDF | 28MB
Superseded Publications		
Addenda to the 1997 Highway Design Manual	Apr 2003	PDF | 2.7MB
Highway Design Manual	1997	PDF | 6.65ME

Miscellaneous Publications

Mass.Go

Title	Date	File Type/Size
English Bid Item Nomenclature List	02/12/2013	PDF | 452KB
Metric Bid Item Nomenclature List	02/12/2013	PDF | 453KB
Diesel Equipment Retrofit		HTML
Design Build Procurement Guide	2006	PDF | 206KB
Procedures for Speed Zoning on State and Municipal Roadways	2012	PDF | 2.2MB
Guide Sign Policy for Secondary State Highways	2008	HTML
Identification of Massachusetts Freight Issues and Priorities	Nov 1999	PDF | 7.4MB
Vegetation Management Plans		
Vegetation Management Plan 2009 - 2013	2009	PDF | 654KB
District 1 Vegetation Management Plan 2012 - 2016	2012	PDF | 452KB
Yearly Operational Plan Districts 2-5, 2012	2012	PDF | 37.9ME
District 6 Vegetation Management Plan 2011 - 2015	2011	PDF | 465KB
Herbicide Alternatives Research	Jul-2008	PDF | 8.9MB

R E P O R T

November 14, 2013
13-1076 S

Geotechnical Engineering Services

Proposed Stackpole Street Pump Station
Lowell, Massachusetts

PREPARED FOR:
Woodard & Curran
Attention: Nathan Little
40 Shattuck Road
Suite 110
Andover, Massachusetts 01810

PREPARED BY:
S. W. Cole Engineering, Inc.
Chad B. Michaud, P.E.
Senior Geotechnical Engineer
10 Centre Road
Somersworth, NH 03878
(603) 692-0088

S.W.COLE ENGINEERING, INC.

- *Geotechnical Engineering*
- *Construction Materials Testing*
- *GeoEnvironmental Services*
- *Ecological Services*

www.swcole.com

TABLE OF CONTENTS

13-1076 S

November 14, 2013

Woodard & Curran
Attention: Nathan Little
40 Shattuck Road
Suite 110
Andover, Massachusetts 01810

Subject: Geotechnical Engineering Services
Proposed Stackpole Street Pump Station
Lowell, Massachusetts

Dear Jeff:

In accordance with our Task Order dated September 25, 2013, we performed a subsurface exploration program and are providing geotechnical engineering services for the proposed Stackpole Street Pump Station Project, located on Stackpole Street in Lowell, Massachusetts. This report summarizes our findings and recommendations and the contents of this report are subject to the limitations set forth in Attachment A.

1.0 INTRODUCTION

1.1 Scope of Work

The purpose of our work was to explore the subsurface conditions at the site and to provide recommendations relative to foundation design and earthwork associated with the proposed construction. The exploration program has included the making of one test boring, laboratory testing, and a geotechnical evaluation of the findings as they relate to the proposed construction.

1.2 Existing Site Conditions

The existing site is located on the north side of Stackpole Street, east of its intersection with Nesmith Street (State Route 38). The site is bordered to the west by Nesmith Street, to the south by Stackpole Street, and to the east by an adjacent commercial property. Along the northern portion of the site a wooded area of steep topography descends about 30 feet to the Merrimack River. An existing pump station currently occupies the western portion of the site. An existing paved area exists to the east of the

existing pump station building; and the area of proposed building construction is relatively level at the approximate elevation of 93 feet. We understand that the existing pump station building likely utilizes perimeter spread footing foundations founded below the frost depth (approximately 4 feet) and a slab-on-grade.

The general site vicinity is depicted on the “Site Location Map” attached as Sheet 1. The existing site conditions are shown on the “Exploration Location Plan” attached as Sheet 1A.

1.3 Proposed Construction

Proposed construction will include construction of a new pump station building, immediately east of the existing pump station building. This new pump station will occupy a footprint of approximately 20 feet by 20 feet in plan dimension.

Although proposed site grading is not available, we anticipate the new construction to have finish grades at or near existing grades.

Proposed construction is shown on the "Exploration Location Plan," attached as Sheet 1A.

2.0 EXPLORATION AND TESTING

2.1 Exploration

One test boring (B-1) was made at the site on October 17, 2013 by Great Works Pump & Test Boring, Inc. of Rollinsford, New Hampshire working under subcontract to S. W. Cole Engineering, Inc. (S.W.COLE). The test boring location was selected and established in the field by S.W.COLE based on taped measurements from existing site features. The elevation presented on the test boring log was interpolated from contours shown on the site plan provided by Woodard & Curran. The boring was advanced to a depth of approximately 71.4 feet using cased drive-and-wash boring techniques. Split-spoon soil samples were generally obtained at 5-foot intervals using Standard Penetration Testing procedures.

The approximate exploration location is shown on the “Exploration Location Plan,” attached as Sheet 1A. The test boring log is attached as Sheets 2 and 3. A key to the notes and symbols used on the log is attached as Sheet 4.

2.2 Laboratory Testing

Soil samples recovered from the test boring were visually examined and classified in our laboratory. Laboratory testing performed on selected soil samples included two gradation tests, and five moisture content tests. Results of the gradation tests are presented on Sheets 5 and 6. Results of the moisture content tests are shown on the exploration log.

3.0 SUBSURFACE CONDITIONS

3.1 Soils

The boring generally encountered 2 inches of surficial bituminous concrete pavement overlying granular fill, overlying an alluvial deposit of sand and silt.

Granular Fill: Below the pavement the test boring encountered a granular fill consisting of medium dense brown to dark brown sand and silt with some gravel. The fill from 1.5 feet and 4.5 feet also contained a trace amount of ash fragments.

Native Sands: Below the depth of 4.5 feet, the boring encountered native stratified sands generally consisting of medium dense to dense brown or gray sand of varying coarseness, with varying proportions of silt and gravel. The native sand was observed to a depth of approximately 24 feet below the ground surface.

Silts: Below the native sand, the boring encountered stiff to very stiff gray or brown clayey silt with varying quantities of sand. Some gravel was observed in the silt from approximately 24 feet to 29 feet. The silt was observed to a depth of approximately 69.7 feet below the ground surface.

Glacial Till: Below the silt, the test boring encountered glacial till consisting of very dense brown silty sand with some gravel. Cobbles were encountered within the glacial till from approximately 69.7 to 71.0 feet. The glacial till was observed to the bottom of the test boring at a depth of approximately 71.4 feet below the ground surface.

For a more detailed description of the exploration, please refer to the attached boring log as Sheets 2.

3.2 Groundwater

The test boring encountered saturated soils at a depth of approximately 15 feet below the ground surface. These saturated soils are most likely caused by a perched groundwater table above the silt layer. The deeper groundwater table is most likely hydraulically connected to the Merrimack River. According to the plan provided by Woodard & Curran, the Merrimack River surface water elevation is at approximately 49 feet, which corresponds to a groundwater depth of approximately 44 feet below the ground surface at the site. Due to the relatively short amount of time test boring were left open, long term groundwater information is not available. Groundwater levels should be expected to fluctuate seasonally and during periods of heavy precipitation and/or snow melt.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

The predominant soils encountered at the boring in the proposed building area are granular fill, overlying alluvial deposits of sand and silt, overlying glacial till. Based on our knowledge of the proposed construction, it is our opinion the existing fill soils are not suitable for the support of the proposed building foundations in their current condition. Due to the undocumented placement of the fills, there is some uncertainty in the long term performance of the fills with respect to settlement below building foundation loads.

We recommend fill soils be over-excavated below the footprint of the building. The limits of removal of existing fill below the foundations for the buildings should extend beyond the footing edges by at least 1 foot laterally for each foot of depth of excavation below the footing. The over-excavation should be backfilled with compacted Massachusetts Department of Transportation (MassDOT) Gravel Borrow (M1.03.0 Type b). Assuming finish grading is near existing grade, over-excavation below the bottom of frost protected foundation will be on the order of one to two feet.

A representative from S.W.COLE should be on site to observe subgrade soil conditions during excavation operations.

4.2 Foundation Design

Although building loads are not available at this time, based on experience with construction of similar structures, we anticipate the building can be supported on conventional shallow spread footings with a slab-on-grade (after removal of existing fill below the building footprint and replaced with compacted MassDOT Gravel Borrow (M1.03.0 Type b)). We recommend that footings be designed for a net allowable bearing capacity of 3.0 ksf for foundations supported on native soils or compacted new fill over native soils. Care should be taken not to proof-compact the native fine grained soils, as they are anticipated to be sensitive to disturbance from vibrations from proof-compaction efforts.

The design-freezing index for the Lowell, Massachusetts area is approximately 1000 Fahrenheit degree-days, corresponding to a frost penetration depth on the order of 4.0 feet. This depth is constant with the Massachusetts Building Code requiring all footings exposed to freezing temperatures to have at least 4.0 feet of soil cover to provide frost protection.

We recommend foundation design consider the following parameters:

GEOTECHNICAL FOUNDATION DESIGN PARAMETERS	
Design Frost Depth	4.0 feet
Net Allowable Soil Bearing Capacity	3.0 ksf
Total unit weight of backfill (γ_t) – MassDOT M1.03.0 Type b	125 pcf
Internal Friction Angle – MassDOT M1.03.0 Type b	30°
Base Friction Factor – Concrete to MassDOT M1.03.0 Type b	0.4
Active Lateral Earth Pressure Coefficient – MassDOT M1.03.0 Type b	0.3
Passive Lateral Earth Pressure Coefficient – MassDOT M1.03.0 Type b	3.0
At-Rest Lateral Earth Pressure Coefficient – MassDOT M1.03.0 Type b	0.5
Estimated Post Construction Settlement	½-inch or less

Strip footings should be at least 18 inches wide and column footings should be at least 24 inches wide, regardless of the bearing pressure.

4.3 Seismic Considerations

We have interpreted the seismic site classifications using the Massachusetts Building Code (8th edition), which is comprised of the International Building Code 2009 (IBC), several companion international codes, and a separate package with Massachusetts amendments to the international codes. Based on the exploration performed on this site, we interpret the site soils correspond to Seismic Site Class D in accordance with Section 1613.5.2. The information obtained at the exploration location suggests that liquefaction of soils is not a design consideration.

4.4 Site Preparation

Site preparation should begin with the construction of an erosion control system to protect drainageways and areas outside the construction limits. Existing structures, utilities, associated foundation elements, pavement, and topsoil should be removed from beneath the proposed site. Voids created by removal of old subsurface elements, utilities, and former foundations should be backfilled MassDOT Gravel Borrow (M1.03.0 Type b) compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557.

The soils that will be exposed during stripping and over-excavation will be subject to erosion. When practicable, vegetation adjacent to the construction site should remain undisturbed to lessen the potential for erosion.

The existing fill soils should be removed from below the building footprint and replaced with compacted MassDOT Gravel Borrow (M1.03.0 Type b). A representative from S.W.COLE should be on site to observe subgrade soil conditions during excavation operations.

4.5 Excavation Work

The excavation work will encounter materials that can undergo substantial strength loss when subjected to construction traffic and excavation activities, particularly during periods of precipitation. Care must be exercised during construction to reduce disturbance of the bearing soils. Should the subgrade become yielding or difficult to work, disturbed areas shall be excavated and backfilled with compacted MassDOT Gravel Borrow (M1.03.0 Type b). MassDOT Gravel Borrow (M1.03.0 Type b) shall be placed in lifts and compacted to at least 95 percent of its maximum dry density as

determined by ASTM D-1557.

We recommend excavation to sand / silt subgrades be made with a smooth-edged excavator bucket to reduce the potential for disturbance. When practicable, vegetation adjacent to the construction site should remain undisturbed to lessen the potential for erosion.

Excavations should be sloped or adequately shored to prevent sloughing and caving of the sidewalls during construction. We recommend that temporary unsupported soil excavations be cut to a slope of 1.5H to 1V (horizontal to vertical) or flatter. All excavations should be consistent with OSHA trenching regulations.

It is anticipated that excavation for building footing subgrade and site utilities may extend to near a perched groundwater table. The contractor is responsible for developing an appropriate dewatering plan that protects the native soil subgrade from disturbance and strength loss in the event that seeping groundwater is encountered within the excavations.

4.6 Fill and Compaction

Although a wide range of soil materials can be used successfully, it has been our experience that granular soils with good drainage characteristics (as recommended below) provide significant advantages particularly in wet conditions and during cold weather construction. Although these materials provide advantages during wet and cold weather, freezing weather or precipitation may warrant use of alternative materials having better drainage characteristics and are non-frost susceptible. We recommend either filling be limited during these times or more applicable materials be used. We recommend the following fill materials:

MassDOT Gravel Borrow (M1.03.0 Type b): Clean, non-frost susceptible, sand and gravel free of organics and other deleterious materials meeting the following gradation:

MASSDOT GRAVEL BORROW M1.03.0 Type b	
Sieve Size	Percent Finer by Weight
3 Inch	100
½ Inch	50 to 85
No. 4	40 to 75
No. 50	8 to 28
No. 200	0 to 10

MassDOT Gravel Borrow (M1.03.0 Type b) is recommended for use as:

- Backfill for interior and exterior sides of perimeter foundations
- Backfill around interior column foundations
- Material below entrance slabs and within 3H:1V transition zone (see Sheet 7)
- Backfill for repair of soft or yielding areas
- Fill used to raise site grade below the floor slab base material

MassDOT Dense-Graded Crushed Stone (M2.01.7): Clean, non-frost susceptible, sand, gravel and/or crushed stone free of organics and other deleterious materials meeting the following gradation:

MASSDOT DENSE-GRADED CRUSHED STONE M2.01.7	
Sieve Size	Percent Finer by Weight
2 Inch	100
1.5 Inch	70 to 100
¾ Inch	50 to 85
No. 4	30 to 55
No. 50	8 to 24
No. 200	3 to 10

MassDOT Dense-Graded Crushed Stone (M2.01.7) is recommended for use as:

- Slab base material
- Backfill for repair of soft or yielding areas

Crushed Stone: Crushed, washed, hard, durable rock meeting the gradation requirements for ASTM D-448, No. 67 stone. Crushed Stone is recommended for use as:

- Drainage aggregate for underdrains

Placement and Compaction: Fill should be placed in horizontal lifts and be compacted. Lift thickness should range between 6 to 12 inches depending upon the size and type of equipment, such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. We recommend fill placed below the building and paved areas be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Foundation backfill should be compacted to at least 95 percent of ASTM D-1557. Crushed Stone should be compacted to 100 percent of its dry rodded weight as determined by ASTM C-29.

4.7 Foundation Drainage

We recommend exterior underdrains be provided near footing grade along perimeter walls of the building. The underdrains should be placed adjacent to the edge of the footings. The underdrain pipe should be a minimum of 4 inches in diameter and have perforations of 1/4 to 5/8 inch. We recommend at least 6 inches of 3/4 inch Crushed Stone bedding be provided around the underdrains, and that the stone be wrapped with a non-woven geotextile filter fabric such as Mirafi 140N or equivalent.

The underdrains must have positive gravity outlets protected from freezing. Exterior foundation backfill should be sealed with a surficial layer of clayey or loamy soil in areas that are not to be paved or occupied by entrance slabs. This is to reduce direct surface water infiltration into the backfill. A general underdrain detail is shown on Sheet 7.

4.8 Slab-on-Grade

We recommend on-grade concrete floors be supported on a minimum of 12 inches of compacted MassDOT Dense-Graded Crushed Stone (M2.01.7). Provided the appropriate base materials are used, we recommend a modulus of subgrade reaction of 100 pci be considered in the floor slab design. The structural engineer or concrete consultant shall design steel reinforcing and joint spacing appropriate to slab thickness and function.

We recommend consideration of a sub-slab vapor, retarder particularly in areas of the building where the concrete slab will be covered with an impermeable surface treatment or floor covering that may be sensitive to moisture vapors, to reduce the potential for floor covering damage from moisture. The vapor retarder shall have a permeance less than the floor cover applied to the slab. The vapor retarder must have sufficient durability to withstand direct contact with the sub-slab base material and construction activity. The vapor retarder material shall be placed according to the manufacturer's recommended method, including the taping and lapping of all joints and wall connections. The architect and/or flooring consultant should select the vapor retarder products compatible with flooring and adhesive materials.

The floor slab should be appropriately cured using moisture retention methods after casting. Typical floor slab curing methods should be used for at least 7 days. The architect or flooring consultant should assign curing methods consistent with current applicable American Concrete Institute (ACI) procedures with consideration of curing method compatibility to proposed flooring and adhesive materials.

4.9 Entrances, Sidewalks, and Exterior Concrete Pad/Slabs

Concrete entrances and sidewalks adjacent to building entrances and exterior concrete pads/slabs in general should be designed to reduce the effects of frost action. We recommend fill beneath the width of entrances and sidewalks abutting the building and exterior concrete pads/slabs continue to at least 3.5 feet below finish grade. These areas should be backfilled with compacted non-frost susceptible fill meeting the MassDOT Gravel Borrow (M1.03.0 TYPE B) gradation specifications. Gradual transition (3 horizontal to 1 vertical) of the MassDOT Gravel Borrow (M1.03.0 Type b) thickness should be provided from the 3.5-foot depth to the bottom of gravel sub-base at the paved areas and concrete slabs away from the building entrances. This transition will reduce the potential for detrimental differential movement due to frost action. The 3.5-foot depth of MassDOT Gravel Borrow (M1.03.0 Type b) should be provided below all exterior areas adjacent to the building where frost heaving will be detrimental.

Backfill below entrances should be placed in lifts and be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557.

4.10 Weather Considerations

If foundation construction takes place during fall or winter, foundations and floor slabs must be protected during freezing conditions. Concrete and new soil must not be placed on frozen soil; and once placed, the soil beneath the concrete structures must be protected from freezing.

Site soils are moisture sensitive and subgrades will be susceptible to disturbance during wet conditions. Site work and construction activities should take appropriate measures to protect exposed subgrades.

4.11 Design Review and Construction Testing

S.W.COLE should be retained to review the sitework and foundation design drawings to determine that our interpretation of the subsurface conditions and geotechnical recommendations have been appropriately interpreted and implemented.

Further, S.W.COLE should be retained to provide soils engineering and testing services during the excavation and foundation phases of the work. This is to observe compliance with the design concepts, specifications, and design recommendations and to allow design changes in the event that subsurface conditions are found to differ from those anticipated prior to the start of construction. S.W.COLE is available to provide testing of soil, concrete, masonry, steel, spray-applied fireproofing and asphalt construction materials.

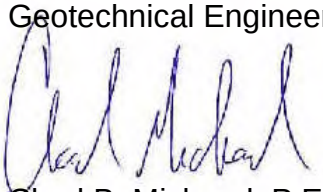
5.0 CLOSURE

It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you as the design progresses and during the construction phase.

Very truly yours,

S. W. Cole Engineering, Inc.

Corey J. Clark, P.E.
Geotechnical Engineer



Chad B. Michaud, P.E.
Senior Geotechnical Engineer

CJC-CBM:cjc

Attachment A
Limitations

This report has been prepared for the exclusive use of Woodard & Curran for specific application to the proposed Stackpole Street Pump Station Project, located on Stackpole Street in Lowell, Massachusetts. S.W.COLE has endeavored to conduct the work in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE's scope of work has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE.

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N
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2,000 0 2,000 4,000
Scale in Feet

S.W.COLE ENGINEERING, INC.

WOODARD AND CURRAN

SITE LOCATION MAP

PROPOSED STACKPOLE STREET PUMP STATION
STACKPOLE STREET
LOWELL, MASSACHUSETTS

Job No.	13-1076	Scale	1:24000
Date:	11/07/2013	Sheet	1

NOTE:
SITE LOCATION MAP PREPARED FROM ESRI ArcGIS ONLINE AND DATA PARTNERS INCLUDING USGS AND © 2007 NATIONAL GEOGRAPHIC SOCIETY.

R:\2013\13-1076\GIS\MXDs\13-1076 Sheet 1 SLM.mxd, 11/7/2013 11:59:24 AM, 1:24,000.

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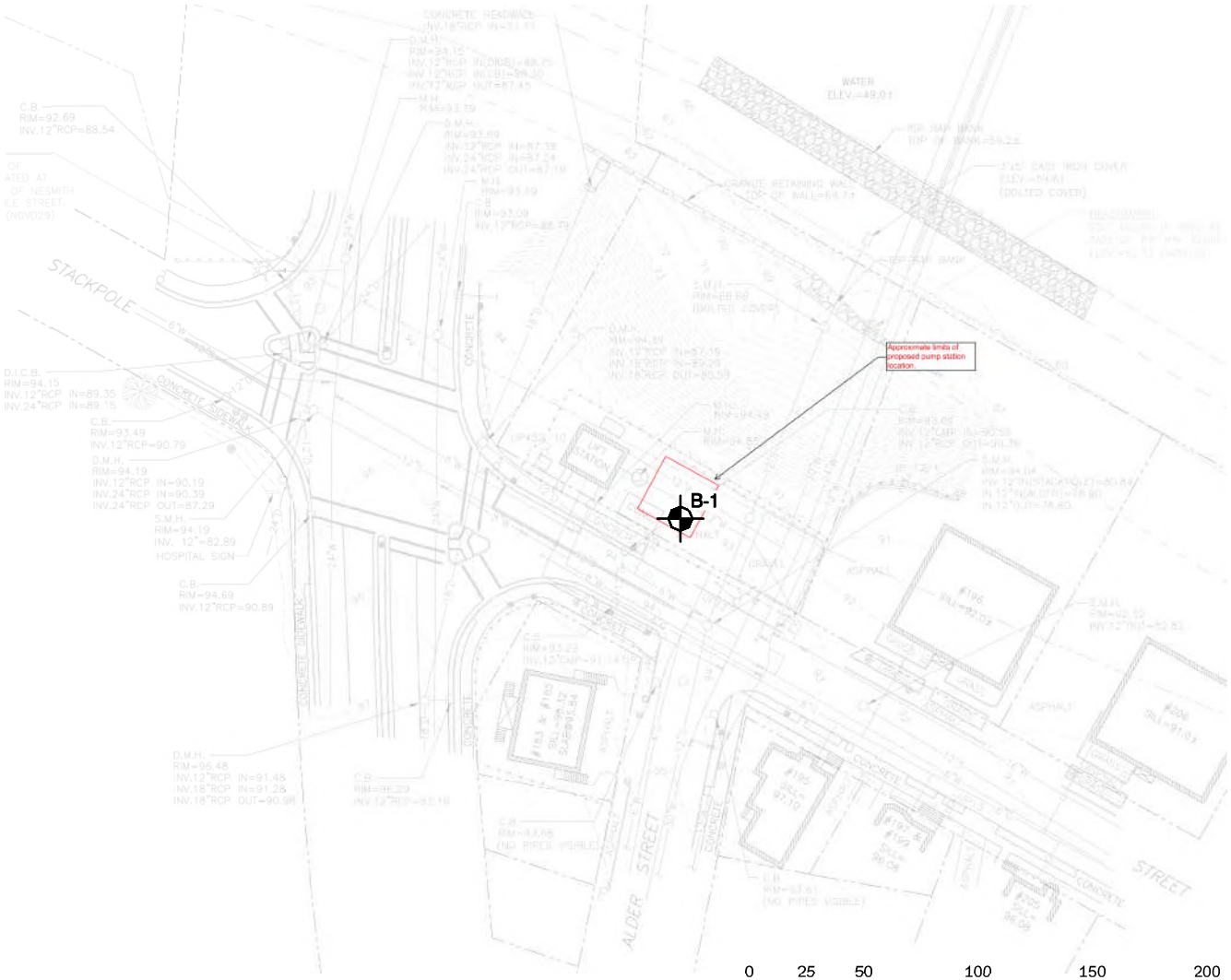

LEGEND:

APPROXIMATE BORING LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A 1"=20' SCALE PLAN OF THE SITE ENTITLED "STACKPOLE ST PS SITE PLAN," PREPARED BY WOODARD & CURRAN, DATED OCTOBER 7, 2013 AND PROVIDED AS A PORTABLE DOCUMENT FORMAT (PDF).
2. BORING B-1 WAS LOCATED IN THE FIELD BY TAPED MEASUREMENTS FROM EXISTING SITE FEATURES.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S.W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

S.W. COLE ENGINEERING, INC.

WOODARD AND CURRAN

EXPLORATION LOCATION PLAN

PROPOSED STACKPOLE STREET PUMP STATION
STACKPOLE STREET
LOWELL, MASSACHUSETTS

Job No.:	13-1076	Scale:	1" =50'
Date :	11/07/2013	Sheet:	1A

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S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-1**
SHEET: 1 OF 2
PROJECT NO.: 13-1076

PROJECT / CLIENT: PROPOSED STACKPOLE STREET PUMP STATION - WOODARD & CURRAN
LOCATION: STACKPOLE STREET - LOWELL, MASSACHUSETTS
DRILLING CO. : GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD

DATE START: 10/17/2013
DATE FINISH: 10/17/2013
ELEVATION: 93.5' ±
SWC REP.: NBS

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HW	4"	300 lb	24 in
SAMPLER:	SS	2"	140 lb	30 in
CORE BARREL:	N/A	N/A		

WATER LEVEL INFORMATION
PERCHED GROUNDWATER @ 15.0' ±; GWT
ANTICIP. TO BE ± LEVEL OF MERRIMACK RIVER

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									0.2'	BITUMINOUS CONCRETE PAVEMENT
									1.0'	BROWN SILTY GRAVELLY SAND (FILL)
	1D	24"	20"	2.5'	15	9	7	7	1.5'	BROWN FINE SAND AND SILT WITH SOME GRAVEL (FILL) w = 20.0%
										DARK BROWN FINE SAND AND SILT WITH SOME GRAVEL AND
									4.5'	ASH FRAGMENTS (FILL) ~MEDIUM DENSE~
	2D	24"	18"	7.0'	17	23	23	17		GRAY - BROWN FINE SAND AND SILT WITH SOME GRAVEL
										w = 9.8% ~DENSE~
									9.0'	
										BROWN GRAVELLY SILTY SAND WITH SOME SEAMS OF
										MEDIUM SAND WITH SOME SILT
	3D	24"	18"	12.0'	5	10	23	19		w = 9.9%
										~DENSE~
									14.0'	
										GRAY - BROWN CLAYEY SILT WITH SOME FINE SAND SEAMS
	4D	24"	20"	17.0'	9	11	14	16		w = 32.5%
										~MEDIUM DENSE~
									19.0'	
										GRAY - BROWN GRAVELLY SILTY SAND WITH SOME CLAY
	5D	24"	18"	22.0'	12	16	20	22		w = 14.8%
										~DENSE~
									24.0'	
										GRAY - BROWN CLAYEY SILT WITH SOME FINE TO MEDIUM SAND, AND GRAVEL
	6D	24"	20"	27.0'	11	12	15	18		q_p = 2.5 ksf ~VERY STIFF~
									29.0'	
										q_p = 4.5 ksf
	7D	24"	22"	32.0'	7	8	12	13		GRAY - BROWN CLAYEY SILT WITH SOME FINE SAND
										~VERY STIFF~
	8D	24"	22"	37.0'	5	8	11	11		q_p = 6.0 ksf

SAMPLES:
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[X] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: **B-1**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-1**
SHEET: 2 OF 2
PROJECT NO.: 13-1076
DATE START: 10/17/2013
DATE FINISH: 10/17/2013
ELEVATION: 93.5' ±
SWC REP.: NBS

PROJECT / CLIENT: PROPOSED STACKPOLE STREET PUMP STATION - WOODARD & CURRAN
LOCATION: STACKPOLE STREET - LOWELL, MASSACHUSETTS
DRILLING CO. : GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HW	4"	300 lb	24 in
SAMPLER:	SS	2"	140 lb	30 in
CORE BARREL:	N/A	N/A		

WATER LEVEL INFORMATION
PERCHED GROUNDWATER @ 15.0' ±; GWT
ANTICIP. TO BE ± LEVEL OF MERRIMACK RIVER

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
	9D	24"	20"	42.0'	10	10	15	19		q_p = 4.0 ksf
										GRAY - BROWN CLAYEY SILT WITH SOME FINE SAND
										~VERY STIFF TO STIFF~
	10D	24"	22"	47.0'	9	6	8	9		q_p = 2.5 ksf
									49.0'	
	11D	24"	20"	52.0'	7	12	17	17		GRAY - BROWN GRAVELLY SILTY SAND WITH SOME CLAY
										~MEDIUM DENSE~
									54.0'	
										BROWN FINE SANDY SILT WITH TRACE CLAY
										~VERY STIFF~
	12D	24"	22"	62.0'	10	29	43	50	62.0'	
										(NO SAMPLING)
									69.7'	
										COBBLE 69.7' - 71.0'
	13D	5"	4"	71.4'	50-5"				71.4'	BROWN SILTY SAND WITH SOME GRAVEL (GLACIAL TILL) ~VERY DENSE~
										BOTTOM OF EXPLORATION @ 71.4'

SAMPLES:
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[X] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: **B-1**

KEY TO THE NOTES & SYMBOLS
Test Boring and Test Pit Explorations

All stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q_u	-	unconfined compressive strength, kips/sq. ft. - based on laboratory unconfined compressive test
S_v	-	field vane shear strength, kips/sq. ft.
L_v	-	lab vane shear strength, kips/sq. ft.
q_p	-	unconfined compressive strength, kips/sq. ft. based on pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W_L	-	liquid limit - Atterberg test
W_P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass. RQD is computed from recovered core samples.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight
f	-	fines content (percent by weight passing U.S. No. 200 Sieve)

Description of Proportions:

Soil Components:	*Oversized Soil Components and Non-Soil Components:*
0 to 5% TRACE	undetermined percentage WITH
5 to 12% SOME	< 1 per foot OCCASIONAL
12 to 35% "Y"	> 1 per foot FREQUENT
35+% AND	

REFUSAL: **Test Boring Explorations** - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: **Test Pit Explorations** - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

S.W.COLE ENGINEERING, INC.

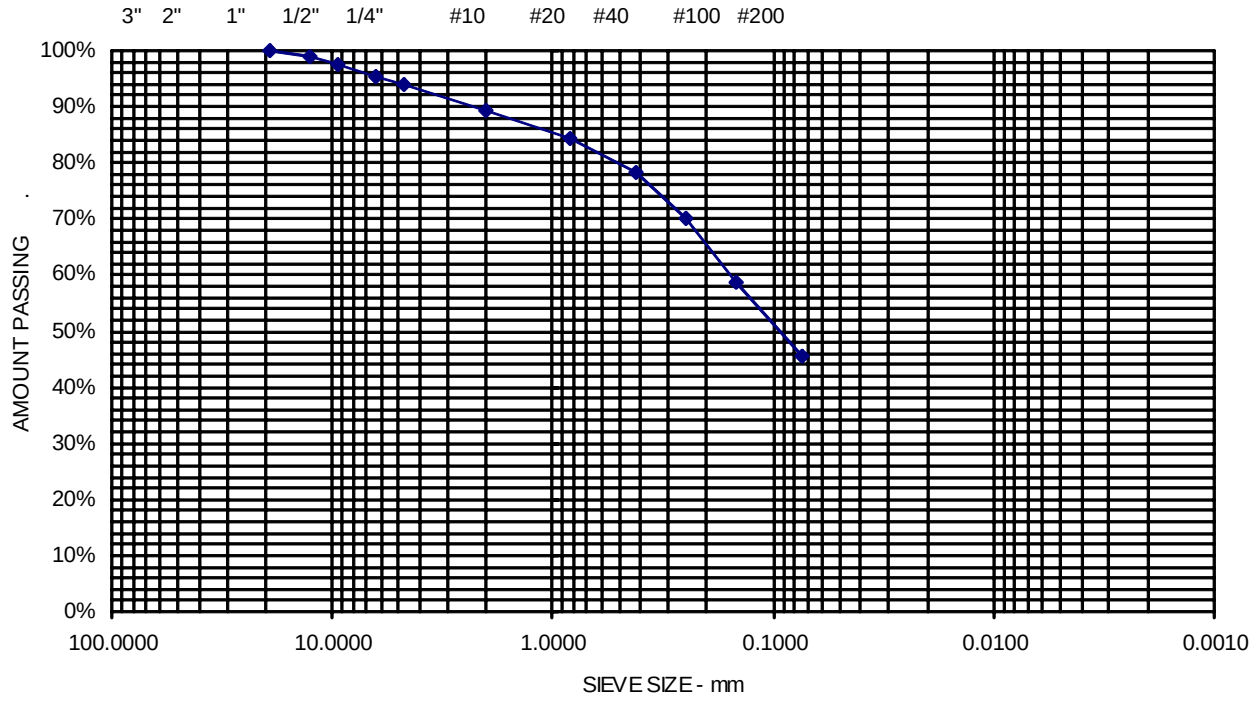
Report of Gradation

ASTM C-117 & C-136

Project Name	LOWELL MA - PROPOSED STACKPOLE STREET PUMP STATION - GEOTECHNICAL ENGINEERING SERVICES	Project Number	13-1076
Client	WOODARD & CURRAN, INC.	Lab ID	11696S
Exploration	**B-1**	Date Received	10/17/2013
Material Source	**1D 0.5'-2.5'**	Date Completed	10/18/2013
		Tested By	MURRAY SWINDELL

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**99**	
9.5 mm	**3/8"**	**98**	
6.3 mm	**1/4"**	**95**	
4.75 mm	**No. 4**	**94**	5.9% Gravel
2.00 mm	**No. 10**	**89**	
850 um	**No. 20**	**84**	
425 um	**No. 40**	**78**	48.6% Sand
250 um	**No. 60**	**70**	
150 um	**No. 100**	**59**	
75 um	**No. 200**	**45.5**	45.5% Fines

SAND AND SILT WITH SOME GRAVEL



Comments: MOISTURE CONTENT = 20.0%

S.W.COLE ENGINEERING, INC.

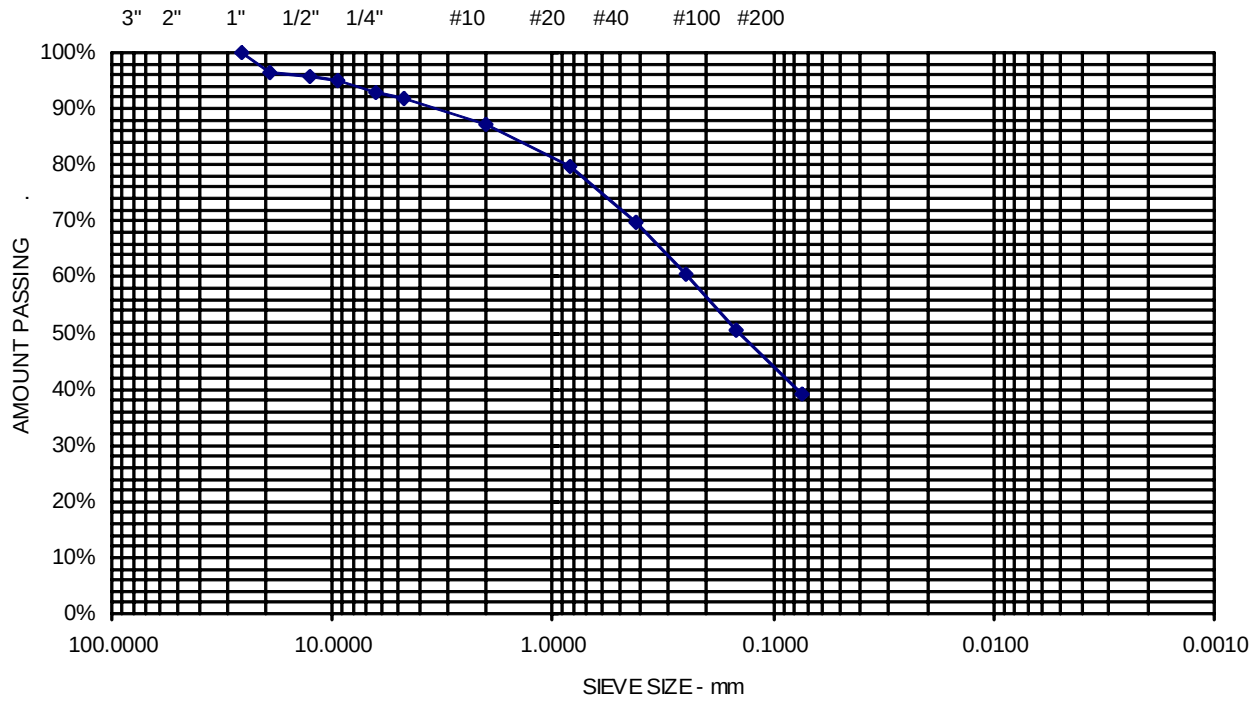
Report of Gradation

ASTM C-117 & C-136

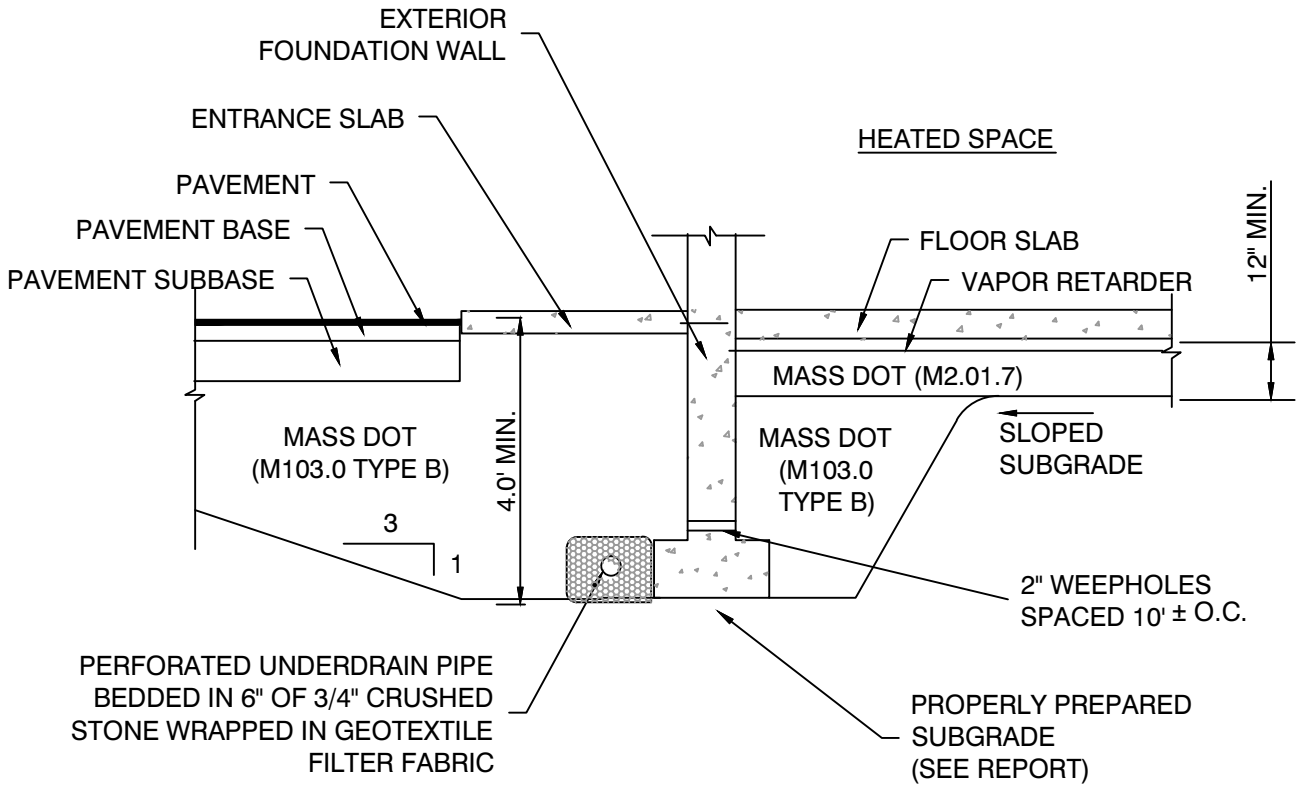
Project Name	LOWELL MA - PROPOSED STACKPOLE STREET PUMP STATION - GEOTECHNICAL ENGINEERING SERVICES	Project Number	13-1076
Client	WOODARD & CURRAN, INC.	Lab ID	11697S
Exploration	**B-1**	Date Received	10/17/2013
Material Source	**2D 5'-7'**	Date Completed	10/18/2013
		Tested By	MURRAY SWINDELL

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**96**	
12.5 mm	**1/2"**	**96**	
9.5 mm	**3/8"**	**95**	
6.3 mm	**1/4"**	**93**	
4.75 mm	**No. 4**	**92**	8.1% Gravel
2.00 mm	**No. 10**	**87**	
850 um	**No. 20**	**80**	
425 um	**No. 40**	**70**	52.9% Sand
250 um	**No. 60**	**61**	
150 um	**No. 100**	**50**	
75 um	**No. 200**	**39.1**	39.1% Fines

SAND AND SILT WITH SOME GRAVEL



Comments: MOISTURE CONTENT = 9.8%



NOTE:

1. UNDERDRAIN INSTALLATION AND MATERIAL GRADATION RECOMMENDATIONS ARE CONTAINED WITHIN THIS REPORT.

2. DETAIL IS PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY, NOT FOR CONSTRUCTION.

S.W.COLE ENGINEERING, INC.

WOODARD AND CURRAN

UNDERDRAIN DETAIL

PROPOSED STACKPOLE STREET PUMP STATION
STACKPOLE STREET
LOWELL, MASSACHUSETTS

Job No.:	13-1076	Scale:	Not to Scale
Date :	11/14/2013	Sheet:	7

NOTICE OF INTENT

Lowell Regional Water Utility's Raw Pump Station

224802.20

Lowell Regional Water Utility (LRWU)

January 8, 2014

Table of Contents

Transmittal Form for Permit Application and Payment

Enter your transmittal number → X258908 (Transmittal Number)

Your unique Transmittal Number can be accessed online: http://mass.gov/dep/service/online/trasmfrm.shtml

Massachusetts Department of Environmental Protection

Transmittal Form for Permit Application and Payment

1. Please type or print. A separate Transmittal Form must be completed for each permit application.

2. Make your check payable to the Commonwealth of Massachusetts and mail it with a copy of this form to: DEP, P.O. Box 4062, Boston, MA 02211.

3. Three copies of this form will be needed.

Copy 1 - the original must accompany your permit application. **Copy 2** must accompany your fee payment. **Copy 3** should be retained for your records

4. Both fee-paying and exempt applicants must mail a copy of this transmittal form to:

MassDEP
P.O. Box 4062
Boston, MA
02211

*** Note:**
For BWSC Permits, enter the LSP.

A. Permit Information

1. Permit Code: 7 or 8 character code from permit instructions	2. Name of Permit Category
BRP WPA Form 3	Notice of Intent

3. Type of Project or Activity: Repaving of existing parking lot.

B. Applicant Information – Firm or Individual

1. Name of Firm - Or, if party needing this approval is an individual enter name below: Lowell Regional Water Utility

2. **Last Name** of Individual	3. **First Name** of Individual	4. MI

5. Street Address: 815 Pawtucket Blvd

6. City/Town	7. State	8. Zip Code	9. Telephone #	10. Ext. #
Lowell	MA	01854	978-970-4242	

11. Contact Person	12. e-mail address (optional)
Daniel Lahiff	dlahiff@lowellma.gov

C. Facility, Site or Individual Requiring Approval

1. Name of Facility, Site Or Individual: Lowell Regional Water Utility's Raw Water Pump Station

2. Street Address: 1002/1194 Pawtucket Blvd.

3. City/Town	4. State	5. Zip Code	6. Telephone #	7. Ext. #
Lowell	MA	01851		

8. DEP Facility Number (if Known)	9. Federal I.D. Number (if Known)	10. BWSC Tracking # (if Known)

D. Application Prepared by (if different from Section B)*

1. Name of Firm Or Individual: Woodard & Curran

2. Address: 40 Shattuck Road - Suite 110

3. City/Town	4. State	5. Zip Code	6. Telephone #	7. Ext. #
Andover	MA	01810	978-557-8150	

8. Contact Person	9. LSP Number (BWSC Permits only)
Bridget Mitchell	

E. Permit - Project Coordination

1. Is this project subject to MEPA review? ☐ yes ☒ no
   If yes, enter the project's EOEA file number - assigned when an Environmental Notification Form is submitted to the MEPA unit:

EOEA File Number

F. Amount Due

DEP Use Only

Permit No:

Rec'd Date:

Reviewer:

Special Provisions:

1. ☒ **Fee** Exempt (city, town or municipal housing authority)(state agency if fee is $100 or less).
   There are no fee exemptions for BWSC permits, regardless of applicant status.
2. ☐ Hardship Request - payment extensions according to 310 CMR 4.04(3)(c).
3. ☐ Alternative Schedule Project (according to 310 CMR 4.05 and 4.10).
4. ☐ Homeowner (according to 310 CMR 4.02).

Check Number	Dollar Amount	Date
N/A - Fee exempt	N/A - Fee exempt	N/A - Fee exempt

WPA Form 3 – Notice of Intent

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

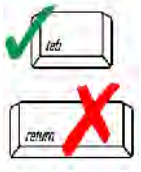
Provided by MassDEP:

MassDEP File Number

Document Transaction Number

City/Town

Important:
When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Note:
Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

1002/1194 Pawtucket Boulevard	Lowell	01851
a. Street Address	b. City/Town	c. Zip Code

Latitude and Longitude:

42 38' 31.38"	71 22' 30.96"
d. Latitude	e. Longitude

23	Block 4540 Parcel 1194
f. Assessors Map/Plat Number	g. Parcel /Lot Number

2. Applicant:

Daniel	Lahiff
a. First Name	b. Last Name

Lowell Regional Water Utility
c. Organization

815 Pawtucket Boulevard
d. Street Address

Lowell	MA	01854
e. City/Town	f. State	g. Zip Code

978-970-4242		dlahiff@lowellma.gov
h. Phone Number	i. Fax Number	j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name	b. Last Name

City of Lowell
c. Organization

375 Merrimack Street
d. Street Address

Lowell	MA	01852
e. City/Town	f. State	g. Zip Code

h. Phone Number	i. Fax Number	j. Email address

4. Representative (if any):

Bridget	Mitchell
a. First Name	b. Last Name

Woodard & Curran, Inc.
c. Company

40 Shattuck Road
d. Street Address

Andover	MA	01810
e. City/Town	f. State	g. Zip Code

978-557-8150	978-557-7948	bmitchell@woodardcurran.com
h. Phone Number	i. Fax Number	j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

Not Applicable	Not Applicable	Not Applicable
a. Total Fee Paid	b. State Fee Paid	c. City/Town Fee Paid

A. General Information (continued)

6. General Project Description:

The proposed work involves repaving the existing parking lot at the Lowell Regional Water Utility's Raw Water Pump Station.

7a. Project Type Checklist:

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Limited Project Driveway Crossing
4. ☐ Commercial/Industrial
5. ☐ Dock/Pier
6. ☒ Utilities
7. ☐ Coastal Engineering Structure
8. ☐ Agriculture (e.g., cranberries, forestry)
9. ☐ Transportation
10. ☐ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☐ Yes ☒ No If yes, describe which limited project applies to this project:

2. Limited Project

8. Property recorded at the Registry of Deeds for:

a. County	b. Certificate # (if registered land)
Middlesex	
c. Book	d. Page Number
5686	343

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Bank	1. linear feet	2. linear feet
b. ☐ Bordering Vegetated Wetland	1. square feet	2. square feet
c. ☐ Land Under Waterbodies and Waterways	1. square feet	2. square feet
	3. cubic yards dredged	

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☒ Bordering Land Subject to Flooding	14,439 (temporary) 1. square feet	14,439 (temporary) 2. square feet
	3. cubic feet of flood storage lost	4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet	
	2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☒ Riverfront Area	Merrimack River 1. Name of Waterway (if available)	

2. Width of Riverfront Area (check one):

☒ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☐ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 13,903 square feet

4. Proposed alteration of the Riverfront Area:

3,883 (temporary) a. total square feet	3,883 (temporary) b. square feet within 100 ft.	0 c. square feet between 100 ft. and 200 ft.

5. Has an alternatives analysis been done and is it attached to this NOI? ☒ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☒ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet	
	2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

		Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐	Coastal Banks	1. linear feet	
g. ☐	Rocky Intertidal Shores	1. square feet	
h. ☐	Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐	Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐	Land Containing Shellfish	1. square feet	
k. ☐	Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐	Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement
If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW | b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings | b. number of replacement stream crossings

C. Other Applicable Standards and Requirements

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/online_viewer.htm.

a. ☒ Yes ☐ No **If yes, include proof of mailing or hand delivery of NOI to:**

Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
100 Hartwell Street, Suite 230
West Boylston, MA 01583

October 2008
b. Date of map

C. Other Applicable Standards and Requirements (cont'd)

If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.C, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.1.d, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

1. c. Submit Supplemental Information for Endangered Species Review*

   1. ☐ Percentage/acreage of property to be altered:

      (a) within wetland Resource Area _____ percentage/acreage

      (b) outside Resource Area _____ percentage/acreage

   2. ☐ Assessor's Map or right-of-way plan of site

   3. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work ******

      (a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

      (b) ☐ Photographs representative of the site

      (c) ☐ MESA filing fee (fee information available at: http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_fee_schedule.htm). Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

      *Projects altering **10 or more acres** of land, also submit:*

      (d) ☐ Vegetation cover type map of site

      (e) ☐ Project plans showing Priority & Estimated Habitat boundaries

   d. OR Check One of the Following

   1. ☒ Project is exempt from MESA review. Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_exemptions.htm; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

   2. ☐ Separate MESA review ongoing. _____ a. NHESP Tracking # _____ b. Date submitted to NHESP

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see http://www.mass.gov/dfwele/dfw/nhesp/nhesp.htm, regulatory review tab). Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

C. Other Applicable Standards and Requirements (cont'd)

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

2. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☐ Not applicable – project is in inland resource area only

b. ☐ Yes ☐ No If yes, include proof of mailing or hand delivery of NOI to either:

South Shore - Cohasset to Rhode Island, and the Cape & Islands:	North Shore - Hull to New Hampshire:
Division of Marine Fisheries - Southeast Marine Fisheries Station Attn: Environmental Reviewer 1213 Purchase Street – 3rd Floor New Bedford, MA 02740-6694	Division of Marine Fisheries - North Shore Office Attn: Environmental Reviewer 30 Emerson Avenue Gloucester, MA 01930

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

3. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

b. ACEC

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

a. ☐ Yes ☒ No

5. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

a. ☐ Yes ☒ No

6. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

2. ☒ A portion of the site constitutes redevelopment

3. ☐ Proprietary BMPs are included in the Stormwater Management System.

b. ☐ No. Check why the project is exempt:

1. ☐ Single-family house

C. Other Applicable Standards and Requirements (cont'd)

2. ☐ Emergency road repair

3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

3. ☐ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Raw Water Pump Station
a. Plan Title

Woodard & Curran
b. Prepared By

Bridget Mitchell, P.E.
c. Signed and Stamped by

January 2014
d. Final Revision Date

As Noted
e. Scale

f. Additional Plan or Document Title

January 2014
g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☒ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☒ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

2. Municipal Check Number	3. Check date
4. State Check Number	5. Check date
6. Payor name on check: First Name	7. Payor name on check: Last Name

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	2. Date 1/2/14
3. Signature of Property Owner (if different)	4. Date
5. Signature of Representative (if any) Bucky Mitchell	6. Date 1/7/14

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the "yes" box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

MEMORANDUM TO FILE

PROJECT: **Lowell Regional Water Utility's Raw Water Pump Station Repaving**
PROJECT NO.: 224802.20
DATE: **December 10, 20103**

PHONE CALL FROM: Bridget Mitchell **PHONE NO.** 978-557-8150
PHONE CALL TO: Lauren Glorioso **PHONE NO.** 508-389-6361
Natural Heritage & Endangered Species Program, Mass Wildlife

SUBJECT: MESA Permitting

Per discussions with Lauren Glorioso of the Natural Heritage & Endangered Species Program, the proposed repaving of the parking lot at the Lowell Regional Water Utility's Raw Water Pump Station site is exempt from MESA filing in accordance with 321 CMR 10.14 (3) which states:

> The following Projects and Activities shall be exempt from the requirements of 321 CMR 10.18 through 10.23:
>
> (3) the maintenance, repair, removal, or replacement, or additions that do not exceed 50% of the footprint of existing commercial and industrial buildings, multifamily and mixed use structures within existing paved areas and lawfully developed and maintained lawns or landscaped areas;

SIGNED:_____

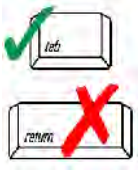
NOI Wetland Fee Transmittal Form

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Applicant Information

1. Location of Project:

1002/1194 Pawtucket Boulevard	Lowell
a. Street Address	b. City/Town
NA	NA
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Daniel	Lahiff	
a. First Name	b. Last Name	
Lowell Regional Water Utility		
c. Organization		
815 Pawtucket Blvd.		
d. Mailing Address		
Lowell	MA	01854
e. City/Town	f. State	g. Zip Code
978-970-4242		
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

a. First Name	b. Last Name	
City of Lowell		
c. Organization		
375 Merrimack Street		
d. Mailing Address		
Lowell	MA	01852
e. City/Town	f. State	g. Zip Code
h. Phone Number	i. Fax Number	j. Email Address

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee

Step 5/Total Project Fee: Fee Exempt

Step 6/Fee Payments:

Total Project Fee:	Fee Exempt a. Total Fee from Step 5
State share of filing Fee:	Fee Exempt b. 1/2 Total Fee **less $**12.50
City/Town share of filling Fee:	Fee Exempt c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Budget Mitchell 1/7/14
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☐ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation ***Not applicable – see project narrative***

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge ***Not applicable – see project narrative***

☐ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality ***Not applicable – see project narrative***

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☐ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☐ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs) ***Not applicable - see project narrative.***

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas ***Not applicable – see project narrative***

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control – *See project narrative*

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan *Not applicable – see project narrative*

☐ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☐ Name of the stormwater management system owners;
- ☐ Party responsible for operation and maintenance;
- ☐ Schedule for implementation of routine and non-routine maintenance tasks;
- ☐ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☐ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

To demonstrate compliance with Stormwater Management Standard 10, this statement verifies that no illicit discharges exist on the site and all measures to prevent illicit discharges to the stormwater management systems will be taken.

The figures accompanying the Notice of Intent are drawn to scale and identify the stormwater structures on the project area. The City has verified that there are no connections between the stormwater and wastewater systems in this area. In addition, Lowell is subject to coverage under EPA's NPDES *General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems*, and therefore implements an illicit discharge detection and elimination program throughout the City.

NOI Project Narrative

TABLE OF CONTENTS

TABLES

1. INTRODUCTION

On behalf of the Lowell Regional Water Utility (LRWU), Woodard & Curran has prepared a Notice of Intent (NOI) in support of the proposed work adjacent to the Merrimack River at 1002 Pawtucket Boulevard. The proposed work involves repaving the existing parking lot at the Lowell Regional Water Utility's Raw Water Pump Station and miscellaneous improvements to the building exterior.

An NOI is required because the proposed project work is located within wetland resource areas, as defined under the Massachusetts Wetlands Protection Act (WPA; MGL Ch. 131 §40) and WPA regulations (310 CMR 10.00), as well as the City of Lowell (the "City") Wetland Ordinance (Chapter 280, Sections 1-13).

The Massachusetts Department of Environmental Protection (MassDEP) WPA Form 3 is included in this submission. This project narrative presents a summary of existing conditions at the site, identifies wetland resources, describes the proposed project details and evaluates the project design with respect to the eight interests of the WPA and the applicable performance standards of the WPA regulations and City Ordinance.

2. EXISTING CONDITIONS

The project Site is located adjacent to the Merrimack River at the Lowell Regional Water Utility's Raw Water Pump Station at 1002/1194 Pawtucket Boulevard in Lowell, MA. Figure 1 of the NOI application provides a Site Locus Plan depicting the project location. The Permitting Plan presented in Attachment A to the NOI application depicts the proposed work and the resource areas within the project site.

Woodard & Curran reviewed Massachusetts Geographic Information System (MassGIS) data files and consulted with local officials to determine whether any sensitive resources or protected areas existed at or within the vicinity of the Site. A printout of MassGIS Oliver depicting the sensitive resources and protected area is presented as Figure 2. From this review, the following was determined:

- The Site is located within a FEMA regulated flood Zone.
- The Site contains Wetland Resource Areas.
- The Site is located within Natural Heritage and Endangered Species Program (NHESP) Priority Habitat (PH 1321)
- The Site is not located within 500 feet of a wellhead protection area, Zone II areas, Interim Wellhead Protection Areas, Zone A areas, and/or Potentially Productive Aquifers. The Merrimack River is not designated as a Class A Public Water Supply. However, the surface water intake, which feeds the raw water pump station, is located on the west side of the building site within the Merrimack River. The Merrimack River is designated a Class B (freshwater) warm water fishery.
- There are no known private drinking water wells at or in the vicinity of the Site.
- There are no protected open space areas, Areas of Critical Environmental Concern (ACEC), EPA Sole Source Aquifers, Certified Vernal Pools, habitats of Species of Special Concern, habitats of Threatened or Endangered Species at the Site.

Resource Areas

A portion of the Site includes the eastern Bank bordering the Merrimack River, as well as a 25-foot Riverfront Area (RA) associated with the Merrimack River. A portion of the Site is also located within the 100 year floodplain associated with the Merrimack River, which meets the WPA definition of Bordering Land Subject to Flooding (BLSF; 310 CMR 10.57).

In summary, the following Resource Areas, as defined under the WPA Regulations and/or City Ordinance, have been identified at the Site:

- Bank (WPA and City)
- Bordering Land Subject to Flooding (WPA and City)
- Riverfront Area (WPA)

Additionally, a 100 foot buffer zone is associated with the Bank. Resource area boundaries are depicted on the Permitting Plan provided in Attachment A to the NOI application. Subsequent sections of this narrative describe the proposed project, potential impacts to Resource Areas, mitigation of such impacts, and how the proposed project meets the performance standards of the WPA Regulations and City Ordinance.

3. PROPOSED PROJECT DESIGN

The proposed work involves repaving the existing parking lot at the Raw Water Pump Station. More details are provided in the Permitting Plan presented in Attachment A to the NOI application.

3.1 STORMWATER MANAGEMENT

As described above, this project involves repaving an existing parking lot. Per the Massachusetts Wetlands Protection Act and associated Regulations, this project is considered a redevelopment project because it is proposed work on a previously developed site that results in no net increase in impervious area. Due to the project site restrictions including lack of space, existing topography, and the adjacent river, it is impracticable to provide any additional structural Best Management Practices (BMP's) for this limited redevelopment project. The project does not include the installation of any new stormwater controls, the creation of impervious cover, the increase in stormwater flow, or the altering of any existing stormwater features or drainage paths. The following sections further detail applicability of the Massachusetts stormwater standards per the Massachusetts Stormwater Handbook.

Standard 1: No New Untreated Discharges

This project is designed such that there are no new untreated discharges. No new outfalls will be installed as part of this project.

Standard 2: Peak Rate Attenuation

This project, as designed, will not cause post-construction peak discharge rates to exceed pre-construction peak discharge rates. There will be no increase in any impervious surfaces or modifications to existing grade or ground cover. As such, there will be no change in water flow, drainage capacity, flood storage volume, or run-off as a result of the project.

Standard 3: Recharge

The annual groundwater recharge for the post-development site approximates the annual recharge from existing site conditions, and therefore no loss of annual recharge is anticipated. As previously stated, no additional impervious cover will be created; therefore there will be no change to the annual recharge.

Standard 4: Water Quality

No new stormwater management systems will be installed as part of this project; therefore this standard is not applicable. Stormwater runoff will continue to sheet flow over vegetation before entering the Merrimack River.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

This project site does not contain any LUHPPLs, therefore this standard is not applicable.

Standard 6: Critical Areas

The project is not located within Outstanding Resource Waters, Special Resource Waters, recharge areas for public water supplies, bathing beaches, cold water fisheries or shellfish growing areas, therefore this standard is not applicable.

Standard 7: Redevelopments and Other Projects Subject to the Standards, only to the Maximum Extent Practical

This project is considered a redevelopment project because it is proposed work on a previously developed site that results in no net increase in impervious area. Therefore, per Standard 7, the project fully meets Standards 1, 8, 9 and 10, and meets Standards 2, 3, and 4-6 only to the maximum extent practicable.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

Erosion control measures will be implemented prior to conducting any work, and will be removed following cessation of work, and exposed soils and sediments being stabilized.

Standard 9: Operation and Maintenance Plan

There are no stormwater Best Management Practices being installed as part of this project; therefore preparation of an operation and maintenance plan is not applicable.

Standard 10: Prohibition of Illicit Discharges

To demonstrate compliance with this Standard, this statement verifies that no illicit discharges exist on the site and all measures to prevent illicit discharges to the stormwater management systems will be taken.

3.2 RESOURCE AREA ALTERATIONS

The proposed project will result in temporary disturbance to Riverfront Area and BLSF. Specifically, alterations include removal and disposal of the existing bituminous pavement and replacement with new bituminous concrete.

The following table summarizes the area of Resource Area impacts associated with the proposed project, as well as proposed mitigation measures.

Table 3-1: Summary of Resource Area Alterations

Resource Area	Alteration	Area Altered (units as noted)	Mitigatory Measures
Riverfront Area	Repaving Existing Parking Lot.	3,883 square feet (temporary)	Area will be repaved to match existing conditions.
Bordering Land Subject to Flooding	Repaving Existing Parking Lot.	14,439 square feet (temporary)	Area will be repaved to match existing conditions.

3.3 EROSION CONTROL

Erosion control details are provided on the Permitting Plan in Attachment A to the NOI application and include the following measures:

- Placement of siltation barrier downgradient of proposed disturbance along the existing and proposed pavement edge.

4. EVALUATION OF PERFORMANCE STANDARDS

The project will utilize best available measures to minimize adverse effect during construction. The following sections describe how the proposed project will comply with the applicable general performance standards for Bordering Land Subject to Flooding and Riverfront Area to the maximum extent practicable.

4.1 BORDERING LAND SUBJECT TO FLOODING (310 CMR 10.57(4))

The proposed project meets the performance standards for BLSF, as indicated by the following:

1. No permanent flood storage volume will be lost as a result of the proposed project therefore no compensatory storage is required.
2. The proposed work is temporary and will not permanently restrict flows so as to cause an increase in flood stage or velocity.
3. The proposed work is temporary and will not permanently impair wildlife habitat. Temporary impact to BLSF will be restored to pre-construction (i.e. paved) conditions.

4.2 RIVERFRONT AREA (310 CMR 10.58(4) AND (5))

The proposed project meets the general performance standards for Riverfront Area:

1. The proposed work meets the performance standards for other Resource Areas present within the Riverfront Area, as described in the previous sections.
2. The proposed work is temporary and will not result in adverse impacts to rare species. Any impacts to Riverfront Area will be temporary and will be restored to pre-construction conditions following construction.
3. There are no practicable and substantially equivalent economic alternatives to the proposed project that will have less adverse effects on the interests of the WPA. The proposed work is required to repair the currently deteriorated pavement at the Raw Water Pump Station. The following summary of alternatives evaluated is presented as the Alternatives Analysis required for proposed work in the Riverfront Area:
    a. **Leave pavement in current condition.** – If the parking lot is not repaved, it will continue to deteriorate and potentially make for hazardous conditions for access to the Raw Water Pump Station. The Raw Water Pump Station is essential for delivering potable water to the City of Lowell.
4. The proposed work is temporary and not anticipated to have permanent significant impacts on the riverfront area that are inconsistent with the interests identified in the WPA. As previously discussed the project is designed to have no significant adverse impact. Within the 25 foot Riverfront Area, the proposed work will meet following requirements:
    a. Alteration will be limited to the maximum extent feasible;
    b. Stormwater management will be implemented during construction and complies with Massachusetts Stormwater Standards as applicable;
    c. The capacity of the riverfront area will be preserved to provide important wildlife habitat functions; and
    d. Groundwater and surface water quality will not be permanently impaired as erosion and sedimentation controls will be implemented.

4.3 EVALUATION OF THE INTERESTS OF THE WETLANDS PROTECTION ACT

The proposed project design upholds the eight interests of the WPA, defined in 310 CMR 10.01(2), as described below.

- **Protection of the public and private water supply and groundwater supply.** The proposed project will address the currently deteriorating pavement at the Lowell Raw Water Pump Station, therefore improving the functionality of the parking lot and continued access to the pump station. As a result, the proposed project will enhance protection of the public water supply.

- **Flood control.** The proposed project involves temporary disturbance of bordering land subject to flooding. It will not permanently impact flood control.

- **Storm damage prevention** - The proposed project involves temporary disturbance. It will not permanently impact storm damage prevention.

- **Prevention of pollution** - Erosion control measures will be implemented prior to conducting any work, and will be removed following cessation of work, and exposed soils and sediments being stabilized.

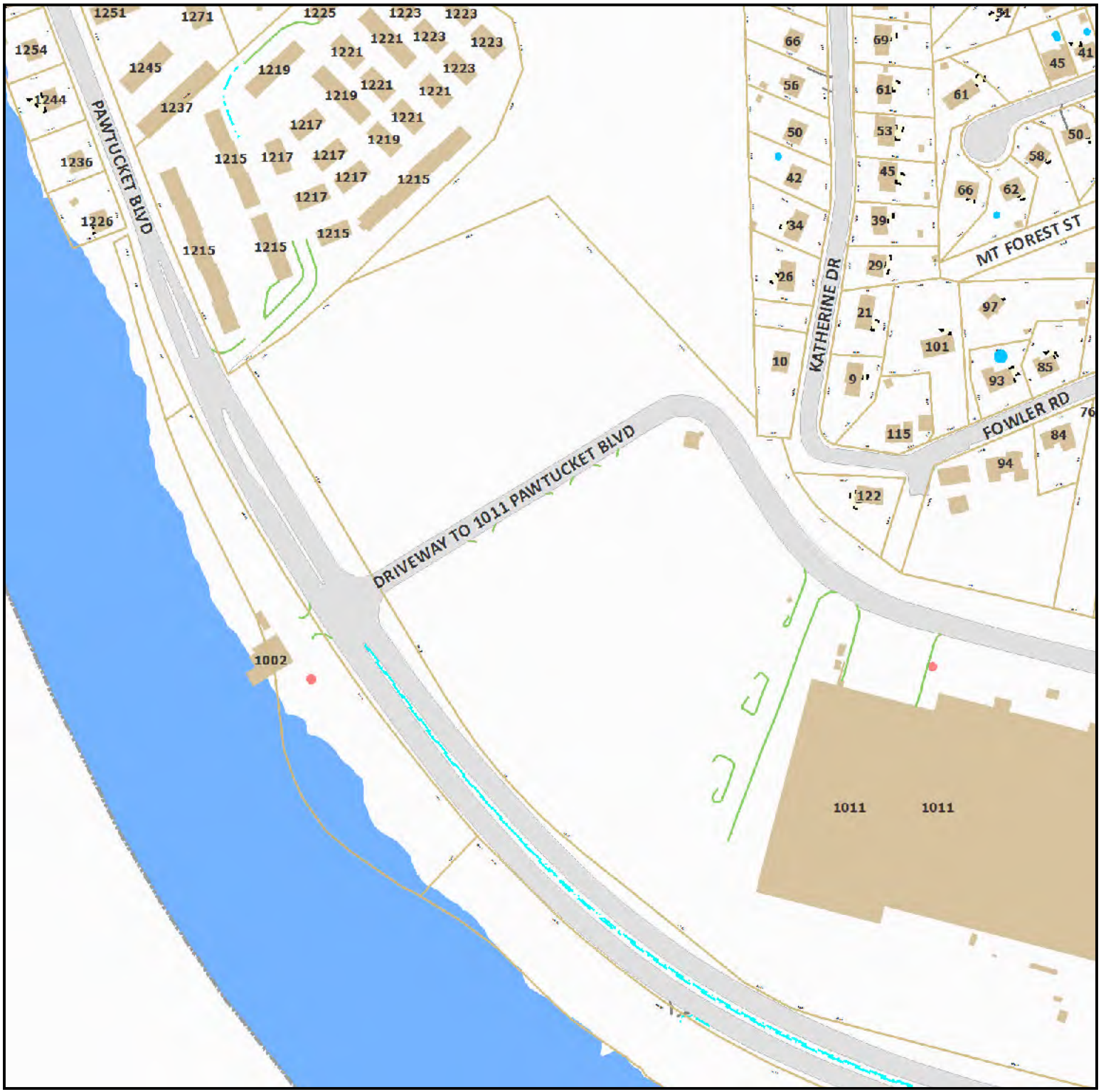
- **Protection of land containing shellfish.** The proposed project is not anticipated to adversely affect fisheries freshwater shellfish since none are present.

- **Protection of fisheries.** The proposed project involves temporary disturbance to a parking lot. It is not anticipated to adversely affect fisheries. During construction BMPs will be employed to manage erosion and sedimentation from construction activities.

- **Protection of wildlife habitat.** The proposed project involves temporary disturbance to a parking lot. It will not have a permanent impact on wildlife habitat.

In summary, the proposed repaving is not anticipated to result in incremental impacts to the existing flood control or storm damage, or fish and wildlife.

Abutters List and Notice to Abutters



City of Lowell
Massachusetts

1002 Pawtucket Blvd

- Lowell Boundary
- Parcels
- ★ Popular Destinations

COOL Destinations
- Art Parks
- Entertainment Venues
- Galleries
- Museums

Buildings
- Building
- Foundation
- Mobile Home
- Tank
- Deck
- Pool - Above Ground
- Pool - In-Ground

- (show all)
- Paved Roads
- Water Bodies

1" = 226 ft

December 11, 2013

Office of the Board of Assessors
City Hall • 375 Merrimack Street • Lowell, MA 01852
P: 978.674.1102 • F: 978.970.4205
www.LowellMA.gov

Susan A. LeMay, M.A.A.
Chief Assessor
Joel H. Cohen, M.A.A.
Assessor
Karen A. Golden, M.A.A.
Assessor

December 23, 2013

Conservation Commission
375 Merrimack St
Lowell, MA 01852

Dear Board Members:

This is to attest that the individuals described on the attached listing are the certified list of parties in interest in Lowell, MA of the premises located at 1194 Pawtucket Boulevard, Lowell, MA.

Very truly yours,

Susan A. LeMay, M.A.A.
Chief Assessor
Board of Assessors

Abutters List – Conservation Commission
Attachment(s) – 4 pages
cc: Assessor File

SAL/kr

RE: 1001 PAWTUCKET BLVD

1001 PAWTUCKET LLC
C/O WINSTANLEY ENTERPRISES INC
150 BAKER AVE EXT STE 303
CONCORD, MA 01742

RE: 1180 PAWTUCKET BLVD

COMMONWEALTH OF MASSACHUSETTS
DEPT OF ENVIRONMENTAL MGMT
251 CAUSEWAY ST
BOSTON, MA 02114

RE: 1194 PAWTUCKET BLVD

CITY OF LOWELL
WATER DEPARTMENT
375 MERRIMACK STREET
LOWELL, MA 01852

RE: 1200 PAWTUCKET BLVD

COMMONWEALTH OF MASSACHUSETTS
DEPT OF ENVIRONMENTAL MGMT
251 CAUSEWAY ST
BOSTON, MA 02114

RE: 1215 PAWTUCKET BLVD #36

BENTON CHRISTOPHER A
1215 PAWTUCKET BLVD UNIT 36
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #29

BHAGAT KIRTAN K
BHAGAT KOKILA K
1215 PAWTUCKET BLVD UNIT 29
LOWELL, MA 01854-

RE: 1215 PAWTUCKET BLVD #37

BUTLER KEITH S
BUTLER PAPAPORN YOMSIN
1215 PAWTUCKET BLVD UNIT 37
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #45

COLLINS DONNA
1215 PAWTUCKET BLVD UNIT 45
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #3

CORREIA ROBERT K
1215 PAWTUCKET BLVD UNIT 3
LOWELL, MA 01854-1063

RE: 1215 PAWTUCKET BLVD #12

DESAI KAUSHIKKUMAR C
DESAI PRITI K
1215 PAWTUCKET BLVD UNIT 12
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #13

DONNELLY STEPHEN M
1215 PAWTUCKET BLVD UNIT 13
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #19

DUNBAR THOMAS A IV
1215 PAWTUCKET BLVD UNIT 19
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #26

GILLIS BRIAN M
1215 PAWTUCKET BLVD UNIT 26
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #16

GLEASON LEONARD A
GLEASON CLOMA R
1215 PAWTUCKET BLVD UNIT 16
LOWELL, MA 01854-1063

RE: 1215 PAWTUCKET BLVD #33

GLYNN PAUL K
GLYNN PATRICIA M
14 PUTNAM AVE
CHELMSFORD, MA 01824

RE: 1215 PAWTUCKET BLVD #34

HIRBOUR TIMOTHY
180 TYNGSBORO RD UNIT 10C
N CHELMSFORD, MA 01863

RE: 1215 PAWTUCKET BLVD #44

IRIZARRY YOLANDA
PICA JOHN A
1215 PAWTUCKET BLVD UNIT 44
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #41

KARABA DICKSON M
1215 PAWTUCKET BLVD UNIT 41
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #9

KOSIK STANLEY W
1215 PAWTUCKET BLVD UNIT 9
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #17

LIVINGSTON SONIA M
LIVINGSTON GARY M
1215 PAWTUCKET BLVD #17
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #1

MACKAY BARRY E
1215 PAWTUCKET BLVD UNIT 1
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #25

GREGOIRE DOLORES I
1215 PAWTUCKET BLVD UNIT 25
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #31

HOAR ERIK M
HOAR VICTORIA N
1215 PAWTUCKET BLVD UNIT 31
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #22

KAMDAR TUSHAR D
KAMDAR DHIRAJ P
1215 PAWTUCKET BLVD UNIT 22
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #14

KOSIK HELEN M
1215 PAWTUCKET BLVD UNIT 14
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #32

KOZIOL CHRISTOPHER J
KOZIOL ROBERT R
1215 PAWTUCKET BLVD #32
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #30

MACHADO ALBERTINO
1215 PAWTUCKET BLVD UNIT 30
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #7

MCGUANE PAULINE
1215 PAWTUCKET BLVD UNIT 7
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #27

MISTRY PIYUSH J
1215 PAWTUCKET BLVD UNIT 27
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #35

MORRIS RICHARD J
1215 PAWTUCKET BLVD UNIT 35
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #28

PALLADINO RICHARD A
1215 PAWTUCKET BLVD UNIT 28
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #10

PATEL DINESH
1215 PAWTUCKET BLVD UNIT 10
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #38

PATEL KHANDU K
PATEL PUSHPA
1215 PAWTUCKET BLVD UNIT 38
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #18

PATEL PRAGNA V
1215 PAWTUCKET BLVD UNIT 18
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #39

PATEL RAMNIK H
1215 PAWTUCKET BLVD UNIT 39
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #42

MODY APURVA N
URRA-MODY ANNA
1215 PAWTUCKET BLVD UNIT 42
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #6

NOLET JOSEPH E
NOLET CHERYL A
66 FARWELL RD
TYNGSBORO, MA 01879

RE: 1215 PAWTUCKET BLVD #23

PATEL BHARAT N
PATEL HEMLATA B
1215 PAWTUCKET BLVD UNIT 23
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #5

PATEL ISHVER B
PATEL LAXMI I
1215 PAWTUCKET BLVD UNIT 5
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #4

PATEL NIKUNJBHAI N
PATEL SWATIBEN N
1215 PAWTUCKET BLVD UNIT 4
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #21

PATEL PRAHALED C
PATEL JAYMALA
1215 PAWTUCKET BLVD UNIT 21
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #8

PATEL VIJAYKUMAR
PATEL BHAVNA
1215 PAWTUCKET BLVD UNIT 8
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #43

SILVA ROBERT M
9 CEDAR CREEK DR
DRACUT, MA 01826

RE: 1215 PAWTUCKET BLVD #11

SMALLS LILLIE
1215 PAWTUCKET BLVD #11
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #15

SPENCER KAREN
8 KIMBALL CT 1005
BURLINGTON, MA 01803

RE: 1215 PAWTUCKET BLVD #2

STAFFIER BARBARA M
1215 PAWTUCKET BLVD UNIT 2
LOWELL, MA 01854-5962

RE: 1215 PAWTUCKET BLVD #40

SUTARIA HARSUKH K
SUTARIA HARSHA
1215 PAWTUCKET BLVD UNIT 40
LOWELL, MA 01854

RE: 1215 PAWTUCKET BLVD #20

TRS CARIGNAN FAMILY TRUST
CARIGNAN RAYMOND V SR
CARIGNAN PHYLLIS A CO-TRUSTEES
1215 PAWTUCKET BLVD UNIT 20
LOWELL, MA 01854-1064

RE: 1215 PAWTUCKET BLVD #24

WHELAN KENNETH V
98 GENEST ST
DRACUT, MA 01826

RE: 1217 PAWTUCKET BLVD #56

BARBOSA DAVID S
8 TRACEY AVE
NASHUA, NH, 03063

RE: 1217 PAWTUCKET BLVD #52

BERAJAWALA SHUEIL H
BERAJAWALA HEMCHAND K
BERAJAWALA NAYNA H
51 KELLEY CIR
LOWELL, MA 01854

RE: 1217 PAWTUCKET BLVD #59

CHAUNAMON CHIP
PO BOX 9227
LOWELL, MA 01853

RE: 1217 PAWTUCKET BLVD #58

FAZILOGLU YUNUS E
1217 PAWTUCKET BLVD UNIT 58
LOWELL, MA 01854

RE: 1217 PAWTUCKET BLVD #53

HANSON RICHARD J
HANSON JEANNETTE B
1217 PAWTUCKET BLVD UNIT 53
LOWELL, MA 01854-1067

RE: 1217 PAWTUCKET BLVD #48

JOSHI DEVIKANT R
JOSHI SUSILASEN
1217 PAWTUCKET BLVD UNIT 48
LOWELL, MA 01854

RE: 1217 PAWTUCKET BLVD #51

LISS AMY C
1217 PAWTUCKET BLVD UNIT 51
LOWELL, MA 01854

RE: 1217 PAWTUCKET BLVD #47

LUONG NAM T
TRAN HUE
1217 PAWTUCKET BLVD UNIT 47
LOWELL, MA 01854

RE: 1217 PAWTUCKET BLVD #54

LUSSIER MARY E
LUSSIER ERIC K
1217 PAWTUCKET BLVD #54
LOWELL, MA 01854

RE: 1217 PAWTUCKET BLVD #60

PATEL MINESH
PATEL DAKSHA
1217 PAWTUCKET BLVD UNIT 60
LOWELL, MA 01854

RE: 1217 PAWTUCKET BLVD #50

PATEL VIBHA
199 ROUTE 16A
INTERVALE, NH, 03945

RE: 1217 PAWTUCKET BLVD #46

RENDON MANUEL
1217 PAWTUCKET BLVD #46
LOWELL, MA 01854

RE: 1217 PAWTUCKET BLVD #57

RICHARDS CLAIRE N
1217 PAWTUCKET BLVD #57
LOWELL, MA 01854

RE: 1217 PAWTUCKET BLVD #49

SAVLA VIJAY
SALVA PIYUSHA
4 SANDY DR
ACTON, MA 01720

RE: 1217 PAWTUCKET BLVD #55

SAVLA VIJAY J
SAVLA PIYUSHA
4 SANDY DRIVE
ACTON, MA 01720

RE: 1219 PAWTUCKET BLVD #62

AMIN JAYESH M
AMIN KALPANA J
51 HERITAGE RD
DRACUT, MA 01826

RE: 1219 PAWTUCKET BLVD #65

ANDERSON JEANETTE D
1219 PAWTUCKET BLVD UNIT 65
LOWELL, MA 01854

RE: 1219 PAWTUCKET BLVD #63

CRISTANCHO-MARTINEZ PALOMA
1219 PAWTUCKET BLVD UNIT 63
LOWELL, MA 01854

RE: 1219 PAWTUCKET BLVD #75

CROSSLEY CORRIE LANA
DOE MICHAEL S
1219 PAWTUCKET BLVD UNIT 75
LOWELL, MA 01854-1069

RE: 1219 PAWTUCKET BLVD #73

LY PETER K
LUONG VAN TO
1219 PAWTUCKET BLVD UNIT 73
LOWELL, MA 01854

RE: 1219 PAWTUCKET BLVD #61

MAKUDEN JOHNSON
MAKUDEN DEVYANI
1219 PAWTUCKET BLVD UNIT 61
LOWELL, MA 01854

RE: 1219 PAWTUCKET BLVD #70

MUSHKAT RAFAEL I
MUSHKAT LUBA S
1219 PAWTUCKET BLVD UNIT 70
LOWELL, MA 01854-1069

RE: 1219 PAWTUCKET BLVD #67

O'BRIEN MARIANN
1219 PAWTUCKET BLVD UNIT 67
LOWELL, MA 01854

RE: 1219 PAWTUCKET BLVD #71

O'DONNELL KEITH C
1219 PAWTUCKET BLVD UNIT 71
LOWELL, MA 01854

RE: 1219 PAWTUCKET BLVD #72

OUELLET KEVIN
1219 PAWTUCKET BLVD UNIT 72
LOWELL, MA 01854

RE: 1219 PAWTUCKET BLVD #74

PUERTA MARIA H
1219 PAWTUCKET BLVD UNIT 74
LOWELL, MA 01854-1069

RE: 1219 PAWTUCKET BLVD #64

THOMPSON AMY L
400 MERRILL LN UNIT 6
DRACUT, MA 01826

RE: 1219 PAWTUCKET BLVD #69

TOURIGNY PHILIP P
TOURIGNY EMELIANA L
1219 PAWTUCKET BLVD UNIT 69
LOWELL, MA 01854

RE: 1219 PAWTUCKET BLVD #68

TRS NAYNA H BERAJAWALA TRUST
BERAJAWALA HEMCHAND K
BERAJAWALA NAYNA H TRUSTEE
15 KELLEY CIR
LOWELL, MA 01854

RE: 1219 PAWTUCKET BLVD #66

YETSKO MEREDITH
1219 PAWTUCKET BLVD UNIT 66
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #79

ABSHIRE JAMES L
ABSHIRE GOLDIE
169 DEPOT RD
WESTFORD, MA 01886

RE: 1221 PAWTUCKET BLVD #76

AMORINO FRANK J
1221 PAWTUCKET BLVD UNIT 76
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #92

DEMPSEY ANDRIA M
DUNN JOSEPH M JR
1221 PAWTUCKET BLVD UNIT 92
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #90

FIELD B MCIHAEL
CHANDLER JESSICA
1221 PAWTUCKET BLVD UNIT 90
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #91

GORDON ROBERT E
1221 PAWTUCKET BLVD UNIT 91
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #81

LE CAT-SI D
1221 PAWTUCKET BLVD UNIT 81
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #87

LEE FRANK J
LEE TING
148 NATHAN LN
CARLISLE, MA 01741-1323

RE: 1221 PAWTUCKET BLVD #86

LIN FU HAN
YIN GUO YING
135 HARVARD ST UNIT 1
MALDEN, MA 02148

RE: 1221 PAWTUCKET BLVD #85

MASON MICHAEL
1221 PAWTUCKET BLVD UNIT 85
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #77

PATEL JAGRUTI
8 NOTTINGHAM RD
TYNGSBORO, MA 01879

RE: 1221 PAWTUCKET BLVD #89

PATEL RAVIN M
PATEL DIXITA
1221 PAWTUCKET BLVD UNIT 89
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #84

SHERRING GEORGE
1221 PAWTUCKET BLVD UNIT 84
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #80

SUNDARA BALAJI
SUNDOVA SEEMA PANDE
11 ROSECLIFF DR
NASHUA, NH, 03062

RE: 1221 PAWTUCKET BLVD #82

TARDIFF DANIEL C
1221 PAWTUCKET BLVD UNIT 82
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #93

THOMPSON NEIL
1221 PAWTUCKET BLVD UNIT 93
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #78

TU NHON
1221 PAWTUCKET BLVD UNIT 78
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #83

VALENTE MARIANNE
1221 PAWTUCKET BLVD UNIT 83
LOWELL, MA 01854

RE: 1221 PAWTUCKET BLVD #88

WOODWORTH MARY
C/O MARYANN RILEY
1221 PAWTUCKET BLVD UNIT 88
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #102

BARRETT CATHERINE
1223 PAWTUCKET BLVD UNIT 102
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #104

BENNETT STEVEN
1223 PAWTUCKET BLVD UNIT 104
LOWELL, MA 01854-1080

RE: 1223 PAWTUCKET BLVD #95

CHEN JIANXIANG
10209 MACGILL AVE
COLUMBIA, MD, 21044

RE: 1223 PAWTUCKET BLVD #100

DURAND JAMIE R
1223 PAWTUCKET BLVD UNIT 100
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #96

GILL MICHAEL
1223 PAWTUCKET BLVD UNIT 96
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #103

HARRINGTON DANIEL E
1223 PAWTUCKET BLVD UNIT 103
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #110

MEHTA AMOL R
MEHTA RAGESHREE A
81 HEMENWAY RD
FRAMINGHAM, MA 01701-2617

RE: 1223 PAWTUCKET BLVD #97

PATEL VINODBHAI S
PATEL BHAVANA V
24 MEGHANN LN
LOWELL, MA 01852

RE: 1223 PAWTUCKET BLVD #109

BERNIER DENISE R
1223 PAWTUCKET BLVD UNIT 109
LOWELL, MA 01854-1080

RE: 1223 PAWTUCKET BLVD #107

DESAI PANKAJ K
DESAI RITA P
C/O VILLAGE VARIETY STORE
1301 PAWTUCKET BLVD
LOWELL, MA 01854-1801

RE: 1223 PAWTUCKET BLVD #99

GAVIN COLLEEN M
GAVIN NOREEN E
1223 PAWTUCKET BLVD UNIT 99
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #101

HANKINS ALEX M
1223 PAWTUCKET BLVD UNIT 101
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #98

LOUGHLIN WILLIAM JR
1223 PAWTUCKET BLVD UNIT 98
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #111

OLIVER JONATHAN R
1223 PAWTUCKET BLVD UNIT 111
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #108

POL PATRICIA L
1223 PAWTUCKET BLVD #108
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #105

RAMALHO ARTHUR W
1223 PAWTUCKET BLVD #105
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #106

SIGMAN MATTHEW J
SIGMAN FALLON M
1223 PAWTUCKET BLVD UNIT 106
LOWELL, MA 01854

RE: 1223 PAWTUCKET BLVD #94

WICKENS BRIAN J
1223 PAWTUCKET BLVD UNIT 94
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #120

BARRY CHERILYN
1225 PAWTUCKET BLVD #120
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #112

BATTEN MARK P
1225 PAWTUCKET BLVD UNIT 112
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #125

BOND MABEL E
1225 PAWTUCKET BLVD 125
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #116

BROWN GEORGE J
BROWN MARLENE
1225 PAWTUCKET BLVD #116
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #121

CHANDRASEKARAN NAVEEN KUMAR
KRISHNAN GAJALAKSHMI
1225 PAWTUCKET BLVD UNIT 121
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #122

GIBSON LISA E
1225 PAWTUCKET BLVD UNIT 122
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #126

HOGAN ROBERT P
HOGAN NANCY J
1225 PAWTUCKET BLVD UNIT 126
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #113

JEAN KRISTEN L
JEAN DEBORAH M
1225 PAWTUCKET BLVD UNIT 113
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #124

NUNEZ JULIO C MARTINEZ
141 THISSELL AVE APT 19
DRACUT, MA 01826-5113

RE: 1225 PAWTUCKET BLVD #117

PATEL NALINKUMAR N
PATEL TRUPTI N
1225 PAWTUCKET BLVD UNIT 117
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #119

PATEL TULSHIDAS R
PATEL SAVILABEN T
1225 PAWTUCKET BLVD UNIT 119
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #123

PICCO JENNIFER
BARNHART DONNA
1225 PAWTUCKET BLVD #123
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #114

SAN SAMUEL SARITH
1225 PAWTUCKET BLVD UNIT 114
LOWELL, MA 01854

RE: 1225 PAWTUCKET BLVD #118

SHAH ESHANI
15 BEAVER RD
READING, MA 01867

RE: 1225 PAWTUCKET BLVD #115

SHANG-ZHAM SHUCI
4 WHEATLAND ST
BURLINGTON, MA 01803

COMMITMENT & INTEGRITY
DRIVE RESULTS

40 Shattuck Road, Suite 110
Andover, Massachusetts 01810
www.woodardcurran.com

T 866.702.6371
T 978.557.8150
F 978.557.7948

January 8, 2014

Project Abutters
Lowell, MA

Re: Lowell Regional Water Utility
Raw Water Pump Station Repaving
Notice of Intent

To Whom It May Concern:

On behalf of the Lowell Regional Water Utility (LRWU) and in accordance with the second paragraph of the Massachusetts General Laws Chapter 131, Section 40, you are hereby notified of the following:

The Lowell Conservation Commission will hold a public hearing at the City Council Chambers at 375 Merrimack Street (City Hall), Second Floor, on January 22, at 7:00 p.m. in accordance with the provisions of the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131, s. 40, as amended) for a Notice of Intent submitted by Woodard & Curran Inc. on behalf of the Lowell Regional Water Utility. The Notice of Intent is for the proposed repaving of the parking lot at the Lowell Regional Water Utility's Raw Water Pump Station site adjacent to the Merrimack River at 1002/1194 Pawtucket Boulevard.

Plans are available for inspection at the Lowell Conservation Commission Office, Division of Planning and Development (DPD), JFK Civic Center, 50 Arcand Drive, Lowell, Massachusetts (Hours: Tuesday through Friday 9 a.m. to 5 p.m.). Plans are also available for inspection at the office of Woodard & Curran Inc., 40 Shattuck Road, Suite 110, Andover, Massachusetts (Hours: Monday through Friday 8:30 a.m. to 4:30 p.m).

For more information, please contact the Lowell Conservation Commission at (978) 970-4252, the applicant's representative Ms. Bridget Mitchell at Woodard & Curran Inc., at (978) 557-8150 or the Massachusetts Department of Environmental Protection Office at (617) 654-6601.

Note: Notice of the public hearing will be published at least five days in advance in the Lowell Sun.

Sincerely,

WOODARD & CURRAN INC.

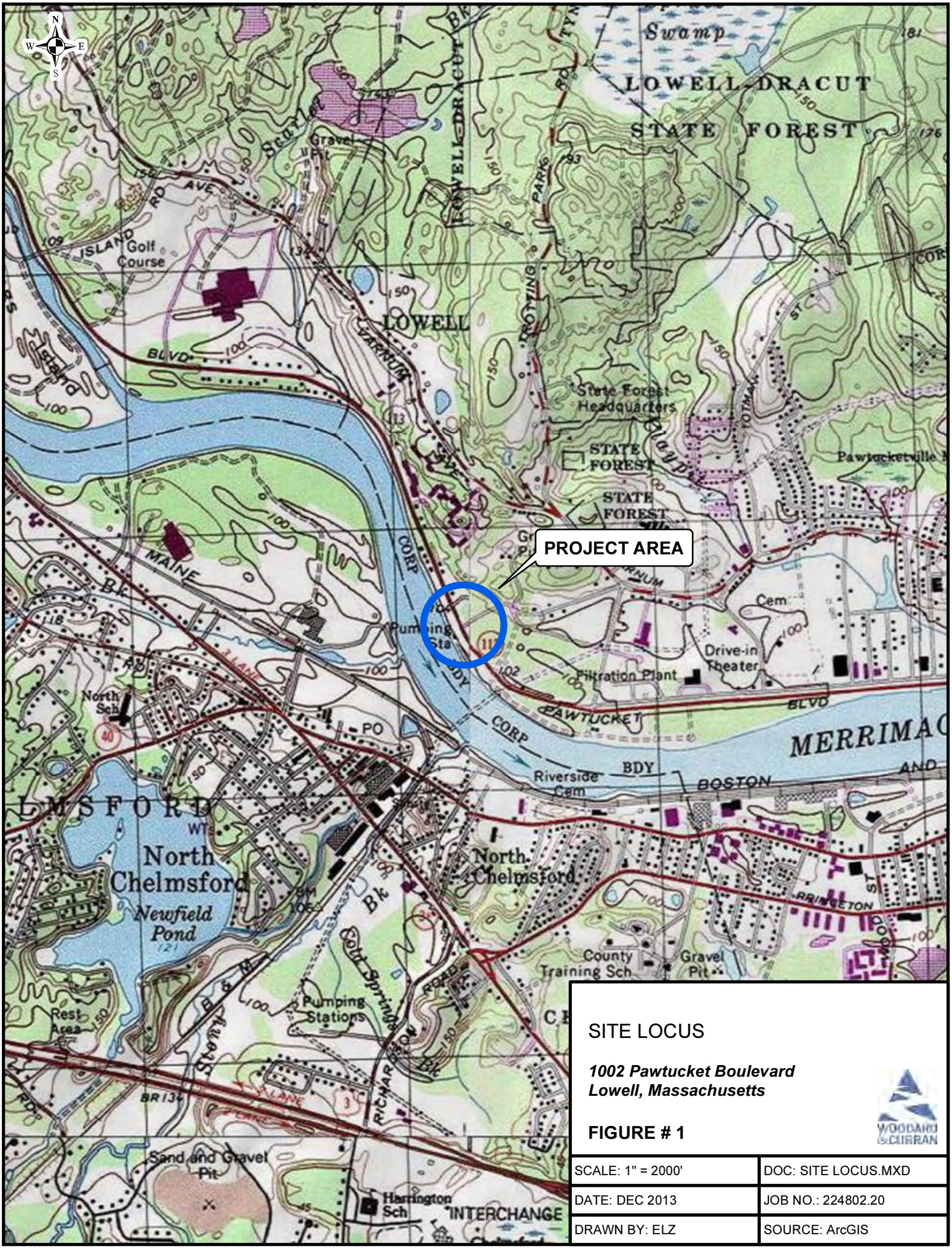
Bridget Mitchell

Bridget Mitchell, P.E.
Project Engineer

BDM/bdm
224802.20

Figures

- Locus Plan
- MassGIS Oliver Resource Area Map



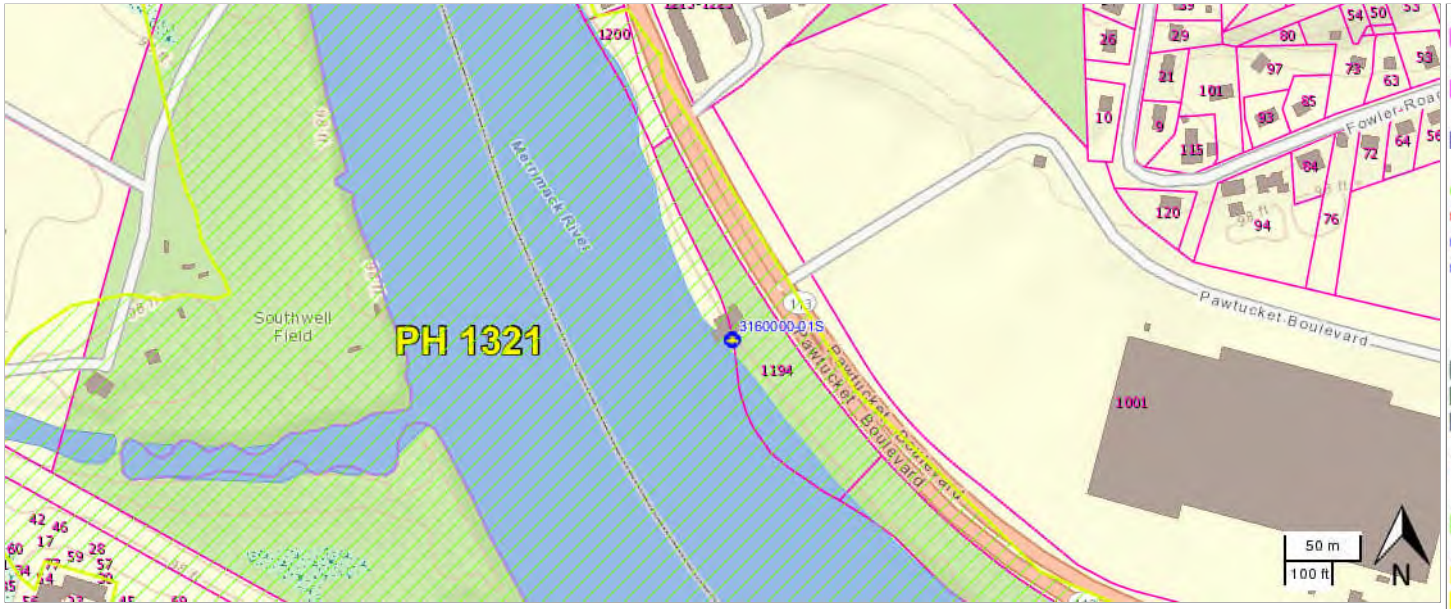
SITE LOCUS

1002 Pawtucket Boulevard
Lowell, Massachusetts

FIGURE # 1

SCALE: 1" = 2000'	DOC: SITE LOCUS.MXD
DATE: DEC 2013	JOB NO.: 224802.20
DRAWN BY: ELZ	SOURCE: ArcGIS

Resource Areas - Lowell Regional Water Utility's Raw Water Pump Station



Zone IIs

IWPAs

Zone A

Public Water Supplies
Community Groundwater Well
Non-Community Groundwater Well
Surface Water Intake
Emergency Surface Water Intake
Community Labels
Non-Community Labels

Outstanding Resource Waters
PUBLIC WATER SUPPLY CONTRIBUTOR
ORW FOR ACEC
ORW FOR BOTH WATER SUPPLY AND OTHER

NHESP Certified Vernal Pools

NHESP Estimated Habitats of Rare Wildlife

NHESP Priority Habitats of Rare Species

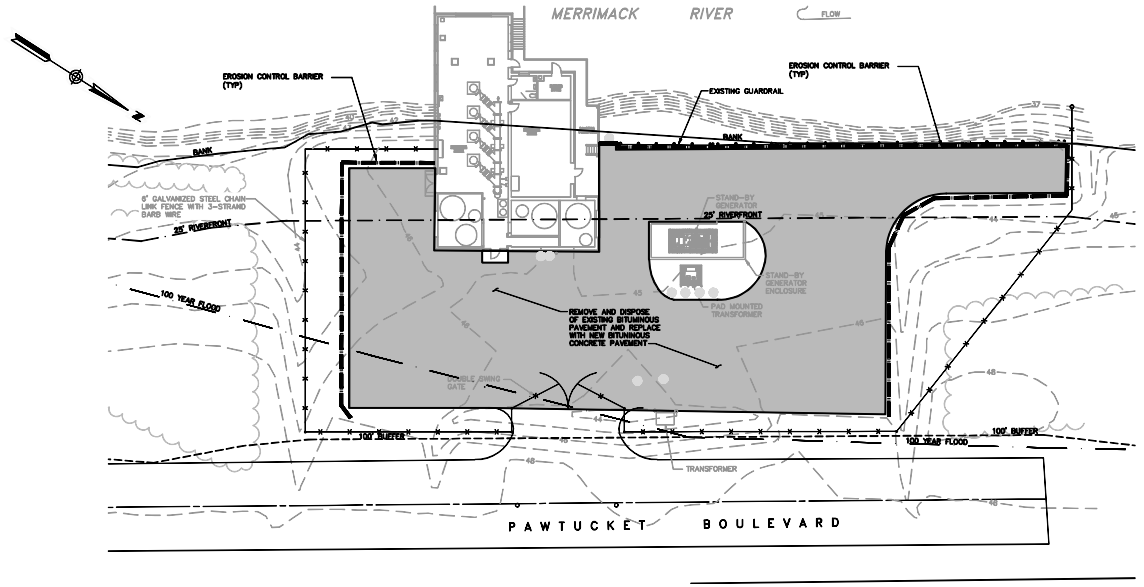
Areas of Critical Environmental Concern ACECs

Detailed Features

Tax Parcels

Structures

Attachment A - Permitting Plans

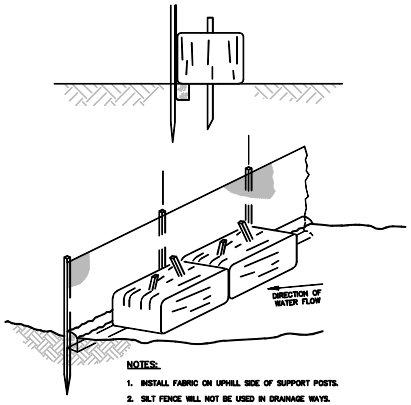


RAW WATER PUMP STATION SITE PLAN

SCALE: 1" = 20'

NOTES:

1. BASE PLAN COMPILED FROM EXISTING DRAWINGS AND FIELD OBSERVATIONS. ELEVATIONS ARE APPROXIMATE AND RELATIVE TO THE LOCAL SITE.
2. BANK, RIVERFRONT, AND 100' BUFFER BOUNDARIES OBTAINED FROM NOTICE OF INTENT MASSDEP FILE NO. 208-0540 DRAWINGS FOR WATER UTILITY WORK CONDUCTED AT THE LOWELL REGIONAL WATER UTILITY'S RAW WATER PUMP STATION UNDER ORDER OF CONDITIONS ISSUED SEPTEMBER 2009.
3. 100 YEAR FLOOD BOUNDARY DIGITIZED FROM MASS GIS OLIVER 2013.
4. CONTRACTOR SHALL MAINTAIN ACCESS TO BUILDINGS FOR OPERATING STAFF AT ALL TIMES.
4. CONTRACTOR SHALL INSTALL TEMPORARY INLET PROTECTION IN ALL CATCH BASINS TO PREVENT SEDIMENT FROM ENTERING DRAINAGE INFRASTRUCTURE.
5. ANY AREA DISTRUBED BY CONTRACTOR OUTSIDE LIMITS OF WORK SHALL BE RESTORED TO ORGINAL CONDITION AT NO EXTRA COST TO THE OWNER.

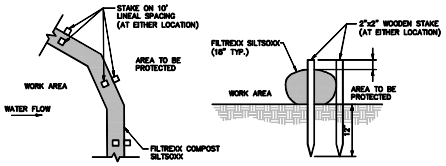


NOTES:

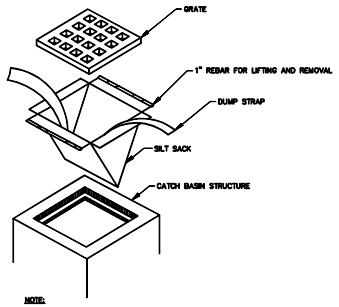
1. INSTALL FABRIC ON UPHILL SIDE OF SUPPORT POSTS.
2. SILT FENCE WILL NOT BE USED IN DRAINAGE WAYS.
3. CONTRACTOR TO REMOVE SILT AS NECESSARY TO MAINTAIN FABRIC EFFECTIVENESS.

EROSION CONTROL BARRIER

N.T.S.



PLAN VIEW SECTION

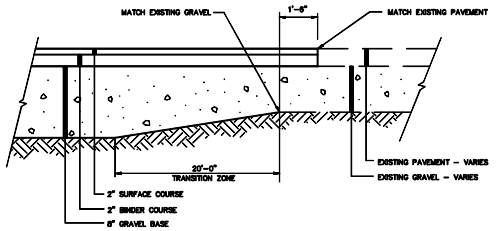


NOTE:

1. INSTALL SILTSACK PER MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. EMPTY OR REMOVE SEDIMENT FROM SILTSACK WHEN RESTRAINT CORD IS NO LONGER VISIBLE. CLEAN, RINSE, AND REPLACE AS NEEDED.
2. SILT SACKS TO BE INSTALLED DURING CONSTRUCTION OPERATIONS WHEN THE POTENTIAL FOR SEDIMENT TO ENTER EXISTING & PROPOSED BASINS EXISTS.

TEMPORARY INLET PROTECTION

N.T.S.



BITUMINOUS PAVEMENT & BUTT JOINT DETAIL

N.T.S.

WOODARD & CURRAN
980 Washington Street, Suite 325N
Dedham, Massachusetts 02026
800.446.5516 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE
DESIGNED BY: RCC	CHECKED BY: RCC	
DRAWN BY: JAR	224802-C-101.dwg	

RAW WATER PUMP STATION
SITE PLAN

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER TREATMENT FACILITY
SYSTEM UPGRADES

JOB NO.: 224802.20
DATE: JANUARY 2014
SCALE: AS NOTED
SHEET: OF

C-101

Attachment B – NHESP Correspondence

COMMITMENT & INTEGRITY
DRIVE RESULTS

40 Shattuck Road
Suite 110
Andover, Massachusetts 01810
www.woodardcurran.com

T 866.702.6371
T 978.557.8150
F 978.557.7948

TRANSMITTAL

WOODARD &CURRAN

TO: Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
100 Hartwe3ll Street, Suite 230
West Boylston, MA 01583

DATE: January 8, 2014
PROJECT NAME: Raw Water Pump Station
PROJECT NUMBER: 224802.20
PLANT LOCATION:

RE: **Lowell Regional Water Utility**
Raw Water Pump Station - Repaving
Notice of Intent

WE ARE SENDING:

- ☐ Quotation
- ☐ Drawings
- ☐ Bid Package
- ☐ Floppy Disk / CD
- ☐ Brochure
- ☐ Schedule
- ☐ Installation Package
- ☐ Sample
- ☐ Change Order
- ☐ Manuals
- ☒ Other (specify) Notice of Intent

Qty.	Doc. No.	Rev. No.	Dated	Description
1			1-8-14	Notice of Intent

For Your:

- ☐ USE
- ☒ APPROVAL
- ☐ REVIEW/COMMENTS
- ☐ INFORMATION
- ☐ OTHER

Sent By:

- ☐ REGULAR MAIL
- ☒ FEDERAL EXPRESS
- ☐ UPS
- ☐ COURIER
- ☐ OTHER

COMMENTS:

BY: Bridget Mitchell

14

2013 00039150
Bk: 27496 Pg: 267 Page: 1 of 14
Recorded: 07/18/2013 09:29 AM

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
206-0707
MassDEP File #

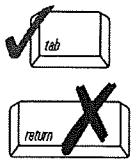
eDEP Transaction #

Lowell
City/Town

A. General Information

Please note: this form has been modified with added space to accommodate the Registry of Deeds Requirements

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. From: Lowell
Conservation Commission

2. This issuance is for (check one): a. ☒ Order of Conditions b. ☐ Amended Order of Conditions

3. To: Applicant:

Dan — a. First Name
Lahiff — b. Last Name
Lowell Regional Water Utility — c. Organization
815 Pawtucket Blvd. — d. Mailing Address
Lowell — e. City/Town
MA — f. State
01854 — g. Zip Code

4. Property Owner (if different from applicant):

a. First Name
b. Last Name
c. Organization
d. Mailing Address
e. City/Town
f. State
g. Zip Code

5. Project Location:

178 Stackpole St. & 1600 VFW Highway — a. Street Address
Lowell — b. City/Town
199, 198 — c. Assessors Map/Plat Number
5470-178, 5915-1600 — d. Parcel/Lot Number

Latitude and Longitude, if known: 42d38m44s — d. Latitude; 71d17m56s — e. Longitude

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

Middlesex
a. County

b. Certificate Number (if registered land)

2014
c. Book

428
d. Page

7. Dates: May 22, 2013 (a. Date Notice of Intent Filed) June 12, 2013 (b. Date Public Hearing Closed) June 18, 2013 (c. Date of Issuance)

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

Stackpole Street Pump Station - High Pressure Main Improvements (Cover Sheet, G-01, and C-01 through C-05)

Woodward & Curran
b. Prepared By

Arthur Leventis
c. Signed and Stamped by

May, 2013
d. Final Revision Date

1" = 40'
e. Scale

f. Additional Plan or Document Title

g. Date

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

a. ☒ Public Water Supply
b. ☐ Land Containing Shellfish
c. ☒ Prevention of Pollution
d. ☒ Private Water Supply
e. ☒ Fisheries
f. ☒ Protection of Wildlife Habitat
g. ☒ Groundwater Supply
h. ☒ Storm Damage Prevention
i. ☒ Flood Control

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

a. ☒ the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

B. Findings (cont.)

Denied because:

b. ☐ the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**

c. ☐ the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**

3. ☐ Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) — a. linear feet

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. ☒ Bank	40 a. linear feet	40 b. linear feet	40 c. linear feet	40 d. linear feet
5. ☐ Bordering Vegetated Wetland	a. square feet	b. square feet	c. square feet	d. square feet
6. ☒ Land Under Waterbodies and Waterways	600 a. square feet	600 b. square feet	600 c. square feet	600 d. square feet
	e. c/y dredged	f. c/y dredged		
7. ☒ Bordering Land Subject to Flooding	805 a. square feet	805 b. square feet	805 c. square feet	805 d. square feet
Cubic Feet Flood Storage	e. cubic feet	f. cubic feet	g. cubic feet	h. cubic feet
8. ☐ Isolated Land Subject to Flooding	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. ☒ Riverfront Area	790 a. total sq. feet	790 b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

B. Findings (cont.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. ☐ Land Under the Ocean	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. ☐ Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. ☐ Coastal Beaches	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
14. ☐ Coastal Dunes	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
15. ☐ Coastal Banks	a. linear feet	b. linear feet		
16. ☐ Rocky Intertidal Shores	a. square feet	b. square feet		
17. ☐ Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. ☐ Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. ☐ Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. ☐ Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. ☐ Land Subject to Coastal Storm Flowage	a. square feet	b. square feet		

B. Findings (cont.)

* **#22.** If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

22. ☐ Restoration/Enhancement *:

a. square feet of BVW | b. square feet of salt marsh

23. ☐ Stream Crossing(s):

a. number of new stream crossings | b. number of replacement stream crossings

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
   a. the work is a maintenance dredging project as provided for in the Act; or
   b. the time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order.
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on 6/18/2016 unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.
8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.

10. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words,

    "Massachusetts Department of Environmental Protection" [or, "MassDEP"]

    "File Number 206-0707 "

11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.

12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.

13. The work shall conform to the plans and special conditions referenced in this order.

14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.

15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

NOTICE OF STORMWATER CONTROL AND MAINTENANCE REQUIREMENTS

19. **The work associated with this Order (the "Project") is** (1) ☒ **is not** (2) ☐ **subject to the Massachusetts Stormwater Standards. If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:**

a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.

b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
i. all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
ii. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
iii. any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;
iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;
v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement) for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following: *i.*) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and *ii.*) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 18(f) through 18(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 18(f) through 18(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.

h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.

i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.

j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.

k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.

l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):

SEE ATTACHED TWELVE (12) SPECIAL CONDITIONS ENTITLED "LOWELL CONSERVATION COMMISSION: SPECIAL CONDITIONS"

D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? ☒ Yes ☐ No

2. The Lowell Conservation Commission hereby finds (check one that applies):

   a. ☐ that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

   1. Municipal Ordinance or Bylaw | 2. Citation

   Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

   b. ☒ that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

   Lowell Wetlands Ordinance (1. Municipal Ordinance or Bylaw) | Chpt. 280 Sect. 1 - 13

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

   The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):

   SEE ATTACHED TWELVE (12) SPECIAL CONDITIONS ENTITLED "LOWELL CONSERVATION COMMISSION SPECIAL CONDITIONS"

E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

1. Date of Issuance

Please indicate the number of members who will sign this form.
This Order must be signed by a majority of the Conservation Commission.

2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

Signatures:

☐ by hand delivery on

Date

☐ by certified mail, return receipt requested, on

Date

F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request of Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

G. Recording Information

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Project Location | MassDEP File Number

Has been recorded at the Registry of Deeds of:

County | Book | Page

for: Property Owner

and has been noted in the chain of title of the affected property in:

Book | Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

List of Property Owners

178 Stackpole Street (map 199, parcel 5470-178)

City of Lowell
375 Merrimack Street
Lowell, MA 01852
2014/ 428

1600 VFW Highway (map 198, parcel 5915-1600)

Commonwealth of Massachusetts
10 Park Plaza
Boston, MA 02116

LOWELL CONSERVATION COMMISSION:
SPECIAL CONDITIONS

1. **Forty-eight (48) hours** prior to the commencement of any work, the Lowell Conservation Commission will be given written notification of said work.
2. **No Work shall commence until this Order of Conditions has been recorded at the Registry of Deeds,** Middlesex North and the recording information has been submitted to the Lowell Conservation Commission office.
3. Failure to record this Order of Conditions within **twenty-eight (28)** days from the date of issuance will result in the Order becoming Null and Void.
4. Additional erosion/sedimentation control measures shall be installed as deemed necessary at the direction of the Lowell Conservation Commission and/or the agent (s).
5. The Lowell Conservation Commission reserves the right to impose additional conditions in order to protect the public interests as identified in M.G.L. 131, s40.
6. Any changes made or intended to be made in the plans submitted to the Lowell Conservation Commission shall require the applicant to inquire of this department in writing as to whether the change is significant enough to require the filing of a new Notice of Intent.
7. The Lowell Conservation Commission and/or the authorized representative(s) reserve the right to access the property at **any time** for the purpose of inspecting the work covered by this Order of Conditions.
8. This Order of Conditions shall be made a part of all construction specifications and contracts.
9. The Order of Conditions shall apply to any successor in control or successor in interest of the property described in the Notice of Intent and accompanying plans submitted to the Lowell Conservation Commission.
10. Unless otherwise specifically stated in this Order, this Order shall also be a permit under the City of Lowell Wetlands Ordinance, City of Lowell Code of Ordinances Chapter 280, Section 1-13 and all conditions of this Order shall also be conditions of such permit.
11. No plants shall be used that are listed as invasive or potentially invasive on the Massachusetts Invasive Plant Advisory Group (MIPAG) list of invasive plants. A list of plantings shall be submitted to the Conservation commission for approval.
12. **Upon completion of the project, the applicant shall submit with their request for a Certificate of Compliance**, a statement and as-built plans by a registered professional engineer, architect, landscape architect or land surveyor stating that the project has been built in accordance with this Order of Conditions and referenced site plans.

If you have any question regarding this Order of Conditions, Please contact the Lowell Conservation Commission office at (978) 674-4144

The City of Lowell • Dept. of Planning and Development • Division of Development Services
Lowell City Hall • 375 Merrimack Street • Lowell, MA 01852
P: 978.674.4144 • F: 978.446.7103
www.LowellMA.gov

Adam Baacke
Assistant City Manager/Director

R. Eric Slagle
Director of Development Services

Robert Marsilia
Building Commissioner

To: Daniel Lahiff

From: Swaathi Joseph, Assistant Planner/Conservation Agent

Date: February 24, 2014

Subject: Order of Conditions – Approval

Important: The Order of Conditions is a legal document! Please read the Order of Conditions carefully. Contact the Conservation Office if you have any questions.

The following must be done prior to the start of work:

1. Orders of Conditions must be recorded with the Middlesex North Registry of Deeds. Proof of recording must be returned to our office **before work can begin** on the site. Failure to record this Order within twenty-eight (28) days from the date of issuance may result in the Order becoming Null and Void subject to enforcement as identified in the Rules and Regulations of Lowell Conservation Commission.
2. A DEP sign with the appropriate file number shall be displayed at the site.
3. The Conservation Commission **must** be notified **48 hours** prior to construction to allow for inspection of siltation control devices.
4. Review your Order for any additional conditions before any work commences.

Please be aware that there is a **10-day appeal period** from the date on the Order of Conditions. If you start work during this time, you are working at your own risk.

Any change to the approved plans requires the applicant to contact the Conservation Commission in writing to determine whether the change is significant enough to require a new public hearing.

You have 3 years to complete the approved work.

Once work is complete, you shall submit a "**Request for Certificate of Compliance**" to the Conservation Commission to properly close out your file.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
206-0722
MassDEP File #

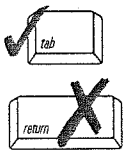
eDEP Transaction #

Lowell
City/Town

A. General Information

Please note: this form has been modified with added space to accommodate the Registry of Deeds Requirements

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. From: Lowell
Conservation Commission

2. This issuance is for (check one): a. ☒ Order of Conditions b. ☐ Amended Order of Conditions

3. To: Applicant:

Daniel (a. First Name) | Lahiff (b. Last Name)

Lowell Regional Water Utility
c. Organization

815 Pawtucket Blvd
d. Mailing Address

Lowell (e. City/Town) | MA (f. State) | 01854 (g. Zip Code)

4. Property Owner (if different from applicant):

(a. First Name) | (b. Last Name)

City of Lowell
c. Organization

375 Merrimack Street
d. Mailing Address

Lowell (e. City/Town) | MA (f. State) | 01852 (g. Zip Code)

5. Project Location:

1002/1194 Pawtucket Boulevard
a. Street Address

Lowell
b. City/Town

23
c. Assessors Map/Plat Number

Block 4540 Parcel 1194
d. Parcel/Lot Number

Latitude and Longitude, if known: 42d38m31.38s (d. Latitude) | -71d22m30.96s (e. Longitude)

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

Middlesex
a. County

b. Certificate Number (if registered land)

5686
c. Book

343
d. Page

7. Dates: 1/2/2014 a. Date Notice of Intent Filed; 2/12/2014 b. Date Public Hearing Closed; 2/24/2014 c. Date of Issuance

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

Raw Water Pump Station Site Plan
a. Plan Title

Woodard & Curran
b. Prepared By

c. Signed and Stamped by

2/5/14
d. Final Revision Date

e. Scale

f. Additional Plan or Document Title

g. Date

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

a. ☐ Public Water Supply
b. ☐ Land Containing Shellfish
c. ☒ Prevention of Pollution
d. ☐ Private Water Supply
e. ☐ Fisheries
f. ☐ Protection of Wildlife Habitat
g. ☐ Groundwater Supply
h. ☒ Storm Damage Prevention
i. ☒ Flood Control

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

a. ☒ the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

B. Findings (cont.)

Denied because:

b. ☐ the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**

c. ☐ the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**

3. ☐ Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) _____ a. linear feet

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. ☐ Bank	a. linear feet	b. linear feet	c. linear feet	d. linear feet
5. ☐ Bordering Vegetated Wetland	a. square feet	b. square feet	c. square feet	d. square feet
6. ☐ Land Under Waterbodies and Waterways	a. square feet	b. square feet	c. square feet	d. square feet
	e. c/y dredged	f. c/y dredged		
7. ☒ Bordering Land Subject to Flooding	14,439 a. square feet	14,439 b. square feet	14,439 c. square feet	14,439 d. square feet
Cubic Feet Flood Storage	e. cubic feet	f. cubic feet	g. cubic feet	h. cubic feet
8. ☐ Isolated Land Subject to Flooding	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. ☒ Riverfront Area	3,883 a. total sq. feet	3,883 b. total sq. feet		
Sq ft within 100 ft	3,883 c. square feet	3,883 d. square feet	3,883 e. square feet	3,883 f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

B. Findings (cont.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. ☐ Land Under the Ocean	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. ☐ Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. ☐ Coastal Beaches	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
14. ☐ Coastal Dunes	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
15. ☐ Coastal Banks	a. linear feet	b. linear feet		
16. ☐ Rocky Intertidal Shores	a. square feet	b. square feet		
17. ☐ Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. ☐ Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. ☐ Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. ☐ Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. ☐ Land Subject to Coastal Storm Flowage	a. square feet	b. square feet		

B. Findings (cont.)

* **#22.** If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

22. ☐ Restoration/Enhancement *:

a. square feet of BVW | b. square feet of salt marsh

23. ☐ Stream Crossing(s):

a. number of new stream crossings | b. number of replacement stream crossings

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
   a. the work is a maintenance dredging project as provided for in the Act; or
   b. the time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order.
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on 2/24/2017 unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.
8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.

10. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words,

    "Massachusetts Department of Environmental Protection" [or, "MassDEP"]

    "File Number 206-0722 "

11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.

12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.

13. The work shall conform to the plans and special conditions referenced in this order.

14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.

15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

NOTICE OF STORMWATER CONTROL AND MAINTENANCE REQUIREMENTS

19. **The work associated with this Order (the "Project") is** (1) ☒ **is not** (2) ☐ **subject to the Massachusetts Stormwater Standards. If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:**

a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.

b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
i. all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
ii. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
iii. any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;
iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;
v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement) for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following: *i.*) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and *ii.*) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 18(f) through 18(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 18(f) through 18(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.

h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.

i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.

j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.

k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.

l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):

See attached "Standard Lowell Order of Conditions"

D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? ☒ Yes ☐ No

2. The Lowell Conservation Commission hereby finds (check one that applies):

   a. ☐ that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

   _____ (1. Municipal Ordinance or Bylaw) _____ (2. Citation)

   Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

   b. ☒ that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

   City of Lowell Wetlands Ordinance (1. Municipal Ordinance or Bylaw) Ch. 280, S. 1-13 (2. Citation)

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

   The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):

   See attached "Standard Lowell Order of Conditions"

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
206-722
MassDEP File #

eDEP Transaction #

Lowell
City/Town

E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

2-24-2014
1. Date of Issuance

Please indicate the number of members who will sign this form.
This Order must be signed by a majority of the Conservation Commission.

4
2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

Signatures:

Katy Bleau

☐ by hand delivery on

Date

☒ by certified mail, return receipt requested, on
2-25-2014

Date

F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request of Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

G. Recording Information

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Project Location | MassDEP File Number

Has been recorded at the Registry of Deeds of:

County | Book | Page

for: Property Owner

and has been noted in the chain of title of the affected property in:

Book | Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

STANDARD LOWELL ORDER OF CONDITIONS

1. **Forty-eight (48) hours** prior to the commencement of any work, the Lowell Conservation Commission will be given written notification of said work.
2. **No Work shall commence until this Order of Conditions has been recorded at the Registry of Deeds**, Middlesex North and the recording information has been submitted to the Lowell Conservation Commission office.
3. Failure to record this Order of Conditions within **twenty-eight (28)** days from the date of issuance may result in the Order becoming Null and Void subject to enforcement as identified in the Rules and Regulations of Lowell Conservation Commission.
4. Additional erosion/sedimentation control measures shall be installed as deemed necessary at the direction of the Lowell Conservation Commission and/or the agent (s).
5. The Lowell Conservation Commission reserves the right to impose additional conditions in order to protect the public interests as identified in M.G.L. 131, s40.
6. Any changes made or intended to be made in the plans submitted to the Lowell Conservation Commission shall require the applicant to inquire of this department in writing as to whether the change is significant enough to require the filing of a new Notice of Intent.
7. The Lowell Conservation Commission and/or the authorized representative(s) reserve the right to access the property at **any time** for the purpose of inspecting the work covered by this Order of Conditions.
8. This Order of Conditions shall be made a part of all construction specifications and contracts.
9. The Order of Conditions shall apply to any successor in control or successor in interest of the property described in the Notice of Intent and accompanying plans submitted to the Lowell Conservation Commission.
10. Unless otherwise specifically stated in this Order, this Order shall also be a permit under the City of Lowell Wetlands Ordinance, City of Lowell Code of Ordinances Chapter 280, Section 1-13 and all conditions of this Order shall also be conditions of such permit.
11. No plants shall be used that are listed as invasive or potentially invasive on the Massachusetts Invasive Plant Advisory Group (MIPAG) list of invasive plants. A list of plantings shall be submitted to the Conservation commission for approval.
12. **Upon completion of the project, the applicant shall submit with their request for a Certificate of Compliance**, a statement and as-built plans by a registered professional engineer, architect, landscape architect or land surveyor stating that the project has been built in accordance with this Order of Conditions and referenced site plans.

If you have any question regarding this Order of Conditions, Please contact the Lowell Conservation Commission office at (978) 674-4252.

COMMITMENT & INTEGRITY
DRIVE RESULTS

40 Shattuck Road
Suite 110
Andover, Massachusetts 01810
www.woodardcurran.com

T 866.702.6371
T 978.557.8150
F 978.557.7948

TRANSMITTAL

WOODARD &CURRAN

TO: City of Lowell Department of Planning and Development
C/O Joseph Giniewicz, Assistant Planner
375 Merrimack Street
Lowell, MA 01852

DATE: February 28, 2014
PROJECT NAME: Water System Improvements
PROJECT NUMBER: 224802.20
PLANT LOCATION:

RE: Special Permit Application
Lowell Regional Water Utility
Stackpole Street Pump Station

WE ARE SENDING:

☐ Quotation ☐ Drawings ☐ Bid Package ☐ Floppy Disk / CD
☐ Brochure ☐ Schedule ☐ Installation Package ☐ Sample
☐ Change Order ☐ Manuals ☒ Other (specify) Special Permit Application

Qty.	Doc. No.	Rev. No.	Dated	Description
8	1		02-27-14	Special Permit Application

For Your:

☐ USE
☒ APPROVAL
☐ REVIEW/COMMENTS
☐ INFORMATION
☐ OTHER

Sent By:

☐ REGULAR MAIL
☐ FEDERAL EXPRESS
☐ UPS
☒ COURIER
☐ OTHER

COMMENTS: Attached, please find eight (8) copies of the special permit application submitted by Woodard & Curran on behalf of the Lowell Regional Water Utility. One (1) copy has a set of full size (24x36) plot plans. The remaining seven (7) copies have sets of reduced size (11x17) plot plans. Please do not hesitate to contact me with any questions.

BY: Nathan Little

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Andover, Massachusetts 01810
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T 866.702.6371
T 978.557.8150
F 978.557.7948

February 27, 2014

Zoning Board of Appeals
City of Lowell
375 Merrimack Street
Lowell, MA 01852

Re: Special Permit Application
Lowell Regional Water Utility
Stackpole Street Pump Station
MassDEP Project # NE 206-0722

Dear Zoning Board of Appeals Members:

Enclosed, please find the application requesting relief for zoning variances for the proposed construction project at the Lowell Regional Water Utility's (LRWU) Stackpole Street Booster Pumping Station (PS) located at 178/180 Stackpole Street. The enclosed application includes all items identified on the Petition/Application Checklist dated August 9, 2011, including:

- Completed Application Form
- One (1) set of original certified ZBA Plot Plans (Sheets C-301, C-302, and S-301) and completed Zoning Analysis worksheet for 178/180 Stackpole Street
- Certified List of Parties in Interest and Labels
- Certificate of Tax Status provided by the City Treasurer
- Copy of the Notice of Disposal in Tax Lien Case for 178 Stackpole Street obtained from the Middlesex North Registry of Deeds website
- Design Plan of proposed construction that shows the appearance and design of the proposed structures (see Sheets C-301, C-302, and S-301)
- Contact Information Sheet for The Lowell Sun
- Proposed findings and hardship statements, below
- Additional Information, including a project description, below

Project Description: The Stackpole Street Booster PS is one of two primary facilities within the water distribution system that transfer water from the low service area to the high service area, which serves approximately 15% of customers in the City of Lowell. The existing PS was built in 1947 and last rehabilitated in 1995 and is in need of replacement. The proposed work at 178/180 Stackpole Street includes;

- Installation of a new, pre-fabricated booster pumping station,
- Relocating the existing emergency generator,
- Upgrading electrical service and installing new SCADA instrumentation and radio panel,
- Connecting suction and discharge mains from the new PS to the existing water mains,
- Demolition and removal of existing PS and associated equipment,
- Finish site work including repaving, installation of new fence and guardrails, replacing sidewalks, and relocating the existing curb cut.

Proposed Findings and Hardship Statements: The Stackpole Street Booster PS, located at 178/190 Stackpole Street, is located within the TTF zoning district. All applicable variances described herein are based on the Lowell Zoning Ordinance, Chapter 290 of the City Code of Ordinances. Please note that property line measurements are based on a single lot for 178/190 Stackpole Street. The zoning variances that are being requested include relief from the following zoning requirements. A summary table is presented below. A complete zoning analysis is presented in the zoning analysis worksheet in the application package.

1. **Minimum front yard**. The minimum front yard required for any building besides a 1 family dwelling is 15 feet based on Section 5.1 of Article V of the Zoning Ordinance. The existing front yard is 6.6 feet from the property line (10 feet from the fence/sidewalk) to the pump station and 0.35 feet from the property line (3.9 feet from the fence/sidewalk) to the generator pad. The proposed front yard is 7.75 feet from the property line (11.3 feet from the fence/sidewalk) to the new pump station. This represents an increase of approximately 1 foot or 7 feet of front yard from the property line to the existing pump station or generator pad, respectively, compared to the proposed pump station. Measurements are taken from exterior building walls. Note that the proposed ramp is 1.7 feet from the property line. Note also that both the existing and proposed fence and gate extend beyond the property line on the south side of the property and into the right of way. Refer to Sheet C-302 of the Design Plans. The proposed work and location of the new pump station will increase lot front yard at the site. Relief from the minimum front yard zoning requirement for the proposed structure is requested due to site constraints limiting construction of a conforming structure. As shown on Sheet C-302, the gradation of the lot turns to a severe slope as you move north towards the Merrimack River. This slope does not allow for construction of the new pump station in this area and severely limits the area to the north of the site that the pump station can be located. It also limits the area that heavy equipment can be positioned to install the new pump station. Due to these site constraints, the LRWU requests relief from the minimum lot front yard zoning requirement.
2. **Minimum side yard**. The minimum side yard required is 10 feet sum 25 feet based on Section 5.1 of Article V of the Zoning Ordinance. The existing side yard is 18.2 feet to the transformer pad or 27.3 feet to the existing pump station from the west property line and 73 feet to the existing generator pad or 98 feet to the existing pump station from the east property line. The proposed side yard is 5 feet to the generator pad or 61.3 feet to the new pump station from the west property line and 58 feet to the new pump station from the west property line. Relief from the minimum side yard zoning requirement for the proposed structure is requested due to site constraints limiting relocation of the existing generator. As shown on Sheet C-302, the gradation of the lot turns to a severe slope as you move north towards the Merrimack River. This slope does not allow for construction of the generator in this area. In addition, sequencing of work required for construction of the new pump station requires the existing generator to be relocated and placed online while the existing pump station is still in service and the new pump station is constructed. Also, per National Grid standards we are required to maintain 10 feet of clearance between the proposed generator and transformer, further restricting the proposed site locations. Due to these site constraints and construction sequencing requirements, the LRWU requests relief from the minimum side yard zoning requirement.
3. **Maximum curb cut width**. The maximum curb cut width is 15 feet based on footnotes in 6.1.10 Table of Dimensional Requirements for Off-Street Parking in Article VI of the Zoning Ordinance. The existing curb cut for the site is 24 feet. The proposed curb cut will be 20 feet to maintain access for utility vehicles and heavy machinery, as necessary. The new curb cut will not impact the neighborhood character, availability of on-street parking, stormwater management, or municipal infrastructure as the new curb cut will reduce the width from the existing curb cut. Also, the existing curb cut will be replaced with new concrete sidewalk and granite curbing. Regarding stormwater management, runoff will continue to flow in a northeasterly direction towards the Merrimack River. Note that a Driveway Permit application has been submitted for review to the City of Lowell Department of Public Works including

more detailed stormwater management calculations. Due to the pump station maintenance and access requirements, and limitation of impacts to the neighborhood, the LRWU requests relief from the maximum curb cut requirement.

Summary of Variances Requested

Zoning Requirement	Required	Existing	Proposed
Minimum Front Yard (ft.)	15	6.6 (Pump Station) 0.35 (Generator)	7.75 (Pump Station)
Minimum Side Yard (2) (ft.)	10 sum 25	27 sum 100	5 sum 63
Maximum Curb Cut (ft.)	15	24	20

If you have any questions or concerns, please contact me at (978) 557-8150.

Sincerely,

WOODARD & CURRAN INC.

Nathan H. Little
Engineer

WOODARD & CURRAN INC.

Robert C. Chapell, P.E.
Vice President

RCC/nhl
224802.20

Enclosure(s): Zoning Board of Appeals Special Permit Application

cc: Daniel Lahiff, Executive Director, LRWU
Robert S. Little, P.E., Vice President, Woodard & Curran

Zoning Board of Appeals

APPLICATION

Date of Application: 2/27/14

Name of Applicant: Lowell Regional Water Utility

Address: 815 Pawtucket Blvd, Lowell, MA 01854

Telephone: (978) 674-4240

Location of Property: 178 + 180 Stackpole St, Lowell, MA 01852

Petitioner's Relationship to Property: Owner
(i.e. owner, tenant, prospective purchaser, lessee, etc.)

District/Zone of Property Location: ITF

State present use of premises: Municipal Water Pump Station

State proposed use of premises: Municipal Water Pump Station

Give extent of proposed alterations, if any: See cover letter attached

Request is for: (Special Permit(s)) (Variance(s)) **Other (specify)**

1. **Type of Special Permit(s), Variance(s), or Other Relief requested:** "Reconstruction of a non-conforming structure", reconstruction of non-conforming site entrance.

2. **Please state why you feel the requested relief sought should be granted (attach additional sheets if necessary):**

See cover letter attached.

ZBA APPLICATION (cont.)

Applicable sections of the Building Code/Zoning Ordinance with full description:
(an additional sheet may be attached if necessary)
Applicable sections of the building code/zoning ordinance include Article IV (Non-conforming structures, 4.5.3), Article V (5.1 Dimensional Requirements) and Article VI (6.1.4 Parking Requirements; 6.1.10 Dimensional Requirements for off-street parking).

Have you submitted plans for the above to the Building Inspector? **YES** **or** **(NO)**

Date of denial by Building Inspector
(if applicable please attach denial letter): N/A

Has any application, appeal, or petition for relief from the Zoning Ordinance been previously made with respect to this property? **YES** **or** **(NO)**

If so, please state when, what relief was sought and whether the relief was granted or denied:

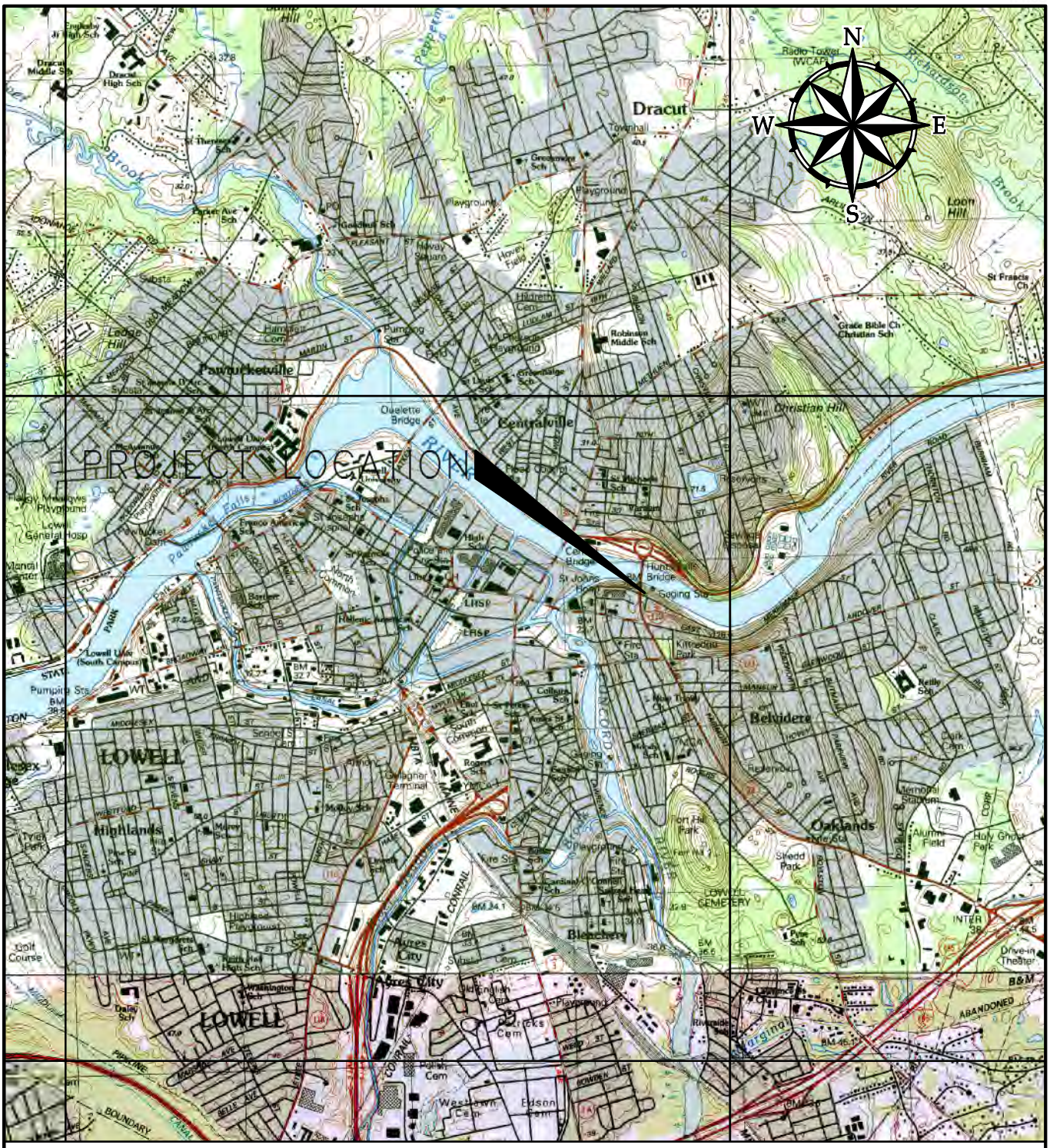
N/A

I have read the instructions for Petitioner. The information contained in this application is true to the best of my knowledge and belief and I hereby request a hearing before the Zoning Board of Appeals with reference to the above-noted application, appeal or petition.

Signed: _____
Applicant/Petitioner/Appellant

Title: Executive Director

****



SCALE: 1:31250

SOURCE
U.S.G.S. QUADRANGLE, LOWELL, MA,
PHOTO REVISED 1987, 15 MINUTE SERIES

WOODARD & CURRAN
980 Washington Street, Suite 325
Dedham, Massachusetts 02026
800.446.5518 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

LOCUS MAP

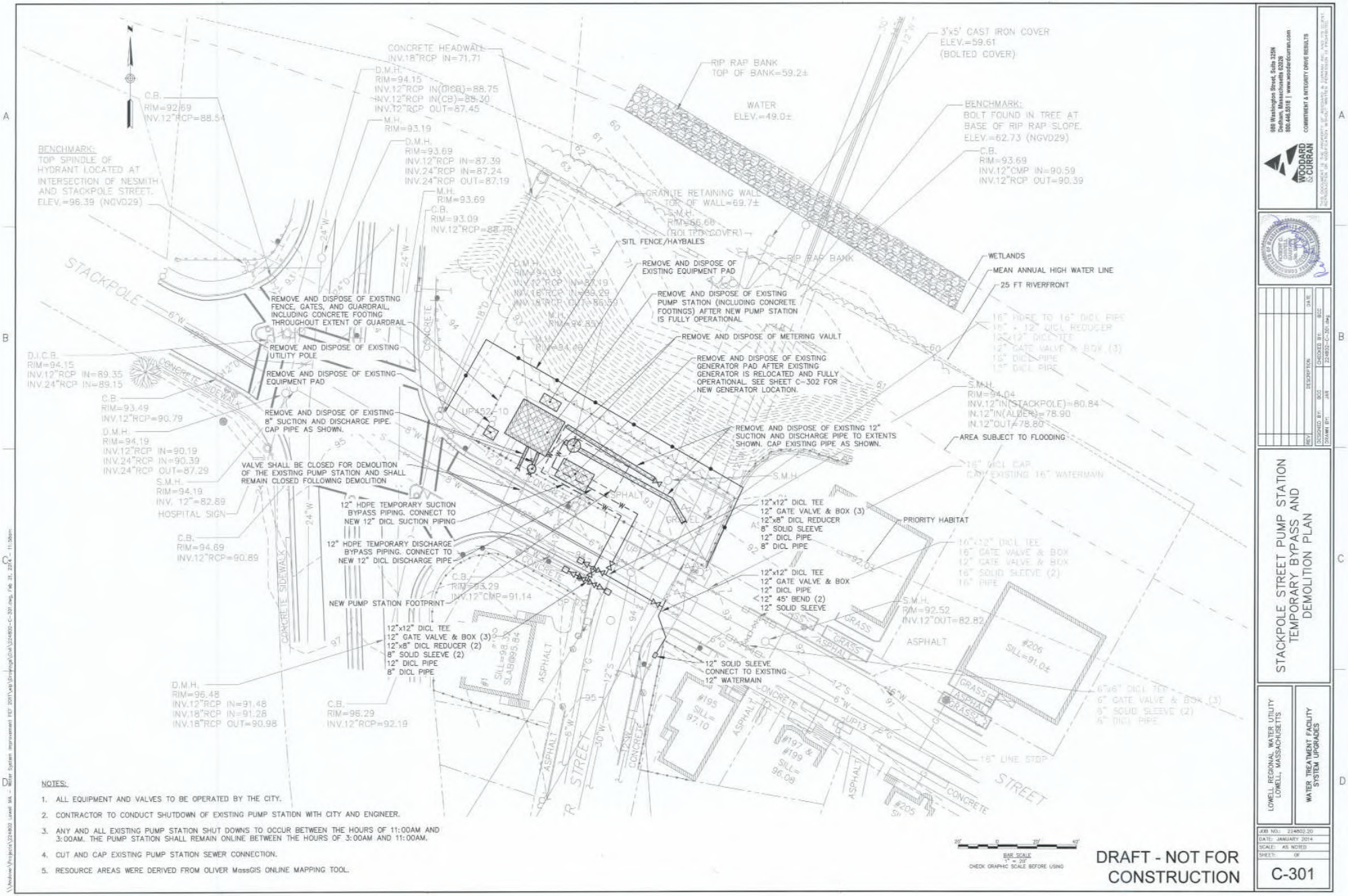
DESIGNED BY: NHL	CHECKED BY: NHL
DRAWN BY: NHL	224802-COVER.DWG

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER TREATMENT FACILITY
SYSTEM UPGRADES

JOB NO:	224802.20
DATE:	FEB 2014
SCALE:	AS NOTED

FIGURE 1



NOTES:

1. ALL EQUIPMENT AND VALVES TO BE OPERATED BY THE CITY.
2. CONTRACTOR TO CONDUCT SHUTDOWN OF EXISTING PUMP STATION WITH CITY AND EINGINEER.
3. ANY AND ALL EXISTING PUMP STATION SHUT DOWNS TO OCCUR BETWEEN THE HOURS OF 11:00AM AND 3:00AM. THE PUMP STATION SHALL REMAIN ONLINE BETWEEN THE HOURS OF 3:00AM AND 11:00AM.
4. CUT AND CAP EXISTING PUMP STATION SEWER CONNECTION.
5. RESOURCE AREAS WERE DERIVED FROM OLIVER MassGIS ONLINE MAPPING TOOL.

DRAFT - NOT FOR CONSTRUCTION

WOODARD & CURRAN
888 Washington Street, Suite 3250N
Dedham, Massachusetts 02026
800.446.5918 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE
DESIGNED BY:	BCC	
DRAWN BY:	JAR	
CHECKED BY:	BCC	
224802-C-301.dwg		

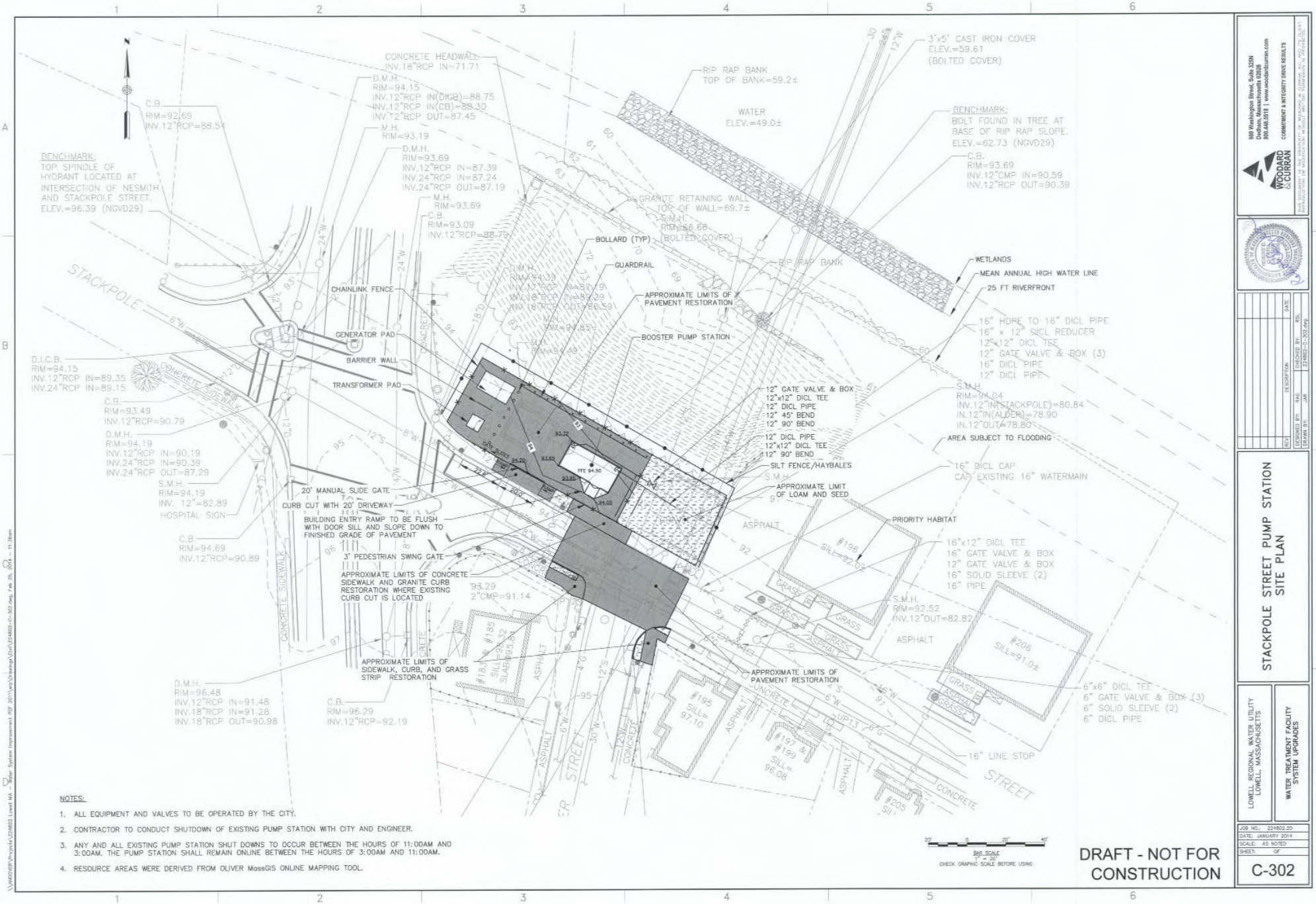
STACKPOLE STREET PUMP STATION
TEMPORARY BYPASS AND
DEMOLITION PLAN

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER TREATMENT FACILITY
SYSTEM UPGRADES

JOB NO.: 224802.20
DATE: JANUARY 2014
SCALE: AS NOTED
SHEET: OF

C-301



NOTES:

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DRAFT - NOT FOR CONSTRUCTION

WOODARD & CURRAN
980 Washington Street, Suite 325N
Dedham, Massachusetts 02026
800.446.5518 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

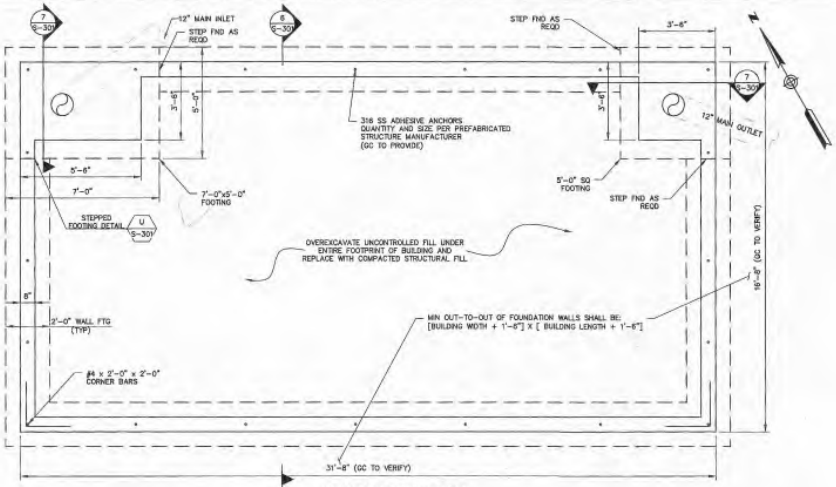
REV	DESCRIPTION	DATE
	DESIGNED BY: RAG	CHECKED BY: RSL
	DRAWN BY: JAR	224802-C-302.dwg

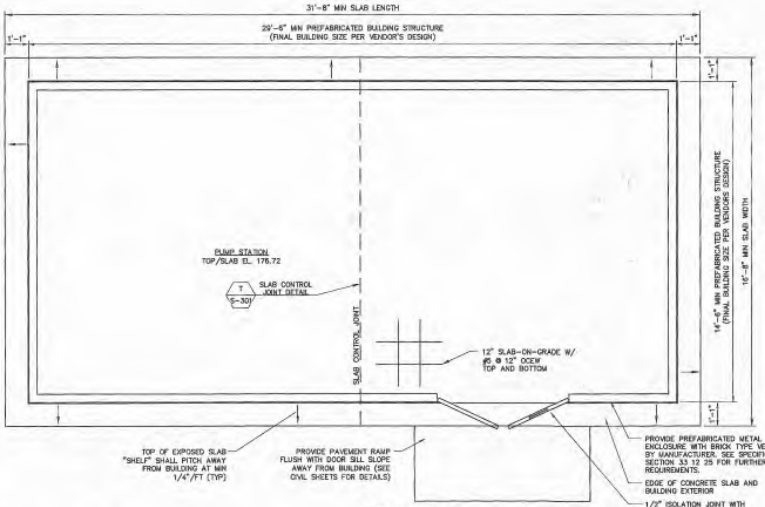
STACKPOLE STREET PUMP STATION
SITE PLAN

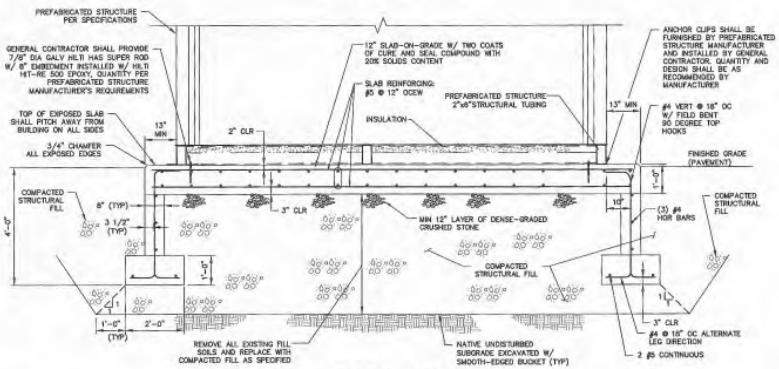
LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

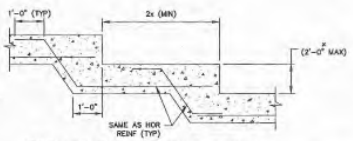
WATER TREATMENT FACILITY SYSTEM UPGRADES

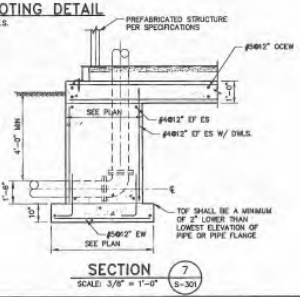
JOB NO.: 224802.20
DATE: JANUARY 2014
SCALE: AS NOTED
SHEET: OF
C-302

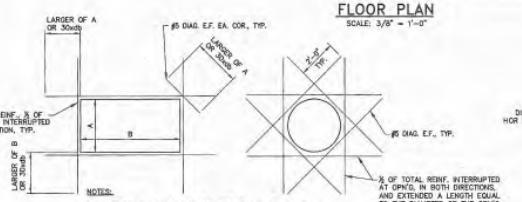


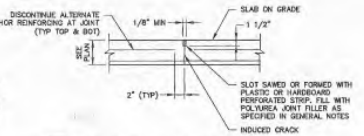












GENERAL NOTES:

A. FOUNDATIONS:

1. REFER TO GEOTECHNICAL REPORT PREPARED BY S.W. COLE ENGINEERING, INC, DATED NOVEMBER 14, 2013, FOR GEOTECHNICAL RECOMMENDATIONS.
2. ALL WALL FOOTINGS SHALL BEAR ON A 12" MINIMUM LAYER OF COMPACTED STRUCTURAL FILL AT A MINIMUM DEPTH OF 4' BELOW ADJACENT FINISH EXTERIOR GRADE.
3. PROVIDE CONTROL OF SURFACE AND SUBSURFACE WATER AS REQUIRED TO INSURE THAT ALL FOUNDATION WORK IS DONE IN THE DRY.
4. NO FOUNDATION SHALL BE PLACED ON FROZEN SUBGRADE. PROTECT IN-PLACE FOUNDATIONS AND SLAB-ON-GRADE FROM FROST PENETRATION UNTIL THE PROJECT IS COMPLETE.
5. EXISTING UNCONTROLLED FILL SOILS SHALL BE OVER-EXCAVATED BELOW THE ENTIRE FOOTPRINT OF THE BUILDING AND REPLACED WITH COMPACTED STRUCTURAL FILL. CONTRACTOR SHALL ASSUME FILL SOILS EXTEND BELOW THE BOTTOM OF THE WALL FOOTINGS A DEPTH OF 2 FEET. FOOTING ELEVATIONS SHOWN ON THE DRAWINGS REPRESENT ESTIMATED DEPTHS AND ARE NOT TO BE CONSTRUED AS LIMITING THE AMOUNT OF EXCAVATION REQUIRED TO REACH SUITABLE BEARING MATERIAL.
6. SAND/SILT SUBGRADE WILL UNDERGO SUBSTANTIAL STRENGTH LOSS WHEN SUBJECT TO CONSTRUCTION TRAFFIC AND PERIODS OF PERCOLATION. SOILS THAT BECOME YIELDING OR DIFFICULT TO WORK SHALL BE REMOVED AND REPLACED WITH COMPACTED STRUCTURAL FILL.
7. FOUNDATIONS AND SLAB-ON-GRADE HAVE BEEN DESIGNED FOR A 55,000 LBS UNFACTORED PREFABRICATED BUILDING STRUCTURE. NOTIFY ENGINEER, IN WRITING, IF WEIGHT OF PREFABRICATED BUILDING IS MORE THAN 55,000 LBS.

B. CONCRETE:

1. CONCRETE WORK, STEEL REINFORCING BARS, AND CONCRETE MIX DESIGN SHALL BE IN ACCORDANCE WITH DIVISION 3 OF THE SPECIFICATIONS.
2. CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
3. DETAILING, FABRICATION AND ERECTION OF REINFORCING STEEL SHALL BE DONE IN ACCORDANCE WITH LATEST EDITION OF ACI 315 "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT".

4' 3' 2' 1' 0 3' 8'
BAR SCALE
3/8" = 1'-0"
CHECK GRAPHIC SCALE BEFORE USING

DRAFT - NOT FOR CONSTRUCTION

WOODARD & CURRAN
399 Washington Street, Suite 3250N
Dedham, Massachusetts 02026
800.446.5310 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE
DESIGNED BY: SWH	CHECKED BY: JPS/SWH	
DRAWN BY: DWE	224802-S-301.dwg	

STACKPOLE STREET PUMP STATION PLAN, ELEVATION, SECTIONS, & DETAILS

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER TREATMENT FACILITY SYSTEM UPGRADES

JOB NO.: 224802.20
DATE: JANUARY 2014
SCALE: AS NOTED
SHEET: OF

S-301

CITY OF LOWELL -- ZONING ANALYSIS

MUST BE COMPLETED FOR ZONING BOARD OF APPEALS APPLICATIONS

ADDRESS

CURRENT ZONING	REQUIRED	PROVIDED	RELIEF NEEDED	REPETITIVE
Minimum Lot Size (sq.ft.)	6000	18,550		
Height	35	12'-8"		
Max. Stories	2.5	1		
Minimum Lot Frontage (ft.)	80	148		
Minimum Front Yard (ft.)	15	7.75	7.25	
Maximum Front Yard (ft.)	20	7.75		
Minimum Rear Yard (ft.)	20	125		
Minimum Side Yard (2) (ft.)	10 sum 25	5 sum 63	5	
ADA Parking -- Van/Truck	N/A	N/A		
Parking Requirements	1 space / 1600 sqFt	See COMMENTS, below		
Lot Area Per DU	4000	18,550		
Usable Open Space	500 40S/DU	N/A		
Pool Offset to Dwelling	N/A	N/A		
Other	Curb Cut Width	See COMMENTS, below		

Please fill out all items applicable to your project.

FORM COMPLETED BY: Nathan Little, Woodard & Curran

DATE: 2/21/2014

COMMENTS:

Individual parking spaces are not identified within the parcel. The paved area shown to the west of the new pump station on Sheet C-302 will be used for parking. A relief from the maximum curb cut width is also requested, as described in the Cover Letter.

Office of the Board of Assessors
City Hall • 375 Merrimack Street • Lowell, MA 01852
P: 978.674.1102 • F: 978.970.4205
www.LowellMA.gov

Susan A. LeMay, M.A.A.
Chief Assessor
Joel H. Cohen, M.A.A.
Assessor
Karen A. Golden, M.A.A.
Assessor

February 21, 2014

Lowell Board of Appeals
375 Merrimack St
Lowell, MA 01852

Dear Board Members:

This is to attest that the individuals described on the attached listing are the certified list of parties in interest in Lowell, MA of the premises located at 178 Stackpole Street and 180 Stackpole Street, Lowell, MA.

Very truly yours,

Susan A. LeMay, M.A.A.
Chief Assessor
Board of Assessors

Abutters List – Board of Appeals
Attachment(s) – 4 pages
cc: Assessor File

SAL/kr

RE: 27 ALDER ST

BOGLE CLEVELAND A
BOGLE DEONN L
27 ALDER ST APT A
LOWELL, MA 01852

RE: 36 ALDER ST

MALDONADO OLIVIA
40 ALDER ST
LOWELL, MA 01852

RE: 40 ALDER ST

MALDONADO OLIVIA
40 ALDER ST
LOWELL, MA 01852

RE: 35 ALDER ST

MCGUIRE MICHAEL C
PO BOX 382
N CHELMSFORD, MA 01863

RE: 29 ALDER ST

VAN GULDEN DIRK
29 ALDER ST
LOWELL, MA 01852

RE: 118 BARTLETT ST

KANGAS ALICE L
118 BARTLETT ST
LOWELL, MA 01852-1304

RE: 12 BARTLETT ST

LOWELL GENERAL HOSPITAL THE
295 VARNUM AVE
LOWELL, MA 01854

RE: 110 BARTLETT ST

PARENT ARTHUR M
PARENT HELENE M
110 BARTLETT ST
LOWELL, MA 01852

RE: 120 BARTLETT ST

PILIOGLOS STEPHEN
5 SUMMIT ST
OLD ORCHARD BEACH, ME 04064

RE: 112 BARTLETT ST

TANNHEIMER JOHN R
TANNHEIMER SUSAN J
112 BARTLETT ST
LOWELL, MA 01852-1304

RE: 2 HOSPITAL DR

LOWELL GENERAL HOSPITAL THE
1 HOSPITAL DR
LOWELL, MA 01854

RE: 2.0 HOSPITAL DR

SAINTS MEMORIAL MEDICAL CENTER
C/O SAINTS DD INC
48 JUNCTION SQUARE DR
CONCORD, MA 01742

RE: 178 STACKPOLE ST

CITY OF LOWELL
TAX POSSESSION
375 MERRIMACK ST
LOWELL, MA 01852

RE: 178.2 STACKPOLE ST

LOWELL GENERAL HOSPITAL THE
295 VARNUM AVE
LOWELL, MA 01854

RE: 180 STACKPOLE ST

CITY OF LOWELL
WATER DEPT
375 MERRIMACK ST
LOWELL, MA 01852

RE: 183-185 STACKPOLE ST #A

TRS STEVO NOMINEE TRUST
O'NEILL STEVEN P TRUSTEE
31 ANDERSON DR
TYNGSBORO, MA 01879

RE: 183-185 STACKPOLE ST #B

TRS STEVO NOMINEE TRUST
O'NEILL STEVEN P TRUSTEE
31 ANDERSON DR
TYNGSBORO, MA 01879

RE: 195 STACKPOLE ST

SOR PHY
ENG NAIM B
SOR ARINA
SOR SOPHOIN
195 STACKPOLE ST
LOWELL, MA 01852

RE: 196 STACKPOLE ST

TRS 196-206 STACKPOLE ST REALTY TRUST
SIEGEL ADAM B
SIEGEL EDWARD A TRUSTEES
31 HALE RD
STOW, MA 01775

RE: 197 STACKPOLE ST

CHANG TUNG SHAN
CHANG SYLVESTINE
PO BOX 624
LOWELL, MA 01853-0624

RE: 205 STACKPOLE ST

SAMBORSKI KEITH A
205 STACKPOLE ST
LOWELL, MA 01852-1307

RE: 206 STACKPOLE ST

TRS 196-206 STACKPOLE ST REALTY TRUST
SIEGEL ADAM B
SIEGEL EDWARD A TRUSTEES
31 HALE RD
STOW, MA 01775

RE: 209 STACKPOLE ST

DESROCHERS ARMAND R
DESROCHERS LINDA D
209 STACKPOLE ST
LOWELL, MA 01852-1307

RE: 215 STACKPOLE ST

BIRCH EDWARD P
BIRCH EVELYN G
215 STACKPOLE ST
LOWELL, MA 01852-1307

RE: 219 STACKPOLE ST

SILVA LOUIE M
SILVA IRMA I
219 STACKPOLE ST
LOWELL, MA 01852

RE: 122 STACKPOLE ST

LOWELL GENERAL HOSPITAL THE
295 VARNUM AVE
LOWELL, MA 01854

RE: 222 STACKPOLE ST #5

ABORN-HYATT MARY
264 RIVER ST
BILLERICA, MA 01821

RE: 222 STACKPOLE ST #17

MAHONEY DANIEL F JR
16 FLEMING ST
LOWELL, MA 01851

RE: 222 STACKPOLE ST #16

CHOATE PATRICIA A
222 STACKPOLE ST UNIT 16
LOWELL, MA 01852

RE: 222 STACKPOLE ST #15

DAVID-SUN LLC
4 MYRNA RD
LEXINGTON, MA 02420

RE: 222 STACKPOLE ST #9

DIBELLA DIANNE L
222 STACKPOLE ST UNIT 9
LOWELL, MA 01852

RE: 222 STACKPOLE ST #3

EMERSON WILLIAM R
222 STACKPOLE ST UNIT 3
LOWELL, MA 01852

RE: 222 STACKPOLE ST #2

GODOY MERCEDES
222 STACKPOLE ST UNIT 2
LOWELL, MA 01852

RE: 222 STACKPOLE ST #14

GUERRERO JOSE LUIS
222 STACKPOLE ST UNIT 14
LOWELL, MA 01852

RE: 222 STACKPOLE ST #1

JOHNSON WESLEY
505 PROSPECT ST
METHUEN, MA 01844

RE: 222 STACKPOLE ST #12

KANE DANIEL J
222 STACKPOLE ST UNIT 12
LOWELL, MA 01852

RE: 222 STACKPOLE ST #11

KEENAN PATRICIA M
222 STACKPOLE ST UNIT 11
LOWELL, MA 01852

RE: 222 STACKPOLE ST #18

MARTINEZ SAMUEL
MARTINEZ F REBECCA
222 STACKPOLE ST UNIT 18
LOWELL, MA 01852

RE: 222 STACKPOLE ST #8

PINARD JULIE A
222 STACKPOLE ST UNIT 8
LOWELL, MA 01852

RE: 222 STACKPOLE ST #6

ROBERTS ANDREW T
222 STACKPOLE ST UNIT 6
LOWELL, MA 01852

RE: 222 STACKPOLE ST #10

STAMBOULIDIS CHRISTOS
STAMBOULIDIS MAGDALINI
10 ROBERT RD
RANDOLPH, MA 02368

RE: 222 STACKPOLE ST #4

SULLIVAN MICHAEL S
151 A ST
DRACUT, MA 01826

RE: 222 STACKPOLE ST #7

TRS RWM REALTY TRUST
MISELIS RANDALL W TRUSTEE
48 WOODLAND PARK DRIVE
HAVERHILL, MA 01853

RE: 222 STACKPOLE ST #13

WARNICK STEPHEN T
WILKERSON JEAN K
222 STACKPOLE ST UNIT 13
LOWELL, MA 01852

Development Services Division
Tax Verification Form

DEVELOPMENT SERVICES USE ONLY:

Master Parcel Address: 178 - 180 Stackpole St

Parcel Owner: City of Lowell

200394 - For 180

Municipal Charge Liens for fees/violations:

\+ No Outstanding Charge Liens

201238 - For 178

_____ Charge Lien Outstanding

_____ Charge Lien Paid, Not Yet Discharged Date Paid: _____

Clerk Initials: DD Date: 2-14-14

TREASURERS OFFICE USE ONLY:

✓ Taxes are current on property

_____ Customer has made a payment plan and is current on payments

_____ Customer is in TAX TITLE and has NOT made any payment plan with the Treasurer

✓ Water and Sewer are current on property

Other: _____

_____

_____

Clerk Initials: NM Date: 2-14-14

Elizabeth A Cannon

COMMONWEALTH OF MASSACHUSETTS

LAND COURT

CASE NO. 46700

NOTICE OF DISPOSAL IN TAX LIEN CASE

This is to certify that the petition of
City of Lowell

vs.

Walter J. Riley, and
Rita M. Riley, Trustees of
Shawsheen Realty Trust,

to foreclose its tax lien under a certain deed for non-payment of taxes, given by the Collector of Taxes for the City of Lowell in the County of Middlesex and said Commonwealth, dated August 28, 1967 and duly recorded in Book 1820 Page 3

was filed in this Court on April 1, 1971

Thereafter due proceedings under said petition were instituted according to law, and finally on June 2, 1972 a decree forever foreclosing and barring all rights of redemption under said deed was entered, and this notice of final disposition of said petition is directed to be recorded in the Registry of Deeds for the North District of Middlesex County, pursuant to Section 74 of Chapter 60 of the General Laws.

By the Court, (RANDALL, J.)

Attest:

Jeanne M. Maloney
Deputy Recorder

Dated June 2, 1972

fc

Rec June 16 1972 12:11PM #9814

August 9, 2011

Contact – Responsible Party

Date: 2/27/14

Applicant Name & Address: Nathan Little
Woodard + Curran
40 Shattuck Road - Suite 110
Andover, MA 01810

Applicant Phone Number: (978) 557-8150

Subject Location: 118 + 180 Stackpole St, Lowell, MA 01852

Scheduled Hearing Date: March 24, 2014

Petition Number: _____

Re: ZBA Notice of Public Hearing Advertisement with The Lowell Sun

Dear Applicant,

Please be advised that the Administrator of the Zoning Board of Appeals will arrange the publication of your advertisement for Notice of Public Hearing. In accordance with the requirements of Mass General Law, this advertisement will be published in the legal section of the paper on second and fourth Sundays preceding the date of the Public Hearing. As the applicant, you must pay for the actual cost of this advertising. The Lowell Sun will contact and/or bill you directly for this advertisement.

If you have any questions, please contact the Zoning Board of Appeals at the number above.

Thank you,

William Bailey, Chairman
Zoning Board of Appeals

Cc: The Lowell Sun Legal Advertising

The City of Lowell • Department of Planning and Development
City Hall, Rm. 55 • 375 Merrimack St. • Lowell, MA 01852
P: 978.674.4144 • F: 978.446.7103
www.LowellMA.gov

Diane N. Tradd
Acting DPD Director

Eric Slagle
Director

DEVELOPMENT SERVICES MEMORANDUM

DATE: March 12, 2014

TO: Nathan Little, Woodard & Curran

CC: Eric Slagle, Director of Development Services
Robert Marsilia, Building Commissioner
Joseph Giniewicz, Assistant Planner
Chairperson William Bailey & Members of the Lowell Zoning Board of Appeals

FROM: Swaathi Joseph, Assistant Planner

RE: 178-180 Stackpole Street Variance Application

PROJECT SUMMARY

Woodard & Curran has submitted a Variance application on behalf of Lowell Regional Water Utility to to replace the pumping station and associated equipment without meeting dimensional requirements for front yard and sideyard setbacks and curbcut width (pursuant to Sec. 5.1and 6.1.10 of the zoning code).

The property is located in the TTF (Traditional Two Family) zoning district. As noted in Section 3.1.1 of the City Zoning Ordinance, "Traditional Neighborhood Residential Districts are designed to preserve, promote and enhance the pedestrian-scale character of Lowell's historic residential neighborhoods."

DECISION CRITERIA & PREREQUISITES

The Lowell Zoning Ordinance and Massachusetts General Law (Ch. 40A, Sec. 10) state that the Zoning Board must find the following zoning prerequisites have been met before a variance may be granted. Specifically, section 11.2.3 states that, "the Board of Appeals is authorized to grant a variance from zoning ordinances only if each of the following jurisdictional conditions" exist:

1. Special hardship "owning to circumstances relating to the soil conditions shape or topography of such land or structures and especially affecting such land or structures but not affecting generally the zoning district."
2. If "relief can be granted without substantial detriment to the public good."
3. Relief requested can be granted "without nullifying or substantially derogating from the intent of the zoning."

DEVELOPMENT SERVICES COMMENTARY

Based on a review of the submitted materials, we offer the following to the Board for consideration. ***If the Board finds that the applicant has met the requirements for granting a Variance***, the following comments may either be clarified during the public hearing or be adopted as conditions in part or in whole to the approved relief. As always the Board may wish to add any additional conditions based on their review.

GENERAL COMMENTS

1. No Work shall commence until a Decision Letter has been recorded at the Registry of Deeds, Middlesex North and the recording information has been submitted to the Lowell Division of Development Services (DDS) office.
2. The Lowell Zoning Board and/or the authorized representative(s) reserve the right to access the property at any time for the purpose of inspecting the work covered by this proposal.
3. Documents approved by the Board and/or the agent (s) thereof shall be made a part of all construction specifications.
4. Any approval and conditions of said approval shall apply to any successor in control or successor in interest of the property described in the Variance Application and accompanying plans submitted to the Lowell Zoning Board of Appeals.

SPECIFIC COMMENTS

Development Services has reviewed the proposal and has no comments relative to the petition presented.

COMMITMENT & INTEGRITY
DRIVE RESULTS

40 Shattuck Road
Suite 110
Andover, Massachusetts 01810
www.woodardcurran.com

T 866.702.6371
T 978.557.8150
F 978.557.7948

May 16, 2014

Zoning Board of Appeals
City of Lowell
375 Merrimack Street
Lowell, MA 01852

Re: Response to the Decision on Case Number ZB-2014-011
Lowell Regional Water Utility
Stackpole Street Pump Station
MassDEP Project # NE 206-0722

Dear Zoning Board of Appeals Members:

The Board's Decision on Case Number ZB-2014-011 following the public hearing held in the City of Lowell's City Council Chambers on March 24, 2014 was **Granted w/ Conditions**. The conditions were as follows;

1. The applicant shall work with the Development Services Office to reduce the area of the parking lot and reuse the existing access.

2. The applicant shall work with the Development Services Office to develop a landscape plan to screen the generator and building.

3. The applicant shall work with the Development Services Office to relocate the generator away from the adjacent intersection and maybe consider using a mobile generator if possible.

Nathan Little (Woodard & Curran), Swaathi Joseph (Department of Planning and Development), and Joseph Giniewicz (Department of Planning and Development) met on April 8, 2014 to discuss the aforementioned conditions. The following paragraphs summarize the discussions regarding the aforementioned conditions;

1. Impervious Area: The proposed site would reduce the impervious area of the existing site from 5,206 square feet (sf) to 4,052 sf for a total reduction in impervious area of 22%. The reduction in impervious area will result in the creation of 1,172 sf of new "green" area to the east of the proposed pump station. Further reduction of impervious area is not feasible as vehicular access to the proposed pump station, generator, and transformer are necessary for operation and maintenance requirements.

   Site Access: Reusing the existing site access would not be feasible as the proposed location of the new pump station is directly in front of the existing access gate, which would restrict vehicular access to the site. The proposed location for the new pump station was selected due to site constraints, which included the existing pump station to the west, underground utilities to the east, and significant slope to the north. Therefore, a new site access gate is proposed to the west of the current access gate. A draft of the driveway permit application was submitted to the City Engineering Department for review on March 6, 2014. The final application will be submitted by the Contractor prior to construction.

2. Visual Screening: The possibility of visually screening the generator and building with landscaping and/or fencing was discussed. Fence screening would include either standard chain-link fence slats or hedgelink (slats with an artificial hedging appearance) along the west and south fence line up to the west most gate post. The fence screening will increase fencing costs for the project. Landscaping would include a 4 foot wide section of landscaped and mulched area along the west side, or exterior of the site's west fence line. The landscaping would also include planting six (6), 6 foot arborvitae along the length of the landscaped area. The landscaping will also increase overall costs of the project.

3. Generator Relocation: Relocating the generator further east would require a second mobilization effort to move the generator and would cost an additional $40,000 to $50,000. Due to site constraints the second generator relocation would only move the generator approximately 30 feet east of its current proposed location. The relocated generator would make plowing the site more difficult and would not be cost effective.

   Mobile Generator: The mobile generator unit that would be required for the Stackpole Street Pump Station would be large and difficult to mobilize. The Lowell Regional Water Utility currently does not have a vehicle capable of transporting a mobile generator of that size and would have to coordinate an appropriate vehicle during an emergency situation.

The meeting and subsequent correspondence yielded the following conclusions regarding the conditions;

1. Further reducing the parking lot area and reusing the existing gate are not feasible due to the necessity for vehicular access for operation and maintenance requirements and emergency scenarios as well as existing site constraints.

2. Visual screening of the generator using a combination of fence slats and landscaping would increase project costs but is a viable option for increasing the aesthetic quality of the site along Nesmith Street.

3. Relocating the existing generator a second time during construction is not cost effective. Using a mobile generator is not feasible due to the fact that LRWU does not have a vehicle capable of transporting a unit with the required capacity. However, the proposed generator location was shifted approximately 4 feet east of the prior proposed location to provide additional distance between Nesmith Street and the unit.

Based on the conclusions above, it is recommended that visual screening of the generator and building utilizing landscaping and fence slats (as previously discussed) be pursued in an attempt to increase the aesthetic quality of the site and comply with the conditions outlined in the Board's decision. Please see Sheet C-302R, attached.

If you have any questions or concerns, please do not hesitate to contact us at (978) 557-8150.

Sincerely,

WOODARD & CURRAN INC.

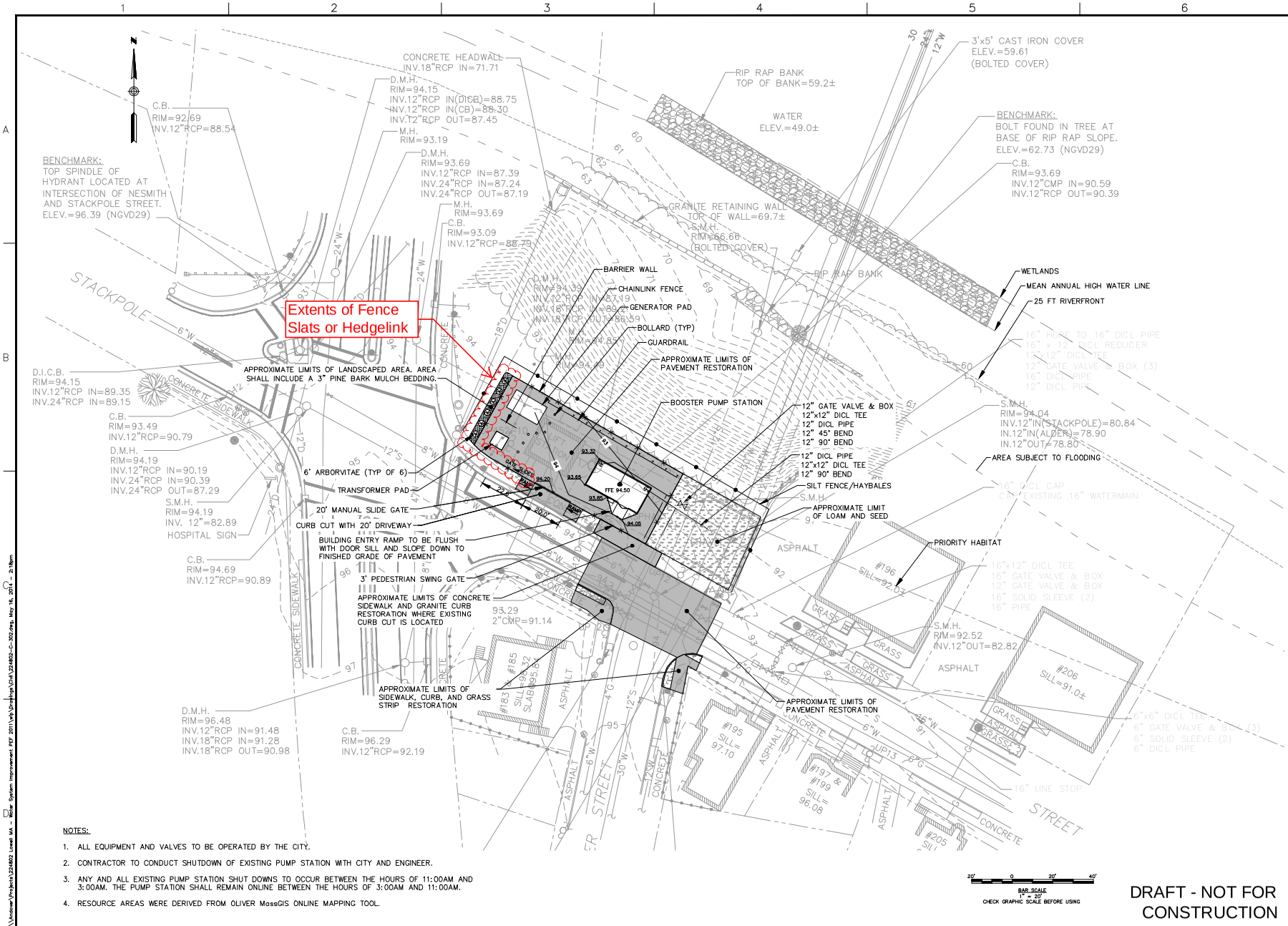
Nathan H. Little
Engineer

WOODARD & CURRAN INC.

Robert C. Chapell, P.E.
Vice President

RCC/nhl
224802.20

cc: Daniel Lahiff, Executive Director, LRWU
Robert S. Little, P.E., Vice President, Woodard & Curran



980 Washington Street, Suite 325N
Dedham, Massachusetts 02026
800.446.5516 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE
	DESIGNED BY: RAG CHECKED BY: RSL	
	DRAWN BY: JAR 224802-C-302.dwg	

STACKPOLE STREET PUMP STATION SITE PLAN

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER TREATMENT FACILITY SYSTEM UPGRADES

JOB NO.: 224802.20
DATE: MAY 2014
SCALE: AS NOTED
SHEET: OF

C-302R

COMMITMENT & INTEGRITY
DRIVE RESULTS

40 Shattuck Road | Suite 110
Andover, Massachusetts 01810
www.woodardcurran.com

T 866.702.6371
T 978.557.8150
F 978.557.7948

WOODARD &CURRAN

March 6, 2014

Lisa E. DeMeo, P.E.
City of Lowell Engineering Department
375 Merrimack Street
3rd Floor, Room 61
Lowell, MA 01852

Re: Driveway Permit Application
Lowell Regional Water Utility
Stackpole Street Pump Station
MassDEP Project # NE 206-0722

Dear Ms. DeMeo:

Enclosed please find Draft Construction Drawings and drainage calculations for the proposed project at the Lowell Regional Water Utility's (LRWU's) Stackpole Street Booster Pumping Station (PS) located at 178/180 Stackpole Street. As discussed via our phone call on March 3, 2014, we are requesting your review of the project plans and calculations. We understand the selected Contractor will be required to obtain a local Driveway Permit. We are submitting this information now in an effort to streamline the permitting process for the Contractor and eliminate uncertainty of the proposed design.

The proposed work at 178/180 Stackpole Street includes:

- Installation of a new, pre-fabricated booster pumping station,
- Relocating the existing emergency generator,
- Upgrading electrical service and installing new SCADA instrumentation and radio panel,
- Connecting suction and discharge mains from the new PS to the existing water mains,
- Demolition and removal of existing PS and associated equipment,
- Finish site work including repaving, installation of new fence and guardrails, replacing sidewalks, and relocating the existing curb cut, and
- Repaving of an approximate 70' length of Stackpole Street at the intersection of Alder Street and reconstruction of sidewalk ramps.

A Driveway Permit is required given the proposed relocation of the site curb cut and the proposed work within the right-of-way.

Please note that this project is a redevelopment of an existing pump station facility. The Stackpole Street Booster PS is one of two primary facilities within the water distribution system that transfer water from the low service area to the high service area, which serves approximately 15% of customers in the City of Lowell. The existing PS was built in 1947 and last rehabilitated in 1995 and is in need of replacement.

The proposed work is designed to meet the City of Lowell Driveway Permit Regulations (Adopted July 8, 2008) and Lowell Zoning Ordinance excluding the front yard, side yard, and curb cut width. Variances to the Zoning Ordinance were requested in a ZBA Special Permit Application dated February 27, 2014. A copy of the ZBA Application cover letter is enclosed for your reference. The following table shows a summary of the applicable Driveway Permit Regulations Section 14.0 Control Dimensions.

WOODARD &CURRAN

Table 1 – Summary of Control Dimensions

Control Dimension Criteria	Required	Existing	Proposed
Driveway Angle (14.2)	90° Recommended 60° Minimum	90°	90°
Driveway Width (14.3)	15' Maximum Curb Cut	24'	20'
Edge Clearance (14.4)	10' Minimum	46.0'	39.3'
Corner Clearance (14.5)	20' Minimum	61.3'	22.5'

The proposed project is designed to comply with Section 13.0 Drainage of the Driveway Permit Regulations. Woodard & Curran utilized HydroCAD Version 10.00 to estimate peak flows during the twenty-five (25) year 24-hour Type III storm frequency for pre and post-construction conditions. Rainfall for the 25-year storm event is 5.4" based upon data from the *Rainfall Frequency Atlas of the United States (TP-40)*. In an effort to simplify the stormwater model, the property lines were used to delineate the sub catchment areas for comparison of pre and post-construction analysis. Stormwater on-site will continue to sheet flow northeasterly down the approximate 150' vegetated hillside above the Merrimack River. Stormwater from the site will not flow into Stackpole Street or the City Road drainage system. Results of the hydraulic evaluation are summarized below.

Table 2 – Summary of Stormwater Analysis

	% Site Impervious	Peak Flow (cfs)
Existing	28.0	1.2
Proposed	22.0	1.1

The proposed design will reduce impervious area on site and therefore reduce peak flow runoff. Stormwater from the paved developed portion of the site will continue to be treated and recharge into the ground as it flows over the hillside vegetation prior to entering the Merrimack River.

Please feel free to contact us if you have any questions or concerns. We look forward to receiving your feedback on the proposed project.

Sincerely,

WOODARD & CURRAN INC.

Bridget Mitchell

Bridget Mitchell, P.E.
Project Engineer

RCC/bdm
224802.20

Enclosure(s): Draft Construction Drawings
HydroCAD Calculations
LRWU ZBA Special Permit Application cover letter dated February 27, 2014

cc: Daniel J. Lahiff, Executive Director, LRWU
Robert S. Little, P.E., Vice President, Woodard & Curran

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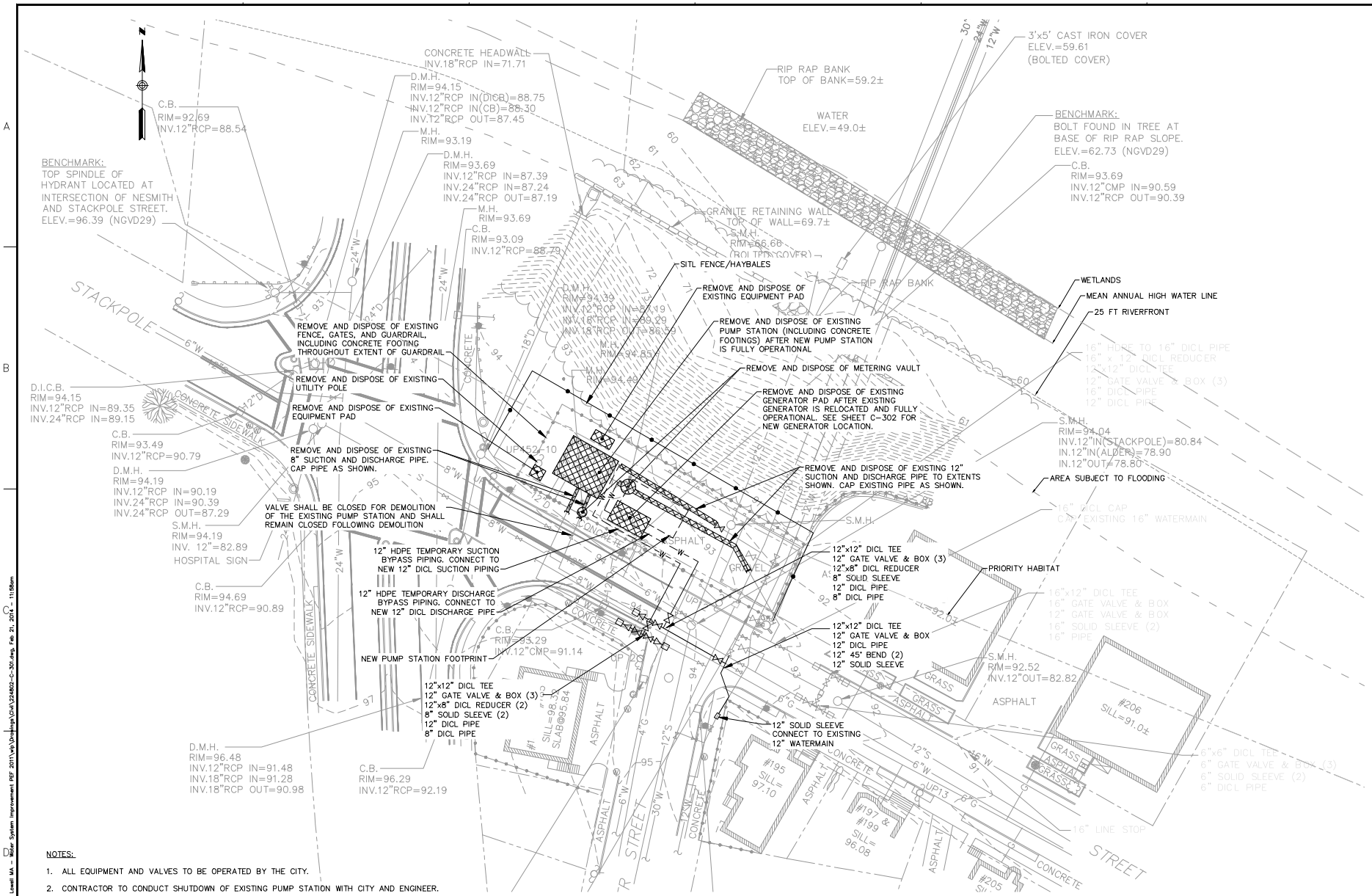

NOTES:

1. ALL EQUIPMENT AND VALVES TO BE OPERATED BY THE CITY.
2. CONTRACTOR TO CONDUCT SHUTDOWN OF EXISTING PUMP STATION WITH CITY AND ENGINEER.
3. ANY AND ALL EXISTING PUMP STATION SHUT DOWNS TO OCCUR BETWEEN THE HOURS OF 11:00AM AND 3:00AM. THE PUMP STATION SHALL REMAIN ONLINE BETWEEN THE HOURS OF 3:00AM AND 11:00AM.
4. CUT AND CAP EXISTING PUMP STATION SEWER CONNECTION.
5. RESOURCE AREAS WERE DERIVED FROM OLIVER MassGIS ONLINE MAPPING TOOL.

BAR SCALE
1" = 20'
CHECK GRAPHIC SCALE BEFORE USING

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WOODARD & CURRAN
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Dedham, MA 02026-9114
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COMMITMENT & INTEGRITY DRIVE RESULTS

REV.	DESCRIPTION	DATE
DESIGNED BY:	BCC	
DRAWN BY:	JAM	
CHECKED BY:	BCC	
224802-C-301.dwg		

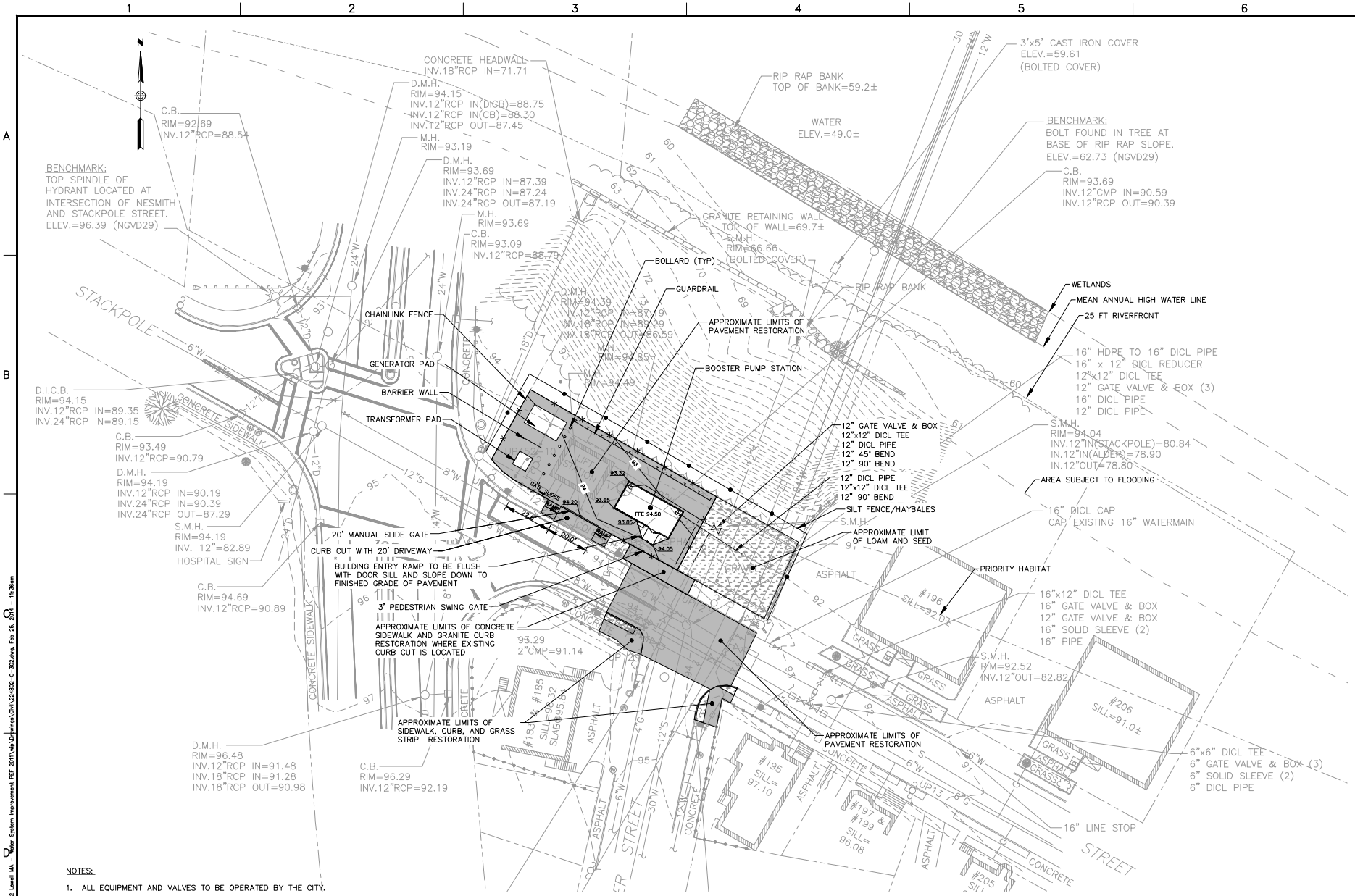
STACKPOLE STREET PUMP STATION
TEMPORARY BYPASS AND DEMOLITION PLAN

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER TREATMENT FACILITY
SYSTEM UPGRADES

JOB NO.: 224802.20
DATE: JANUARY 2014
SCALE: AS NOTED
SHEET: OF

C-301



NOTES:

1. ALL EQUIPMENT AND VALVES TO BE OPERATED BY THE CITY.
2. CONTRACTOR TO CONDUCT SHUTDOWN OF EXISTING PUMP STATION WITH CITY AND ENGINEER.
3. ANY AND ALL EXISTING PUMP STATION SHUT DOWNS TO OCCUR BETWEEN THE HOURS OF 11:00AM AND 3:00AM. THE PUMP STATION SHALL REMAIN ONLINE BETWEEN THE HOURS OF 3:00AM AND 11:00AM.
4. RESOURCE AREAS WERE DERIVED FROM OLIVER MassGIS ONLINE MAPPING TOOL.

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NO.	DESCRIPTION	DATE
1	ADDED C-302.dwg	2/24/15

DESIGNED BY: RMG
DRAWN BY: JAH
CHECKED BY: RSL

STACKPOLE STREET PUMP STATION SITE PLAN

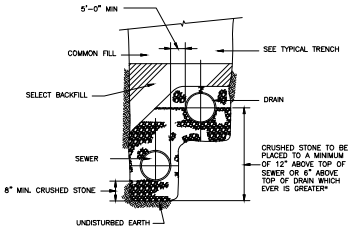
LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER TREATMENT FACILITY
SYSTEM UPGRADES

JOB NO.: 224802.20
DATE: JANUARY 2014
SCALE: AS NOTED
SHEET: OF

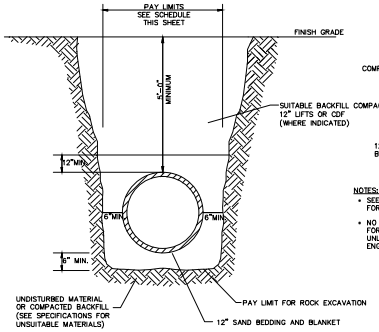
C-302

TRENCH, PAVEMENT & ROCK WIDTH PAY LIMITS					
TRENCH DEPTH	NOMINAL PIPE DIAMETER (D)	TRENCH WIDTH	TEMPORARY AND BINDER PAVEMENT	PERMANENT TOP PAVEMENT	ROCK EXCAVATION
<12'	LESS THAN 24"	4' – 0"	4' – 0"	6' – 0"	4' – 0"
<12'	24 TO 30"	5' – 0"	5' – 0"	7' – 0"	5' – 0"
<12'	GREATER THAN 30"	6' – 0"	6' – 0"	8' – 0"	6' – 0"
12' TO 16'	LESS THAN 24"	5' – 0"	5' – 0"	7' – 0"	5' – 0"
12' TO 16'	24 TO 30"	6' – 0"	6' – 0"	8' – 0"	6' – 0"
12' TO 16'	GREATER THAN 30"	7' – 0"	7' – 0"	9' – 0"	7' – 0"
>16'	LESS THAN 24"	6' – 0"	6' – 0"	8' – 0"	6' – 0"
>16'	24 TO 30"	7' – 0"	7' – 0"	9' – 0"	7' – 0"
>16'	GREATER THAN 30"	8' – 0"	8' – 0"	10' – 0"	8' – 0"

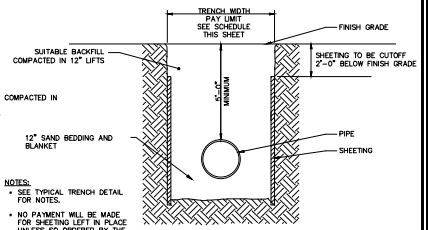


CRUSHED STONE CONFORMING TO ASTM C33 GRADATION 67 SHALL BE USED AS BEDDING FOR EACH PIPE FROM A MINIMUM OF 8 INCHES BELOW THE PIPE TO MID-DIAMETER OF THE PIPE. A SAND CUSHION, COMPACTED IN 12-INCH LAYERS SHALL BE USED FROM MID-DIAMETER TO 12 INCHES MINIMUM OVER EACH PIPE. COMPACT SELECT COMMON FILL MAY BE USED FROM THE TOP OF THE SAND CUSHION OF THE LOWER PIPE TO BOTTOM OF THE CRUSHED STONE BEDDING FOR THE UPPER PIPE.

TYPICAL TRENCH DETAIL FOR PARALLEL PIPES
N.T.S.

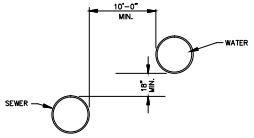


TYPICAL TRENCH DETAIL
N.T.S.

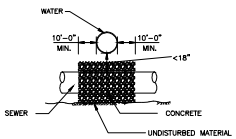


NOTES:
* SEE TYPICAL TRENCH DETAIL FOR NOTES.
* NO PAYMENT WILL BE MADE FOR SHEETING LEFT IN PLACE UNLESS SO ORDERED BY THE ENGINEER.

SHEETED TRENCH DETAIL
N.T.S.



NORMAL CONDITIONS



UNUSUAL CONDITIONS

NOTES:
THE SEPARATION OF WATER MAINS AND SEWERS SHALL COMPLY WITH THE FOLLOWING GENERAL REQUIREMENTS.

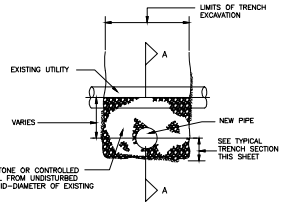
A. PARALLEL INSTALLATION:

1. NORMAL CONDITIONS: THE INSIDE EDGE OF A WATER MAIN SHALL BE LAID AT LEAST 10 FEET HORIZONTALLY FROM THE INSIDE EDGE OF ANY SANITARY SEWER, STORM SEWER OR SEWER MANHOLE.
2. UNUSUAL CONDITIONS: WHEN LOCAL CONDITIONS PREVENT A HORIZONTAL SEPARATION OF 10 FEET, THE INSIDE EDGE OF A WATER MAIN MAY BE LAID A MINIMUM OF 5 FEET FROM THE INSIDE EDGE OF A SEWER PROVIDED THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES HIGHER THAN THE TOP OF THE SEWER (SEE DETAIL) AND THE WATER MAIN IS IN A SEPARATE TRENCH OR ON AN UNDISTURBED EARTH SHELF.

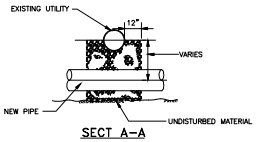
B. CROSSINGS:

1. NORMAL CONDITIONS: WHEREVER POSSIBLE, SEWERS CROSSING WATER MAINS SHALL BE LAID A MINIMUM VERTICAL DISTANCE OF 18" FROM OUTSIDE OF WATER MAIN TO OUTSIDE OF SEWER. WHERE WATER MAIN CROSSES UNDER SEWER, ADEQUATE STRUCTURAL SUPPORT SHALL BE PROVIDED FOR THE SEWER TO MAINTAIN LINE AND GRADE.
2. UNUSUAL CONDITIONS: WHEN IT IS IMPOSSIBLE TO OBTAIN 10' HORIZONTAL AND 18" VERTICAL SEPARATION, THE SEWER SHALL BE ENCASED IN CONCRETE 10' ON BOTH SIDES OF THE CROSSING MEASURED PERPENDICULAR TO THE WATER MAIN.

MINIMUM WATER AND SEWER PIPE SEPARATION DETAIL
N.T.S.

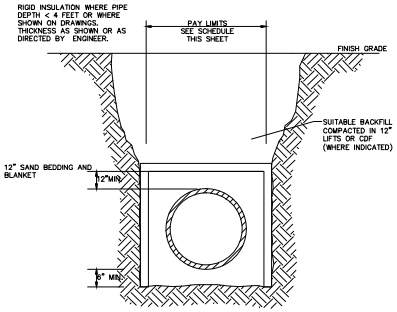


TYPICAL SECTION

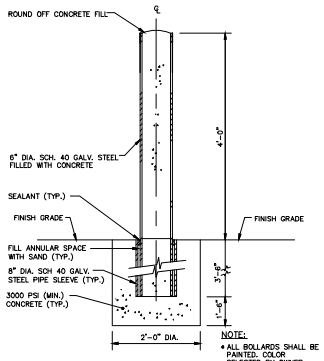


SECT A-A

UTILITY CROSSING
N.T.S.



TYPICAL TRENCH DETAIL FOR PIPE INSULATION
N.T.S.

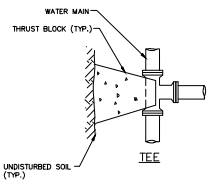


NOTE:
* ALL BOLLARDS SHALL BE PAINTED COLOR SELECTED BY OWNER.

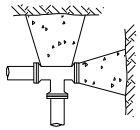
BOLLARD DETAIL
N.T.S.

NOMINAL PIPE SIZE (INCHES)	MAXIMUM PIPE OD (INCHES)	REQUIRED BEARING AREA (SQ FT)					
		90 DEG	60 DEG	45 DEG	30 DEG	22.30 DEG	11.25 DEG
3	3.96	2.0	1.4	1.1	0.7	0.5	0.3
4	4.80	2.9	2.0	1.6	1.1	0.8	0.4
6	6.90	6	4	3	2.2	1.6	0.8
8	9.05	10	7	6	4	3	1.4
10	11.10	15	11	8	6	4	2.1
12	13.20	22	15	12	8	6	3
14	15.30	29	21	16	11	8	4
16	17.40	38	27	20	14	10	5
18	19.50	48	34	26	17	13	7
20	21.60	58	41	32	21	16	8
24	25.80	83	59	45	30	23	12
30	32.00	128	90	69	47	35	18
36	38.30	183	130	99	67	51	25

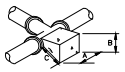
NOTES:
1. MAXIMUM TEST PRESSURE = 1.5x150 PSI
2. MINIMUM ALLOWABLE SOIL BEARING PRESSURE = 2000 PSF
3. BEARING AREA = AxB
4. C SHALL BE GREATER THAN A/2 AND B/2
5. WRAP FITTINGS WITH POLYETHYLENE PRIOR TO CONSTRUCTING THRUST BLOCKS. NO JOINTS SHALL BE COVERED WITH CONCRETE.



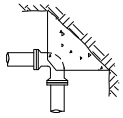
TEE



TEE (PLUGGED)

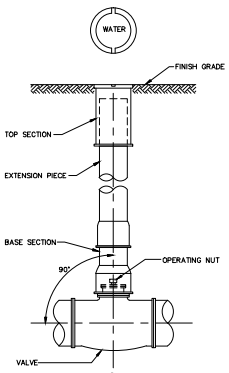


TEE



BEND

THRUST BLOCKS FOR HORIZONTAL BENDS AND LOWER VERTICAL BENDS
N.T.S.



VALVE WITH VALVE BOX, 18" AND SMALLER
N.T.S.

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224802-C-501, 502, 503.dwg		

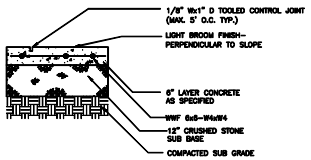
CIVIL DETAILS 1

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

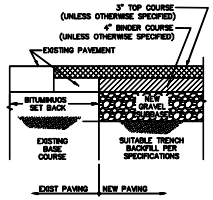
WATER TREATMENT FACILITY SYSTEM UPGRADES

JOB NO.: 224802.20
DATE: JANUARY 2014
SCALE: AS NOTED
SHEET: 6 OF

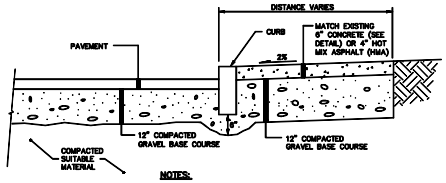
C-501



CONCRETE SIDEWALK
N.T.S.



PAVEMENT TRANSITION BETWEEN NEW AND EXISTING ASPHALT PAVEMENTS DETAIL
N.T.S.



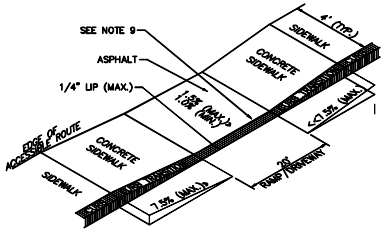
NOTES:

PROVIDE TYPE I-1 TOP COURSE FOR HMA SIDEWALK. PLACE IN 2" COMPACTED LIFT DEPTHS SAW CUT EDGES.

REPLACE SIDEWALK IN KIND.

REPLACE WHOLE PANELS FOR CONCRETE SIDEWALK REPAIR.

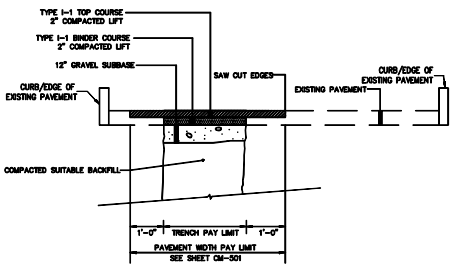
TYPICAL REPLACEMENT SIDEWALK DETAIL
N.T.S.



CURB CUT NOTES:

1. THE MAXIMUM ALLOWABLE SIDEWALK AND CURB RAMP CROSS SLOPES SHALL BE 1.5% (1% MIN.).
2. THE MAXIMUM ALLOWABLE SLOPE OF ACCESSIBLE ROUTE EXCLUDING CURB RAMPS SHALL BE 5%.
3. THE MAXIMUM ALLOWABLE SLOPE OF ACCESSIBLE ROUTE CURB RAMPS SHALL BE 7.5%.
4. A MINIMUM OF 3 FEET CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (I.E., HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.)
5. CURB TREATMENT VARIES, SEE PLANS FOR CURB TYPE.
6. BASE OF RAMP SHALL BE GRADED TO PREVENT PONDING.
7. SEE TYPICAL SIDEWALK SECTION FOR RAMP CONSTRUCTION.
8. WHERE ACCESSIBLE ROUTES ARE LESS THAN 5' IN WIDTH (EXCLUDING CURBING) A 5' x 5' PASSING AREA SHALL BE PROVIDED AT INTERVALS NOT TO EXCEED 200 FEET.
9. ELIMINATE ALL CURBING AT RAMP (OTHER THAN VERTICAL CURBING, WHICH SHALL BE SET FLUSH) WHERE IT ABUTS ROADWAY.

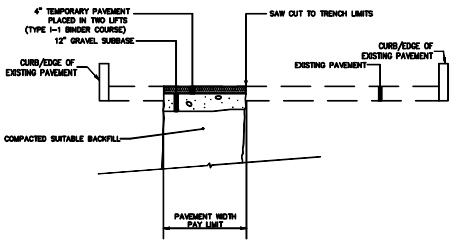
CURB CUT DETAIL
N.T.S.



NOTES:

1. SEAL PAVEMENT JOINTS AFTER PAVING.

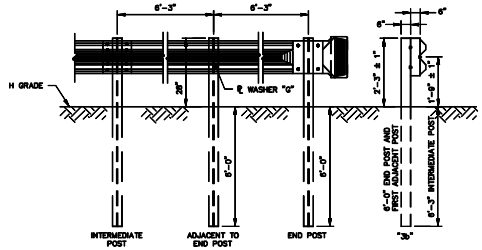
PERMANENT TRENCH PAVEMENT SECTION
N.T.S.



NOTES:

1. CONTRACTOR SHALL LAY 4 INCHES OF TEMPORARY PAVEMENT COMPACTED IN TWO LIFTS.
2. PAVE TRENCHES DAILY UNLESS OTHERWISE APPROVED BY OWNER.

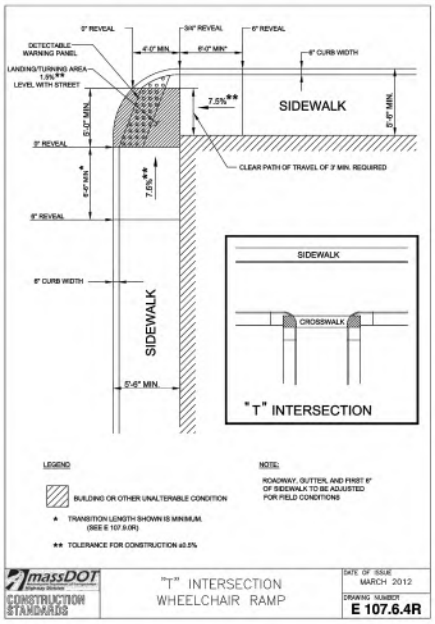
TEMPORARY TRENCH PAVEMENT SECTION
N.T.S.



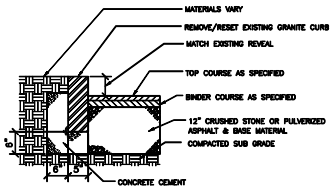
NOTES:

1. ALL POST SPACING SHALL BE 6'-3" UNLESS OTHERWISE DIRECTED BY ENGINEER.
2. GUARDRAIL SHALL BE MDOT SPECIFICATION TYPE "3b" POSTS AND SHALL CONFORM TO MDOT SPECIFICATION SECTION 710.07(b).
3. ALL HOLES IN BEAM SHALL BE SHOP-PUNCHED BEFORE GALVANIZING.

TYPICAL GUARDRAIL DETAIL
N.T.S.



WHEELCHAIR RAMP DETAIL
N.T.S.



SIDEWALK NOTES:

1. SIDEWALK CROSS SLOPES WILL BE 2% MAXIMUM.
2. AN UNOBSTRUCTED PATH OF TRAVEL WITH A MINIMUM WIDTH OF 3 FT SHALL BE MAINTAINED, THE DESIREABLE WIDTH IS 3.25 FT.
3. WHERE THE ROAD PROFILE EXCEEDS 5% THE HIGH SIDE CURB TRANSITION (Ldh) SHALL BE 13 FT.
4. TESTING SURFACE: WHEN TESTING WITH A STRAIGHT EDGE PLACED PARALLEL TO THE LINE OF SLOPE, THERE SHALL BE NO DEVIATION FROM A TRUE SURFACE IN EXCESS OF 1/4 INCHES.

VERTICAL GRANITE CURB
N.T.S.

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REV	DESCRIPTION	DATE
DESIGNED BY:	MSC	
DRAWN BY:	MNL	
CHECKED BY:	MNL	
FSA602-C-501, 502, 503.dwg		

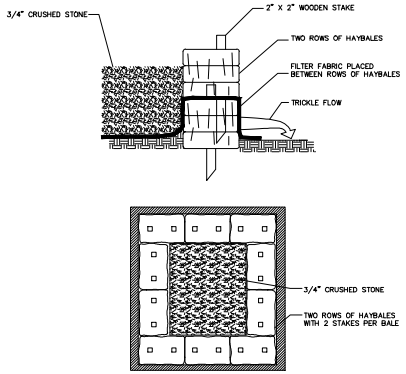
CIVIL DETAILS 2

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER TREATMENT FACILITY SYSTEM UPGRADES

JOB NO.: 2246002.20
DATE: JANUARY 2014
SCALE: AS NOTED
SHEET: 7 OF

C-502



DETENTION BASIN NOTES:

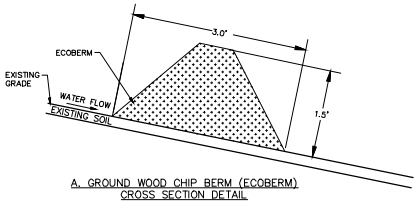
1. ALL BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY, AT NO ADDITIONAL COST TO THE OWNER.
2. SHOULD THE BARRIER DECOMPOSE OR BECOME INEFFECTIVE BEFORE THE END OF THE EXPECTED LIFE AND THE BARRIER IS STILL NECESSARY, IT SHALL BE REPLACED PROMPTLY.
3. SEDIMENT DEPOSITS SHALL BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN THE DEPOSITS REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.
4. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE BARRIER IS NO LONGER REQUIRED SHALL BE REMOVED AND DISPOSED.

DETENTION BASIN DETAIL

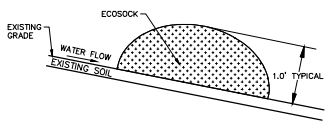
N.T.S.

Permanent Erosion Control:

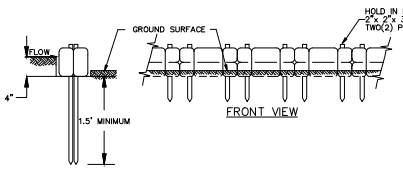
Measure	Dates for use	Timing, Activity, and Location
Riprap Prtection	All	Install riprap immediately following culvert installation or final channel grading at locations shown on plans.
Pavement – Base Course – Final Course	When no frost is in ground	Install only in areas shown on the plan, shortly after pavement base is brought to final grade. Install near completion of project.
Permanent Seeding	April 15 to Sept. 15	On final grade areas, within 7 days of grade preparation. prepare topsoil, followed with seeding and mulch application.
Dormant Seeding	Sept. 16 to April 15	On final grade areas, with prepared topsoil. Apply seed at double the specified rate, on bare soil, and follow with an application of winter mulch.
Ground Cover, Trees, Shrubs	April 15 to Nov. 1	Install with final landscaping.
Permanent Mulch	All	Install with final landscaping.



A. GROUND WOOD CHIP BERM (ECOBERM) CROSS SECTION DETAIL

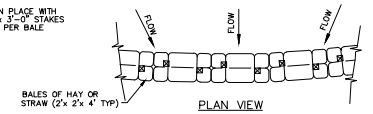


B. COMPOST-MULCH SOCK (FILTREXX FILTER SOCK) CROSS SECTION DETAIL



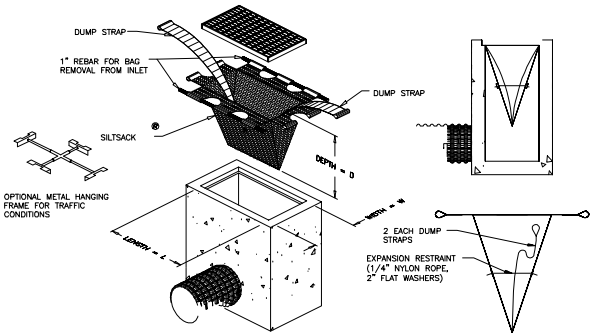
SIDE VIEW

FRONT VIEW



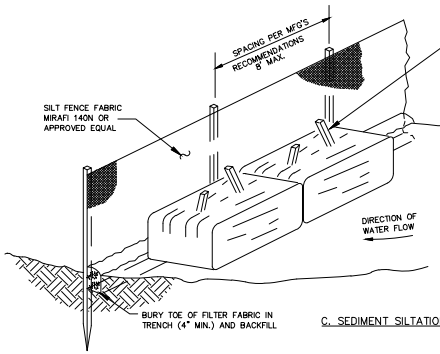
PLAN VIEW

D. EROSION CONTROL HAYBALES CROSS SECTION DETAIL



INLET SEDIMENT CONTROL DEVICE (SILT SACK) DETAIL

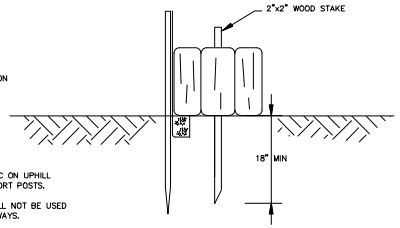
N.T.S.



NOTES:

1. INSTALL FABRIC ON UPHILL SIDE OF SUPPORT POSTS.
2. SILT FENCE WILL NOT BE USED IN DRAINAGE WAYS.
3. CONTRACTOR TO REMOVE SILT AS NECESSARY TO MAINTAIN FABRIC EFFECTIVENESS.

C. SEDIMENT SILTATION FENCE WITH HAYBALES CROSS SECTION DETAIL



NOTE:

1. CONTRACTOR TO INSTALL WHERE NECESSARY OR AS DIRECTED BY THE ENGINEER.
2. CONTRACTOR MAY SELECT ANY OF THESE EROSION CONTROL BARRIERS.

EROSION CONTROL BARRIER DETAIL

N.T.S.

DRAFT - NOT FOR CONSTRUCTION

WOODARD & CURRAN
900 Washington Street, Suite 325N
Boston, MA 02111-1753
800.446.5918 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE
DESIGNED BY:	NWL	
DRAWN BY:	NWL	
CHECKED BY:		
PCC:	224802-C-501, 502, 503.dwg	

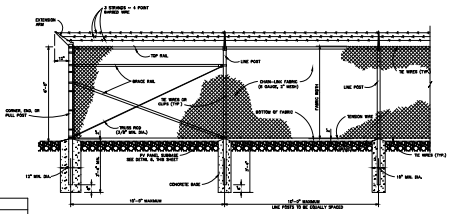
CIVIL DETAILS 3

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER TREATMENT FACILITY SYSTEM UPGRADES

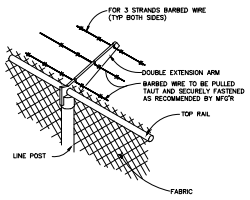
JOB NO.: 224802.20
DATE: JANUARY 2014
SCALE: AS NOTED
SHEET: 8 OF

C-503

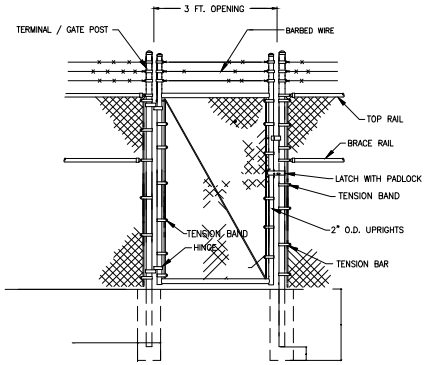


STEEL POST SCHEDULE	
USE AND SECTION	MINIMUM OUTSIDE DIMENSIONS (NOMINAL)
CORNER, END & PULL POSTS	
TUBULAR – ROUND	2.875" O.D.
LINE POSTS	
TUBULAR – ROUND	2.375" O.D.
TOP & BRACE RAILS	
TUBULAR – ROUND	1.66" O.D.

CHAIN LINK SECURITY FENCE DETAIL

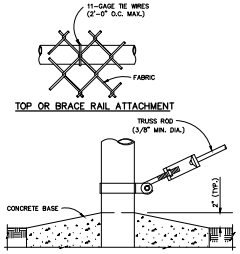


EXTENSION ARM FOR BARBED WIRE

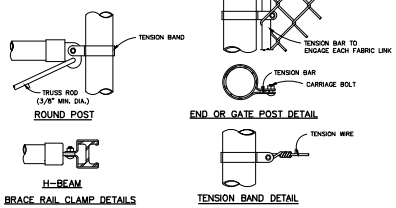


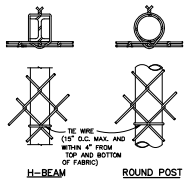
TYPICAL SINGLE PEDESTRIAN GATE DETAIL

N.T.S.



COATINGS:
GATE FRAME –ALUMINUM ALLOY 6063-T6
POSTS –STEEL, GALVANIZED IN ACCORDANCE WITH ASTM, F1083 OR A123
FABRIC –TO MATCH LINE FENCE
BARBWIRE –TO MATCH LINE FENCE



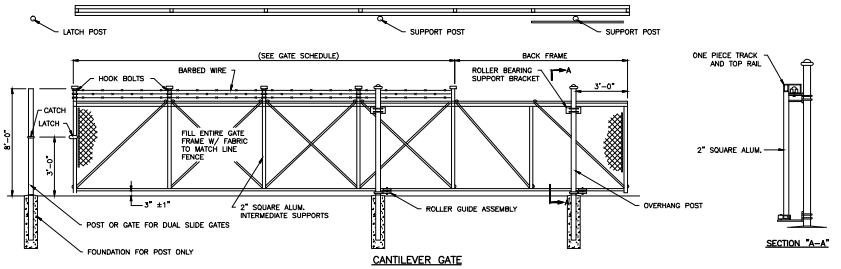


NOTES:
1. DETAILS SHOWN ARE TO CLARIFY REQUIREMENTS AND ARE NOT INTENDED TO LIMIT OTHER TYPES OF FENCE SECTIONS AND METHODS OF INSTALLATION.
2. WIRE TIES, RAILS, POSTS, AND BRACES SHALL BE CONSTRUCTED ON THE SECURE SIDE OF THE FENCE ALIGNMENT. CHAIN-LINK FABRIC SHALL BE PLACED ON THE OPPOSITE SIDE OF THE SECURE AREA.
3. C-SECTION POSTS SHALL BE INSTALLED SO THAT THE VOID INSIDE THE POST IS COMPLETELY FILLED WITH CONCRETE UP TO THE TOP OF THE FOUNDATION.

TYPICAL CHAIN LINK FENCE DETAIL

N.T.S.

COATINGS:
GATE FRAME –ALUMINUM ALLOY 6063-T6
POSTS –STEEL, GALVANIZED IN ACCORDANCE WITH ASTM, F1083 OR A123
FABRIC –TO MATCH LINE FENCE
BARBWIRE –TO MATCH LINE FENCE



GATE DETAILS
NOT TO SCALE

DRAFT - NOT FOR CONSTRUCTION

WOODARD & CURRAN
900 Washington Street, Suite 320N
Boston, MA 02111-1650
800.446.5918 | www.woodardcurran.com
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REV.	DESCRIPTION	DATE
DESIGNED BY:	NHL	
DRAWN BY:	NHL	
CHECKED BY:	MCC	
224802-C-501, 502, 503.dwg		

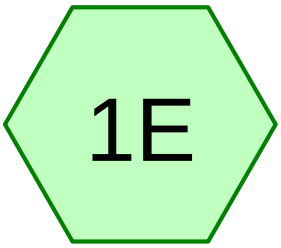
CIVIL DETAILS 2

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

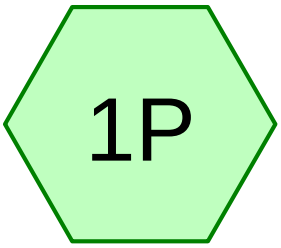
WATER TREATMENT FACILITY SYSTEM UPGRADES

JOB NO.: 224802.20
DATE: JANUARY 2014
SCALE: AS NOTED
SHEET: 7 OF

C-504



Existing



Proposed

Subcat Reach Pond Link

Routing Diagram for DrainageCalc

Prepared by {enter your company name here}, Printed 3/6/2014

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: Existing Runoff Area=18,550 sf 27.92% Impervious Runoff Depth>2.24"
Tc=6.0 min CN=71 Runoff=1.18 cfs 0.080 af

Subcatchment 1P: Proposed Runoff Area=18,550 sf 21.99% Impervious Runoff Depth>2.08"
Tc=6.0 min CN=69 Runoff=1.09 cfs 0.074 af

Summary for Subcatchment 1E: Existing

Runoff = 1.18 cfs @ 12.10 hrs, Volume= 0.080 af, Depth> 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.40"

Area (sf)	CN	Description
5,180	98	Paved parking, HSG A
0	69	50-75% Grass cover, Fair, HSG B
13,370	60	Woods, Fair, HSG B
18,550	71	Weighted Average
13,370		72.08% Pervious Area
5,180		27.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 1P: Proposed

Runoff = 1.09 cfs @ 12.10 hrs, Volume= 0.074 af, Depth> 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.40"

Area (sf)	CN	Description
4,079	98	Paved parking, HSG A
1,792	69	50-75% Grass cover, Fair, HSG B
12,679	60	Woods, Fair, HSG B
18,550	69	Weighted Average
14,471		78.01% Pervious Area
4,079		21.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

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COMMITMENT & INTEGRITY
DRIVE RESULTS

40 Shattuck Road | Suite 110
Andover, Massachusetts 01810
www.woodardcurran.com

T 866.702.6371
T 978.557.8150
F 978.557.7948

February 27, 2014

Zoning Board of Appeals
City of Lowell
375 Merrimack Street
Lowell, MA 01852

Re: Special Permit Application
Lowell Regional Water Utility
Stackpole Street Pump Station
MassDEP Project # NE 206-0722

Dear Zoning Board of Appeals Members:

Enclosed, please find the application requesting relief for zoning variances for the proposed construction project at the Lowell Regional Water Utility's (LRWU) Stackpole Street Booster Pumping Station (PS) located at 178/180 Stackpole Street. The enclosed application includes all items identified on the Petition/Application Checklist dated August 9, 2011, including:

- Completed Application Form
- One (1) set of original certified ZBA Plot Plans (Sheets C-301, C-302, and S-301) and completed Zoning Analysis worksheet for 178/180 Stackpole Street
- Certified List of Parties in Interest and Labels
- Certificate of Tax Status provided by the City Treasurer
- Copy of the Notice of Disposal in Tax Lien Case for 178 Stackpole Street obtained from the Middlesex North Registry of Deeds website
- Design Plan of proposed construction that shows the appearance and design of the proposed structures (see Sheets C-301, C-302, and S-301)
- Contact Information Sheet for The Lowell Sun
- Proposed findings and hardship statements, below
- Additional Information, including a project description, below

Project Description: The Stackpole Street Booster PS is one of two primary facilities within the water distribution system that transfer water from the low service area to the high service area, which serves approximately 15% of customers in the City of Lowell. The existing PS was built in 1947 and last rehabilitated in 1995 and is in need of replacement. The proposed work at 178/180 Stackpole Street includes;

- Installation of a new, pre-fabricated booster pumping station,
- Relocating the existing emergency generator,
- Upgrading electrical service and installing new SCADA instrumentation and radio panel,
- Connecting suction and discharge mains from the new PS to the existing water mains,
- Demolition and removal of existing PS and associated equipment,
- Finish site work including repaving, installation of new fence and guardrails, replacing sidewalks, and relocating the existing curb cut.

Proposed Findings and Hardship Statements: The Stackpole Street Booster PS, located at 178/190 Stackpole Street, is located within the TTF zoning district. All applicable variances described herein are based on the Lowell Zoning Ordinance, Chapter 290 of the City Code of Ordinances. Please note that property line measurements are based on a single lot for 178/190 Stackpole Street. The zoning variances that are being requested include relief from the following zoning requirements. A summary table is presented below. A complete zoning analysis is presented in the zoning analysis worksheet in the application package.

1. **Minimum front yard**. The minimum front yard required for any building besides a 1 family dwelling is 15 feet based on Section 5.1 of Article V of the Zoning Ordinance. The existing front yard is 6.6 feet from the property line (10 feet from the fence/sidewalk) to the pump station and 0.35 feet from the property line (3.9 feet from the fence/sidewalk) to the generator pad. The proposed front yard is 7.75 feet from the property line (11.3 feet from the fence/sidewalk) to the new pump station. This represents an increase of approximately 1 foot or 7 feet of front yard from the property line to the existing pump station or generator pad, respectively, compared to the proposed pump station. Measurements are taken from exterior building walls. Note that the proposed ramp is 1.7 feet from the property line. Note also that both the existing and proposed fence and gate extend beyond the property line on the south side of the property and into the right of way. Refer to Sheet C-302 of the Design Plans. The proposed work and location of the new pump station will increase lot front yard at the site. Relief from the minimum front yard zoning requirement for the proposed structure is requested due to site constraints limiting construction of a conforming structure. As shown on Sheet C-302, the gradation of the lot turns to a severe slope as you move north towards the Merrimack River. This slope does not allow for construction of the new pump station in this area and severely limits the area to the north of the site that the pump station can be located. It also limits the area that heavy equipment can be positioned to install the new pump station. Due to these site constraints, the LRWU requests relief from the minimum lot front yard zoning requirement.
2. **Minimum side yard**. The minimum side yard required is 10 feet sum 25 feet based on Section 5.1 of Article V of the Zoning Ordinance. The existing side yard is 18.2 feet to the transformer pad or 27.3 feet to the existing pump station from the west property line and 73 feet to the existing generator pad or 98 feet to the existing pump station from the east property line. The proposed side yard is 5 feet to the generator pad or 61.3 feet to the new pump station from the west property line and 58 feet to the new pump station from the west property line. Relief from the minimum side yard zoning requirement for the proposed structure is requested due to site constraints limiting relocation of the existing generator. As shown on Sheet C-302, the gradation of the lot turns to a severe slope as you move north towards the Merrimack River. This slope does not allow for construction of the generator in this area. In addition, sequencing of work required for construction of the new pump station requires the existing generator to be relocated and placed online while the existing pump station is still in service and the new pump station is constructed. Also, per National Grid standards we are required to maintain 10 feet of clearance between the proposed generator and transformer, further restricting the proposed site locations. Due to these site constraints and construction sequencing requirements, the LRWU requests relief from the minimum side yard zoning requirement.
3. **Maximum curb cut width**. The maximum curb cut width is 15 feet based on footnotes in 6.1.10 Table of Dimensional Requirements for Off-Street Parking in Article VI of the Zoning Ordinance. The existing curb cut for the site is 24 feet. The proposed curb cut will be 20 feet to maintain access for utility vehicles and heavy machinery, as necessary. The new curb cut will not impact the neighborhood character, availability of on-street parking, stormwater management, or municipal infrastructure as the new curb cut will reduce the width from the existing curb cut. Also, the existing curb cut will be replaced with new concrete sidewalk and granite curbing. Regarding stormwater management, runoff will continue to flow in a northeasterly direction towards the Merrimack River. Note that a Driveway Permit application has been submitted for review to the City of Lowell Department of Public Works including

more detailed stormwater management calculations. Due to the pump station maintenance and access requirements, and limitation of impacts to the neighborhood, the LRWU requests relief from the maximum curb cut requirement.

Summary of Variances Requested

Zoning Requirement	Required	Existing	Proposed
Minimum Front Yard (ft.)	15	6.6 (Pump Station) 0.35 (Generator)	7.75 (Pump Station)
Minimum Side Yard (2) (ft.)	10 sum 25	27 sum 100	5 sum 63
Maximum Curb Cut (ft.)	15	24	20

If you have any questions or concerns, please contact me at (978) 557-8150.

Sincerely,

WOODARD & CURRAN INC.

Nathan H. Little
Engineer

WOODARD & CURRAN INC.

Robert C. Chapell, P.E.
Vice President

RCC/nhl
224802.20

Enclosure(s): Zoning Board of Appeals Special Permit Application

cc: Daniel Lahiff, Executive Director, LRWU
Robert S. Little, P.E., Vice President, Woodard & Curran

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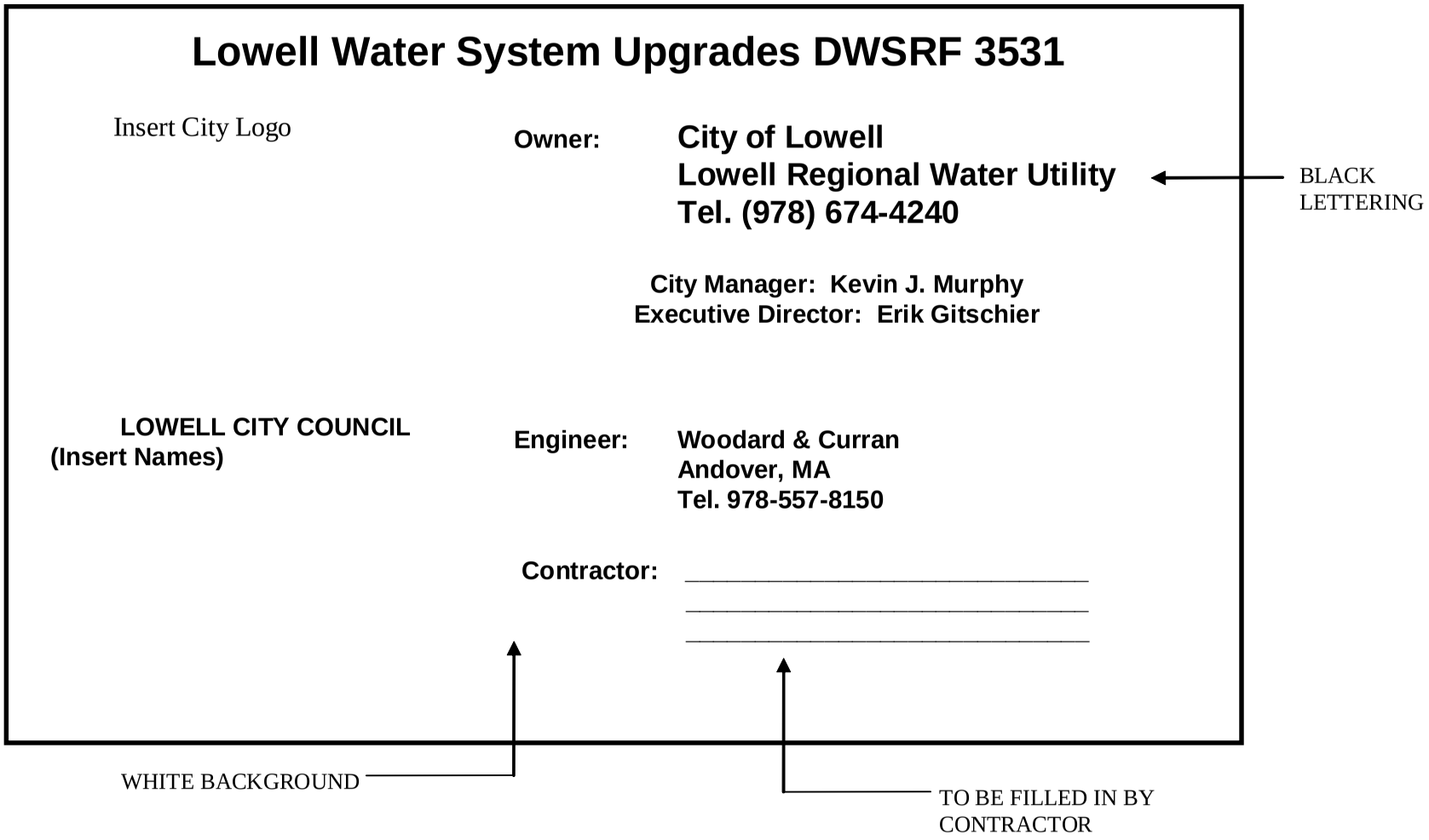
PROJECT SIGN



SIGN DIMENSIONS: 4’ x 8’ x ¾”)
PLYWOOD PANEL (APA RATED A-B GRADE – EXTERIOR)
CONTRACTOR TO VERIFY WORDING AND LAYOUT PRIOR TO CONSTRUCTION

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Asbestos & Lead Inspection Report

for

178 Stackpole Street
Lowell, MA

August, 2014

prepared for:

Woodard and Curran
35 New England Business Center
Andover, MA

prepared by:

Enviro-Safe Engineering
203 Prospect Street
Brockton, MA 02301

Asbestos Inspection Report

for

178 Stackpole Street
Lowell, MA

Prepared by:_____

Patricia E Riley, Massachusetts licensed asbestos inspector AI60295

prepared for:

Woodard and Curran
35 New England Business Center
Andover, MA

prepared by:

Enviro-Safe Engineering
203 Prospect Street
Brockton, MA 02301

1.0 INTRODUCTION

Dexter Wangnoon, Massachusetts licensed asbestos inspector AI900561 of Enviro-Safe Engineering (ESE) and Gary Kellner, Massachusetts licensed lead paint inspector M-1981 of Harvard Environmental Services conducted a survey and assessment of asbestos containing materials (ACM) and paint for the presence of lead at 178 Stackpole Street, Lowell on July 23, 2014. The survey included a visual inspection of all interior spaces and collection of samples of suspect materials.

The purpose of the survey was to identify materials as part of an environmental site assessment. Roofing material was sampled as it was a demolition inspection.

2.0 BULK SAMPLING METHODOLOGY

All bulk samples were analyzed at a Massachusetts licensed laboratory by the USEPA endorsed Polarized Light Microscopy with Dispersion Staining (PLM/DS) method. The PLM/DS method is a qualitative and quantitative form of analysis that yields the type and percentage of asbestos present in the sample, if any.

The USEPA defines an asbestos containing material as a material containing greater than 1% asbestos. Any material that meets that definition is regulated by the Federal and State law.

Sample results are located in Appendix A.

3.0LOCATION OF ACM

Asbestos containing material was not found throughout the building.

4.0 LOCATION OF NON-ASBESTOS CONTAINING MATERIALS

The following materials were tested and found not to contain asbestos:

Material: Ceiling sheetrock/joint compound

Material: Roofing

5.0 LEAD PAINT DETERMINATION

The lead paint determination tested a sampling of surfaces throughout the building. All of the testing was performed using the NITON XL model 309 X-ray fluorescence (XRF) spectrum analyzer lead detector. The instrument uses a Cadmium-109 radioactive source, combined with K and L-shell detectors, to provide accurate readings of lead concentrations through all depths of paint. Gary Kellner is trained and certified to operate this model of test equipment.

The full report is located in Appendix B.

5.0 CONCLUSION

Asbestos containing material was not found throughout the building.

Lead paint was found on the two windows at the front side of the building, and at the lower vent on the left side. At the interior window sills at the two front windows, lead paint was found on the painted brick sills.
No lead-based paint was detected at any other components or surfaces.

Appendix A

Bulk Sample Results

Covino Environmental Associates, Inc.
300 Wildwood Ave, Woburn, MA
Phone 781.933.2555 Fax 781.932.9402 Email mail@covinoinc.com

Asbestos Bulk Chain of Custody

Covino Project No. *14.00001*
Samples Collected by: Dylan Wangnoon
License # AI900561
Date(s) Collected: 7/23/14

Client: *ENVIROSAFE ENGINEERING*
203 Prospect Street
Brockton, MA 02301 L2450

Project Name and Location: 178 Stackpole St, Lowell

Turnaround (circle) same day 24-hr standard (5 day)
Contact *PATRICIA RILEY*
Phone *617-623-6678*
Fax *617-623-9495*
Email *prileyash@aol.com*

Sample ID	DO NOT WRITE IN SHADED AREAS	Stereoscopic Visual				Optical Properties						Fiber Ref. Ind.		%Asbestos Fiber Present						% Non Asbestos Present					
Field ID # / Lab ID #	DESCRIPTION	Color	%Asb	Text	Homog	Mokash	Extn	Sign E	Bire	Pleo	Other	⊥	∥	CHRYS	AMOS	CROCI	TREMO	ANTHO	ACTIN	Fibrous Glass	Cellulose	Wool	Synthetic	Other	Non Fibrous
L2450A / 428964	MATERIAL: Ceiling Sheet Rock LOCATION: Ceiling in Pump house	MULTI	20	L	N															2 ISO	18 U INC				80
L2450B / 428965	MATERIAL: Roofing LOCATION: Front Side	BK	20	NF	Y															20 ISO					80
L2450C / 428966	MATERIAL: Roofing LOCATION: RF Side	BK	20	NF	Y															20 ISO					80
L2450D / 428967	MATERIAL: Roofing LOCATION: Backside	BK	20	NF	Y															20 ISO					80
	MATERIAL: LOCATION:																								
	MATERIAL: LOCATION:																								

Relinquished by: _____ Date: _____ Received by: _____ Date: 7-24-14

Analyst Signature _____ Date(s) Analyzed: 7-24-14 Turn: 24c

Account Report Comments

Appendix B

Lead Paint Determination Report

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Harvard Environmental

Harvard Environmental Services
524 High Street, P.O. Box 2547
Westwood, MA 02090
E-mail: gary@leadinspection.net

Phone 781-329-0404
Fax 781-326-5205

Lead-Based Paint Survey

Pumping Station

178 Stackpole St, Lowell MA

July 23, 2014

Performed by:
Gary Kellner, MA Master Lead Inspector License # M-1981
Harvard Environmental Services
524 High Street, Westwood MA 02090

Performed for:
EnviroSafe Engineering
203 Prospect St, Brockton Ma 02301

Introduction.
On July 23, 2014, Harvard Environmental Services performed a survey to determine the presence of lead-based paint at a municipal pumping station at 178 Stackpole Street, Lowell, MA. Testing was done by Massachusetts licensed Master Lead Inspector Gary Kellner, license # M-1981.

Test Description.
This survey, also called a lead paint determination, was performed by Gary Kellner, licensed by Massachusetts to inspect for lead-based paint, (Master-level license #M-1981). The surfaces which were tested included the interior and exterior surfaces of the pumping station.

Test Procedures and Equipment.
Tests for lead content in paint were performed using the Thermo Scientific NITON model XLp X-ray fluorescence (XRF) spectrum analyzer. The instrument uses a Cadmium-109 radioactive source, combined with K and L-shell detectors, to provide accurate readings of lead concentrations through all depths of paint. Gary Kellner has been trained and certified by the manufacturer to operate this model of test equipment.

Calibration.
Calibration of the NITON XLp is performed internally and automatically as part of the instrument startup procedure. Following automatic calibration, per the manufacturer's specifications, a controlled external calibration check was performed using NIST standards for 0.0, 0.3, and 1.0 mg/ cm^2 lead concentrations. All tests matched the nominal readings on each of the standards.

Test Results.

See Table below for lead concentration of all sampled surfaces.
Lead readings are given as milligrams lead per square centimeter. In Massachusetts and federal regulations, lead-based paint in surface coatings is defined as paint having a lead concentration of 1.0 mg/ cm^2 or greater.

In the OSHA Lead-in-Construction rule, any measurable lead content triggers requirements for worker protection procedures.

In the federal RCRA law pertaining to waste disposal in solid landfills, any lead content triggers testing requirements prior to disposal.

Locations at the building are referenced A, B, C, D, for the four sides. Side A is the front side, with the other sides labeled clockwise as B, C, and D.

In the table below those items highlighted in yellow were found to contain lead-based paint.

Table 1.

Int / Ext	Location	Component	Material	Pb	Color
I	A1	Window Frame	Metal	2.6	Gray
I	A2	Window Frame	Metal	2.6	Gray
I	A1	Window Sill	Brick	2.6	Gray
I	A	Lower Wall	Brick	0.0	Gray
I	D2	Window Frame	Metal	0.0	White
I	D1	Window Frame	Metal	0.0	White
E	A	Fascia Board	Wood	0.0	White
E	A	Window Panel	Composite	0.0	Blue
E	D	Post	Metal	0.0	Yellow
E	B	Lower Vent	Metal	7.2	Green

Int / Ext	Location	Component	Material	Pb	Color
E	D	Window Vent	Metal	0.0	Black
E	C	Fence	Metal	0.0	Black
I	A	Door	Metal	0.0	Red
I	A	Wall	Brick	0.0	White
I	A	Door Frame	Metal	0.0	Red
I		Pipe	Metal	0.0	Blue
I	C	Floor Grate	Metal	0.0	Black
I	C	Frame at Fl Grate	Metal	0.0	Red
I		Floor Plate	Metal	0.0	Red
I		Pump Base	Metal	0.0	Green

Summary of Results.

Lead paint was found on the two windows at thew front side of the building, and at the lower vent on the left side. At the interior window sills at the two front windows, lead paint was found on the painted brick sills.
No lead-based paint was detected at any other components or surfaces.

All demolition activities which will affect above listed lead-painted surfaces must be conducted in accordance with state and federal regulations which mandate protection for workers and the environment.

The following regulations apply to work performed at this property:

1. The **OSHA** lead standard for construction activities, 29 CFR 1926.62, would be applicable at this project, whenever lead-painted components are affected, as the demolition work may expose workers to airborne lead hazards.

2. Massachusetts regulation **454 CMR 22** limits activities of workers engaged in the demolition of lead painted building components.

3. The disposal of materials containing lead is regulated by federal Resource Conservation and Recovery Act (RCRA) provisions, which spell out how the waste stream must be tested to determine whether it must be characterized as hazardous. RCRA requires that the waste stream which contains LBP-containing materials be tested using the Toxicity Characteristic Leacheate Procedure (TCLP). If the leachable lead amount exceeds 5 parts per million, the characterized waste stream must be treated as hazardous. **If the metal components are recycled, which is the anticipated disposal method, the disposal restrictions would not be applicable to the steel window frames. However, paint chips, dust and debris on site after removal of the buildings would be subject to evaluation for hazardous waste criteria per TCLP test requirements.**

Note: concerning Renovation, Repair and Painting (RRP) rules which became effective in 2010: EPA (4/23/10), superseded by Massachusetts (7/8/10) These rules apply to work performed in residences and in certain schools. Demolition of industrial structures would **not** trigger the lead safety provisions of the Mass RRP rules.

Appendix 1.

Examples of Components with lead-based paint:
Pb>= 1.0.

Lower vent at exterior left side.

pb = 7.2 mg/cm2.

Steel window frames at two front windows.

pb = 2.6 mg/cm2.

Brick window sills at two front windows.
pb = 2.6 mg/cm2.

Appendix 2.

Examples of Components <u>without</u> lead-based paint:
Pb < 1.0.

Exterior upper trim.

pb = 0.0 mg/cm2.

Exterior door and door frame.

pb = 0.0 mg/cm2.

Appendix 2 (continued).

Examples of Components <u>without</u> lead-based paint:
Pb < 1.0.

Interior pipes
pb = 0.0 mg/cm2.

Interior brick wall, excluding window sills.
pb = 0.0 mg/cm2.

Interior floor grille and frame:
pb = 0.0 mg/cm2.

PERMIT - LOWELL

Guardrail

Permit #: 4-2014-0377

Subject to all the terms, conditions, and restrictions printed or written below, permission is hereby granted to CITY OF LOWELL to enter upon the State Highway known as the ROUTE 110 (VFW HIGHWAY) EASTBOUND ON-RAMP from ROUTE 38 northbound for the purpose of temporarily removing approximately twenty-five (25) Linear Feet (LF) of steel beam highway guardrail on the southerly side of the roadway between approximate stations 38+48 and 38+73 in order to get the grass area equipment in and out of the grass area between the roadway and the Merrimack River to install a thirty (30) - Inch Water Main Line Stop, Thirty (30) - Inch Gate Valve, and thirty (30) - Inch Ductile Iron Pipe, Thirty (30) - Inch Couplings and associated appurtenances. Grantee shall install approximately thirty (30) - LF of Precast Portable Concrete Barrier to protect the opening in the guardrail at all times when a work zone set-up with a Police Detail is not in place as shown on the attached submitted plan. Also, to install hay bales and silt fence from behind the guardrail on the southerly side of the roadway at approximate station 37+72 southwesterly approximately ninety five (95) - LF continuing westerly approximately eighty (80) - LF continuing northerly approximately one hundred and five (105) - LF ending behind the guardrail on the southerly side of the roadway at approximate station 39+20. All work shall be done in accordance with the plans submitted and on file in the District Four Permit Office by Woodward & Curran titled "Lowell Regional Water Utility Lowell, Massachusetts, Water System Improvements, Water Main Upgrades North of Merrimack River" dated November 2014.

No trees greater than two (2) inch diameter shall be removed to complete this work.

The Traffic Management Plan shall include the following, edit Note 8 to read "The first five (5) plastic drums of a taper shall be mounted with Type A lights."

WORK HOURS: 9:00 A.M. thru 3:00 P.M. Monday thru Friday.

The Grantee shall not engage in any work under benefit of this Permit until a MassDOT Roadway Work Notification Form (attached) is filed with the District Permit Office prior to the start of work. The form must contain the required information and have the proper signatory approval. The form must be submitted no later than 12:00 PM on the Wednesday prior to the week the work will begin. The duration of work approvals shall be limited to one week at a time. If the work exceeds one week then a new Roadway Work

Notification Form is required to be submitted for each additional week. The Grantee can fax the completed form to MassDOT at 781.646.5115.

The Grantee shall notify the District Permit Office at 781.641.8451, two (2) working days prior to the start of work. No work shall be authorized without said notification.

The Grantee shall contact the Area Contact Person (7:30 AM to 4:00 PM Monday through Friday) at 617.279.7203, two (2) working days prior to the start of work.

The Contractor is responsible to ensure that all contractor personnel, including all subcontractors, working on the project are issued and are wearing all necessary personal protective safety equipment while working within the project limits. This equipment shall include, as a minimum, a hardhat and a safety vest, regardless of the type of work being performed. Other safety equipment shall be added as required to perform the work in which they are engaged and in accordance with all local, state and federal requirements in effect.

A copy of this permit must be on the job site at all times for inspection. Failure to have this permit available will result in suspension of the rights granted by this permit until such permit is made available.

The Completion of Work Form shall be sent to the Grantor as soon as possible after the completion of the physical work.

Uniformed Police Officers with their official vehicles shall be in attendance at all times while work is being done under this permit.

The furnishing and erecting of all required signs and traffic safety devices shall be the responsibility of the Grantee.

All signs and devices shall conform to the 2003 edition of the Manual on Uniform Traffic Control Devices (MUTCD) with the Commonwealth of Massachusetts Amendments.

Cones and non-reflecting warning devices shall not be left in operating position on the highway when the daytime operations have ceased. If it becomes necessary for this Department to remove any construction warning devices or their appurtenances from the project due to negligence by the Grantee all costs for this work will be charged to the Grantee.

Flashing arrow boards will be used at all times when operations occupy the roadway and shall be available for use at all times.

All warning devices shall be subject to removal, replacement and repositioning by the Grantee as often as deemed necessary by the Engineer.

Signs must be installed so that the visibility of any existing signs remains unobstructed.

The Grantee shall not engage in any trench work under benefit of this Permit until a Department of Public Safety Excavation of Trenches Form (attached) is filed with the District Permit Office two (2) working days prior to the start of work. The Grantee can fax the completed form to MassDOT at 781.646.5115.

The Grantee(s) must adhere to 520 CMR 14.00; EXCAVATION AND TRENCH SAFETY as promulgated by the Department of Public Safety in conjunction with the Division of Occupational Safety pursuant to the authority granted by M.G.L. Chapter 82A: Section 1.

The Attached Trench Permit Rider shall become an integral part of the terms and conditions of this permit.

Provisions shall be made for the safety and protection of Pedestrian Traffic during the construction period.

The Grantee shall notify Dig-Safe at 1.888.344.7233 at least 72 hours prior to the start of work for the purpose of identifying the location of underground utilities.

Dig-Safe # To be obtained prior to the commencement of work.

All work shall be in compliance with the 1988 Edition of the "Massachusetts Highway Department Standard Specifications for Highways and Bridges", and Supplemental Specifications Dated June 15, 2012.

No equipment, trucks, workers, etc., shall occupy any part of the traveled way except between the hours of 9:00 A.M. and 3:00 P.M. Monday thru Friday. Except for an emergency, in no case will operations exceed the specified hours without the prior approval of the District Highway Director or an authorized Representative. This includes the placement of traffic control devices, vehicles, equipment or anything that restricts the flow of traffic through the construction zone. Emergencies must be unexpected situations or sudden occurrences of a serious and urgent nature that demand immediate attention.

No work shall be done under the terms of this permit on Saturdays, Sundays or Holidays.

No work will be performed on the day before or the day after a holiday or a long weekend which involves a holiday on any highway, roadway or property under the control of the MassDOT Highway Division or in areas where the work would adversely impact the normal flow of traffic on the State Highway System, without permission of the District Highway Director or an authorized Representative.

It is imperative that construction operations are managed so that motorists travel "delay" is

minimized. At any time during the operation when a traffic delay of over twelve (12) minutes occurs and the situation is worsening, the Grantee will begin to suspend operations. Continuously increasing "delays" of over twelve (12) minutes are not to be permitted and may result in the termination of this Permit by the Department.

When in the opinion of the Engineer, this operation constitutes a hazard to traffic in any area, the Grantee may be required to suspend operations during certain hours and to remove his equipment from the roadway.

The Grantee will be responsible for any damage caused by this operation to curbing, structures, roadway, etc.

The State Highway Layout shall be kept clean of debris of any nature at all times and shall be thoroughly cleaned at the completion of this permit.

At the completion of this permit, all disturbed areas shall be restored to a condition equal or similar to that which existed prior to the work.

Any grass areas disturbed within the State Highway Layout shall be graded, loamed to a depth of 4" and seeded.

If the existing guardrail is removed or damaged it shall be reset or replaced to MassDOT Standards. This work shall be performed by an approved contractor.

If it becomes necessary to open the roadway surface in a larger area or relocate the existing work area to a location other than specified in this permit then the Grantee shall apply for an additional permit to cover this project.

All rocks, boulders and other material and/or debris as a result of the trenching operation shall be removed from the State Highway layout at the end of each workday.

Back fill for the trench may be selected from the excavated material free from large lumps, clods, or rock placed in layers not exceeding 6 inches in depth and thoroughly compacted.

Any bound marked MHB shall not be removed or disturbed. If it becomes necessary to remove and reset any highway bounds then the Grantee shall hire a Registered Professional Land Surveyor to perform this work. It shall be the responsibility of this land surveyor to submit to this office a statement in writing and a plan containing his stamp and signature showing that said work has been performed.

This permit is issued with the stipulation that it may be modified or revoked at any time at the discretion of the District Four Highway Director or an authorized Representative without rendering said Department or the Commonwealth of Massachusetts liable in any way.

The Grantee shall indemnify and hold harmless the Commonwealth and its Highway Division against all suits, claims or liability of every name and nature arising at any time out of or in consequence of the acts of the Grantee in the performance of the work covered by this permit and or failure to comply with terms and conditions of the permit whether by themselves or their employees or subcontractors.

APPLICANT'S REPRESENTATIVE: Ralph Snow

TELEPHONE NUMBER: (781) 251-0200

The Permit shall be void unless the work herein contemplated shall have been completed before December 8, 2015.

Dated at Arlington this 8th day of December, 2014.

MassDOT - Highway Division,

By

Paul D. Stedman
Acting District Highway Director

ASA/asa

TRENCH PERMIT RIDER

Pursuant to G.L. cs. 81, §21 and 82A §1, 720 CMR 13.00 and 520 CMR 7.00 et seq

THIS PERMIT MUST BE FULLY COMPLETED PRIOR TO CONSIDERATION

Name of Applicant **Street Address**			**Phone** **Cell**
City/Town	**MA**	**ZIP**	
Name of Excavator (if different from applicant) **Street Address**			**Phone** **Cell**
City/Town	**MA**	**ZIP**	
Name of Owner(s) of Property **Street Address**			**Phone** **Cell**
City/Town	**MA**	**ZIP**	
Other Contact			**Permit Fee Received** No ( ) Yes ( )

Description, location and purpose of proposed trench:
Please describe the exact location of the proposed trench and its purpose (include a description of what is (or is intended) to be laid in proposed trench (eg; pipes/cable lines etc..) Please use reverse side if additional space is needed.

Insurance Certificate #:

Name and Contact Information of Insurer:

Policy Expiration Date:

Dig Safe #:

Name of Competent Person (as defined by 520 CMR 7.02):

Massachusetts Hoisting License #	
License Grade:	**Expiration Date:**

BY SIGNING THIS FORM, THE APPLICANTAND EXCAVATOR ACKNOWLEDGE AND CERTIFY THAT THEY ARE FAMILIAR WITH, OR, BEFORE COMMENCEMENT OF THE WORK, WILL BECOME FAMILIAR WITH, ALL LAWS AND REGULATIONS APPLICABLE TO WORK PROPOSED, INCLUDING OSHA REGULATIONS, G.L. c. 82A, 520 CMR 7.00 et seq., AND ANY APPLICABLE MUNICIPAL ORDINANCES, BY-LAWS AND REGULATIONS AND THEY COVENANT AND AGREE THAT ALL WORK DONE UNDER THE PERMIT ISSUED FOR SUCH WORK WILL COMPLY THEREWITH IN ALL RESPECTS AND WITH THE CONDITIONS SET FORTH BELOW.

THE UNDERSIGNED APPLICANT AND EXCAVATOR AGREE JOINTLY AND SEVERALLY TO REIMBURSE THE COMMONWEALTH FOR ANY AND ALL COSTS AND EXPENSES INCURRED BY THE COMMONWEALTH IN CONNECTION WITH THIS PERMIT AND THE WORK CONDUCTED THEREUNDER, INCLUDING BUT NOT LIMITED TO ENFORCING THE REQUIREMENTS OF STATE LAW AND CONDITIONS OF THIS PERMIT, INSPECTIONS MADE TO ASSURE COMPLIANCE THEREWITH, AND MEASURES TAKEN BY THE COMMONWEALTH TO PROTECT THE PUBLIC WHERE THE APPLICANT OR EXCAVATOR HAS FAILED TO COMPLY THEREWITH INCLUDING POLICE DETAILS AND OTHER REMEDIAL MEASURES DEEMED NECESSARY BY THE COMMONWEALTH.

THE UNDERSIGNED APPLICANT AND EXCAVATOR AGREE JOINTLY AND SEVERALLY TO DEFEND, INDEMNIFY, AND HOLD HARMLESS THE COMMONWEALTH AND ALL OF ITS AGENTS AND EMPLOYEES FROM ANY AND ALL LIABILITY, CAUSES OR ACTION, COSTS, AND EXPENSES RESULTING FROM OR ARISING OUT OF ANY INJURY, DEATH, LOSS, OR DAMAGE TO ANY PERSON OR PROPERTY DURING THE WORK CONDUCTED UNDER THIS PERMIT.

APPLICANT SIGNATURE

_____ **DATE** _____

EXCAVATOR SIGNATURE (IF DIFFERENT)

_____ **DATE** _____

For Department use – Do not write in this section	
PERMIT APPROVED BY	**$_____ Application Fee**
PERMITTING AUTHORITY **Date**	
CONDITIONS OF APPROVAL	

CONDITIONS AND REQUIREMENTS PURSUANT TO G.L.C.82A AND 520 CMR 7.00 et seq. (as amended)

By signing the application, the applicant understands and agrees to comply with the following:

i. No trench may be excavated unless the requirements of sections 40 through 40D of chapter 82, and any accompanying regulations, have been met and this permit is invalid unless and until said requirements have been complied with by the excavator applying for the permit including, but not limited to, the establishment of a valid excavation number with the underground plant damage prevention system as said system is defined in section 76D of chapter 164 (DIG SAFE);

ii. Trenches may pose a significant health and safety hazard. Pursuant to Section 1 of Chapter 82 of the General Laws, an excavator shall not leave any open trench unattended without first making every reasonable effort to eliminate any recognized safety hazard that may exist as a result of leaving said open trench unattended. Excavators should consult regulations promulgated by the Department of Public Safety in order to familiarize themselves with the recognized safety hazards associated with excavations and open trenches and the procedures required or recommended by said department in order to make every reasonable effort to eliminate said safety hazards which may include covering, barricading or otherwise protecting open trenches from accidental entry.

iii. Persons engaging in any in any trenching operation shall familiarize themselves with the federal safety standards promulgated by the Occupational Safety and Health Administration on excavations: 29 CFR 1926.650 et.seq., entitled Subpart P "Excavations".

iv. Excavators engaging in any trenching operation who utilize hoisting or other mechanical equipment subject to chapter 146 shall only employ individuals licensed to operate said equipment by the Department of Public Safety pursuant to said chapter and this permit must be presented to said licensed operator before any excavation is commenced;

v. By applying for, accepting and signing this permit, the applicant hereby attests to the following: (1) that they have read and understands the regulations promulgated by the Department of Public Safety with regard to construction related excavations and trench safety; (2) that he has read and understands the federal safety standards promulgated by the Occupational Safety and Health Administration on excavations: 29 CMR 1926.650 et.seq., entitled Subpart P "Excavations" as well as any other excavation requirements established by this municipality; and (3) that he is aware of and has, with regard to the proposed trench excavation on private property or proposed excavation of a city or town public way that forms the basis of the permit application, complied with the requirements of sections 40-40D of chapter 82A.

vi. This permit shall be posted in plain view on the site of the trench.

For additional information please visit the Department of Public Safety's website at www.mass.gov/dps

Summary of Excavation and Trench Safety Regulation (520 CMR 14.00 et seq.)

This summary was prepared by the Massachusetts Department of Public Safety pursuant to G.L.c.82A and does not include all requirements of the 520 CMR 14.00. To view the full regulation and G.L.c.82A, go to www/mass.gov/dps
Pursuant to M.G.L. c. 82, § 1, the Department of Public Safety, jointly with the Division of Occupational Safety, drafted regulations relative to trench safety. The regulation is codified in section 14.00 of title 520 of the Code of Massachusetts Regulations. The regulation requires all excavators to obtain a permit prior to the excavation of a trench made for a construction-related purpose on public or private land or rights-of-way. All municipalities must establish a local permitting authority for the purpose of issuing permits for trenches within their municipality. Trenches on land owned or controlled by a public (state) agency requires a permit to be issued by that public agency unless otherwise designated.

In addition to the permitting requirements mandated by statute, the trench safety regulations require that all excavators, whether public or private, take specific precautions to protect the general public and prevent unauthorized access to unattended trenches. Accordingly, unattended trenches must be covered, barricaded or backfilled. Covers must be road plates at least ¾" thick or equivalent; barricades must be fences at least 6' high with no openings greater than 4" between vertical supports; backfilling must be sufficient to eliminate the trench. Alternatively, excavators may choose to attend trenches at all times, for instance by hiring a police detail, security guard or other attendant who will be present during times when the trench will be unattended by the excavator.

The regulations further provide that local permitting authorities, the Department of Public Safety, or the Division of Occupational Safety may order an immediate shutdown of a trench in the event of a death or serious injury; the failure to obtain a permit; or the failure to implement or effectively use adequate protections for the general public. The trench shall remain shutdown until re-inspected and authorized to re-open provided, however, that excavators shall have the right to appeal an immediate shutdown. Permitting authorities are further authorized to suspend or revoke a permit following a hearing. Excavators may also be subject to administrative fines issued by the Department of Public Safety for identified violations.

Summary of 1926 CFR Subpart P -OSHA Excavation Standard

This is a worker protection standard, and is designed to protect employees who are working inside a trench. This summary was prepared by the Massachusetts Division of Occupational Safety and not OSHA for informational purposes only and does not constitute an official interpretation by OSHA of their regulations, and may not include all aspects of the standard.
For further information or a full copy of the standard go to www.osha.gov.

- **Trench Definition per the OSHA standard:**
  - An excavation made below the surface of the ground, narrow in relation to its length.
  - In general, the depth is greater than the width, but the width of the trench is not greater than fifteen feet.
- **Protective Systems** to prevent soil wall collapse are always required in trenches deeper than 5', and are also required in trenches less than 5' deep when the competent person determines that a hazard exists. Protection options include:
  - Shoring. Shoring must be used in accordance with the OSHA Excavation standard appendices, the equipment manufacturer's tabulated data, or designed by a registered professional engineer.
  - Shielding (Trench Boxes). Trench boxes must be used in accordance with the equipment manufacturer's tabulated data, or a registered professional engineer.
  - Sloping or Benching. In Type C soils (what is most typically encountered) the excavation must extend horizontally 1 ½ feet for every foot of trench depth on both sides, 1 foot for Type B soils, and ¾ foot for Type A soils.
  - A registered professional engineer must design protective systems for all excavations greater than 20' in depth.
- **Ladders** must be used in trenches deeper than 4'.
  - Ladders must be inside the trench with workers at all times, and located within 25' of unobstructed lateral travel for every worker in the trench.
  - Ladders must extend 3' above the top of the trench so workers can safely get onto and off of the ladder.
- **Inspections** of every trench worksite are required:
  - Prior to the start of each shift, and again when there is a change in conditions such as a rainstorm.
  - Inspections must be conducted by the competent person (see below).
- **Competent Person(s) is:**
  - Capable (i.e., trained and knowledgeable) in identifying existing and predictable hazards in the trench, and other working conditions which may pose a hazard to workers, and
  - Authorized by management to take necessary corrective action to eliminate the hazards. Employees must be removed from hazardous areas until the hazard has been corrected.
- **Underground Utilities** must be:
  - Identified prior to opening the excavation (e.g., contact Digsafe).
  - Located by safe and acceptable means while excavating.
  - Protected, supported, or removed once exposed.
- **Spoils** must be kept back a minimum of 2' from the edge of the trench.
- **Surface Encumbrances** creating a hazard must be removed or supported to safeguard employees. Keep heavy equipment and heavy material as far back from the edge of the trench as possible.
- **Stability of Adjacent Structures:**
  - Where the stability of adjacent structures is endangered by creation of the trench, they must be underpinned, braced, or otherwise supported.
  - Sidewalks, pavements, etc. shall not be undermined unless a support system or other method of protection is provided.
- **Protection from water accumulation hazards:**
  - It is not allowable for employees to work in trenches with accumulated water. If water control such as pumping is used to prevent water accumulation, this must be monitored by the competent person.
  - If the trench interrupts natural drainage of surface water, ditches, dikes or other means must be used to prevent this water from entering the excavation.
- **Additional Requirements:**
  - For mobile equipment operated near the edge of the trench, a warning system such as barricades or stop logs must be

used.

- Employees are not permitted to work underneath loads. Operators may not remain in vehicles being loaded unless vehicles are equipped with adequate protection as per 1926.601(b)(6).
- Employees must wear high-visibility clothing in traffic work zones.
- Air monitoring must be conducted in trenches deeper than 4' if the potential for a hazardous atmosphere exists. If a hazardous atmosphere is found to exist (e.g., O_2 <19.5% or >23.5%, 20% LEL, specific chemical hazard), adequate protections shall be taken such as ventilation of the space.
- Walkways are required where employees must cross over the trench. Walkways with guardrails must be provided for crossing over trenches > 6' deep.
- Employees must be protected from loose rock or soil through protections such as scaling or protective barricades.

massDOT
Massachusetts Department of Transportation
Highway Division

MASSACHUSETTS
Roadway Work Notification Form

Start Date:_____ **Start Time:**_____ **End Date:**_____ **End Time:**_____

☐ Construction: No. _____ ☐ Bridge Inspection ☐ Maintenance Crew

☐ Permit Project: No. _____ ☐ Other: _____

District: _____ **City/Town:** _____

Roadway: _____ **Direction:** ○ NB ○ SB ○ EB ○ WB ○ OTHER

From: _____ *(Exit # or Intersecting Street)* **To:** _____ *(Exit # or Intersecting Street)*

Bridge No.: _____ _____ *(Roadway)* over _____ *(Roadway, Waterway, Railroad, Other)*

Ramp Closures:

Exit # _____ From, _____ (Roadway & Direction) To, _____ (Roadway & Direction)

Brief Description of Work: (Attach second sheet for multiple lane closures or additional information)

Existing Lanes	S = Shoulder L = Travel Lane M = Median							
Lane Usage	O = Open X = Closed							

Contact Person: _____ Radio ID: _____

Cell Phone: _____ Office Phone: _____

Recommended: _____ **Approved:** _____ **Date:** _____

Phase One

District: _____ **City/Town:** _____

Roadway: _____ **Direction:** ○ NB ○ SB ○ EB ○ WB ○ OTHER

Brief Description of Work: (Attach second sheet for multiple lane closures or additional information)

Existing Lanes	S = Shoulder L = Travel Lane M = Median							
Lane Usage	O = Open X = Closed							

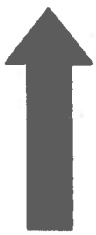
Phase Two

District: _____ **City/Town:** _____

Roadway: _____ **Direction:** ○ NB ○ SB ○ EB ○ WB ○ OTHER

Brief Description of Work: (Attach second sheet for multiple lane closures or additional information)

Existing Lanes	S = Shoulder L = Travel Lane M = Median							
Lane Usage	O = Open X = Closed							



Deval L. Patrick, Governor
Frank DePaola, Acting Secretary & CEO
Frank DePaola, Administrator

massDOT
Massachusetts Department of Transportation
Highway Division

Completion of Work

You may proceed with the work described within this Permit, which has been issued to you by the Massachusetts Department of Transportation (MassDOT).

Your attention is called to the time frame allowed for completion of said work. If an extension of time is required or an alteration to any of the permit conditions becomes necessary, application for such changes should be made as soon as possible to the District Highway Director.

Upon completion of the work, please fill out this form and forward it to: Massachusetts Department of Transportation, District Four, 519 Appleton Street, Arlington, MA 02476.

IF THIS NOTICE IS NOT RETURNED, THE LIABILITY ASSUMED UNDER THIS PERMIT WILL CONTINUE.

By Authority of the Massachusetts Department of Transportation District Four Highway Director.

I hereby notify you that the work outlined and authorized under the terms and conditions of MassDOT Permit No. _____ has been completed in accordance with *all requirements of MassDOT. The date of completion*:

Permit Grantee:_____

Signed:_____

City/ Town:_____

Date:_____

519 Appleton Street, Arlington, MA 02476
Tel: 781-641-8300
www.mass.gov/massdot

COMMITMENT & INTEGRITY
DRIVE RESULTS

980 Washington Street | Suite 325
Dedham, Massachusetts 02026
www.woodardcurran.com

T 800.446.5518
T 781.251.0200
F 781.251.0847

Via Regular US Mail

November 24, 2014

Paul Stedman
Acting District Highway Director, Mass Highway District 4
519 Appleton Street
Arlington, MA 02476

Re: Water System Improvements - Response to Comments

Dear Mr. Stedman:

The following is a response to an email from April S. Antonelli dated October 27, 2014. The items in the email and their responses are included below.

1. Provide proposed limits of guardrail removal.

   RESPONSE: Please refer to revised Sheet C-303, attached. As shown in the Phase 2 site plan and noted in Note 3, the contractor shall temporarily remove up to a maximum of 24 feet of guardrail and associated guardrail posts.

2. Provide a detail displaying the area where the guardrail is removed will be treated during the workday.

   RESPONSE: Please refer to Figure 1, attached.

3. Will the guardrail be replaced at the end of each workday? If not, provide a detail on how the area will be left at the end of each workday.

   RESPONSE: No, the guardrail will not be replaced at the end of each workday. Please refer to Figure 2 for site requirements during non-construction periods.

As always, if you have any questions about this please feel free to contact me. I can be reached via email at bchapell@woodardcurran.com or by phone at (781) 251-0200.

Sincerely,

WOODARD & CURRAN

Bob Chapell, P.E.
Senior Project Manager

Enclosure(s): Sheet C-303 (Revised), Figure 1, Figure 2

cc: Woodard & Curran File

PN: 227251.50

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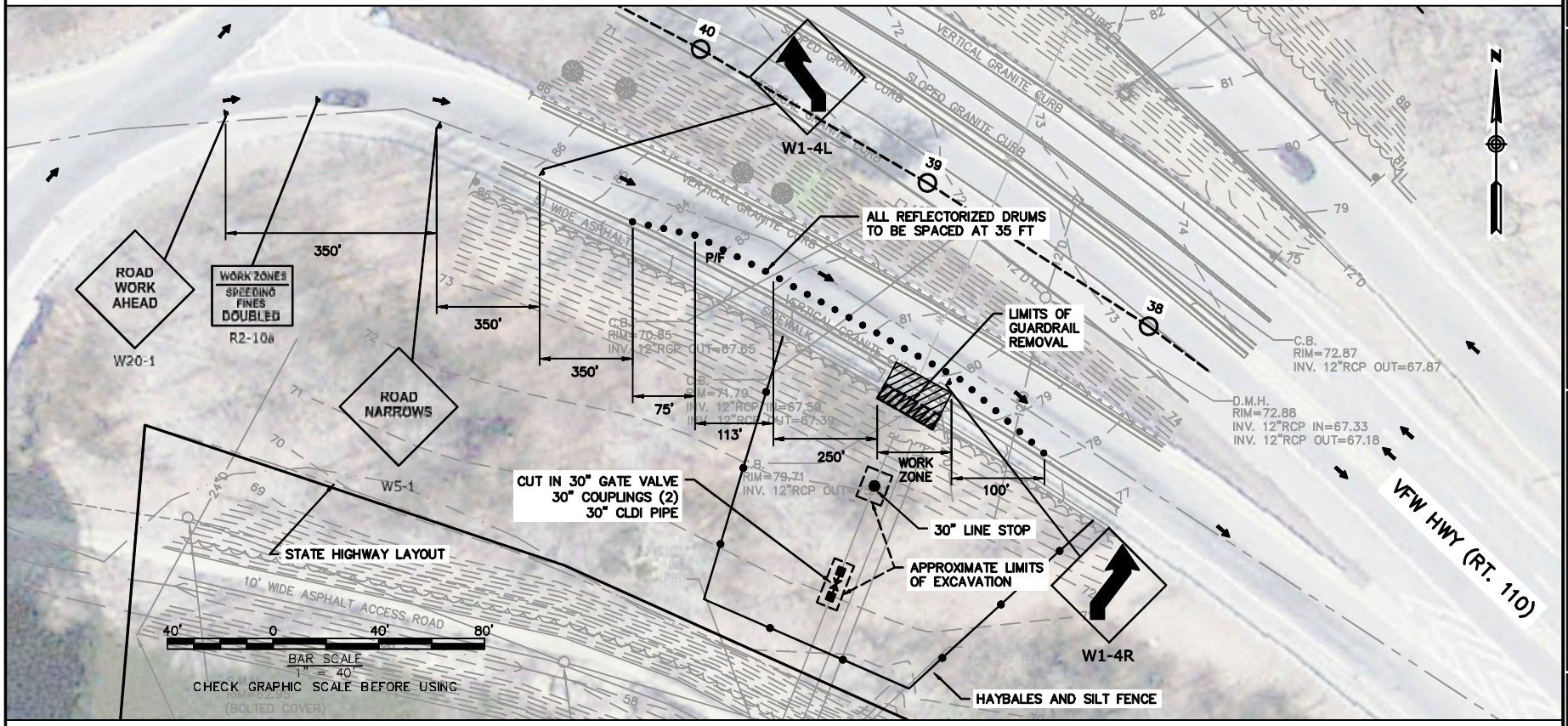
NOTES

1. ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS.
2. ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
3. TEMPORARY CONSTRUCTION SIGNAGE AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
4. TEMPORARY CONSTRUCTION SIGNAGE, BARRICADES, AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
5. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, AND REFLECTORIZED PLASTIC DRUMS WITH LIGHTING DEVICES MOUNTED ON THEM MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES."
6. CONTRACTOR SHALL PROVIDE MAINTAINED ACCESS TO DRIVEWAYS AND STREETS THROUGHOUT CONSTRUCTION.
7. IF ACCESS CAN NOT BE MAINTAINED, CONTRACTOR SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS.
8. THE FIRST THREE (3) DRUMS OF A TAPER MAY BE MOUNTED WITH TYPE A LIGHTS.
9. DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
10. MINIMUM LANE WIDTH TO BE 11 FEET UNLESS OTHERWISE SHOWN. MINMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
11. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.
12. BECAUSE OF SPEED LIMITS, MOVABLE IMPACT ATTENUATORS WILL NOT BE USED.
13. SIGNAGE AND DISTANCES WERE DERIVED FROM THE GENERAL GUIDELINES AND FIGURE Gen-2, Gen-3, Gen-4, AND TLR-2 FROM THE "MASS HIGHWAY STANDARD DETAILS FOR THE DEVELOPMENT OF TRAFFIC MANAGEMENT PLANS."
14. TRAFFIC MANAGEMENT PLAN AS SEEN MAY MOVE EAST/WEST ON VFW HIGHWAY (ROUTE 110) AS NECESSARY FOR LEAST INVASIVE ACCESS TO WORK ZONE.
15. THIS SETUP MAY NOT BE LEFT AFTER WORK HOURS. SEE FIGURE 2 FOR SITE REQUIREMENTS AFTER WORK HOURS.
16. POSTED SPEED LIMIT IS 35 MPH.
17. DIMENSIONS NOTED FOR TRAFFIC CONTROLS ARE NOT TO SCALE.

LEGEND

- DIRECTION OF TRAFFIC
- REFLECTORIZED PLASTIC DRUM
- SIGN
- P/F POLICE DETAIL / FLAGGER



WOODARD & CURRAN
COMMITMENT & INTEGRITY DRIVE RESULTS
40 Shattuck Road, Suite 110
Andover, Massachusetts 01810
866.702.6371 | www.woodardcurran.com

TRAFFIC MANAGEMENT PLAN

DESIGNED BY: NHL
DRAWN BY: NHL
CHECKED BY: NHL
224802-C-303.DWG

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER SYSTEM IMPROVEMENTS

JOB NO: 224802.20
DATE: NOV 2014
SCALE: AS NOTED

FIGURE 1

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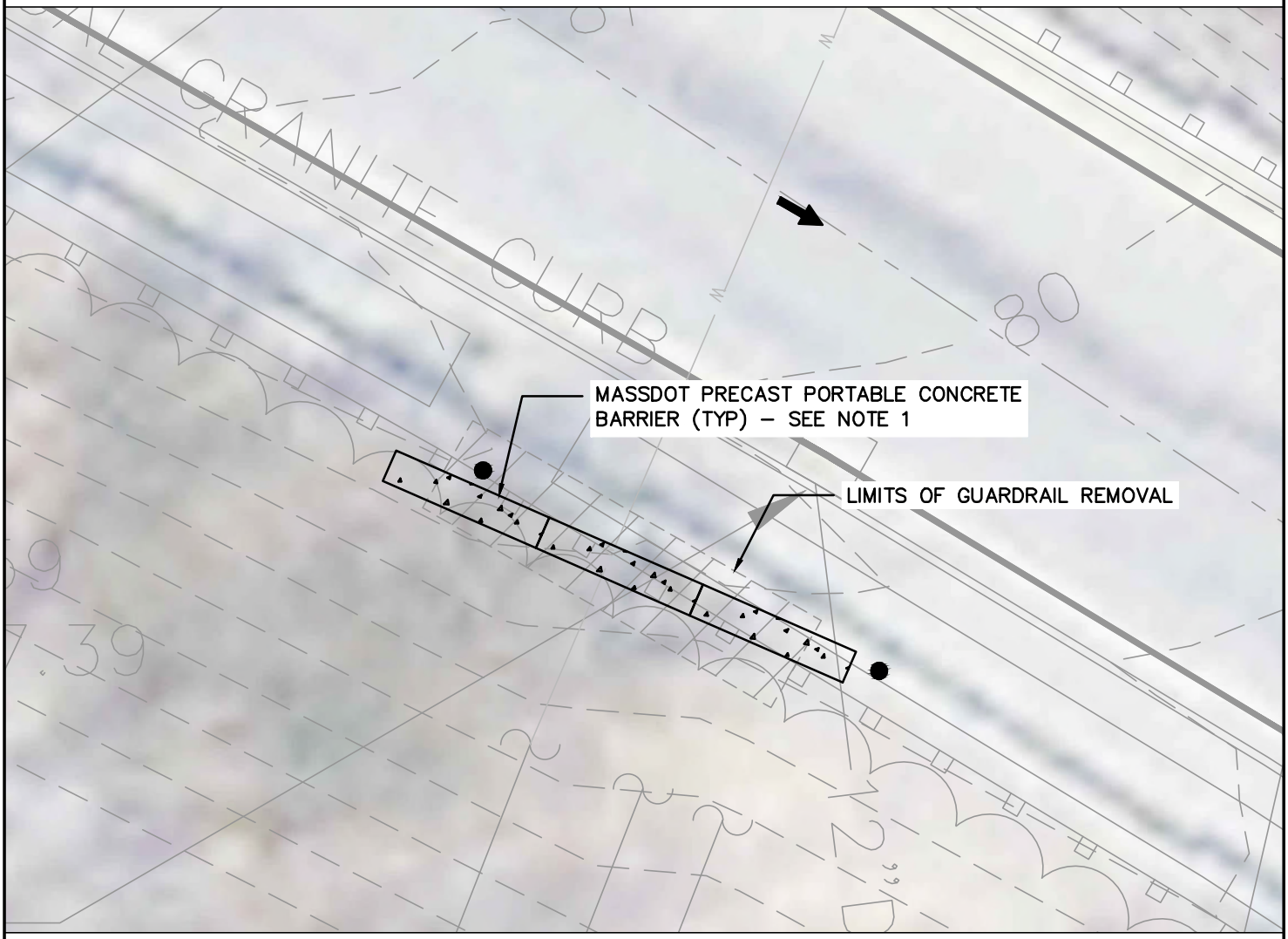
NOTES

1. MASSDOT PRECAST PORTABLE CONCRETE BARRIERS (REFERENCE E403.1.0, E403.2.0, E403.3.0) SHALL BE INSTALLED IN SUCH A WAY AS TO EXTEND SOUTH PAST THE GUARDRAIL ON THE WEST AND BE POSITIONED AT A SLIGHT ANGLE AS TO EXTEND NORTH PAST THE GUARDRAIL ON THE EAST. THE JERSEY BARRIERS SHALL BE INSTALLED IN SUCH A WAY AS TO NOT CREATE A BLUNT END TOWARDS ONCOMING TRAFFIC.

LEGEND

- DIRECTION OF TRAFFIC
- REFLECTORIZED PLASTIC DRUM



10' 0 10' 20'

BAR SCALE
1" = 10'
CHECK GRAPHIC SCALE BEFORE USING

WOODARD &CURRAN
40 Shattuck Road, Suite 110
Andover, Massachusetts 01810
866.702.6371 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

SITE REQUIREMENTS DURING NON–CONSTRUCTION PERIODS

DESIGNED BY: NHL	CHECKED BY: NHL
DRAWN BY: NHL	224802–C–303.DWG

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER SYSTEM IMPROVEMENTS

JOB NO: 224802.20
DATE: NOV 2014
SCALE: AS NOTED

FIGURE 2

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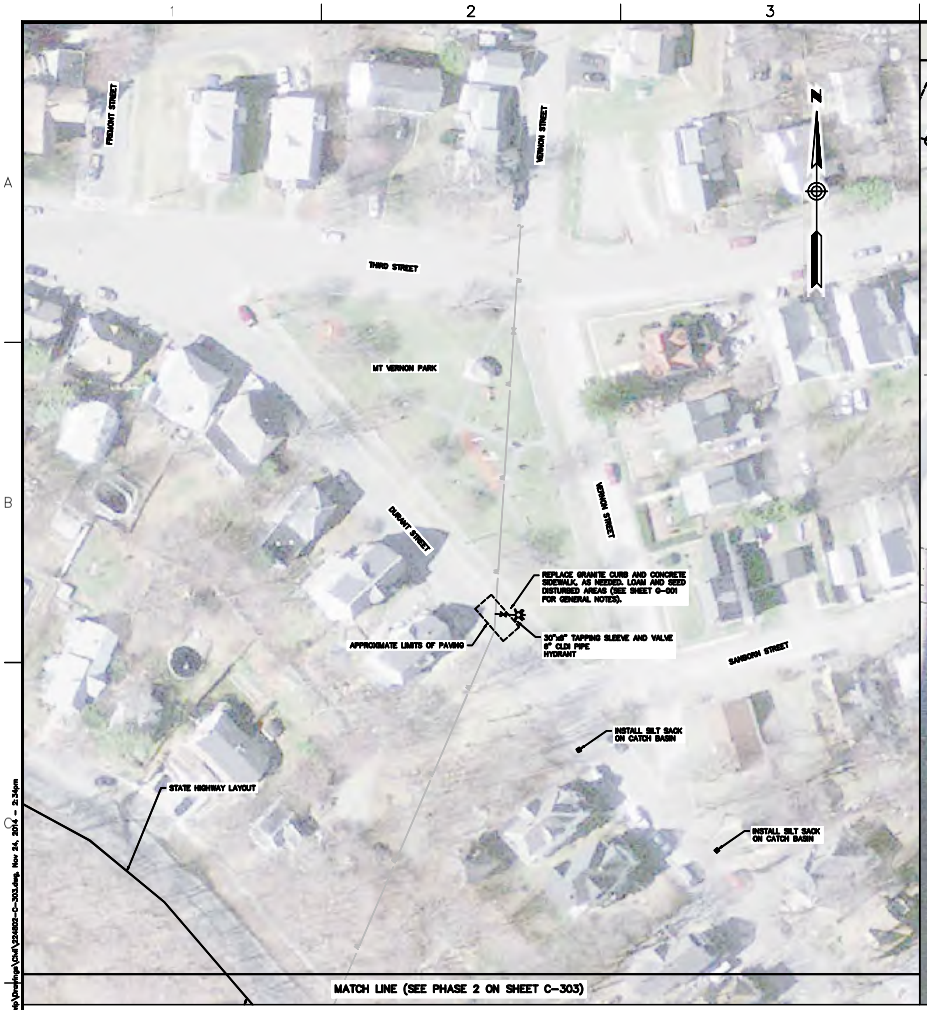
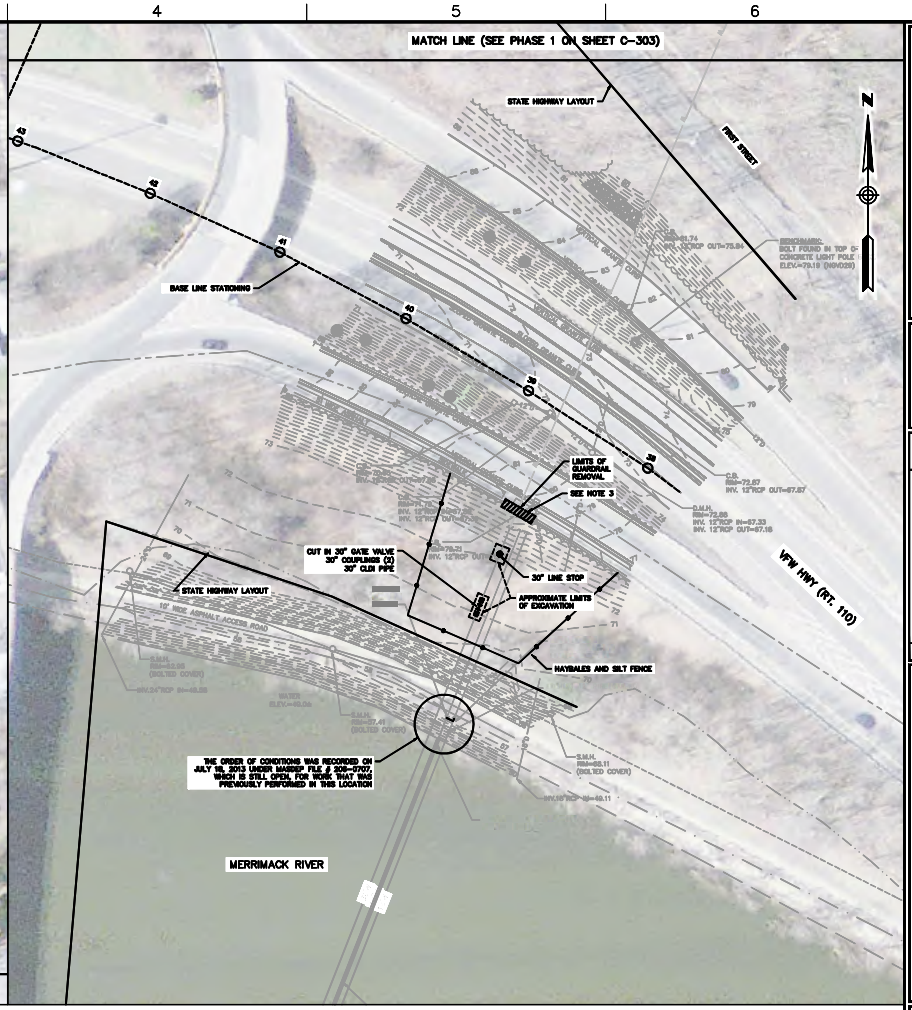


PHASE 1
SCALE: 1"=40'



PHASE 2
SCALE: 1"=40'

40' 0 40' 80'
CHECK GRAPHIC SCALE BEFORE USING

NOTES:

1. COMPLETE WORK IN PHASE 1 PRIOR TO STARTING WORK IN PHASE 2.
2. EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO EXCAVATION. INSTALL SILT SACKS IN CATCH BASINS DOWNHILL OF EXCAVATION.
3. CONTRACTOR SHALL TEMPORARILY REMOVE GUARDRAIL AND POSTS ALONG ROUTE 110 AS NEEDED (UP TO A MAXIMUM OF 24 FT) FOR CONSTRUCTION ACTIVITIES. TRAFFIC MANAGEMENT SHALL BE ENFORCED AS SHOWN IN FIGURE 1 OF THE MASSDOT ACCESS PERMIT APPLICATION DURING PERIODS OF ACTIVE CONSTRUCTION. CONTRACTOR SHALL COORDINATE POLICE DETAILS DURING THESE ACTIVITIES. POLICE DETAILS SHALL BE PAID BY OWNER BUT SHALL BE SCHEDULED BY CONTRACTOR. SITE REQUIREMENTS DURING NON-CONSTRUCTION PERIODS ARE SHOWN IN FIGURE 2 IN THE MASSDOT ACCESS PERMIT APPLICATION. CONTRACTOR SHALL RESTORE THE SITE TO PRE-CONSTRUCTION CONDITIONS FOLLOWING ALL CONSTRUCTION ACTIVITIES, INCLUDING BUT NOT LIMITED TO REPAIR AND REPLACEMENT OF GUARDRAIL, POSTS, SIDEWALK, AND CURBING (AND ANY OTHER IMPACTED UTILITIES), AS NEEDED.
4. CONTRACTOR SHALL WORK WITH OWNER AND ENGINEER TO LOCATE EXISTING WATER MAINS.
5. UPON COMPLETION OF WORK, AREA SHALL BE GRADED TO MATCH PRE-CONSTRUCTION CONDITIONS AND LOAMED AND SEEDED.
6. THE LIMITS OF THE STATE HIGHWAY LAYOUT (SHLO) AND THE BASE LINE STATIONING WERE DERIVED FROM THE STATE HIGHWAY ALTERATION OF 1/20/1953 (LAYOUT 4111).

NOT TO SCALE

NOT FOR CONSTRUCTION

WOODARD & CURRAN
COMMITMENT & INTEGRITY DRIVE RESULTS
888 Washington Street, Suite 325N
Boston, Massachusetts 02026
800.446.5518 | www.woodardcurran.com

REV	DESCRIPTION	DRAWN BY	CHECKED BY	DATE
A	FOR MASSDEP REVIEW	MHL		07/16/14
DRAWING BY: MHL		CHECKED BY:		
DRAWING STY: MHL		224802-C-303.dwg		

WATER MAIN UPGRADES NORTH OF MERRIMACK RIVER

LOWELL REGIONAL WATER UTILITY
LOWELL, MASSACHUSETTS

WATER SYSTEM IMPROVEMENTS

JOB NO.: 224802.20
DATE: JULY 2014
SCALE: 1" = 40'
SHEET: 3 OF

C-303

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14-0974 S

November 7, 2014

Woodard & Curran, Inc.
Attention: Mr. Robert S. Little, P.E.
40 Shattuck Road, Suite 110
Andover, MA 01810

Subject: Exploration and Geotechnical Engineering Services
Proposed ADA Ramp
Edmund F. Tarmey Water Utility Building
815 Pawtucket Boulevard
Lowell, Massachusetts

Dear Rob:

In accordance with our Task Order dated September 17, 2014, we have performed a subsurface exploration program for the proposed ADA Ramp at 815 Pawtucket Boulevard in Lowell, Massachusetts. This letter summarizes our findings and recommendations and the contents of this letter are subject to the limitations set forth in Attachment A.

SCOPE OF WORK

The purpose of our work was to explore subsurface conditions at the site and to provide geotechnical recommendations relative to the proposed construction. Our work has included the making of two test boring explorations, a geotechnical evaluation of the subsurface findings and preparation of this letter report.

SITE CONDITIONS

The site is currently occupied by the Edmund F. Tarmey Water Utility Building with an associated stairway leading to the building lobby. The site is relatively flat at elevation 104 to 106 feet to the east of the stairway. The area east of the stairway is occupied by landscaped lawn.

PROPOSED CONSTRUCTION

We understand new construction will include an ADA ramp leading toward the aforementioned lobby, in addition to the aforementioned stairway. We understand the

option being considered for the new ramp includes a straight alignment to the east of the stairway. The ramp will be approximately 50 feet in length. We understand the owner is also considering an elevator system in lieu of the ADA ramp, but that system was not included in our scope of work.

EXPLORATIONS

Two test borings were made at the site on October 27, 2014 by a drilling contractor working under subcontract to S. W. Cole Engineering, Inc. (S.W.COLE). The exploration locations were selected and established in the field by S.W.COLE based on taped measurements from existing site features. Soil samples were obtained using Standard Penetration Testing (ASTM D1586) at standard 5-foot intervals.

The exploration locations are shown on the "Exploration Location Plan" attached as Sheet 1. Logs of the explorations, based on our observations are attached as Sheets 2 and 3. A key to the notes and symbols used on the logs is attached as Sheet 4.

SUBSURFACE FINDINGS

The test boring explorations, B-1 and B-2, generally encountered a surficial layer grassed dark brown topsoil at the ground surface. Below the topsoil, Test Boring B-1 encountered loose silty fine sand (fill) to a depth of about 9.0 feet below ground surface (bgs) and Test Boring B-2 encountered medium brown gravelly silty sand (fill) to 4.0 feet bgs overlying brown silty fine sand with asphalt pieces (fill) to about 8.0 feet bgs. Underlying the topsoil and fill, the test borings (B-1 and B-2) encountered loose silty fine sand to depths of 14.0 and 19.0 feet bgs, respectively. Below the loose silty fine sand, the test borings generally encountered loose to medium dense silty sand with varying amounts of gravel until being completed at 21.0 and 26.0 feet bgs, respectively.

Please refer to the Exploration Location Plan attached as Sheet 1, which depicts the test boring locations. Please refer to the exploration logs attached as Sheets 2 and 3 for a more detailed description of the subsurface findings.

Observations of groundwater were made at the test boring locations at the time of exploration work. The soils encountered in the test borings generally appeared saturated at depths below 14.0 feet bgs. Groundwater observations made during the relatively short period the boreholes were open and may not be indicative of actual

groundwater conditions during other times of year. Groundwater levels will fluctuate seasonally and following periods of precipitation and/or snowmelt.

RECOMMENDATIONS

Based on the subsurface findings and our understanding of proposed construction, the site is suitable for support of the new ADA ramp. Key geotechnical considerations for design and construction are as follows.

- Considering the site soils, we anticipate the new ADA ramp can be supported on a shallow foundation system consisting of spread footings and frost walls provided the below items are addressed.

- Loose fill underlies the proposed ramp area to a depth of about 8.0 to 9.0 feet bgs. To eliminate all risk of post-construction settlement associated with the fill, fills should be over-excavated below the ramp and within the bearing zone (1 foot horizontal extension beyond the footing edges for every 1 foot of excavation below footings) and be backfilled with compacted fill. It is our assessment that the excavated soils are suitable for backfill of the over-excavation when placed in a controlled compacted manner.

- Alternatively, the spread footing could be placed on proof-compacted subgrade soils overlain by a working mat of 12-inches of compacted crushed stone. This alternative does not eliminate the risk associated with settlement of the soils. We calculate that elastic (immediate) settlement could be on the order of 1-inch from the load applied by the fill used to raise grade. The owner must be aware this risk and be willing to accept the consequences of settlement.

- The existing fills and native soils were observed to contain appreciable amounts of silt and are therefore frost susceptible. Considering the silt content, site soils should not be re-used as backfill for the new ADA ramp.

- We recommend soils used within the frost depth below the concrete ramp slab consist of free-draining non-frost susceptible soils to mitigate potential for frost heaving below the ramp. Alternatively, rigid insulation could be incorporated into the materials below the slab.

Site and Foundation Subgrade Preparation: We recommend the existing fill below the ramp area be over-excavated. The limits of over-excavation should extend 1-foot laterally beyond the edge of footings for each 1-foot of excavation below the foundations.

Alternatively, in lieu of complete fill removal we recommend proof compaction of the soils at spread footing foundation subgrade. Proof compaction of the subgrade soils should consist of at least 3 to 5 passes of a vibratory plate compactor with a static weight of 600 lbs or greater. The footing subgrade should then be surface with a 12-inch layer of compacted crushed stone.

Further, we the area in the ramp alignment be cut to subgrade to allow for the 4-feet of free-draining low frost susceptible soils. The exposed soils should be proof-rolled with 10 passes of a vibratory drum roller having a static weight of at least 10 tons.

Foundation Design: We recommend that the new ADA ramp be supported on a shallow foundation system consisting of spread footings and frost walls. We recommend that foundation footings bear on subgrades as described above.

We recommend the following geotechnical parameters for spread footing foundation design:

GEOTECHNICAL FOUNDATION DESIGN PARAMETERS	
Design Frost Depth	4.0 feet
Net Allowable Bearing Capacity of Native Silty Sand	1.0 ksf
Total Unit Weight of Backfill (γ_t) – Structural Fill	125 pcf
Internal Friction Angle – Structural Fill	30°
Base Friction Factor – Concrete to Native Sand	0.4
Base Friction Factor – Concrete to Native Sand	0.5
Active Lateral Earth Pressure Coefficient – Structural Fill	0.3
Passive Lateral Earth Pressure Coefficient – Structural Fill	3.0
At-Rest Lateral Earth Pressure Coefficient – Structural Fill	0.5
Estimated Post-Construction Settlement (for complete fill over-excavation)	½-inch or less
Estimated Post-Construction Settlement (existing fill remain in place)	1-inch +/-

Excavation and Dewatering: We recommend that any unsuitable materials, including existing fills, organics, disturbed soils and any other deleterious materials be removed from below the ramp footprint. The limits of over-excavation should extend beyond the exterior edge of foundation footings horizontally by one foot for every one foot in depth below footing elevation. All excavations should be consistent with OSHA trenching regulations. Care must be exercised during construction to reduce disturbance of the bearing soils. We recommend excavation to finish subgrade be performed using a smooth-edged bucket to reduce the potential for disturbance of the subgrade soils.

The contractor should be prepared for dewatering of excavations. The bottoms of some excavations could have water pooling due to weather at the time of construction. Controlling the water level to at least 1 foot below subgrade elevation will help reduce disturbance of the subgrade soils.

The Contractor is ultimately responsible for selection, design, and implementation of excavation and dewatering plans.

Backfill and Compaction: We recommend that backfill adjacent to foundation footings consist of Structural Fill. Structural Fill should be clean, non-frost susceptible, sand and gravel free of organics and other deleterious materials meeting the following gradation:

STRUCTURAL FILL	
Sieve Size	Percent Finer by Weight
4 Inch	100
3 Inch	90 to 100
¼ Inch	25 to 90
No. 40	0 to 30
No. 200	0 to 5

It is our opinion that MassDOT M1.03.0 Type B Gravel Borrow meets the intention of the Structural Fill specification and is an acceptable substitute.

We recommend that drainage aggregate for foundation underdrains consist of compacted Crushed Stone. Crushed Stone should be washed, hard, durable rock meeting the gradation requirements for ASTM D-448, No. 57 stone.

Fill should be placed in horizontal lifts and compacted such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. Loose lift thicknesses should not exceed 12 inches. We recommend that fill be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Crushed Stone should be compacted in loose lifts not exceeding 12-inches with 2 to 3 passes of a vibratory plate compactor with a static weight of at least 600 lbs.

Ramp Slab: We recommend the fill used below the slab to 4.0 feet, measured from the top of slab, consist of free-draining, low frost susceptible soils, such as Structural Fill to mitigate risk of frost heaving of the soils below the slab. This will require over-excavation and replacement at the lower elevation of the ramp. General details are illustrated on Sheet 5.

Design Review and Construction Testing: S.W.COLE should be retained to review the foundation and earthwork construction documents to determine that our geotechnical recommendations have been properly interpreted and implemented. A soils and concrete testing program should also be implemented during construction to observe compliance with the design concepts, plans, and specifications. S.W.COLE would be please to provide a proposal for these services at the appropriate time.

It has been a pleasure to be of assistance to you during this phase of your project. If you have any questions or require any further assistance, please don't hesitate to contact us. Thank you for contacting us for this project.

Sincerely,

S. W. COLE ENGINEERING, INC.

Nathan M. Cote, P.E.
Geotechnical Engineer

Chad B. Michaud, P.E.
Senior Geotechnical Engineer

NMC:cbm

Attachment A
Limitations

This report has been prepared for the exclusive use by Woodard & Curran, Inc. for specific application to the proposed ADA Ramp at 815 Pawtucket Boulevard in Lowell, Massachusetts. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct the work in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

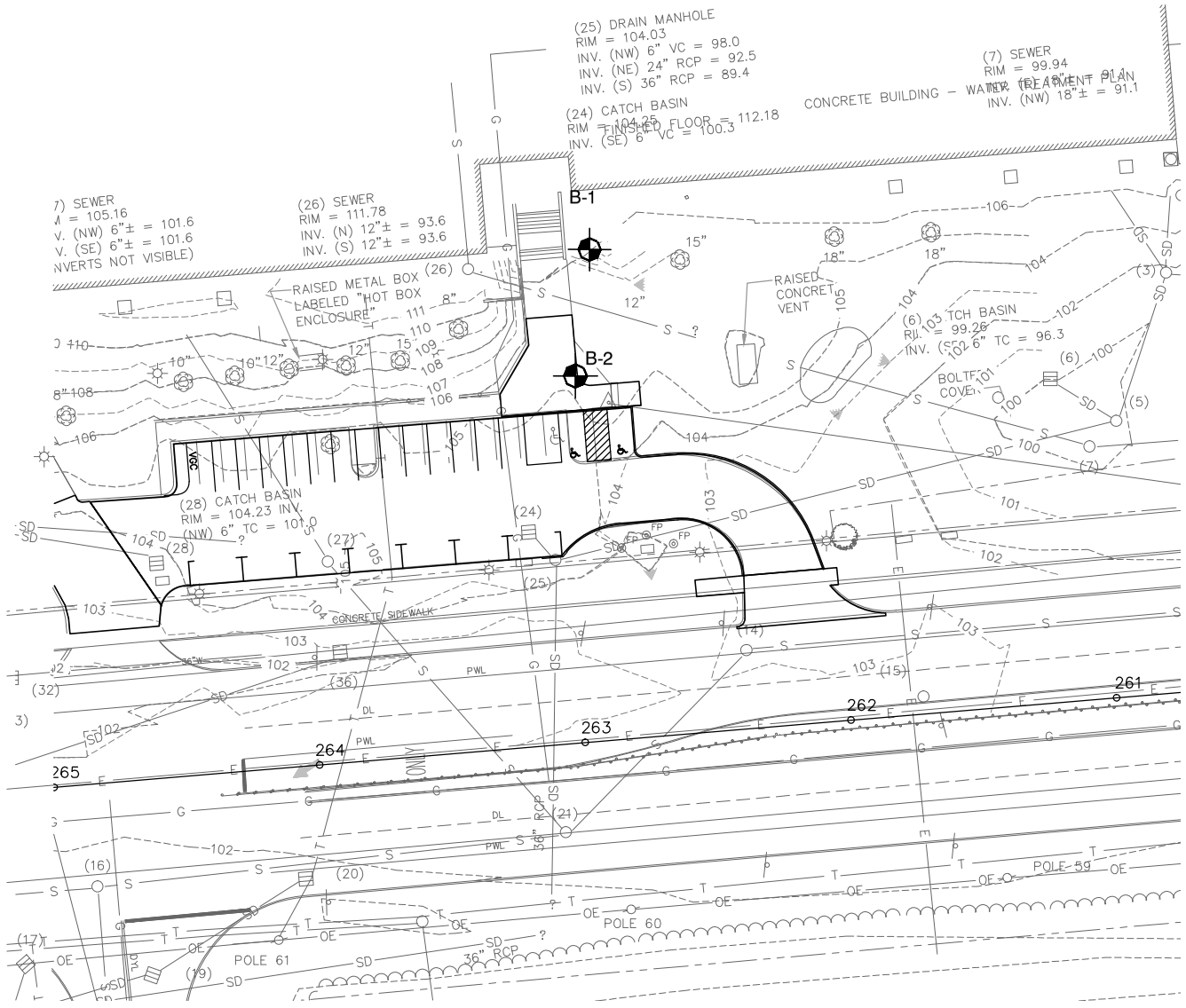
The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE's scope of work has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE.



LEGEND:

APPROXIMATE BORING LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCALE PLAN OF THE SITE PROVIDED BY WOODARD & CURRAN, INC., RECEIVED VIA E-MAIL 11/3/2014 IN AUTOCAD DWG FORMAT.
2. THE BORINGS WERE LOCATED IN THE FIELD BY TAPED MEASUREMENTS FROM EXISTING SITE FEATURES.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

0 20 40 80 120 160

SCALE IN FEET

S.W.COLE ENGINEERING, INC.

WOODARD & CURRAN, INC.

EXPLORATION LOCATION PLAN

PROPOSED ADA RAMP
815 PAWTUCKET BOULEVARD
LOWELL, MASSACHUSETTS

Job No.:	14-0974	Scale:	1" = 40'
Date :	11/05/2014	Sheet:	1

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-1**
SHEET: 1 OF 1
PROJECT NO.: 14-0974

PROJECT / CLIENT: PROPOSED ADA RAMP / WOODARD & CURRAN, INC.
LOCATION: 815 PAWTUCKET BOULEVARD (LOWELL, MASSACHUSETTS)
DRILLING CO. : MILLER ENGINEEING & TESTING, INC. DRILLER: BOB MARCOUX

DATE START: 10/27/2014
DATE FINISH: 10/27/2014
ELEVATION: 105' ±
SWC REP.: N. COTE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2-1/4"	-	-
SAMPLER:	SS	1-3/8"	140 lbs.	30"
CORE BARREL:	-	-		

WATER LEVEL INFORMATION
SOILS APPEAR SATURATED
BELOW 14.0' (10/27/2014)

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									4"	GRASSED DARK BROWN TOPSOIL
	1D	24"	18"	2.0'	2	3	6	7		BROWN SILTY FINE SAND (FILL) ~LOOSE~
	2D	24"	16"	4.0'	4	3	3	3	4.0'	
	3D	24"	18"	6.0'	3	2	1	1		BROWN SILTY FINE SAND TRACE GRAVEL (FILL) ~LOOSE~
	4D	24"	18"	8.0'	1	2	2	4	9.0'	
	5D	24"	18"	11.0'	3	5	5	5		BROWN SILTY FINE SAND ~MEDIUM DENSE~
	6D	24"	16"	16.0'	2	2	4	5	14.0'	
										BROWN SILTY SAND ~MEDIUM DENSE~
	7D	24"	24"	21.0'	8	8	13	21	19.0'	
									21.0'	BROWN MEDIUM SAND TRACE SILT ~MEDIUM DENSE~
										BOTTOM OF EXPLORATION AT 21.0'

SAMPLES:
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: **B-1**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-2**
SHEET: 1 OF 1
PROJECT NO.: 14-0974

PROJECT / CLIENT: PROPOSED ADA RAMP / WOODARD & CURRAN, INC.
LOCATION: 815 PAWTUCKET BOULEVARD (LOWELL, MASSACHUSETTS)
DRILLING CO. : MILLER ENGINEEING & TESTING, INC. DRILLER: BOB MARCOUX

DATE START: 10/27/2014
DATE FINISH: 10/27/2014
ELEVATION: 105' ±
SWC REP.: N. COTE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2-1/4"	-	-
SAMPLER:	SS	1-3/8"	140 lbs.	30"
CORE BARREL:	-	-		

WATER LEVEL INFORMATION
SOILS APPEAR SATURATED
BELOW 14.0' (10/27/2014)

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									6"	GRASSED DARK BROWN TOPSOIL
	1D	24"	18"	2.0'	3	9	15	15		BROWN GRAVELLY SILTY SAND (FILL) ~MEDIUM DENSE~
	2D	24"	20"	4.0'	9	7	4	4	4.0'	
	3D	24"	12"	6.0'	3	4	3	1		BROWN SILTY FINE SAND WITH ASPHALT PIECES (FILL) ~LOOSE~
	4D	24"	12"	8.0'	1	1	1/12"		8.0'	
	5D	24"	14"	11.0'	2	3	4	5		BROWN SILTY FINE SAND ~MEDIUM DENSE~
	6D	24"	12"	16.0'	3	4	2	2		~LOOSE~
									19.0'	
	7D	24"	18"	21.0'	1	1	1	1		BROWN SILTY SAND AND GRAVEL ~LOOSE~
									24.0'	
										BROWN SILTY FINE SAND SOME GRAVEL
	8D	24"	18"	26.0'	5	5	5	5	26.0'	~MEDIUM DENSE~
										BOTTOM OF EXPLORATION AT 26.0'

SAMPLES:
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: **B-2**

KEY TO THE NOTES & SYMBOLS
Test Boring and Test Pit Explorations

All stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q_u	-	unconfined compressive strength, kips/sq. ft. - laboratory test
S_v	-	field vane shear strength, kips/sq. ft.
L_v	-	lab vane shear strength, kips/sq. ft.
q_p	-	unconfined compressive strength, kips/sq. ft. – pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W_L	-	liquid limit - Atterberg test
W_P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight

Description of Proportions:

Trace:	0 to 5%
Some:	5 to 12%
"Y"	12 to 35%
And	35+%
With	Undifferentiated

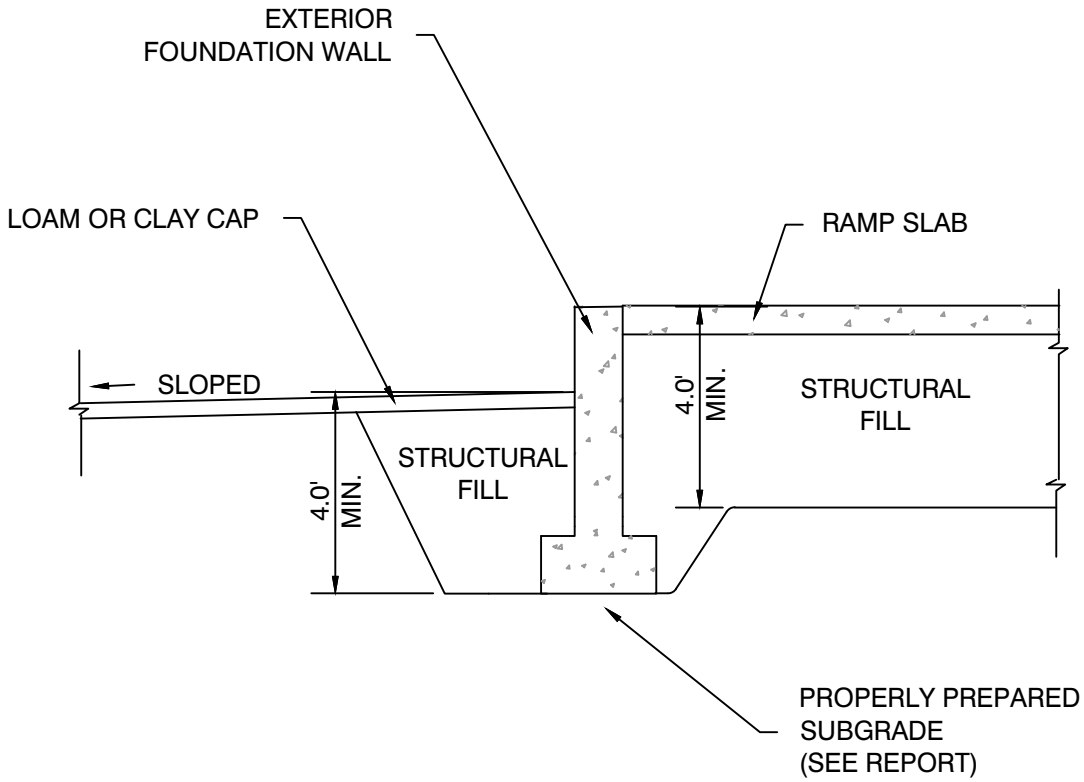
Description of Stratified Soils

Parting:	0 to 1/16" thickness
Seam:	1/16" to 1/2" thickness
Layer:	½" to 12" thickness
Varved:	Alternating seams or layers
Occasional:	one or less per foot of thickness
Frequent:	more than one per foot of thickness

REFUSAL: **Test Boring Explorations** - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: **Test Pit Explorations** - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.



NOTE:

1. MATERIAL GRADATION RECOMMENDATIONS ARE CONTAINED WITHIN THIS REPORT.

2. DETAIL IS PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY, NOT FOR CONSTRUCTION.

S.W.COLE
ENGINEERING, INC.

WOODARD & CURRAN, INC.

CONCEPTUAL FOUNDATION DETAIL

PROPOSED ADA RAMP
815 PAWTUCKET BOULEVARD
LOWELL, MASSACHUSETTS

Job No.:	14-0974	Scale:	Not to Scale
Date :	11/07/2014	Sheet:	5

SECTION 01 15 30

PAYMENT AND ADMINISTRATIVE PROCEDURES AND QUALITY REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements relating to payment, the process of contract administration, and the methods of communicating, controlling, and assuring quality, and applies to all Specifications and Drawings.

1. In certain Paragraphs, checked items indicate those requirements applicable to the Project.

2. Provisions of this Section may be supplemented in the **Specific Project Requirements and Procedures** or other sections of Division 01.

B. Section Includes

1.02 PAYMENT PROCEDURES
Schedule of Values
Payment Procedures
Change Procedures
Measurement and Payment Procedures
Correlation of Submittals

1.03 ADMINISTRATIVE REQUIREMENTS
Project Management and Coordination; Meetings
Documentation of Progress
Submittal Procedures
Closeout Procedures

1.04 QUALITY REQUIREMENTS
Reference Standards and Regulatory Requirements
Qualifications

1.05 ATTACHMENTS

1.02 PAYMENT PROCEDURES

A. **Schedule of Values**: in accordance with Article 2 of the Standard General and Supplementary Conditions, if any.

1. Provide sufficient detail to allow for determination of the value of the Work at any degree of completion.

☒ For each line item, identify number and title of specification section in accordance with the Table of Contents.

☐ See **Specific Project Requirements and Procedures** for additional requirements.

B. **Payment Procedures:** in accordance with Article 14 of Standard General and Supplementary Conditions, if any.

1. Submit 6 copies of each Application for Payment using the form included in the Project Forms section. Utilize latest approved Schedule of Values for listing items in Application for Payment. Provide supporting documentation for items included in the Application for Payment.

2. Payment Period: at intervals stipulated in the Agreement.

3. Submit an updated Progress Schedule with each Application for Payment.

C. **Change Procedures**: in accordance with Articles 10 and 12 of Standard General and Supplementary Conditions, if any, and forms included in the Project Forms section.

1. Field Order: issued by Engineer or Owner to advise of minor changes in the Work not involving an adjustment to Contract Price or Contract Time as authorized by Paragraph 9.04 of the Standard General and Supplementary Conditions, if any.

2. Change Request: issued by Engineer, Owner or Contractor to request or authorize minor variations and deviations, amendments or supplements to the Contract Documents per Paragraph 3.04 of the Standard General and Supplementary Conditions, if any. Initiate requests for substitute items per Paragraph 6.05 of the Standard General and Supplementary Conditions, if any, using a Change Request.

a. Engineer or Owner to include a detailed description of a proposed change with supplementary or revised Drawings and Specifications, including a change in Contract Times related to the change (with a stipulation for any overtime work required) and the period of time during which the requested price will be considered valid. Prepare and submit an estimate within 15 days.

b. Contractor to describe the proposed change and its full effect on the Work. Describe the reason for the change and the effect on the Contract Price and Contract Time with full documentation (and a statement describing the effect on Work by separate or other contractors). Document any requested substitutions in accordance with the Standard General and Supplementary Conditions, if any.

3. Work Change Directive: issued by Engineer or Owner, signed by Engineer or Owner and instructing Contractor to proceed with a change in the Work. Work authorized in a Work Change Directive will be included in a subsequent Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Price or Contract Time. Promptly execute the change.

4. Change Order: issued by Engineer or Owner in accordance with Articles 10 and 12 of the Standard General and Supplementary Conditions, if any.

   a. *Stipulated Price Change Order*: based on Contractor's maximum price quotation or Contractor's request for a Change Order as approved by Engineer or Owner.

   b. *Unit Price Change Order*: for pre-determined unit prices and quantities and executed on a fixed unit price basis. Execute Work under a Work Change Directive for unit costs or quantities of work not pre-determined. Changes in Contract Price and Contract Time to be computed as specified for Time and Material Change Order.

   c. *Time and Material Change Order*: based on itemized account and supporting data after completion of change within time limits indicated in the Standard General and Supplementary Conditions, if any. Engineer or Owner and Contractor to determine the change allowable in Contract Price and Contract Time as provided in the Standard General and Supplementary Conditions, if any. Maintain detailed records of work done on this basis, provide full information required for evaluation of proposed changes, and substantiate costs for changes in the Work.

5. Substitutes and "Or Equals": Request substitute items as a Change Request in accordance with subparagraph C.2. above, with complete data substantiating compliance of proposed substitution with Contract Documents.

    a. Substitute items will be processed in accordance with Paragraph 6.05 of the Standard General and Supplementary Conditions, if any, and subparagraph 1.03.C.6 below.

    b. Substitute items will not be considered when indicated or implied on Shop Drawing or material and equipment data submittals without separate written request, or when acceptance will require revision to the Contract Documents.

D. **Measurement and Payment Procedures**

1. Payment includes full compensation for required labor, material and equipment, tools, plant, transportation, services and incidentals; erection, application or installation and construction of an item of the Work; and overhead and profit, unless otherwise indicated.

    ☒ See **Specific Project Requirements and Procedures** for additional requirements.

☐ Unit Prices

    a. Unit quantities and measurements indicated in the Bid Form and Bid Form Supplements, if any, are for Contract purposes only. Actual quantities and measurements supplied or placed in the Work determine amount of payment.

    b. Take measurements in presence of Engineer and compute quantities. Engineer or Owner to verify and also take measurements and quantities. Notify Engineer or Owner in advance when measurements must be taken.

☒ See **Specific Project Requirements and Procedures** for additional requirements.

E. **Correlation of Submittals**

1. Promptly revise Schedule of Values and Applications for Payment to record each authorized Change Order as a separate line item and adjust the Contract Price.

2. Promptly revise Progress Schedule to reflect any change in Contract Times and revise sub-schedules to adjust time for other items of the Work affected by the change.

3. Promptly enter changes in Project Record Documents.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Project Management and Coordination; Meetings

1. Contact information for Owner and other entities related to the Project and special coordination requirements and contacts during prosecution of the Work **will be provided at the Preconstruction Conference and Site Mobilization Meeting.**

2. Inform Owner and Engineer of the address for sending official correspondence and the address and telephone number of Contractor's representative who will be project manager and Site superintendent for the Contract and identify the 24 hour, 7 days per week emergency response telephone or cell phone number that is staffed by a person (not a passive answering machine) or provide that a phone call will be returned within one hour.

3. During periods of construction and testing keep Owner and Engineer informed in writing with name, address, and telephone number of Contractor's representative who will be responsible and available outside of normal working hours for emergency repairs and the maintenance of safety devices.

4. Identify correspondence, submittals, drawings, data and materials, packing slips or other items associated with this Contract as specified in the **Specific Project Requirements and Procedures**.

5. Coordinate scheduling, submittals, and Work of the various Specifications to effectuate an efficient and orderly sequence for installing interdependent construction elements, with provisions for accommodating items installed later.

6. Preconstruction Conference and Site Mobilization Meeting

   a. Owner to schedule an initial preconstruction conference in accordance with Paragraph 2.06 of the Standard General and Supplementary Conditions, if any.

b. Attendance required by Owner, Contractor, Engineer, Contractor's Superintendent, Project Manager, and Subcontractors as a minimum.

c. Agenda

- Distribute Contract Documents
- Discuss design concepts
- Discuss preliminary Progress Schedule, Schedule of Submittals, Schedule of Values and preliminary cash flow projections.
- Designate personnel representing each party; communication procedures
- Procedures and processing of submittals, substitutions, applications for payments, Change Orders and Contract closeout procedures
- Scheduling
- Use of premises by Owner and Contractor
- Owner's requirements and partial occupancy
- Construction facilities and controls provided by Owner
- Temporary utilities provided by Owner and Contractor
- Survey and Site Layout
- Security and housekeeping procedures
- Schedules
- Procedures for testing
- Procedures for maintaining record documents
- Requirements for start-up
- Inspection and acceptance of equipment put into service during construction period
- Access, laydown and coordination with others

d. Engineer will record minutes and distribute draft copies promptly after meeting to Owner and Contractor for review, then revise as required and distribute thereafter to meeting participants, with copies to Owner and Contractor, and those affected by decisions made.

7. Progress Meetings

a. Owner to schedule progress meetings beginning no later than 60 days after the Initial Conference and continue thereafter on a **monthly** basis throughout progress of the Work.

b. Attendance required by Contractor, Contractor's Superintendent, major Subcontractors and Suppliers, Owner and Engineer as appropriate to agenda topics for each meeting.

c. Agenda

- Review minutes of previous meetings
- Unresolved Issues
- Review Work progress
- Observations, problems, and decisions
- Identification of problems which impede planned progress
- Review of Schedule of Submittals and status of submittals
- Review of off-Site fabrication and delivery schedules
- Maintenance of progress schedule
- Corrective measures to regain projected schedules
- Planned progress during succeeding Work period
- Coordination of projected progress
- Maintenance of quality and Work standards
- Effect of proposed changes on Progress Schedule and coordination
- Other business relating to Work

d. Engineer will record minutes and distribute draft copies promptly after meeting to Owner and Contractor for review, then revise as required and distribute thereafter to meeting participants, with copies to Owner and Contractor, and those affected by decisions made.

8. Pre-installation Conference and Coordination Meetings

a. When required, convene a pre-installation conference at Site before commencing certain Work that requires coordination or has special requirements or approval.

b. Convene coordination meetings as may be generally required.

c. Attendance required by parties directly affecting, or affected by, Work of the specific Specification section.

1) For pre-installation conference, notify Owner and Engineer 5 days in advance.

2) For coordination meetings, party requesting coordination meeting to notify other party(s).

d. Review conditions, preparation and procedures, and coordination with related Work.

B. **Documentation of Progress**

1. Submit preliminary and final Progress Schedules as specified in Paragraphs 2.05 and 2.07 of the Standard General and Supplementary Conditions, if any, or as established in Notice to Proceed.

   a. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

   b. Indicate estimated percentage of completion for each item of Work at each submission.

   c. Indicate dates for fabrication, factory testing, delivery, shipping and field testing, and material and equipment delivery dates, including those furnished by Owner. Coordinate with Schedule of Submittals.

2. Submit revised Progress Schedule on monthly basis and with each Application for Payment, identifying changes since previous version. Coordinate content with Schedule of Values, if any.

3. Documentation of pre-construction conditions, construction progress, and final conditions:

   ☐ Not Required for the Project

   ☒ Construction Photographs: to record Site conditions. Ensure existing conditions of roadway surfaces, curbing, berms, sidewalks, driveways, property bounds, landscaped areas, abutters property and any other items that might be affected by the Work are clearly recorded.

   ☒ Submit prior to starting construction.

   ☐ Submit photographs with Payment Application:
   - ☐ monthly during progress of Work.
   - ☐ for final payment to record final condition.

   Construction photographs: electronic in PDF or JPG format with maximum 4 prints on 8-1/2 by 11 sheets, minimum 300 dpi quality and a minimum resolution of 6.0 megapixels. Identify photographs with date, time, orientation and Project identification.

☐ Digital Video Recording: Video record, in color, all areas of the Project Site. Ensure existing conditions of roadway surfaces, curbing, berms, sidewalks, driveways, property bounds, landscaped areas, abutters' property and any other items that might be affected by the Work are clearly recorded.

☐ Submit prior to the starting construction.
☐ Submit at completion of construction.

Arrange for video recordings to be conducted by a professional video-photographer in digital videodisc (DVD) format. Include clear and concise audio descriptions of the existing Project Site conditions. Submit a copy of the first completed video recording to the Engineer for review of visual and audio quality. Once approved, submit 2 copies of video recordings. Re-record any recording furnished which, in the opinion of the Engineer, are poor quality or incomplete at no additional cost to Owner.

4. Reports

a. Submit weekly Safety Reports signed by the Safety Representative in accordance with Articles 6.13 and 6.14 of the Standard General and Supplementary Conditions, if any.

b. Other reports to be submitted:
☒ None
☐ Specified in **Specific Project Requirements and Procedures**

C. **Submittal Procedures**

1. Schedule submittals to expedite the Project and coordinate with schedules required by Paragraph 1.03.B above. Deliver each submittal in the quantity indicated to Engineer (with copy to Owner where required) at the addresses specified **in the Specific Project Requirements and Procedures**. Coordinate submission of related items.

2. Present submittals in a clear and thorough manner, in English and using English units. Use sheet size of not less than 8 1/2 by 11 inches and not more than 24 by 36 inches. Provide space for Contractor, Engineer, and Owner's review stamps.

3. Revise and resubmit documents as required. Identify all changes made since previous submittal. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions. Submittals not requested on the submittal schedule may not be recognized or processed.

4. Submit preliminary and final Schedule of Submittals as specified in Article 2 of the Standard General and Supplementary Conditions, if any, or as established in Notice to Proceed. Include all submittals specified in the Standard General and Supplementary Conditions, if any,, General Requirements, and other Specification sections.

   a. Include description of each submittal, date by which each submittal will be delivered to Engineer and Owner date by which each submittal must be approved to maintain project schedule, and relevant section reference.

   b. Allow 15-30 days from receipt of submittal/resubmittal for Engineer review of submittals and possible resubmittal.

5. Shop Drawings and Samples: Submit in accordance with Paragraph 6.17 of the Standard General and Supplementary Conditions, if any, and as follows, and coordinate with the Schedule of Submittals required in subparagraph 4 above.

   Number of prints: **6**

   Electronic format: ☒ PDF ☐ DWG ☐ DXF
   ☐ OTHER (as specified in **Specific Project Requirements and Procedures)**

   Submit to Engineer: ☒ by email ☐ on CD

   a. Complete the submittal transmittal form included as an attachment to this Section as is indicated, numbering each submittal consecutively. Assign resubmittals the same transmittal number as the original with a suffix of a sequential letter to indicate the resubmittal (e.g. the first resubmittal of submittal 25 would be number 25A.) Include only those documents previously issued under original transmittal number in resubmittals. Do not combine new submittals with resubmittals.

   b. Attach a transmittal form to each group of Shop Drawings, manufacturer's literature, equipment data and Samples submitted. Use a sufficient number of transmittal forms so that: items on a single transmittal form pertain to the same equipment item, specification section or element of Work; items on a single transmittal form are either original submittals or the same number

resubmittal; and each Sample is listed on a separate transmittal form.

c. Engineer to complete review in accordance with Paragraph 6.17.D. of the Standard General and Supplementary Conditions, if any.

d. Submittals which do not have a fully completed transmittal form will be returned along with unreviewed attachments. Returned submittals, even though incomplete, will be counted as a submittal in accordance with the Supplementary Conditions, if any.

e. Contractor shall reimburse Owner for Engineer's time beyond one re-submittal per the Standard General and Supplementary Conditions, if any.

f. Submission of any Shop Drawing or Sample bearing Contractor's and Engineer's approval shall constitute a representation to Owner that the requirements of Paragraph 6.17 of the Standard General and Supplementary Conditions, if any, have been fulfilled.

6. Variations: Identify variations from Contract Documents and material and equipment or system limitations which may be detrimental to successful performance of the completed Work and identify reasons therefor in accordance with subparagraph 6.17.C.3 of the Standard General and Supplementary Conditions, if any.

a. Clearly identify requests for "Or-Equal" and substitute items and submit per Paragraph 6.05 of Standard General and Supplementary Conditions, if any, and subparagraph 1.02.C.5 above. Substitute items will not be considered when indicated or implied on Shop Drawing or material and equipment data submittals without separate written request, or when acceptance will require revision to the Contract Documents.

7. Manufacturers' Installation Instructions and Certificates: Submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing.

Number of prints: **6**

Electronic format: ☒ PDF ☐ DWG ☐ DXF
☐ OTHER (as specified in **Specific Project Requirements and Procedures)**

Submit to Engineer: ☒ by email ☐ on CD

a. Indicate special procedures, perimeter conditions requiring special attention and special environmental criteria required for application or installation.

b. Submit manufacturers' certificates for recent or previous test results on material or equipment, but they must be acceptable to Engineer and Owner. Indicate material or equipment conforms to or exceeds specified requirements and provide supporting reference date, affidavits, and certifications as appropriate.

c. Submit test results, data, and reports and certifications to Engineer based on tests performed. Submit test reports and certifications for independent testing services specified.

8. Record Documents and Closeout Submittals: submit in accordance with Paragraph 6.12 of the Standard General and Supplementary Conditions, if any, and Paragraph 1.03.D below.

a. *As-Builts for Material and Equipment*

Number of prints: **2**

Electronic format: ☐ PDF ☒ DWG ☐ DXF
☐ OTHER (as specified in **Specific Project Requirements and Procedures)**

Submit to Engineer: ☐ by email ☒ on CD

Indicate "As-Supplied" in revision block and sign. Show all changes and revisions to Final Completion per **Execution and Closeout Requirements**.

b. *Conformed to Construction Record Drawings*: Submit for Engineer's use in preparing final Record Drawings.

Number of prints: **2**

Electronic format: ☐ PDF ☒ DWG ☐ DXF
☐ OTHER (as specified in **Specific Project Requirements and Procedures)**

Submit to Engineer: ☐ by email ☒ on CD

Indicate "Conformed by Contractor to Construction Records" in revision block and sign. Show all changes and revisions to Final Completion per **Execution and Closeout Requirements.**

c. *Warranties and Guarantees*: Submit duplicate notarized copies of warranty documents which are executed and transferable from Subcontractors, Suppliers, and manufacturers. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of Warranty Period. Assemble in three ring binders with durable plastic cover with a table of contents.

d. *Operation and Maintenance Data*

1) Submit one draft copy of completed volumes 30 days prior to equipment startup. Include 2 copies of completed manuals with major equipment when equipment is shipped. Draft copies will be reviewed and returned after final inspection, with Engineer's comments. Revise content of all sets as required prior to final submission.

2) Submit 6 copies of final volumes, with electronic files in PDF format on CD, within 10 days after final inspection.

3) Submit data in ring binders with durable plastic covers with 8 1/2 by 11 inch text pages. Cover: title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of Project, and subject matter of binder when multiple binders are required.

4) Subdivide binder contents with permanent page dividers, logically organized as described below with laminated plastic tabs and clearly print the contents. Prepare a Table of Contents for each volume, with material, equipment, or system description identified, in three parts as follows:

Part 1: Directory, listing names, addresses, and telephone numbers of Contractor, Subcontractors, and major equipment Suppliers, and service representative.

Part 2: Operation and maintenance instructions arranged by system and subdivided by Specification section.

For each system, identify names, addresses, and telephone numbers of Subcontractors and Suppliers. Identify the following:

- Significant design criteria
- List of equipment with As-Builts certified "As-Supplied"
- Parts list for each component
- Operating instructions
- Inspection, maintenance and adjustment instructions for equipment and systems
- Lubrication and maintenance schedules
- Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents
- Troubleshooting guides
- Schematic diagrams

Part 3: Material Safety Data Sheets

Part 4: Other Project documents and certificates, including the following:

- Certificates
- Photocopies of warranties

☐ See **Specific Project Requirements and Procedures** for additional requirements.

D. **Closeout Procedures**

1. Substantial Completion shall have been achieved when the following has been completed and the requirements of Paragraph 14.04 of the Standard General and Supplementary Conditions, if any, have been met.

   a. Work is complete, systems are successfully operating, and final testing has been successfully completed.

   b. A full inventory of the spare parts and special tools purchased by the Owner are replenished and in the custody of the Owner.

   c. The Site has been restored to the satisfaction of the Owner.

   d. An inspection of the Work has been completed by the Engineer and the Owner.

   e. An updated Punch List is provided.

f. The Contractor's written warranty and guarantee has been submitted as required by Paragraph 16.19.D. of the Standard General and Supplementary Conditions, if any.

g. A Certificate of Substantial Completion has been provided in accordance with Paragraph 14.04.C. of the Standard General and Supplementary Conditions, if any.

2. The Contractor shall have sole care, custody, and control of the Work until achievement of Substantial Completion. During the period between Substantial Completion and the date for Final Completion, Contractor shall be given access to correct items on the Punch List and achieve Final Completion.

3. The date of achieving Substantial Completion is the date set forth in the Certificate of Substantial Completion that is accepted and signed by the Owner.

4. Final Completion shall have been achieved when the Work is complete, the requirements of Paragraphs 14.06 and 14.07 of the Standard General and Supplementary Conditions, if any, have been met, and when the following is complete.

a. Substantial Completion has been achieved and liquidated damages for failure to meet Substantial Completion Date have been paid.

b. All Work including Punch List Items has been completed.

c. Final cleaning has been conducted and Contractor equipment and supplies including waste materials have been removed from the Site and legally disposed of.

d. A full set of record documents have been submitted as specified in subparagraph 1.03.C.8 above and Contractor's written warranty and guarantee has been resubmitted if adjusted.

e. Inspections required by Laws and Regulations are complete. Certificates and permits to occupy and operate have been issued if required.

f. Spare parts, maintenance and extra materials have been delivered in quantities specified to Project Site and stored as directed.

g. A request for final inspection in accordance with Paragraph 14.06 of the Standard General and Supplementary Conditions, if any, has been submitted to the Engineer and the inspection has been completed and the results accepted by the Owner.

h. A Certificate of Completion has been provided in accordance with Paragraph 14.07.B of the Standard General and Supplementary Conditions, if any.

i. A Final Application for Payment has been submitted to the Engineer identifying total adjusted Contract Price, previous payments, and balance due along with required documentation in accordance with Paragraph 14.07.A. of the Standard General and Supplementary Conditions, if any.

1.04 QUALITY REQUIREMENTS

A. Reference Standards and Regulatory Requirements

1. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or Laws or Regulations of any governmental authority are used in accordance with Paragraph 3.02 of the Standard General and Supplementary Conditions, if any.

2. Acronyms and abbreviations used are defined in the applicable versions of the Encyclopedia of Associations published by Gale (part of Cengage Learning) generally available in large libraries and on the internet.

☒ See **Specific Project Requirements and Procedures** for additional requirements.

B. Qualifications

1. Meet or provide capability to meet the criteria specified in individual Specification sections in connection with various portions of the Work of the Contract Documents .

2. As a minimum, Contractor shall:

   a. have been regularly and actively engaged in similar Work as described in the Contract Documents, operating under the same business name and business organization structure, for the last 5 years on at least 5 projects;

   b. have successfully completed at least 3 projects involving construction of similar facilities in the same state as the Project covered by the Contract Documents;

c. have a full-time project manager in responsible charge of the Work with at least 10 years' experience as project manager on comparable projects; and

d. carry at least the insurance coverage and amounts required in Article 5 of the Standard General and Supplementary Conditions, if any.

☒ See **Specific Project Requirements and Procedures** for additional requirements.

1.05 ATTACHMENTS

A. Transmittal form

END OF SECTION

TRANSMITTAL FORM

Owner:		Transmittal No.:	
Project:		Date:	
Contract No.:			
Contract Title:			
Specification Section No.:			

Assign a consecutive, unique number to each submittal and use same on resubmittals. Example: 25 =original submittal; 25A = 1st resubmittal; 25B (and beyond) = additional resubmittals

Submittal (Item) No.	Resubmittal (A B C etc.)	Date	Title/Description	Vendor/Manufacturer	Copies

☐ The material and equipment, and requirements for construction/installation contained in Submittal No.(s) _____ have been reviewed and we certify that they are correct and in strict conformance with the requirements specified (no exceptions or deviations)

☐ The material and equipment and requirements for construction/installation contained in Submittal No.(s) _____ have been reviewed and we certify that they are correct and in strict conformance with the requirements specified except for the following deviations (list below or attach listing):

_____

_____

CONTRACTOR'S NAME_____

ADDRESS_____

BY: _____ DATE: _____

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 SUMMARY

A. This Section specifies temporary facilities and controls for execution of the Work put into place for use only during the period of construction, that will be removed when no longer required for construction operations, and applies to all Specifications and Drawings.

1. In certain paragraphs, checked items indicate requirements applicable to the Project.

2. Provisions of this Section may be supplemented in the **Specific Project Requirements and Procedures** or other sections of Division 01.

B. Section Includes

1.02 TEMPORARY CONSTRUCTION FACILITIES
Barriers
Protection of Work
Security
Safety Facilities
Access Roads
Parking
Field Offices
Staging Area
Project Identification
Progress Cleaning and Waste Removal

1.03 TEMPORARY UTILITIES

1.04 TEMPORARY CONTROLS
Dust Control
Water Control and Dewatering
Erosion and Sediment Control
Noise Control
Pollution Control
Traffic Regulation

1.05 REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

1.02 TEMPORARY CONSTRUCTION FACILITIES

A. Barriers

1. Comply with the requirements of Paragraph 6.11. of the Standard General Conditions and Supplementary Conditions, if any.

2. Furnish barriers to prevent unauthorized entry to and clear delineation of construction areas, to allow for Owner's use of Site, and to protect existing facilities and adjacent properties from damage from construction operations as recommended by OSHA and as otherwise required for the protection of life and property during construction.

3. Construct barricades and protective facilities in accordance with local and state regulations. Furnish and install signs, lights, reflectors, and such protection facilities as may be required.

4. Furnish barricades required by governing authorities for public rights of way.

5. Provide protection for plant life designated to remain. Replace damaged plant life.

6. Protect non owned vehicular traffic, stored materials, Site and structures from damage.

7. If required, furnish commercial grade, minimum 8 foot high chain link fence around construction Site. Equip with vehicular gates with locks.

B. Protection of Work

1. Protect Work during working and non-working hours.

2. Provide special protection where specified in Specifications or Drawings and in accordance with manufacturer recommendations.

3. Furnish temporary and removable protection for installed equipment and material. Control activity in immediate Work area to minimize damage.

4. Protect exterior areas of Work from damage. Prohibit traffic from landscaped areas.

5. Buildings and Enclosures

   a. Furnish protective coverings at walls, projections, jambs, sills, and soffits of openings and protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

   b. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

6. Whenever gale or high winds are forecast, take measures to secure loose material, equipment or other items that could be blown and be damaged or cause damage. Do not leave such loose items unsecured at end of a working day. Particular attention shall be taken with scaffolding and items placed or stored on roofs or within a structure prior to being enclosed.

7. Provide for removal of snow and ice which may impede Work, damage the finishes or materials, be detrimental to workers, or impede trucking, delivery, or moving of materials at the Site, or prevent adequate drainage of the Site or adjoining areas.

C. Security

1. Provide protection to stored items, the Work and Owner's operations from unauthorized entry, vandalism, or theft, and against fire, storms and other losses during working and non-working hours.

2. Coordinate with Owner's security program.

D. Safety Facilities

1. Provide first aid and other safety facilities required by Laws and Regulations during working and non-working hours.

E. Access Roads

1. Construct and maintain temporary roads accessing public thoroughfares to serve construction area. Control dust and water.

2. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.

3. Provide for emergency access and maintain throughout the Work Site.

F. Parking

1. Do not allow construction vehicle parking on existing pavement or sidewalks.

   ☒ Available parking areas at the Project Site are identified on the Drawings

   ☐ Off-Site construction parking area to be established at a location determined by Contractor.

G. Field Offices

☒ Delete - not required for the Project.

☐ Provide for the Project as follows.

1. Furnish weather tight office with lighting, electrical outlets, heating, cooling and ventilating equipment, and equip with furnishings and accessories to accommodate supervision of Work, maintenance of records, and project meetings, including, but not limited to the following.

   - Desk and chairs (2 cushioned office desk chairs and 4 metal fold chairs)
   - Plan table with light and stool
   - 3 locking file cabinets
   - Hanging plan rack
   - Book case with 4 shelves
   - "All-in-one" color copier, printer, scanner and fax machine, capable of 11 by 17 output (OR separate color copier, color printer, color scanner, all capable of 11 by 17 output, and fax machine)
   - Paper stock for duration of Project
   - Telephone with answering machine (or telephone service with voicemail feature)
   - Refrigerator, microwave, and water cooler with bottled water supply for duration of Project
   - First aid kit

2. Furnish separate office for use by Engineer and Resident Project Representative similarly equipped with fully functional equipment and furniture.

3. Maintain utilities per Article 1.03 below for the duration of the Project.

4. Location of Field Offices

☐ Locate as shown on the Drawings.

☐ Locate as specified in the **Specific Project Requirements and Procedures**.

H. Staging Area

☒ Locate as shown on the Drawings.

☐ Locate as specified in the **Specific Project Requirements and Procedures**.

☐ Owner is not providing a location for staging area. Determine and secure a location for staging area.

I. Project Identification

☐ Delete - not required for the Project.

☒ Provide for the Project

☒ as specified in the **Specific Project Requirements and Procedures**.

☐ as shown on the Drawings.

J. Progress Cleaning and Waste Removal

1. Comply with the requirements of Paragraph 6.11. B and C of the Standard General Conditions and Supplementary Conditions, if any.

2. Maintain areas free of waste materials, debris, and rubbish and maintain the Site in a clean and orderly condition.

3. Remove debris and rubbish from spaces and other closed or remote spaces before enclosing the space.

4. Collect and remove waste materials, debris, and rubbish from Site at least weekly and legally dispose off-Site.

1.03 TEMPORARY UTILITIES

A. Power service

☒ Delete - not required for the Project.

☐ Provide for the Project as follows.

1. Arrange for and pay for required power service from local electric utility for duration of Project. Exercise measures to conserve energy. Furnish and install required equipment including pole of sufficient height to provide proper clearance and install weatherproof box of such size to house service disconnect, overcurrent protection, electric meter, and other required equipment.

   ☐ Locate as shown on the Drawings.

   ☐ Locate as designated by Owner.

☐ See the **Specific Project Requirements and Procedures** for additional requirements.

B. Telephone service and internet access to field offices

☒ Delete - not required for the Project.

☐ Provide for the Project as follows.

1. Arrange for, pay for, and maintain telephone service and internet access to field offices at time of Project mobilization and for duration of Project.

2. Obtain voicemail feature if answering machine not provided.

3. Provide wireless, high speed broadband internet access via DSL, cable, satellite, or T1.

☐ See the **Specific Project Requirements and Procedures** for additional requirements.

C. Water service

☐ Delete - not required for the Project.

☒ Provide for the Project as follows.

1. Arrange for, pay for and maintain suitable quality water service as required for duration of Project.

   ☒ Owner will provide water at no charge for construction.

☐ See the **Specific Project Requirements and Procedures** for additional requirements.

D. Furnish and maintain required sanitary facilities and enclosures. Do not use existing facilities.

E. Furnish lighting for construction operations. Furnish lighting for exterior staging and storage areas and for security purposes. Maintain lighting and provide routine repairs.

F. Furnish heat devices and heat and cooling devices as required to maintain specified conditions for construction operations.

G. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

H. Fire Protection

1. Provide temporary fire protection equipment and services during construction per NFPA and local fire code and regulations, and fire marshal's requirements.

2. Use Work procedures that minimize fire hazards to the extent practicable and materials that are fire resistant where possible. Collect and remove combustible debris and waste materials from the Site each day. Store fuels, solvents, and other volatile or flammable materials away from the construction and storage areas in well-marked, safe containers in accordance with Laws and Regulations.

1.04 TEMPORARY CONTROLS

A. **Dust Control**: Execute Work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere. Utilize the application of sprinkled water to reduce the emission of air-borne soil particulates from the Project Site.

B. Water Control and Dewatering

☐ Delete - not required for the Project.

☒ Provide for the Project as follows.

☐ See the **Specific Project Requirements and Procedures** for additional requirements.

Grade Site to drain away from excavations to approved drainage collection facilities. Ensure collected surface drainage water meets permitted criteria for sediment content prior to discharge.

1. Maintain excavations free of water. Furnish, operate and maintain pumping equipment.

2. Dewater excavations and legally dispose of water in a manner that will not cause injury to public and private property.

3. Protect Site from puddling, ponding or running water.

4. Design, furnish, install, maintain, operate and remove temporary dewatering systems as required to lower and control water levels and hydrostatic pressures in excavations during construction; legally dispose of pumped water; construct, maintain, observe and, except where indicated or required to remain in place, remove dewatering equipment and system at the completion of construction.

    a. Dewatering may include: lowering the water table, intercepting and collecting seepage which may penetrate the support of excavation, slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; limiting horizontal displacements and stresses in support of excavation to tolerable and allowable levels; preventing displacements of existing structures, utilities, pavements, and sidewalks; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.

b. *Normal dewatering* is defined as using conventional pumps installed in open excavations, ditches, or sumps to control water and allow for installation of the pipe in a dry trench.

c. *Special dewatering* is defined as installing wellpoints, deep wells, or eductor and ejector systems to control groundwater and hydrostatic pressures to allow for installation of the work. Special dewatering includes design of the dewatering system by a Professional Engineer currently registered in the state where the Project is located in good standing, and conducting additional borings or subsurface explorations deemed necessaryby the Contractor, and approved by the Engineer, to support design.

1) For Special Dewatering, retain the services of a Professional Engineer currently registered in the state where the Project is located in good standing, experienced in design of dewatering systems, to independently evaluate the boring logs and other soils information available to determine those areas that will require special dewatering techniques and to design the required system. If, in the opinion of the Contractor or Contractor's Dewatering Professional Engineer, additional borings are needed to design special dewatering systems or determine areas where special dewatering techniques will be required, the Contractor shall retain and pay for the services of a boring subcontractor. Contractor's Dewatering Professional Engineer shall provide sufficient on-Site inspection and supervision to assure that the dewatering is carried out in accordance with the approved design.

d. Design a dewatering system capable of:

1) effectively reducing the hydrostatic pressure and lowering the groundwater levels to a minimum of 2 feet below excavation subgrade in the existing fills and any organic peat, and below the excavation subgrade in the existing organic silts/clays unless otherwise directed by the Engineer, so that all excavation bottoms are firm and dry;

2) maintaining a dry and stable subgrade until the structures, pipes, appurtenances, and drainage pipe and structure bedding to be built therein have been completed to the extent that structures, pipes, and appurtenances will not be floated or otherwise damaged;

3) lowering of the groundwater level within the work area without adversely affecting existing structures, utilities, pavements, sidewalks or wells outside of the Work area.

e. Submit the following.

1) Plans and description of the Normal and/or Special Dewatering systems, including the number, location and depth of wells, wellpoints or sumps; designs of filters to prevent pumping of fine soil; method and location for filtering, sedimentation tanks and legal disposal of pumped water; and flow capacity of proposed system, accounting for groundwater level relative to tide cycles if applicable

2) Design calculations, description and complete layout drawings, stamped and signed by Contractor's Dewatering Professional Engineer, at least two weeks prior to scheduled installation of Special Dewatering system

3) Locations of observation wells

4) Records of pump operation and groundwater elevations

5. Dewatering Operations and Procedures

a. Provide electrically operated dewatering equipment, powered with independent generators adequately sized to operate the dewatering system and capable of running on commercial power. Provide standby equipment independent of commercial power and provide for dewatering within 24 hours upon primary pump or power failure. No work shall be performed by the Contractor below the pre-construction groundwater level during dewatering system failure.

b. Provide suitable temporary pipes, flumes or channels for water that may flow along or across the Site of the Work.

c. Provide dewatering equipment with noise attenuation systems capable of meeting the governing noise regulation requirements.

d. Encapsulate the suction end of the pump with crushed stone, filter fabric, and other materials to minimize the amount of silt discharged to the amount allowed by the construction dewatering permit.

e. Do not operate equipment on paved surfaces to prevent damaging these surfaces.

f. Locate dewatering facilities to prevent interference with utilities and construction work to be done by others.

g. For dewatering operations with relatively minor flows, direct pump discharges using filtration bag or system per Erosion and Sediment Control below, or pump into hay bale sedimentation traps lined with filter fabric. Filter water through the hay bales and filter fabric prior to seepage into storm drainage or any natural water course.

h. For dewatering operations with larger flows, provide pump discharges into a steel dewatering/sedimentation basin. Use steel baffle plates to slow water velocities, to increase the contact time, and allow adequate settlement of sediment prior to discharge into waterways, storm drainage or discharge point allowed by the construction dewatering permit.

i. Utilize silt sacks in catch basins when excess silt is suspended in the discharge water per Erosion and Sediment Control below.

j. If siltation basin is used, size to effectively filter for the volume and discharge rate of water anticipated without overflow.

k. Provide treatment necessary to prevent discharge of silty and/or contaminated ground water caused by the Contractor's operations, or any contaminated ground water that may pass from excavated surfaces and/or through the excavation support system selected by the Contractor.

l. Dispose of water pumped or drained from the Work in accordance with permit requirements and in a manner to prevent undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures and utilities.

m. Obtain necessary regulatory approvals for the disposal of dewatering flows, including, among others, approval by the Environmental Protection Agency under the National Pollutant Discharge Elimination System (NPDES) program for construction dewatering activities. Submit the completed and approved construction dewatering permit to the Engineer immediately upon receipt.

6. Special Dewatering

a. Use Special Dewatering as necessary if Normal Dewatering methods are inadequate to ensure dry and stable excavation subgrade conditions.

b. Special Dewatering techniques may consist of one- or two-stage wellpoint systems, deep wells, or eductor and ejector type systems. Design with suitable screens to prevent pumping of fines and to address specified Work Site conditions.

c. In areas requiring special dewatering, lower the groundwater level to a minimum of 2 feet below the existing fill and/or organic peat subgrades or to the excavation subgrade for organic silt/clay subgrades prior to any installation and maintain that groundwater level until the excavation has been backfilled and provide monitoring by Contractor's Dewatering Professional Engineer to ensure conformance with the requirements herein.

d. Furnish materials and install at least two observation wells at each excavation area. The location of the wells shall be proposed in the field by the Contractor's Dewatering Professional Engineer and reviewed and approved by the Engineer.

C. Erosion and Sediment Control

☐ Delete - not required for the Project.

☒ Provide for the Project as follows.

☒ See the **Specific Project Requirements and Procedures** for additional requirements.

1. Plan and execute construction using methods to control surface drainage from cuts and fills, from borrow and waste disposal areas and prevent erosion and sedimentation.

2. Submit erosion and sediment control plan to Engineer prior to the start of construction.

3. Install erosion and sediment controls as may be shown on the Drawings and as required by Laws and Regulations. Install additional erosion and sedimentation control measures beyond those shown on the Drawings as necessary to stabilize the Site. Coordinate temporary erosion controls with permanent erosion controls to the extent practical. Provide and maintain devices to control erosion, siltation, and sedimentation that occur during construction operations. Undertake reasonable precautions and measures to avoid erosion of soil and to prevent silting of drainage ditches, storm sewers, rivers, streams, and lakes.

4. Employ pollution prevention measures, erosion and sedimentation control before, during, and after soils are exposed. Implement measures prior to soil disturbance or soil storage to the extent possible to ensure that such measures are in place before activity occurs and employ additional measures as the Work progresses. Implement and maintain as necessary until the Site is permanently stabilized.

5. Perform inspections of disturbed soil areas, material storage areas exposed to precipitation, and erosion control measures with Engineer a minimum of once every 14 days and also within 24 hours after any storm event greater than 0.5-inches of rainfall. Immediately correct deficiencies in the erosion control measures identified or indicated by failures or erosion by implementing additional measures or different techniques to correct and prevent subsequent erosion at no additional cost to Owner.

6. In the event that silt or debris breaches erosion control, immediately remove and clean silt or debris from drainage ditches and storm sewers and revise erosion control measures as required by the Conservation Commission or the Engineer. Should silt or debris breach erosion controls and reach rivers, streams or lakes, immediately notify local, state or Federal representatives as required and implement required remediation methods at no additional cost to Owner.

7. Limit duration of the exposure of soils on embankments, excavations, and graded areas to a minimum.

8. Provide temporary measures such as berms, dikes and drains to prevent water flow. Install erosion control measures in any ditch, swale or channel before water is allowed to flow in the waterway. Handle water pumped from trenches to minimize discharge of silty water to the maximum extent practicable.

9. Stabilize storm drain outfalls as shown on the Drawings before the discharge points become operational. Install inlet protection immediately upon construction of culverts.

10. Stabilize disturbed areas with temporary and permanent erosion control practices as soon as practicable, but no more than 14 days after construction activity on a particular portion of the Site has temporarily or permanently ceased. Exceptions to this time requirement include: a) where construction activities will resume on the particular portion of the Site within 21 days; and b) where snow cover delays initiation of stabilization measures.

11. Place stockpiled topsoil on the Site away from natural drainages, in piles with side slopes of 50 percent to 70 percent. Install siltation fence around the base of the pile to prevent eroding soil from washing into drainages. Cover topsoil piles which are to remain for a period of 21 days or more with temporary seed and mulch immediately following stockpiling.

12. Conduct pavement sweeping to remove sediment and soil debris accumulation on pavement resulting from construction activity

13. Siltation/Silt Fence

    a. Filter fabric: suitable for erosion control.

    b. Wood posts: oak, 2 inches by 2 inches in section, and at least 4.5 feet in length.

    c. Erosion control fencing: heavy-duty filter fabric towed into the existing soil as shown on the Drawings.

    d. Construct as shown on Drawings or as directed by Engineer. Install parallel to contours where possible, prior to Site clearing and grading activities.

        1) Dig a 6 inch by 6 inch minimum trench where the fence is to be installed. Position the fence in the trench with the fence posts set at 8 feet on center (maximum). Curve ends of fence uphill to prevent flow around ends.

        2) Staple sedimentation control fabric and the industrial netting to each post. When joints are necessary, splice filter fabric together only at support posts with 6-inch overlap and securely seal.

        3) Bury lower edge of fabric at least 6 inches below ground surface to prevent underflow. Backfill trench and compact soil over filter fabric.

        4) Installed height: minimum 2.5 feet and 36 inches maximum.

        5) Inspect frequently; repair or replace any damaged sections.

14. Temporary Erosion Control Matting

    a. Rolled matting blanket consisting of curled wood excelsior, coconut fiber, straw or paper bound with a weave of twisted craft paper, cotton cord or plastic mesh.

b. Provide staples for fastening matting to the ground. Staples: fabricated in a "U" shape from 11 gage or heavier stiff steel wire, 6 to 12 inches in length and 1 to 2 inches across.

c. Surface Preparation and Installation

1) Conform to grades and cross sections for slopes and ditches shown on the Drawings. Finish to a smooth and even condition with all debris, roots, stones, and lumps raked out and removed. Loosen soil surface to permit bedding of the matting.

2) Unless otherwise directed, apply seed prior to placement. When directed, spread additional seed over matting, particularly at those locations disturbed by building slots. Press matting onto the ground with a light lawn roller or by other similar means.

3) Bury edges of matting around the edges of catch basins and other structures.

15. Seeding

a. Select seed variety and applied rates based upon the date of application per the following table. Equivalent seed mixture based on suitability for use in controlling erosion of the various soil types and slopes may be used as approved by the Engineer.

Dates	**Seed**	**Applied Rate (pounds per 1,000 feet^2)**
4/1 to 7/1 8/15 to 9/15	Oats	1.8
4/1 to 7/1	Annual Ryegrass	0.9
5/15 to 8/15	Sundangrass	0.9
9/15 to 10/15	Winter Ryegrass	2.6

1) Sow seed at the rates indicated, on the pure live seed basis.

2) Mulch areas where temporary seeding has been applied. Do not mulch seeded areas where matting will be immediately installed. If temporary seeding does not achieve adequate growth by November 1, apply an additional layer of mulch.

3) Mulch temporarily or permanently seeded areas, areas which cannot be seeded within the recommended seeding dates, and any soil stockpile areas, immediately following seeding. Straw or hay mulch, wood fiber mulch, and hydromulch are recommended.

16. Sod: grown from certified seed of adapted varieties to produce high quality sod free of any serious thatch, weeds, insects, diseases and other pest problem, be at least one year old and not older than three years, and cut with a 1/2 inch to 1 inch layer of soil.

    a. Lay sod strips on the prepared soil, perpendicular to the slope or direction of water flow, starting at the lowest elevation. Butt the edges and ends of the sod strips together and tamp or roll. Stagger joints.

    b. Staple sod strips at ends and at 3-foot intervals along the center of the strip.

    c. Irrigate sodded area immediately after installation.

17. Catch Basin Silt Sacks

    a. Style: Silt Sack Regular Flow.

    b. Test Method: ASTM D-4884 165.0 lbs./inch.

    c. Silt sack seams: certified average wide width strength.

    d. Meet the following ASTM D-4884 standards. Properties are Minimum Average Roll Values (MARV).

Property	**Test Method**	**Units**	**Test Results**
Grab Tensile	ASTM D-4632	lbs.	315x300
Grab Elongation	ASTM D-4632	%	15x15
Puncture	ASTM D-4833	lbs.	125
Mullen Burst	ASTM D-3786	psi	650
Trapezoid Tear	ASTM D-4533	lbs	120x150
UV Resistance	ASTM D-4355	%	90
Apparent Opening	ASTM D-4751	US Sieve	40
Flow Rate	ASTM D-4491	gal/min/ft ^{2}	40
Permittivity	ASTM D-4491	sec -1	0.55

    1) Utilize silt sacks in catch basins as required when excess silt is suspended in discharge water.

18. Filtration Bag or System for Discharge from Excavation Dewatering

    a. Meet the following standards. Properties are Minimum Average Roll Values (MARV).

Property	**Test Method**	**Units**	**Test Results**
Flow Rate	ASTM D-4491	gal/min/ft ^{2}	40
Permittivity	ASTM D-4491	sec -1	0.55

b. For discharge from excavation dewatering, install filtration bag or system or dewatering siltation basin constructed of a hay bale barrier lined with filter fabric sized to handle the volume of dewatering without overflowing.

19. Compost Filter Socks

a. Furnish and install biodegradable mesh "socks" filled with mature, clean compost per EPA National Pollutant Discharge Elimination System (NPDES) specifications.

1) Install per EPA and manufacturers recommendations.

2) Install parallel to contours where possible. Stake socks as needed to stabilize. Inspect frequently and repair as necessary.

20. Provide detention basins or water filtration systems for dewatering and coordinate locations with Engineer. See Dewatering in Paragraph B. above.

21. Other Temporary Measures

a. Provide and maintain temporary slope drains as required.

b. Employ other temporary erosion control measures as directed by the Engineer or local Conservation Commission.

22. Maintenance

a. Inspect erosion control practices immediately after each rainfall and at least daily during prolonged rainfall or snowmelt for damage. Make appropriate repairs or replacement until Final Completion at no additional cost to the Owner.

b. Remove silt from siltation fence and/or haybale when it has reached one-quarter of the bale and/or fence height, or prior to expected heavy runoff or siltation.

c. Repair matting if any staples become loosened or raised, or if any matting becomes loose, torn, or undermined, make satisfactory repairs immediately.

d. Maintain areas mulched or matted until Final Completion, at no additional cost to the Owner.

e. Maintain sediment basins by removing silt that reaches a depth of over one foot, at no additional cost to the Owner, until Final Completion.

23. Removal of Temporary Erosion Control

    a. Remove temporary materials and devices upon completion of the Work when permanent soil stabilization has been achieved. Re-use materials in good condition if approved by Engineer.

        1) If silt socks are used, remove in paved areas or cut open and disperse media in unpaved areas.

    b. Level and grade to preconstruction conditions and to the extent required to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

    c. Remove siltation fences only when adequate grass growth has been established.

    d. Repair areas damaged by silt fences and hay bales to preconstruction conditions to the satisfaction of the local Conservation Commission and the Engineer.

    e. Remove unsuitable materials from Site and dispose of in a lawful manner.

D. Noise Control

1. Provide methods, means, and facilities to minimize noise from construction operations.

2. Provide noise attenuation systems capable of meeting the Department of Environmental Protection Division of Air Quality Control regulations governed by the following policy:

    "*A source of sound will be considered to be violating the Department's noise regulation (310 CMR 7.10) if the source:*

    - *Increases the broadband sound level by more than 10 dB(A) above ambient, or*
    - *Produces a "pure tone" condition when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by 3 decibels or more.*

    "These criteria are measured both at the property line and at the nearest inhabited residence. Ambient is defined as the background A-weighted sound level that is exceeded 90% of the time measured during equipment operating hours. The ambient may also be established by other means with the consent of the Department."

3. Construct sound enclosures or utilize other noise reduction techniques if the equipment does not meet the noise level requirements.

E. **Pollution Control**

☐ Delete - not required for the Project.

☒ Provide for the Project as follows.

☐ See the **Specific Project Requirements and Procedures** for additional requirements.

1. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

   a. Water Pollution Control

      1) Assure that sediment, debris, petroleums, chemicals, or other contaminants will not enter existing drainage facilities and channels. Use construction methods that will prevent entrance of pollutants and wastes into existing streams, rivers, lakes, and flowing and dry watercourses.

      2) Obtain legal disposal sites and dispose of pollutants and wastes in a legal manner.

      3) Respond immediately to emergencies as directed when water quality of existing streams, rivers, lakes and flowing and dry watercourses is threatened. Take corrective action to remove or contain pollutants until a permanent solution is determined.

   b. Air Pollution Control

      1) Equipment and vehicles that exhibit excessive exhausts emissions due to poor engine adjustments or inefficient operation will not be permitted to operate until corrective repairs or adjustments are made.

      2) Burning of materials from clearing or grubbing operations, combustible construction materials, and rubbish will not be allowed.

F. **Traffic Regulation**

☐ Delete - not required for the Project.

☐ See the **Specific Project Requirements and Procedures** for additional requirements.

☒ Provide for the Project as follows.

1. Control and maintain traffic within the Project area.

   ☒ Submit traffic control plans and coordinate with Owner and local agencies. Submit plan for traffic control to Owner for review 14 days in advance of any Work within public right-of-way, street closure or detour.

   ☐ A traffic control plan is not required for the Project.

2. Provide and maintain traffic control and maintenance devices in accordance with Part 6, Temporary Traffic Control, of the "*Manual on Uniform Traffic Control Devices for Streets and Highways*", published by the U.S. Department of Transportation, Federal Highway Administration and other applicable codes and standards as specified. Operate devices 24 hours per day as required.

3. Provide for access by emergency vehicles, such as police, fire, and disaster units at all times. Contractor shall be liable for damages resulting from failure to provide such access.

4. During construction hours, traffic flow must be controlled by uniformed traffic police officers or other traffic controllers allowed by Laws and Regulations. The services of traffic controllers shall in no way relieve the Contractor of its responsibilities under the Contract.

5. Maintain minimum of one moving lane on roadways at all times.

   a. Where detours are permitted, provide necessary barricades, flashers, flashing arrows and signs in accordance with referenced Manuals and Laws and Regulations.

   b. Provide gravel borrow and bituminous concrete to maintain temporary passable travel lane ramps, temporary bridging, steel plates, temporary pavement, wood-framed walkways, caution, safety and other necessary signs directing the pedestrian and vehicular traffic towards unblocked and safe areas.

6. Provide safe access/egress to businesses and abutting property owners within the Project area. In areas where the construction activity is in progress, install directional signs in front of businesses indicating "OPEN FOR BUSINESS" or similar for guidance of customers.

    a. Certain construction operations such as utility work and roadway/sidewalk reconstruction may restrict access/egress on some roads and to businesses and abutting property owners. Under these circumstances, schedule operations during off-peak hours or late evenings with Owner approval so that a particular work activity can be completed in the shortest possible time.

    b. Provide 48 hours notice to businesses and abutting property owners when access/egress will not be available or restrictions will exist.

7. Exercise particular care to establish and maintain such methods and procedures that will not create hazards.

    a. Remove or properly cover traffic control, safety devices and/or signs having messages that are irrelevant to normal traffic conditions at the end of each Work period. Keep signs clean at all times and provide that legends are distinctive and unmarred.

    b. Place excavated material and construction equipment so that vehicular and pedestrian traffic is maintained at all times unless road closure permit is obtained. If the Contractor's operations cause traffic hazards, implement appropriate safety measures immediately.

    c. In areas of high pedestrian and vehicular traffic volume, the remove waste materials and construction equipment from the Work Site on a daily basis. Do not park construction equipment overnight on the Site or the adjacent roads unless permitted by Owner.

    d. Provide night watchmen where special hazards exist.

8. Post signage clearly stating that any vehicle impeding the progress of construction will be towed at the vehicle owner’s expense. Towing charges incurred by Owner for Contractor’s failure to post such signs will be borne by the Contractor.

1.05 REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, and facilities before Final Application for Payment inspection.

B. Remove temporary underground installations and grade Site as indicated. Clean and repair damage caused by installation or use of temporary utilities, facilities, and controls.

C. Restore existing facilities and areas used during construction to original condition. Restore permanent facilities used during construction to specified condition.

END OF SECTION

SECTION 01 51 38

TEMPORARY WATER PIPING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide, operate and maintain temporary water piping system as described herein and indicated on the Drawings.

1.02 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

1. Minimum contents of water bypass pumping plan:

a. A plan showing the layout of temporary water piping system

b. Bypass main installation and disinfection, laboratory analysis of bypass water service installation.

1.03 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.04 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 TEMPORARY BYPASS WATER MAIN

A. Temporary bypass water main and fittings shall be high density polyethylene (HDPE) pipe in accordance with Section 33 11 00.

PART 3 – EXECUTION

3.01 GENERAL

A. Interruption of water service or fire protection is not permitted during water main construction or bypass installation/removal.

1. Connect temporary bypass water mains to the distribution system at both ends to maintain continuity in the distribution system. “Dead-ending” of the bypass system is not permitted, unless otherwise approved by Owner.

2. Take necessary measures, including tapping existing water mains and installing gate valves when existing hydrants and existing gate valves are unavailable for use, to assure continuous water service and fire protection.

B. Provide minimum inconvenience to property owners during connection and disconnection. Coordinate with and contact property owners by written notice. Submit notice to the Owner for approval prior to distributing to property owners.

3.02 PIPING

A. Temporary bypass pipe and other materials shall provide adequate water tightness. Exercise care throughout the installation of the temporary pipe and making up of temporary connections to avoid possible pollution of water mains or house services or contamination of the temporary bypass pipe itself. Flush and disinfect ALL temporary pipe and hose to prevent contamination in accordance with AWWA Standard C651.

B. Lay temporary piping along the general lines of streets or roadways in a manner that causes the minimum amount of disruption and is least likely to be damaged. Use temporary bituminous pavement, cold patch, or other approved material to form a ramp on each side of the pipe or depress the pipe at driveways to allow for property owners to drive over the temporary pipe as directed by the Engineer, or depress piping at street crossings.

1. In some areas, because the bypass and/or service pipe or hoses may be considered an obstruction to safe passage, additional precautions shall be taken by the Contractor to minimize public inconvenience. This will require additional ramping on both sides of the bypass pipe at building walkway entrances, at all sidewalk crossings, and elsewhere.

2. At street crossings, a narrow trench shall be cut in the existing pavement sufficiently wide and deep enough to allow placement of the bypass pipe just below the roadway surface with temporary surfacing placed above it, compacted by approved means, flush with the adjacent pavement. Allowing the temporary surfacing to be compacted by vehicular traffic is not to be considered as an approved method. Upon removal of the bypass piping, the trench shall be backfilled with suitable material, properly compacted, and restored to service with a permanent wearing surface. No separate payment will be made for this work.

3.03 OPERATION AND MAINTENANCE

A. When bypass water main system has been tested and is approved to be put into service, it shall be maintained 24-hours per day, 7 days per week until the Work has been completed and the bypass system has been removed.

B. Continuously monitor and maintain bypassing operations regardless of duration or timing of bypassing. Unattended bypass pumping is prohibited.

C. Immediately correct and restore service or replace service for any interruptions, whether caused by frost, physical damage, or otherwise, at no additional cost to the Owner.

1. Maintain all components of the bypass system impacted by freezing conditions, including service connections and take reasonable measures when scheduling Work during cold weather season. Should it become necessary to stop Work and remove the bypass system due to freezing conditions, re-install, chlorinate and test the bypass system at no additional cost to the Owner.

D. Submit and emergency contact list with a minimum of three (3) employees skilled in the maintenance and repair of the temporary by-pass systems. Each employee must be well-informed of the bypass system in use with specific knowledge of its operational requirements and valve location.

E. The employees listed on the emergency contact list shall be on call 24 hours/day, 7 days/week while the temporary bypass system is active. Each shall be able to respond to emergency repair calls within a maximum of two (2) hours. The emergency contact list shall include, at a minimum the name, address, home and mobile telephone number for each employee listed.

F. Do not allow leaks in bypass pumping systems. Flush and disinfect leaks at no additional cost to Owner.

G. Complete all sections of the Project in progress before the daily low temperature falls below 35 degrees Fahrenheit. Maintain all components of the by-pass system impacted by freezing conditions, including service connections and take reasonable measures when scheduling work as cold weather season approaches. Should it become necessary to stop work and remove the by-pass system due to freezing conditions, separate payment shall not be made to re-install, chlorinate, test and return the temporary by-pass system to service.

H. Remove all components of the temporary bypass system without delay after the new water mains have been tested, approved and put into service.

3.04 REMOVAL

A. After the water mains have been replaced and new water mains put into service, remove temporary bypass and service lines without delay and perform bituminous patching required by temporary lines.

END OF SECTION

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SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. This Section specifies general requirements for products, materials and equipment and applies to all Specifications and Drawings.

1. Provisions of this Section may supplemented in individual Specification sections.

B. Section Includes

1.02 SOURCE QUALITY CONTROL
General
Independent Testing Agency Certification
Factory Testing

1.03 PRODUCT REQUIREMENTS
General
Transportation and Handling
Storage and Protection

1.04 WARRANTIES

1.02 SOURCE QUALITY CONTROL

A. General

1. Subject material and equipment furnished under the Contract Documents to a complete factory testing program as specified.

2. Shop Drawings and submittals: reviewed by Engineer before initiating testing program.

3. Perform checks and tests in accordance with manufacturer's recommendations and referenced standards.

4. Evaluate test results and advise Owner immediately of any discrepancy between test results and test limits or the failure of any device or system under test. Include test limits for acceptability applicable to each test on the certified test records.

5. Record test information, including the evaluation of testing results, on forms approved by Owner and Engineer.

B. Independent Testing Agency Certification

1. If specified, furnish certificates from an independent testing agency.

2. Independent testing agency to certify that material and equipment components have been examined and tested and are in conformance with the requirements specified in the Contract Documents.

3. Take Samples in accordance with the requirements specified in the Contract Documents, as selected by Owner or independent testing agency. Furnish and ship at no additional cost to Owner.

C. Factory Testing

1. Provide 14 days prior written notice of factory inspections and tests to Owner and Engineer.

2. If failure to give proper written notice results in material and equipment being assembled or covered before a factory inspection or test, make material and equipment ready for inspection or test and reassemble or recover at no additional cost to Owner.

3. Owner may inspect any portion of material and equipment furnished at any reasonable time during manufacture and may witness testing of any portion of material and equipment wherever located. Owner and Engineer to witness tests only.

4. Furnish, set up and operate test equipment and facilities.

5. If facilities for conducting required tests are unavailable to the manufacturer, conduct tests elsewhere or have them performed by an independent agency approved by Owner.

6. Protect material and equipment after testing and checking to provide that subsequent testing of other equipment or systems does not disturb, damage or otherwise interfere with functional capability of material and equipment.

7. Assume responsibility for protection of material and equipment and safety of all personnel during factory testing program.

8. Grounds for rejection: failure to withstand tests; failure to meet ratings; failure to meet applicable standards.

9. In the event of failure

    a. Submit revisions of documents requiring approval for changes required for rectification.

    b. Obtain Owner's and Engineer's approval before making such changes.

    c. Provide written details of any changes to be made not requiring approval.

    d. Notify Owner and Engineer in writing before retesting.

    e. Furnish new material and equipment which meets requirements of the Specifications if rejected material and equipment cannot be rectified to satisfaction of Owner and Engineer.

    f. Retest after rectification in presence of Owner or Engineer.

10. Assume responsibility for all costs, including, but not limited to: loss or damage to materials and equipment resulting from testing; retesting; rectification; new material and equipment to replace damaged or non-rectifiable material and equipment; removal, furnishing, transportation, unloading, and installation of replacement material and equipment; and witness of testing by Owner and Engineer including travel, lodging, meals, and payroll.

11. Submit certified test reports which define tests, list results, and are signed by Contractor's representative, and copies of raw data collected during tests. Submission of certified test reports does not relieve Contractor of responsibility for material and equipment meeting requirements of the Contract Documents after installation.

1.03 PRODUCT REQUIREMENTS

A. General

1. Products include new material and equipment incorporated into the Work and may also include existing material and equipment required for reuse. This does not include machinery and equipment used for preparation, fabrication, conveying, installation and erection of the Work.

2. Do not use materials and equipment removed from existing Work Site, except as specifically permitted.

3. Provide complete with accessories, trim, finished, safety guards, and other devices and details need for a complete installation and for the intended use or effect.

4. Provide standard products which have been produced and used successfully on other similar projects for similar applications. Provide products which are likely to be available to Owner in the future for items required for maintenance and repair or replacement Work.

5. Furnish interchangeable components of the same manufacturer, for similar components.

B. Transportation and Handling

1. Transport and handle material and equipment in accordance with manufacturer's instructions.

2. Notify Engineer and Owner in writing upon acceptance of a shipment.

3. Promptly inspect shipments to assure that material and equipment comply with requirements, quantities are correct, and material and equipment are undamaged.

4. Furnish equipment and personnel to handle material and equipment by methods to prevent soiling, disfigurement, or damage.

5. Uncrate equipment and dispose of packing material properly.

C. Storage and Protection

1. Store and protect material and equipment in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive material and equipment in weather tight, climate controlled enclosures.

2. For exterior storage of fabricated material and equipment, place on sloped supports, above ground.

3. Provide for bonded off Site storage and protection when Site does not permit on Site storage or protection.

4. Cover material and equipment subject to deterioration with impervious sheet covering. Furnish ventilation to avoid condensation or potential degradation of material and equipment.

5. Store loose granular materials on solid flat surfaces in a well-drained area. Avoid mixing with foreign matter.

6. Furnish equipment and personnel to store material and equipment by methods to prevent soiling, disfigurement, or damage.

7. Arrange storage of material and equipment to permit access for inspection. Periodically inspect to assure material and equipment are undamaged and are maintained in acceptable conditions.

8. After receipt of material and equipment, assume responsibility for loss and damage including but not limited to breakage, corrosion, weather damage, and distortion.

1.04 WARRANTIES

A. Provide warranties for equipment and material in accordance with Paragraphs 6.19 and 14.03 of the Standard General and Supplementary Conditions, if any.

B. Provide extended or special warranties as indicated in individual Specification sections.

END OF SECTION

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SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. This Section specifies general execution requirements and startup/commissioning and performance testing for closeout of the Work and applies to all Specifications and Drawings

1. In certain Paragraphs, checked items indicate requirements applicable to the Project.

2. Provisions of this Section may be supplemented in the **Specific Project Requirements and Procedures** or other sections of Division 01.

B. Section Includes

1.02 OVERALL EXECUTION REQUIREMENTS
Coordination
Existing Conditions
Field Engineering
Record Documents
Cutting and Patching
Electrolytic Corrosion Prevention
Quality Assurance and Control of Installation
Manufacturers' Field Services
Independent Testing

1.03 STARTUP, TESTING, AND COMMISSIONING
Spare Parts
Consumables
Checkout and Starting Systems
Starting, Adjusting, and Balancing
Startup and Commissioning/Performance Testing
Demonstration and Training

1.02 OVERALL EXECUTION REQUIREMENTS

A. Coordination

1. Conduct preconstruction and pre-installation meetings before commencing certain Work that requires coordination or has special requirements or approvals.

2. Comply with the required Work sequence and coordination as may be specified in Summary of Work and reflect in the Project scheduling.

3. Coordinate Work such that Work is completed with minimum disruption to residents and businesses.

4. Coordinate space requirements and installation of Work. Utilize spaces efficiently to maximize accessibility for other installations, maintenance, and repairs.

5. Coordinate Work of the various Specifications with interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.

6. Coordinate related Work at the Site in accordance with Article 7 of the Standard General and Supplementary Conditions, if any.

7. Coordinate completion and cleanup of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy.

8. After Owner occupancy of premises, coordinate access to Site for correction of defective Work and/or incomplete Work to minimize disruption of Owner's activities.

☒ See the **Specific Project Requirements and Procedures** for additional requirements.

B. Existing Conditions

1. Paragraph 4.01 of the Standard General and Supplementary Conditions, if any, covers Availability of Lands.

   ☒ No information is identified or available for the Project.

   ☐ Information identified is included as an attachment to the **Specific Project Requirements and Procedures.**

2. Paragraph 4.02 of the Standard General and Supplementary Conditions, if any, covers Subsurface and Physical Conditions.

   ☐ No information is identified or available for the Project.

   ☒ Information identified is included as an attachment to the **Specific Project Requirements and Procedures.**

3. Pursuant to Paragraph 4.04 of the Standard General and Supplementary Conditions, if any, existence and location of Underground Facilities and other utilities and construction indicated as existing are not guaranteed. Before beginning Work investigate and verify the existence and location of Underground Facilities and other utilities and construction.

   ☒ Conduct test pits and other utility research and properly restore utilities interfered with or damaged during construction at no cost to the Owner.

   ☐ Engage a professional subsurface utility locator to verify the existence and location of underground utilities prior to starting Work

☐ See the **Specific Project Requirements and Procedures** for additional requirements.

4. Paragraph 4.05 of the Standard General and Supplementary Conditions, if any, covers Reference Points.

   ☒ No information is identified or available for the Project.

   ☐ Information is included in the **Specific Project Requirements and Procedures**.

5. Paragraph 4.06 of the Standard General and Supplementary Conditions, if any, covers Hazardous Environmental Conditions at Site.

   ☐ No information is identified or available for the Project.

   ☒ Information identified is included as an attachment to the **Specific Project Requirements and Procedures.**

☐ Other information is included as an attachment to the **Specific Project Requirements and Procedures**.

C. Field Engineering

☐ Delete - not required for the Project.

☒ Provide for the Project as follows.

1. Prior to initiating construction, engage an independent professional land surveyor registered in the state where the Project is located to provide surveys and permanent reference points for all bounds and property markers along the line of the Work that may be disturbed during construction. Submit copies of all ties to the bounds and property markers to the Engineer prior to excavation at the Site(s).

2. Maintain surveyor's log of control and other survey work. Keep log available for reference.

3. Verify layout information shown on the Drawings in relation to existing benchmarks before lay out of the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.

4. Promptly report lost or destroyed reference points, benchmarks, or control points. Promptly report requirements relocate reference and control points due to changes in grades. Promptly replace lost or destroyed bounds or markers and control points based on the original survey control points utilizing the services of a professional land surveyor registered in the state where the Project is located. The cost of replacing markers disturbed by the Contractor's operations shall be at the Contractor's expense.

☐ See the **Specific Project Requirements and Procedures** for additional requirements.

D. Record Documents

1. Provide Record Documents in accordance with Paragraph 6.12 of the Standard General and Supplementary Conditions, if any, and in accordance with the **Payment and Administrative Procedures**.

2. Store Record Documents separate from documents used for construction. Record information concurrent with construction progress.

3. Legibly mark each item to record description of actual equipment and material installed and actual construction on approved submittals, including the following.

    a. Manufacturer's name and equipment and material model and number

    b. Material and equipment substitutions or alternates utilized

    c. Approved changes

    d. Measured depths of foundations

    e. Measured horizontal and vertical locations of Underground Facilities and appurtenances, referenced to permanent surface improvements

    f. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work

    g. Field changes of dimension and detail

    h. Details not on original Contract Documents or Shop Drawings

E. **Cutting and Patching**

1. Employ skilled and experienced personnel to perform cutting and patching.

2. Submit written request in advance of cutting or alteration which affects:

    a. structural integrity of any element of Project;

    b. integrity of weather exposed or moisture resistant elements;

    c. efficiency, maintenance, or safety element;

    d. safety, traffic, or hazard barriers;

    e. visual qualities of sight exposed elements; and

    f. work of Owner or separate contractor.

3. Execute cutting, fitting, and patching including excavation and fill to complete Work and to:

    a. fit materials together, to integrate with other work;

    b. uncover Work to install ill-timed Work;

    c. remove and replace defective or non-conforming Work;

d. remove Samples of installed Work for testing when requested; and

e. provide openings in element of Work for penetration of mechanical and electrical work.

4. Execute Work by methods to avoid damage to other work and which will provide appropriate surfaces to receive patching and finishing.

5. Provide adequate temporary support for Work to be cut.

6. Restore Work with new materials in accordance with requirements of Contract Documents. Use materials identical with original materials where recognized that satisfactory results can be produced.

7. Provide protection from elements for areas which may be exposed by uncovering work.

8. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit. Restore exposed finishes of patched areas; and, where necessary extend finish restoration onto retained adjoining Work in a manner, which will eliminate evidence of patching.

9. Identify any Hazardous Waste, Hazardous Environmental Condition, or hazardous substance exposed during the Work to Owner for decision or remedy in accordance with Paragraph 4.06 of the Standard General and Supplementary Conditions, if any.

10. Cut work by methods least likely to damage Work to be retained and work adjoining. Cut Work with sawing and grinding tools, not with hammering, chopping, or burning tools. Cut masonry and concrete materials with masonry saw or core drill. Do not use pneumatic tools without prior approval. Core drill openings through concrete Work. Adhere to mandatory cutback requirements when saw cutting concrete and roadway openings.

11. Do not cut and patch structural Work in a manner resulting in reduction of load-carrying capacity or load/ deflection ratio.

12. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Maintain supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage and seal voids. For interior work at penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire resistant material, to full thickness of the penetrated element.

13. Do not cut and patch operational or safety-related components that reduce capacities to perform in manner intended. Do not cut and patch Work that reduces visual qualities. Remove and replace unsatisfactory cutting patching as directed by Engineer or Owner.

F. Electrolytic Corrosion Prevention

1. Prevent galvanic action, bimetallic corrosion, anodic or cathodic action, and electrolysis at all electrical grounds and for all galvanic scale (electromotive series or table of oxidation potentials). Do not allow contact of dissimilar metals further apart than 0.35 on the galvanic scale (electromotive series or table of oxidation potentials). The electrode potential of common metals is listed below.

	Electrode Potential Volts (Relative to Hydrogen)
Magnesium	+2.37
Aluminum	+1.70
Zinc+	+0.76
Chromium	+0.56
Iron and Steel	+0.44
Cadmium	+0.40
Nickel	+0.25
Tin	+0.14
Lead	+0.13
Copper	-0.34

2. Unless otherwise indicated, provide dielectric insulators between ferrous and nonferrous pipe and equipment.

G. Quality Assurance and Control of Installation

1. Monitor quality control of Subcontractors, Suppliers, manufacturers, material, equipment, services, Site conditions, and workmanship, to produce Work of specified quality. Conduct field quality control and testing specified.

2. Comply fully with manufacturers' installation instructions, including each step in sequence. If manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

3. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

4. Perform Work using persons qualified to produce workmanship of specified quality.

5. Install field Samples and mockups at the Site as required in Specifications for review. Acceptable Samples and mockups represent a quality level for the Work. Where field Sample or mockup is specified to be removed, clear area after field Sample or mockup has been accepted by Engineer or after Work is complete when mockup is to serve as a control reference.

6. Protect adjacent construction in accordance with Paragraph 6.11 of the Standard General and Supplementary Conditions, if any.

H. Manufacturers' Field Services

1. If required in the Specifications, arrange and pay for material or equipment Suppliers or manufacturers to provide qualified staff personnel (field representative) to perform the following services and services specified. Submit reports of activities, actions taken and test results to Engineer within 10 days of completion.

    a. Observe Site conditions, conditions of surfaces and installation, quality of workmanship.

    b. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

    c. Assist with field assembly as required.

    d. Furnish, setup, and operate required test equipment and facilities.

    e. Perform and record results of manufacturer recommended inspections and tests, and tests specified for material and equipment.

    f. Be responsible for protection of material and equipment and safety of all personnel during testing.

    g. Perform any other services normally provided by field representative's company.

    h. Instruct operating personnel in proper use of material and equipment.

    i. Instruct and supervise field repairs before acceptance by Owner.

I. Independent Testing

1. Employ and pay for specified services of an independent firm in accordance with Paragraph 13.03 of the Standard General and Supplementary Conditions to perform inspection and testing as may be specified except where responsibility for a specific inspection or test is expressly allocated to Owner in the Specifications or by Laws and Regulations.

2. Reports will be submitted by the independent firm to Owner, in duplicate indicating observations and results of tests and indicating compliance or noncompliance with Contract Documents.

3. Inspection, testing, and source quality control may occur on or off the Project Site.

4. Cooperate with independent firm. Furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.

5. Notify Owner and independent firm 24 hours before expected time for operations requiring services.

6. Make arrangements with independent firm and pay for additional Samples and tests required for Contractor's use.

7. Retesting required because of nonconformance to specified requirements will be performed by the same independent firm if instructed by Owner. Payment for retesting will be charged to Contractor by deducting inspection or testing charges from the Contract Price.

8. Testing or inspecting does not relieve Contractor from performing Work in accordance with requirements of the Contract Documents.

1.03 STARTUP, TESTING, AND COMMISSIONING

A. Spare Parts

1. Provide spare parts required for construction, startup, testing and commissioning of the Work prior to achievement of Substantial Completion, including spare parts for flushing and consumable supplies such as bolts, nuts, gaskets, filters, insulating tape, etc., normally consumed in the startup, commissioning and testing.

2. If spare parts are purchased by Owner, Contractor shall have the right to use the spare parts purchased by Owner provided that such spare parts are replaced prior to Substantial Completion at Contractor’s expense. Replacement spare parts, replaced by Contractor, shall be new, unused and identical as the original spare part used.

B. Consumables

1. Provide initial fills of consumables including equipment lubricants, resins, chemicals, desiccants, and fuels. Provide subsequent fills if required during Warranty Period if acts or omissions of Contractor cause such consumables to require replacement.

2. Coordinate with Owner for consumables required.

C. Checkout and Starting Systems

1. Coordinate schedule for startup and operation of various equipment and systems with Owner.

2. Notify Owner 7 days before startup of each major piece of equipment or system, including a staffing request for Owner's operations and maintenance personnel required to adequately and safely support each specific start-up and operation activity.

3. Verify that each system or piece of equipment item has been assembled, constructed, or completed in accordance with the Contract and capable of functioning as intended.

4. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, magnetic center alignment, belt tension, control sequence, or other conditions which may cause damage.

5. Verify that each piece of equipment or system has successfully completed construction testing and cold commissioning, including hydrostatic testing, loop checks, relay checks, calibration, and continuity checks and that all tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

6. Verify wiring and support components for equipment are complete and tested.

7. Execute start up under supervision of responsible manufacturers' representative or Contractor's personnel in accordance with manufacturers' instructions utilizing Owner's qualified operations and maintenance staff trained by Contractor.

8. When specified in individual Specification Sections, require manufacturer to provide field representative to be present at Site to inspect, check and approve equipment or system installation before start up, and to supervise placing equipment or system in operation.

D. Adjusting and Balancing

1. Supply necessary equipment, material, construction power, and consumables (except for those provided by Owner) needed to startup and fully test the Work and replenish the same until Substantial Completion is achieved. Contractor may utilize Owner's operating spare parts, such use requiring timely replacement at Contractor's expense.

2. Coordinate as required for conduct of independent testing.

3. Perform specified and required adjusting and balancing concurrently to the maximum extent possible on individual equipment and systems and prior to startup and commissioning/performance testing.

E. Startup and Commissioning/Performance Testing

1. Conduct startup and commissioning/performance tests to demonstrate the Work meets the requirements of the Contract Documents, satisfies the Owner's requirements, and is in accordance with Paragraph 14.04. of the Standard General and Supplementary Conditions, if any. Conduct testing in accordance with

   ☒ individual Specification sections.

   ☒ the separate Startup, Commissioning, and Testing section.

   ☐ the **Specific Project Requirements and Procedures.**

2. Prepare and submit a written startup and commissioning/performance testing procedures no later than 60 days prior to start of testing for review and final test procedures no later than 30 days prior to start of testing. Submit a staffing request for Owner's operations and maintenance personnel.

3. Calibrate test equipment and instrumentation on Site or provide acceptable certificate of calibration conducted within 30 days of testing.

4. Complete functional testing prior to initiating the startup and commissioning/performance testing as specified.

5. Complete specified startup and commissioning/performance tests prior to Substantial Completion. Owner and Engineer will witness Performance Testing. Notify Owner and Engineer in writing at least 7 days prior to starting any startup and commissioning/performance testing. Coordinate for witnessing of tests by required regulatory representatives.

6. Submit written test reports.

F. **Demonstration and Training**

1. Provide formal demonstration and training of Owner's personnel as specified in

☒ individual Specification sections.

☒ the separate Demonstration and Training section.

☐ the **Specific Project Requirements and Procedures.**

END OF SECTION

SECTION 02 41 14

SELECTIVE SITE DEMOLITION AND RESTORATION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Site demolition including clearing, stripping or ordinary excavation of existing bituminous or cement concrete pavements, soils, foundations, bituminous or cement concrete curbs, bituminous or cement concrete sidewalks, grassed areas, demolition, dismantling, replacement and restoration Work, stacking of reusable and disposal of waste and surplus materials and tree protection and removal in accordance with this Section.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with the Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

A. Perform selective Site demolition in accordance with Section 100 of the MassDOT Standard Specifications and the Drawings.

B. Comply with the General Requirements for temporary construction controls, protections, and waste disposal.

1. Ensure against damage or injury to buildings, occupants, and adjacent property from falling debris or other causes. Avoid damage to adjacent areas, facilities, and appurtenances.

2. Maintain free and safe passage to and from the Site.

3. Legally dispose of waste, surplus and unsatisfactory materials including bituminous or cement concrete, debris, rails and ties, common excavation, cold planning, and reclamation immediately as it accumulates during the course of the clearing, grubbing, stripping, demolition, and other Site preparation. Burying is not allowed.

3.02 SITE DEMOLITION

A. Clear the Site of construction debris and waste materials, including grass, bushes, trees, broken concrete, fencing, pipes, lumber and steel pieces, rags and plastics, within the limits of Work as shown on the Drawings or as directed.

B. Strip and/or excavate existing bituminous or cement concrete pavements, soils, foundations, bituminous or cement concrete curbs, bituminous or cement concrete sidewalks, grassed areas.

C. Remove and stack fencing, lamp posts, letter boxes, signs, guardrails, bike racks, and poles and other usable materials to be reinstalled.

1. Remove fence and store for resetting in accordance with Section 665 of the MassDOT Standard Specifications and the Drawings.

D. Demolish and remove existing bituminous pavement, bituminous and concrete walkways, curbing, grass borders and landscaping, bushes, shrubs and vegetation as necessary to construct the drainage improvements. Remove existing obstructions and debris, cut trees, bushes, root stumps, waste stones, wood, lumber, metal, plastic, and other unsuitable materials above, at or below grade that may interfere with or obstruct the new Work, whether or not shown on the Drawings.

E. Remove and stockpile top soil, curb stones, and utility castings and other materials for reuse as shown or as directed by the Engineer.

F. Stockpile recovered materials acceptable to the Engineer to be reused on the Project and protect against damage or deterioration.

G. Do not cut, remove, destroy, or trim trees and shrubs unless specifically marked or permitted. Do not remove tree branches using excavating equipment. Provide that required trimming is performed by a licensed arborist.

1. Remove, store, and protect trees designated on the Drawings per MassDOT Standard Specification and Supplements Section 771.

2. Protect trees or vegetation outside the limits of the Work area.

3. Tree Removal (4-48 inches in diameter)

a. Cut existing trees and expose by excavation, remove or cut, as required, the tree stumps and root systems as shown on the Drawings and as directed. Remove and dispose of tree stumps, roots, organic matter and unsuitable materials resulting from the operation.

b. Excavation around tree: not to exceed the width of the sidewalk

c. Depth of excavation for stump removal: not to exceed 5 feet

d. Depth of excavation for removal of a tree root system: not to exceed 2 feet

e. Cut clean and remove root system encountered within the limits of sidewalk width as determined by the Engineer. Paint cut surfaces of the remaining detached roots with stump rot. Clean and paint tree roots still attached to the trunk with two coats of an approved chemical root guard to protect the tree from later damage.

f. Transport and carefully stack existing tree grates in good condition and not needed for the Project, or dispose of at no additional cost to the Owner, as directed by Engineer.

H. Protect integrity of remaining structures, appurtenances and equipment during demolition, removal and alteration to existing structures, appurtenances, utility pipes, castings, fences, walkways, posts, stairs and other physical features.

I. Maintain slopes longitudinally and laterally to ensure proper and continuous drainage. Field adjust sidewalk and roadway gutter grades at driveways and side street intersections to be consistent with the existing drainage pattern and provide for an appropriate transition between the new and the existing side streets and driveways pavement surfaces at intersections.

J. Leave abandoned underground piping in place, plug or cap and fill with flowable control density fill. Remove or cut abandoned underground piping castings a minimum 12 inches below the finished surface and the area backfilled.

K. Cut sections of piping to be removed to the nearest solid support or provide appropriate new supports and cap each of the remaining ends before backfilling, unless noted on the Drawings or specifically directed by the Engineer.

L. Cut openings in existing masonry Work to provide for a suitable bond, and clean, square and plumb openings for installation of new Work. Thoroughly clean cut surfaces of loosened materials.

3.03 SAWCUTS IN EXISTING PAVEMENTS AND SIDEWALKS

A. Neatly saw cut edges of excavations in existing pavements and sidewalks along either a straight line or design curved line as shown in the Drawings. Ragged, uneven edges are not acceptable.

B. Saw cut existing pavement through its full depth, or to the elevation of the abutting proposed pavement subgrade, whichever is lesser, at joints between existing and proposed pavements, and at utility trenches through existing pavement to remain, to provide a uniform, vertical surface for the proposed pavement joint with the existing pavement.

C. Neatly saw cut edges that become broken, ragged or undermined with a minimum disturbance to remaining pavements or sidewalks prior to the placement of abutting proposed pavement.

D. In areas where an existing concrete sidewalk abuts a building, wall or storefront, and the sidewalk is to be reconstructed or removed, saw cut the existing sidewalk a minimum of 6 inches from the building wall or storefront, unless otherwise directed by the Engineer.

E. Spray or paint saw cut surfaces with a uniform thin coat of RS-1 asphalt emulsion immediately before placement of hot mix asphalt material against the surface.

3.04 REPAIR, REPLACEMENT AND RESTORATION

A. Match materials of repair or restoration to existing adjacent surfaces in finish and texture as closely as possible. Make joints between new and existing Work inconspicuous.

B. Replace or restore items damaged, dislocated or dismantled such as fences, lamp posts, letter boxes, masonry boundary walls, signs, poles, bollards, curb stones, markers, trees, bushes, grassed areas, walkways, stairs, steps, benches, outside lighting and other amenities and physical features designated to remain, to conditions that existed prior to the start of construction.

C. Reinstall fencing removed as shown with new posts as necessary per MassDOT Standard Specifications and Supplements Section 665.

1. New posts: per MassDOT Standard Specification and Supplements Section 600 and Section M8.09.0

D. Re-plant trees designated on the Drawings per MassDOT Standard Specification and Supplements Section 771.

3.05 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.06 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 02 26 00

HAZARDOUS MATERIAL ASSESSMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Conduct a hazardous material assessment of materials and equipment to be demolished at the Raw Water Pump Station in accordance with this Section and applicable reference standards listed in Article 1.03.

2. Related Requirements

a. 02 80 05 Hazardous Material Abatement

b. 02 82 33 Removal and Disposal of Asbestos Containing Materials

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. Asbestos Hazard Emergency Response Act (AHERA)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

A. Review existing building Specifications and Plans and related information. Coordinate with the Engineer to obtain available documents.

B. Inspect the building, materials and equipment to locate, quantify, assess, and sample suspect material.

C. Repair damage and patch holes made during sampling.

3.02 ASBESTOS INSPECTION

A. Asbestos Inspection: conducted by AHERA certified asbestos inspector licensed in the state of the Project location.

B. Collect 3 bulk samples of each material for analysis by Polarized Light Microscopy with Dispersion Staining (PLM/DS).

C. Provide analysis by a licensed and accredited laboratory.

3.03 LEAD PAINT

A. Lead paint survey: conducted by lead inspector licensed in the state of the Project location.

B. Test materials for the presence of lead based paint using a state of the art NITON X-ray fluorescence analyzer (XRF).

3.04 PCBs AND CHEMICALS & SOLVENTS

A. Provide inspection conducted by a qualified person.

3.05 MINIMUM REPORT CONTENTS

A. Identify materials found to be asbestos containing materials (ACM) and materials that test negative for the presence of asbestos.

1. Provide description, location, quantity, and laboratory results of ACM.

2. Provide location and description of materials that test negative for the presence of asbestos.

B. Provide written results of findings of lead paint survey on State-approved lead paint inspection forms.

C. Provide results from inspection and analysis of PCBs and chemicals & solvents.

D. Provide recommended abatement measures for identified hazardous materials including requirements included in Sections 02 80 05 and 02 82 33.

E. Provide costs to perform recommended abatement measures for identified hazardous materials.

F. Perform abatement only after approval by Owner.

END OF SECTION

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SECTION 02 61 00

REMOVAL AND DISPOSAL OF CONTAMINATED SOIL AND WATER

PART 1 – GENERAL

1.01 SUMMARY

A. Remove and dispose of contaminated soil/material generated during normal requirements for excavation including associated handling, transportation, and stockpiling of contaminated soil/material in conformance with Laws and Regulations.

B. Remove, treat and dispose of contaminated water generated during dewatering in conformance with Laws and Regulations.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

B. Conduct Work of this Section only after issuance of Change Order.

C. Excavation beyond that required to remove contaminated materials as specified and shown on the Drawings shall be considered additional Work.

1.03 REFERENCES

A. Reference Standards

1. Massachusetts Department of Environmental Protection (MassDEP)

   a. 310 CMR 30.000 Hazardous Waste Regulations

   b. 310 CMR 40.0000 Massachusetts Contingency Plan

2. Department of Environmental Protection (DEP) for state where Project is located

3. Environmental Protection Agency (EPA)

4. Occupational Safety and Health Administration (OSHA)

   a. OSHA 29 CFR 1926, Safety and Health Regulations for Construction

1.04 SUBMITTALS

A. Provide in accordance with Division 01 General Requirements.

B. Laboratory characterization results

C. Three copies each of handling, transport and/or disposal documentation including bill of lading (BOL), disposal facility receipt, hazardous waste manifest.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Handle, transport and disposal of contaminated material in accordance with applicable Laws and Regulations.

C. Provide that workers performing removal and disposal of contaminated material are OSHA certified in accordance with OSHA 29 CFR 1926 for work with or near hazardous materials, including completion of the 40-hour health monitoring program.

PART 2 – PRODUCTS

2.01 CARBON CANISTERS FOR WATER TREATMENT

A. Provide disposable, 55 gallon drum, liquid phase, granular activated carbon canisters. Expected level of quality: equivalent to Calgon.

PART 3 – EXECUTION

3.01 GENERAL

A. Provide Work is conducted under the direction of a Licensed Site Professional (LSP).

B. Perform Work in areas where contaminated materials are discovered during consecutive Work days unless precipitation prevents it. Do not perform Work in areas where contaminated materials have been or are found during periods of rain or other precipitation or threat of precipitation. In the event that precipitation occurs during construction in the area, cease Work and the cover trenched area with polyethylene liners.

C. Comply with Paragraph 4.06.D. of the General Conditions and Supplementary Conditions (if any), upon discovery of soil materials or water scheduled for removal within an excavation suspected to be contaminated.

D. Costs and fees arising from mishandling, improper disposal or use of faulty equipment associated with the removal of contaminated material and water shall be borne by the Contractor.

E. Handle and transport contaminated material in accordance with applicable Laws and Regulations, including those of the DEP in the state where the Project is located.

3.02 CONTAMINATED SOIL AND MATERIAL

A. Provide excavation, temporary on-site stockpiling, laboratory characterization, loading, and transportation (including stockpile management) of contaminated soil from each area of Work to a central stockpile location within the jurisdiction of Owner as specified by Owner.

B. Cover contaminated soils when transported on public ways to minimize fugitive dust.

C. Provide laboratory characterization required for soil management facility approval, soil management facility approval, handling, transportation and disposal of contaminated material.

D. Submit copies of the laboratory characterization results and soil management facility approval letter to the LSP. Obtain appropriate BOL(s) from LSP for each Work area prior to transporting contaminated soil. Transport contaminated soil under the appropriate BOL(s) in accordance with 310 CMR 40.0030..

E. Arrange for legal disposal of the contaminated soil material at an appropriate facility.

F. Temporary Stockpiling

1. Place contaminated soil generated from each area of Work into separate stockpiles at the central stockpile location. Mark each stockpile as to which area of Work the soil was generated from.

2. Place temporarily stockpiled contaminated soil at the central stockpile location on polyethylene sheeting of at least 6 mils in thickness. Immediately cover stockpiles with polyethylene sheeting of at least 6 mils or other suitable impermeable material with physical strength to resist tearing by the wind and properly secured around the base.

3. Provide that slopes comply with OSHA Regulations and local codes and Regulations.

4. Maintain stockpiles at the central stockpile location. Check stockpiles daily during normal working hours and repair, replace or re-secure the base layer or cover to the satisfaction of the Engineer and Owner.

3.03 CONTAMINATED WATER

A. Provide that LSP coordinates sampling and analysis of water which has accumulated in excavations and will measure the thickness of any non-aqueous phase liquid. If the thickness is persistently greater than 1/2-inch, Owner or Engineer will notify DEP within 72 hours per 30 CMR 40.0313.

B. Provide that pumps and hoses used in the transfer of contaminated water are of oil resistant material, are well maintained and subject to the inspection of the Engineer. Replace or repair leaking pumps and hoses at no additional cost to the Owner.

C. Off-Site Water Disposal

1. If directed by the LSP, pump contaminated water into either a vacuum truck operated by a licensed hazardous waste transporter (for volumes of water up to 3,000 gallons) or into portable, bulk liquid storage tank(s) for larger volumes and transport to an approved off-Site location for disposal.

2. Handle and transport contaminated water in accordance with applicable Laws and Regulations, including the DEP of the state where the Project is located.

D. On-Site Water Treatment and Disposal

1. If directed by the LSP, provide for on-Site handling, treating and disposing of contaminated water removed from excavations. Owner and Engineer will assist in obtaining an emergency NPDES exclusion permit for the disposal of treated water to a storm drain or waterway, if required.

2. Treat contaminated water by pumping through two consecutive liquid phase granular activated carbon canisters at a flow rate not exceeding 10 gallons per minute or as recommended by the manufacturer and as necessary to meet effluent limits. Provide pre-filtration of the water prior to carbon treatment if required in accordance with the manufacturer's recommendation.

3. Test effluent to assure compliance with EPA drinking water quality standards or the effluent concentration requirements specified in the NPDES permit, if applicable.

a. Take samples at least once daily and submit to a qualified analytical testing laboratory for 24-hour turn around. Provide sample testing for the parameter(s) as directed by LSP.

b. Cease Work immediately if test results indicate the effluent exceeds the effluent concentration requirements and adjust flow and/or replace carbon canister to meet the effluent requirements.

c. Legally dispose of carbon canisters in accordance with Laws and Regulations.

END OF SECTION

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SECTION 02 80 05

HAZARDOUS MATERIAL ABATEMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Minimum requirements for removal, containment, and legal disposal or recycling of hazardous and regulated materials at the Stackpole Street Pump Station and Raw Water Pump Station (if authorized), including fluorescent lamps and associated ballasts, thermostats and mercury-containing devices, smoke detectors, batteries, generator gasoline storage containers, natural gas heaters, transformer vault, electrical switchgears, signage and other miscellaneous items, PCBs, lead containing paint, and associated Hazardous Waste generated as a result of the Work, in accordance with this Section, Laws and Regulations and applicable reference standards listed in Article 1.03.

B. Perform asbestos containing material removal and disposal in accordance with Section 02 82 33 Removal and Disposal of Asbestos Containing Material.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

B. Conduct Work of this Section at the Raw Water Pump Station only after issuance of Change Order.

1.03 REFERENCES

A. Reference Standards

1. Massachusetts Department of Environmental Protection (MassDEP)

   a. 310 CMR 7.00 Air Pollution Control Regulations

   b. 310 CMR 30.000 Hazardous Waste Regulations

   c. 310 CMR 30.1000, Standards for Universal Waste Management

   d. 310 CMR 40.0000 Massachusetts Contingency Plan

2. Commonwealth of Massachusetts

   a. MGL Chapter 21E, Massachusetts Oil and Hazardous Material Release Prevention and Response Act

3. Massachusetts Department of Health and Human Services

4. Environmental Protection Agency (EPA)

    a. 40 CFR Subchapter I – Solid Wastes

    b. 40 CFR Subchapter R – Toxic Substances Control Act (TSCA) (also 15 USC § 2601 et seq.)

5. Mine Safety and Health Administration (MSHA)

6. National Institute for Occupational Safety and Health (NIOSH)

7. Occupational Safety and Health Administration (OSHA)

    a. OSHA 29 CFR 1926, Safety and Health Regulations for Construction

8. Resource Conservation and Recovery Act (RCRA)

9. U.S. Department of Transportation (U.S. DOT)

    a. 49 CFR Subtitle B, Chapter I, Subchapter A, Hazardous Materials and Oil Transportation

B. Local and county Board of Health and Fire Department rules, regulations, notifications and permits

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

B. In the event of an oil or chemical spill, immediately notify the Owner and the National Response Center at 1-800-424-8802 or www.nrc.uscg.mil using on-line reporting tool.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Permits, applications, licenses, and notifications required by Laws and Regulations

C. Waste Disposal Plan for disposal of Hazardous Waste which describes the Hazardous Waste stream and disposal means (e.g. landfill or recycle) and the names and address of the proposed Hazardous Waste hauler and proposed disposal, reclamation and treatment facilities

D. Fluorescent Light Fixtures

1. List of Subcontractors to be utilized for incidentals, Hazardous Waste hauling and disposal issues, including Subcontractor's name(s), addresses and phone numbers and applicable licenses.

E. PCB Abatement

1. Training certificates for personnel handling PCB containing materials

2. PCB Spill Prevention Control and Countermeasure Plan

3. PCB Abatement Work Plan

F. Lead Paint Abatement

1. Lead Paint Work Plan and Lead Compliance Program per 29 CFR 1926.62, including proposed worker training, respiratory protection program and medical monitoring for employees throughout all phases of the Work, including make, model and NIOSH approval numbers of respirators to be used; worker orientation plan; written description of proposed procedures, methods, or equipment to be utilized.

   a. Protocol for testing paint to determine the presence of lead

   b. Results of lead testing

   c. Name and address of the testing laboratory, certification(s) of AIHA accreditation for metal analysis, listing of relevant experience in air lead analysis, and presentation of a documented quality assurance and quality control program

   d. Air sampling results

   e. Personnel monitoring results

   f. Copies of written medical opinions for each employee who may be occupationally exposed to lead, as required by 29 CFR 1926.62 (j) (3) (v).

G. Chain of Command of responsibility at Work Site including supervisors and competent person, their names, resumes and phone numbers.

H. Manifests, receipts, and written acknowledgement from the Hazardous Waste disposal, reclamation and treatment facilities with representative's signature, printed name and title, acknowledging:

1. Name, contact, phone number and certification copies of recycling company and facility including written procedures to be used for ballast and light tube recycling.

2. Landfill site information, including EPA ID number, contact name and telephone number

3. Original copies of Waste Disposal Manifests with waste quantities listed and recycling bill of lading for Hazardous Waste transported and confirmation of reclamation if applicable

4. Certificate of Recycling and Disposal after incineration of Hazardous Waste, materials, and recycling of uncontaminated metal components

5. Disposal and recycling of lead waste material from the Site

I. Closeout Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Qualifications: per Division 01 General Requirements and as follows.

1. Minimum personnel training and certification per EPA, RCRA, OSHA and state DEP requirements.

a. Removal and disposal of the light tubes and PCB equipment/ballasts only.

1) Workers: 24 hour OSHA trained pursuant or HAZWOPER trained

2) Supervisors: 40 hour OSHA trained

b. PCB Abatement: 40-hour OSHA HAZWOPER certification and/or 8-hour OSHA refresher training certification

2. Lead testing lab shall be AIHA accredited for analysis of metals.

1.07 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1. Refer to Hazardous Material Assessment

2. Common materials that may contain hazardous or regulated materials include lead paint, PCBs, fluorescent lamps and associated ballasts, thermostats and mercury-containing devices, smoke detectors, batteries, generator gasoline storage containers, natural gas heaters, transformer vault, electrical switchgears, and signage.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

A. Protect personnel and the building environment against exposure to hazardous and regulated materials removed.

B. Engineer may stop hazardous and regulated material removal and abatement Work and for noncompliance with the Specification and violation of applicable Laws and Regulations are identified especially if there is potential impact to human health, the environment, and proper completion of the Project.

C. Prior to assignment to any abatement Work, provide each employee with information regarding the potential hazards of PCBs, lead paint and other hazardous and regulated materials, and safety and health precautions.

D. Implement a Spill Prevention Control and Countermeasure Plan pursuant to 40 CFR 761.

E. Remove potentially hazardous and regulated materials or stored items prior to renovation activities and either recycle or legally dispose of in accordance with RCRA, DEP Hazardous Waste Regulations, and other applicable Laws and Regulations, including 310 CMR 30.000, including 310 CMR 30.1000, Standards for Universal Waste Management which apply to certain batteries, pesticides, thermostats, electrical transformers and mercury-containing devices.

1. Provide that mercury containing devices that are removed from the building are treated by retort and distillation processes to recover and recycle the elemental mercury at an EPA permitted facility.

F. Maintain required acknowledgements, certifications, logs, and documentation for the following on Site during demolition, removal and abatement activities at a location approved by the Engineer.

- Certifications of required worker training
- Medical examinations required by OSHA 29 CFR 1926
- Documentation of fit-testing specifically for respirators used on the Project
- Material Safety Data Sheets of supplies/chemicals
- Approved abatement work plans and programs
- List of emergency telephone numbers
- Waste Disposal Log

G. Personal Protective Equipment (PPE)

1. Provide each employee performing abatement Work information on the use and requirements of PPE. Proper PPE may vary depending on the activity, but may include disposable gloves, disposable rubber boots, steel-toe boots, Tyvek suits, respirators, hard hats, hearing protection, and/or eye protection.

2. Provide respirator training and fit testing for personnel conducting abatement activities that require the use of a respirator. Only issue respirators to personnel who have participated in a respirator training program.

3. Select respirators from those approved by the MSHA, NIOSH, or MA Department of Health and Human Services.

4. Individually fit-test respirators shall be to personnel under the direction of an Industrial Hygienist on a yearly basis. Permanently mark fit-tested respirators to identify the individual fitted, and limit use to that individual. Maintain fit-test records for each employee using a respirator.

5. High Efficiency Particulate Air (HEPA) respirator filters: approved by NIOSH and conform to the OSHA requirements in 29 CFR 1910.134.

6. Provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the work day. Remove and discard filters during any abatement/ decontamination process at a frequency at least as often as recommended by the manufacturer's specifications. Do not allow filters to be reused.

7. Do not use filters with negative pressure air purifying respirators any longer than one 8 hour work day.

8. Provide a storage area where respirators will be kept in a clean environment.

3.02 FLUORESCENT LIGHT TUBE REMOVAL

A. Remove fluorescent light fixtures prior to any other renovation Work.

B. Carefully remove fluorescent light tubes of each size and type from each fixture, properly package in egg crate cardboard cartons and dispose of in accordance with DEP Regulations. Fully enclose in the boxes to prevent breakage.

C. Quantify and store boxed light tubes in a designated Hazardous Waste storage/holding area. Confirm the total linear footage (quantity) of the tubes and inform Engineer.

D. Fluorescent (mercury) light tubes: collected for recycling (reclaimed) mercury vapor gas by a state approved recycling facility.

3.03 BALLAST REMOVAL AND DISPOSAL

A. Utilize process of ballast recycling approved as an Alternative Disposal Method pursuant to 40 CFR 761.60 (e).

B. Utilize only trained personnel to handle PCB materials per Article 1.06.

C. Remove ballasts from light fixtures with care. Remove and store ballasts in 55 gallon drums so as not to cause ballasts to leak as a direct result of removal and packing.

D. Properly package and legally dispose of non-PCB containing ballasts in a landfill that will accept the Hazardous Waste or recycle and reclaim at a facility that is approved to handle the Hazardous Waste.

E. Properly package and legally dispose of PCB containing ballasts in a landfill that will accept the Hazardous Waste and provide documentation. Comply with applicable requirements specified in Article 3.05.

3.04 LIGHT FIXTURE REMOVAL AND DISPOSAL

A. Shut down and lock out lighting circuits. Cut wiring and cap from the nearest junction box for each light. Confirm electrical power is disconnected and locked out to the light fixtures, and then carefully remove from the ceilings and walls.

B. Carefully remove, decontaminate and legally dispose of fluorescent lights and remove incandescent lights. Light fixtures may be recycled as light metal after removing light tubes and ballasts.

3.05 PCB ABATEMENT

A. Preparation

1. Designate the areas for PCB abatement as “PCB Work Area”.

2. Provide authorized workers and visitors with suitable PPE whenever they enter the PCB Work Area.

3. Use physical barriers where necessary, to limit access to the Work area for the duration of the demolition/lead paint abatement Work.

4. Post PCB caution signs, warning signs and barrier tapes at all approaches to the PCB Work Area. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the PCB Work Area. Post emergency exits only on the PCB Work Area side and post with PCB caution signs on the non-PCB Work Area side.

5. Cover ground surfaces exterior to the PCB Work Area with a layer of 6 mil polyethylene sheeting, attached to the building face and laid down on the surface below the exterior PCB Work Area, at least 10 feet wide or to the furthest point of gravity fall for dislodged debris by methods used, whichever is further.

6. Isolate HVAC equipment intakes by temporarily shutting down units and installing plastic sheeting over the opening in the vicinity of any abatement activities involving soil removal, material grinding, or the use of power tools to remove PCB material.

7. Enclose the following locations within polyethylene sheeting. Cover locations in polyethylene sheeting or water impervious membrane (or equivalent) underfoot, overhead, and around walls not adjacent to the remediation surface. Seal sheeting at the seams using duct tape or other suitable adhesive. Utilize wet wiping and water misting as a dust suppressant as appropriate.

    a. Areas susceptible to wind or other conditions that could cause migration of contaminated materials outside the immediate PCB Work Area (e.g., scaffolding or a hydraulic lift platform)

    b. Areas where caulking removal activities are conducted.

    c. Along building walls to contain any debris or building materials removed from the exterior walls during abatement Work

8. Provide that medical approval, respirator fit-test reports, worker acknowledgments, and training certificates are on Site prior to admittance of any personnel to the PCB Work Area.

B. PCB Abatement

1. Prevent unprotected, untrained workers or trades from performing any related Work within the same vicinity as the PCB abatement Work. Prevent unauthorized workers and visitors from entering the Work area.

2. PPE must be utilized by personnel during abatement activities. Provide sufficient quantities of PPE to assure that complete disposable outfits are available for each individual performing abatement Work each day.

3. Manage and containerize any visible PCB debris located outside the PCB Work Area immediately at no additional cost to the Owner.

4. Perform removal and disposal of PCB Bulk Product Waste, such as caulking manufactured with PCBs, at locations identified in the Hazardous Materials Assessment, as shown on the Drawings, and as may be identified by Contractor.

5. Utilize tools for the removal of caulking or other PCB materials in a manner that does not generate dust. Uncontained water blasting and open air mechanical cutting or grinding of PCB source materials is prohibited.

6. Utilize power or pressure washers for PCB removal or clean-up procedures only with proper containment/controls.

7. Use scrapers, solvents, mastic removal chemicals, or other required methods and procedures to ensure complete removal PCB materials.

8. Remove accessible caulk, such as in window frames that could be disturbed before cutting building components.

9. Perform removal and disposal of the windows (including frames, sashes, panes, glazing, and hardware) and the door frames collectively with the caulking removal. Manage the removed caulking, windows, and door frame as a collective Hazardous Waste stream.

10. After gross caulking removal, clean adjacent masonry surface scheduled to remain in place of any residual caulking to the maximum extent practical by scraping with hand tools or scrubbing with an abrasive brush, as appropriate.

11. Place removed material into 6 mil plastic disposal bags or other suitable container upon detachment from the substrate.

12. In the event of a PCB spill, contact the Owner and National Response Center and clean up the spill pursuant to 40 CFR 761 Subpart G.

C. Containers and Labels for PCB Containing Material

1. Stage secure, lined, and covered waste containers (e.g. roll-off, cubic yard box, or 55-gallon U.S. DOT-approved steel container) for the collection of PCB wastes generated during the abatement Work in accordance with 40 CFR 761.65.

2. Properly label and mark containers with PCB materials regulated as Hazardous Waste (i.e., PCBs greater than or equal to 50 ppm in accordance with 40 CFR 761.40.)

3. Provide the appropriate "Large PCB Marking" or "Small PCB Marking" (ML or MS per 40 CFR 761) as shown below, of sufficient size to be clearly legible, for display on waste containers (bags, boxes, roll-offs or drums) which will be used to contain or transport PCB contaminated material, in accordance with 40 CFR 761. In addition, U.S. DOT 49 CFR Parts 171 and 172 requires the name and UN number of the material to be on the bags or drums, and, if shipped in bulk (rolloffs, Gaylord boxes, etc.), the bulk container must also be labeled: "Polychlorinated biphenyl, solid mixture UN 3432".

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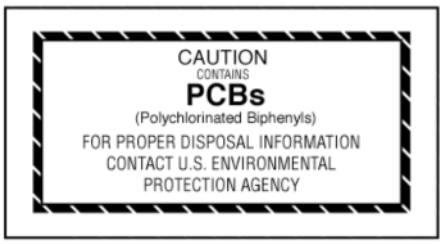

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Also provide the following label on each container to comply with Massachusetts Laws and Regulations for Hazardous Wastes.

> **HAZARDOUS WASTE--Federal Law Prohibits Improper Disposal.** If found, contact the nearest police or public safety authority, or the U.S. Environmental Protection Agency.
> Generator's Name and Address_____
> Generator's EPA Identification Number_____
> Manifest Tracking Number _____

D. Transportation and Disposal of PCB Containing Material

1. Remove Hazardous Waste generated as part of the PCB abatement from the Site within 7 calendar days after completion of PCB abatement Work.

2. Manage PCB waste generated as PCB waste greater than or equal to 50 ppm which is regulated under the Toxic Substances Control Act (TSCA) and classified as a Hazardous Waste subject to transportation under a Uniform Hazardous Waste Manifest.

3. Provide that PCB waste is managed for disposal at a facility permitted to accept hazardous PCB waste greater than or equal to 50 ppm, such as a chemical waste or a RCRA Hazardous Waste (Subtitle C) landfill or equivalent facility. Provide a certified PCB inspector and a legally permitted Hazardous Waste hauler.

4. Provide written notice to Hazardous Waste disposal facility 15 days prior to the first shipment of the Hazardous Waste stream that the Hazardous Waste contains PCBs greater than 50 ppm, in accordance with 40 CFR 761.62. Obtain acknowledgement from the Hazardous Waste disposal facility with representative's signature, printed name and title and submit to Owner and Engineer.

5. Provide 24-hour advance notice to Engineer prior to removing any Hazardous Waste from the Site. Remove Hazardous Waste the Site only during normal working only when Contractor and Engineer are present, and when Engineer authorizes the release of the Hazardous Waste.

6. Upon arrival at the Project Site, the Hazardous Waste hauler must possess and present to the Engineer a valid Hazardous Waste hauler's permit. The Engineer may verify the authenticity of the hauler's permit with the proper authority.

7. Perform inspection with Hazardous Waste hauler and Certified PCB Inspector of all material in the transport container prior to taking possession and signing the Hazardous Waste Manifests.

8. Do not permit any off-Site transfers of Hazardous Waste or allow the Hazardous Waste to be transported or combined with any other off-Site Hazardous Waste unless specifically approved by the Owner. Ensure Hazardous Waste hauler travels directly to the Hazardous Waste disposal Site as identified on the manifest with no unauthorized stops.

E. Decontamination and Cleaning After PCB Abatement

1. When PCB abatement is complete and verified by Engineer, perform decontamination by vacuuming (with a HEPA filter), wet wiping/mopping and a repeated vacuuming (with a HEPA filter) of the entire PCB Work Area to provide that surfaces in and around the PCB Work Area are free of dust generated during the abatement Work.

2. Decontaminate tools and equipment before removal from the PCB Work Area.

3. Thoroughly decontaminate other areas of the building outside of the PCB Work Area if dust or debris has migrated to other areas to ensure visible dust generated by the PCB abatement is eliminated.

4. Remove dust barriers and other protective sheeting. Place in disposable construction bags and dispose of as PCB waste greater than or equal to 50 ppm with the caulking and building material Hazardous Waste stream.

5. Visually inspect the PCB Work Area for any remaining dust or debris and vacuum (with HEPA filter) and wet wipe until clean.

6. Provide a certified PCB inspector to perform a final inspection upon completion of decontamination and removing temporary dust barriers. Clean or reclean areas identified by the certified PCB inspector as requiring further at no additional expense to the Owner.

3.06 LEAD CONTAINING PAINT REMOVAL/ABATEMENT

A. Preparation

1. Test representative building components prior to demolition of building structures and test selective waste streams prior to disposal.

2. Assume that any painted surface not tested contains lead paint.

3. Designate the areas for lead paint abatement as “Lead Paint Work Area”.

4. Use physical barriers where necessary, to limit access to the Work area for the duration of the demolition/lead paint abatement Work.

5. Post lead paint caution signs, warning signs and barrier tapes at all approaches to the Lead Paint Work Area. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the Lead Paint Work Area. Post emergency exits only on the Lead Paint Work Area side, post with lead paint caution signs on the non-Lead Paint Work Area side.

6. Erect isolation barriers as necessary to control exposure to lead-containing dust.

7. Provide authorized workers with suitable PPE whenever they enter the Lead Paint Work Area.

B. Minimum Requirements for Demolition Performed on Painted Components

1. Implement feasible engineering controls as described in the Lead Paint Work Plan and Lead Compliance Program to minimize the possibility of contamination of areas adjacent to the Lead Paint Work Area.

2. Inform workers of the components to be impacted during demolition that are identified as containing lead.

3. Clean up and properly containerize loose and flaking paint present on both interior and exterior surfaces prior to both demolition and or asbestos abatement activity.

4. Use demolition methods to eliminate dispersion of lead paint chips and debris to immediate area surrounding the Lead Paint Work Area. Clean up any lead paint chips and debris that should migrate to the surrounding area/ground during demolition.

5. Perform lead paint abatement if demolition activities (i.e. torch cutting, mechanical sanding or stripping or abrasive methods of paint removal) will directly impact any surface that lead based paint is present.

6. Do not perform demolition activities that increase the workers' exposure above the Action Level of 30 µg/m3. Comply with the OSHA lead standard 29 CFR 1926.62. See Air Samping and Personnel Monitoring.

7. Characterize debris containing lead generated from demolition activities to determine disposal requirements (construction debris or Hazardous Waste) by performing the toxicity characteristic leachate procedure (TCLP) or using other methods consistent with Laws and Regulations which accurately characterize the waste.

C. Lead Paint Abatement

1. Comply with the OSHA lead standard at 29 CFR 1926.62.

2. Prevent demolition or renovation activities that increase the workers' exposure above the Action Level of 30 $\mu g/m^3$

3. Inform workers of the components to be impacted during renovation or demolition that have been identified as containing lead.

4. Worker protection shall comply with the OSHA Lead Standard 29 CPR 1926.62 at a minimum.

5. Prevent unprotected, untrained workers or trades from performing any related Work within the same vicinity as Work involving components identified with lead until clean-up procedures are completed.

6. Provide hand washing facilities and assure that all workers thoroughly wash their hands and face upon exiting Lead Paint Work Areas.

7. Initiate and continue sufficient engineering and Work practice controls, as described in the Lead Paint Work Plan and Lead Compliance Program, to reduce and maintain worker exposures to lead at or below the Action Level.

8. Maintain Lead Paint Work Area free of accumulated debris and paint chips of demolition involving lead.

9. Ensure workers pay careful attention to cleanse the hands and face when decontaminating (provide hygiene facilities, including shower, as required based on initial assessment and continued monitoring);

10. Thoroughly wet the areas to be demolished and mist the air to reduce the potential for creating airborne lead and dust;

11. Ensure that equipment used by the Workers is either left inside the Lead Paint Work Area or thoroughly decontaminated before being removed from the Lead Paint Work Area. Ensure extra Work clothing (in addition to the disposable suits supplied by the Contractor) are left in the clean area until the completion of Work in the Lead Paint Work Area .

12. Clean the clean area of visible debris and disposable materials daily.

13. Do not permit workers or supervisory personnel to eat, drink, smoke, chew gum, or chew tobacco in the Lead Paint Work Area under any circumstance, otherwise demolition operations shall be stopped by Engineer.

14. Only allow workers or supervisory personnel to remove their protective respirators, if applicable, while in the Lead Paint Work Area in the case of life threatening emergency. In this situation, respirators are to be removed for as short a duration as possible.

D. Air Sampling and Personnel Monitoring

1. Perform personnel air sampling during demolition/lead paint abatement Work to determine worker exposure limits. Post results of such sampling, provide to individual workers and submit to Engineer.

2. Provide sampling to check personnel exposure levels. Take representative sampling for the duration of the Work shift or for 8 hours, whichever is less. Personnel samples need not be taken for repeated working conditions if working conditions remain unchanged, but must be taken every time there is a change in the abatement/removal operation, either in terms of the location or the type of Work.

3. Use sampling to determine 8-hour Time-Weighted-Averages (TWA).

4. Conduct personnel sampling as outlined in OSHA Standard 29 CFR 1926.62.

5. Transmit air sampling results to the Engineer and individual workers available at the Site in written form no more than 48 hours after the completion of a sampling cycle. List each sample's result, sampling time and date, personnel monitored and their social security numbers, flow rate, sample duration, sample yield, cassette size, and analyst's name and company, and include an interpretation of the results. Report air sample analysis results in micrograms/cubic meter (µg/m3).

6. Establish air monitoring frequency in accordance with the requirements set forth in 29 CFR 1926.62.

E. Comply with Laws and Regulations applicable to lead waste and recyclable storage.

1. Location of Hazardous Waste and recycling containers on Site shall be subject to Owner and Engineer's approval.

2. Manage waste from demolition and lead paint abatement that is regulated under the TSCA and classified as a Hazardous Waste subject to transportation under a Uniform Hazardous Waste Manifest.

F. Legally dispose of Hazardous Waste determined to be coated with lead-based paint, performing testing and other requirements imposed by the disposal facility. Comply with the requirements of RCRA and applicable Laws and Regulations.

3.07 CLEAN UP

A. Maintain the various Hazardous Waste Work Sites in a neat and orderly manner at all times, so as not to interrupt or infringe upon the Work of other trades.

B. Comply with all requirements for release of various Hazardous Waste Work Sites.

3.08 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 02 82 33

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIAL

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Minimum requirements for the disturbance, removal, containment, and disposal of asbestos containing material (ACM) at the Stackpole Street Pump Station and Raw Water Pump Station (if authorized), by a duly licensed asbestos abatement contractor in accordance with this Section, Laws and Regulations, and applicable reference standards listed in Article 1.03.

2. Work includes, but is not limited to, equipment and material, storage, transportation, signs, preparation, and temporary facilities required to safely remove and dispose of ACM on Site.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

B. Conduct Work of this Section at the Raw Water Pump Station only after issuance of Change Order.

1.03 REFERENCES

A. U.S. EPA Regulation 40 CFR Part 61 National Emission Standards for Hazardous Air Pollutants (NESHAP) Paragraph 61.145, Standard for Demolition and Renovation, and Part 763, Asbestos

B. U.S. Department of Labor; Occupational Safety and Health Act of 1970 (Particular attention is drawn to the Asbestos Regulations of 29 CFR, Part 1926.1001 General Industry Standard for Asbestos, Part 1910.134 Respirator Regulations, and Part 1910.1200 Hazard Communication Program)

C. U.S. Department of Transportation regulations, 49 CFR Parts 171-181; Hazardous Materials Regulations

D. Commonwealth of Massachusetts

1. 453 CMR 6.00, Current Asbestos Regulations
2. MGL Chapter 149, Sections 6A-6G

3. MGL Chapter 21E, Massachusetts Oil and Hazardous Material Release Prevention and Response Act

E. Massachusetts Department of Environmental Protection (MA DEP)

1. 310 CMR 7.00, 7.09, 7.15, 19.00, 22.00, 30.00, 33.00, 40.00 and all related amendments and policy statements

D.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

1. Qualification Statement of licensed asbestos abatement contractor

2. Provide that 2 copies of the following are submitted by the asbestos abatement contractor at the Pre-Construction Conference.

a. Notifications, permits, applications, licenses, and like documents required Laws and Regulations

b. Copies of medical records as required by OSHA or a notarized statement by examining medical doctor that such examinations have taken place, and when, for each worker involved in ACM abatement

c. Record of successful respiratory fit test performed by a Competent Person as defined by OSHA, within the previous 6 months, for each worker involved in ACM abatement

d. Copies of current DOS license for asbestos abatement contractor, each supervisor, and each worker involved in ACM abatement

e. Separate certificate of insurance from asbestos abatement contractor naming Contractor, Owner and Engineer as additional insureds

f. Proposed respiratory program for workers throughout all phases of the abatement Work, including make, model, and NIOSH approval numbers of respirators to be used

g. Written description of procedures, methods, or equipment proposed to be utilized by asbestos abatement contractor that differ from the Specification, including manufacturers' specifications for any equipment not specified for use in the Specification

h. Proposed electrical safeguards to be implemented, including but not limited to location of transformers, GFCI outlets, lighting, etc., necessary to safely perform the abatement Work, including a description of an electrical hazards safety plan for common practices in the abatement Work area

i. List of equipment to be used on Site, by make and model, including generator, negative air pressure equipment, HEPA vacuums, water atomizing devices, etc.

j. Chain of command of responsibility at the Site, including supervisors, foremen, and competent person, and contact information

k. Proposed emergency plan and route of egress from abatement Work areas in the event of fire or injury, including the name and telephone number of nearest medical assistance center

l. Asbestos abatement contractor's testing laboratory, NIOSH PAT proficiency testing results, and certification in the location of the Project

m. Safety Data Sheets on encapsulants, sealers, and any other potentially hazardous materials

n. Name and address of waste management hauler and disposal site

3. Provide that the following are submitted by the asbestos abatement contractor prior to submittal the final Application for Payment.

a. Waste disposal receipts acknowledging legal disposal of waste material from the Project, indicating delivery date, quantity, and appropriate signature of disposal site's authorized representative

b. Copy of the daily entry-exit log book

c. Personnel monitoring and final clearance results as required by OSHA or EPA or this Section

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Obtain the services of a duly licensed asbestos abatement contractor to identify and safely remove ACM prior to demolition of building structures and components that may be disturbed per statutory requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Protection

1. Provide for protection of workers performing Work in vicinity of ACM and the public and the environment from exposure.

C. Obtain the services of a duly licensed or certified waste management hauler and disposal site in accordance with Laws and Regulations.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1. Refer to Hazardous Building Materials Inspection Report.

2. Common materials that may contain asbestos include thermal insulation on boilers, ducts and pipes, vinyl floor tiles, ceiling tiles, various mastics (i.e. glues), and asbestos cement products, including asbestos cement pipes. Some of these materials are "friable", meaning the material can easily be crumbled under hand pressure and release asbestos fibers (e.g., insulation) and some are "non-friable", meaning the material cannot easily be crumbled and cannot easily release asbestos fibers (e.g., vinyl floor tiles and asbestos cement pipes that are in good condition and have not deteriorated).

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 ABATEMENT WORK

A. Provide that abatement of ACM is performed by a duly licensed asbestos abatement contractor in accordance with Laws and Regulations.

B. Remove ACM prior to demolition or renovation activities, wetting the materials prior to removal to prevent asbestos dust, fully containing the Work area (e.g., with plastic sheeting) and drawing air out of the containment through a specially made air filtration unit with HEPA filter capable of capturing asbestos fibers, sealing the wetted asbestos-containing waste material (ACWM) in leak-tight containers with asbestos labeling, and properly disposing of the waste in a permitted landfill or disposal site.

END OF SECTION

SECTION 02 82 35

ASBESTOS CEMENT PIPE REMOVAL AND DISPOSAL

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Removal and legal disposal of asbestos cement (AC) pipe encountered by a licensed asbestos abatement contractor in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. U.S. EPA Regulation 40 CFR Part 61 National Emission Standards for Hazardous Air Pollutants (NESHAP) Paragraph 61.145, Standard for Demolition and Renovation, and Part 763, Asbestos

2. U.S. Department of Labor; Occupational Safety and Health Act of 1970 (Particular attention is drawn to the Asbestos Regulations of 29 CFR, Part 1926.1001 General Industry Standard for Asbestos, Part 1910.134 Respirator Regulations, and Part 1910.1200 Hazard Communication Program)

3. U.S. Department of Transportation regulations, 49 CFR Parts 171-181; Hazardous Materials Regulations

4. Commonwealth of Massachusetts

   a. 453 CMR 6.00, Current Asbestos Regulations

   b. MGL Chapter 149, Sections 6A-6G

   c. MGL Chapter 21E, Massachusetts Oil and Hazardous Material Release Prevention and Response Act

5. Massachusetts Department of Environmental Protection (MA DEP)

   a. 310 CMR 7.00, 7.09, 7.15, 19.00, 22.00, 33.00, 40.00 and all related amendments and policy statements

   b. Asbestos Cement Pipe Guidance Documents (June 2011)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Submit Asbestos Notification Form, ANF-001 10 working days prior to beginning abatement activities to Owner and:

The Commonwealth of Massachusetts, Asbestos Program
PO Box 120087
Boston, MA 02112-0087

C. Asbestos Work Plan prior to commencement of removal of AC pipe including the following:

1. Notification procedures when asbestos concrete pipe is encountered

2. Worker training, certifications, personal protective equipment, and monitoring

3. Sequence of work and operating procedures for the excavation, removal, handling, storage and disposal of asbestos concrete pipe

4. Description of containment systems

5. Emergency response procedures

6. Name, location and certification of proposed disposal location

D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Qualifications: per statutory requirements for licensed asbestos works.

C. Regulatory approvals: per statutory requirements and Department of Environmental Protection.

1.07 SITE CONDITIONS

A. Per Division 01 General Requirements and as shown on the Drawings.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

A. Provide that Work is performed by and under the direction of an asbestos abatement Subcontractor duly licensed per Laws and Regulations.

B. Provide that exposed asbestos cement pipe is handled in accordance with Laws and Regulations.

C. Provide that personnel handling AC pipe are trained and certified. Provide personal protective equipment to handle such material per Laws and Regulations.

D. Legally dispose of AC pipe per Laws and Regulations.

3.02 ATTACHMENTS

A. MA-DEP Asbestos Cement Pipe Guidance Documents (June 2011)

END OF SECTION

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Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

RICHARD K. SULLIVAN JR.
Secretary

KENNETH L. KIMMELL
Commissioner

ASBESTOS CEMENT PIPE GUIDANCE DOCUMENT
June 2011

I. Background

The Massachusetts Department of Environmental Protection's (MassDEP's) asbestos regulation (310 CMR 7.15) protects public health and the environment by establishing safe handling practices for demolishing or renovating buildings and structures to prevent the release of asbestos fibers from asbestos-containing building materials. MassDEP's regulations require notification as well as specific removal, handling, and disposal requirements for all asbestos-containing material (ACM). Work practices include removing ACM prior to demolition or renovation activities, wetting the materials prior to removal to prevent asbestos dust, fully containing the work area (e.g., with plastic sheeting) and drawing air out of the containment through a specially made air filtration unit with HEPA filter capable of capturing asbestos fibers, sealing the wetted asbestos-containing waste material (ACWM) in leak-tight containers with asbestos labeling, and properly disposing of the waste in a permitted landfill.

Common materials that may contain asbestos include thermal insulation on boilers, ducts and pipes, vinyl floor tiles, ceiling tiles, various mastics (i.e. glues), and asbestos cement products, including asbestos cement pipes. Some of these materials are "friable", meaning the material can easily be crumbled under hand pressure and release asbestos fibers (e.g., insulation) and some are "non-friable", meaning the material cannot easily be crumbled and cannot easily release asbestos fibers (e.g., vinyl floor tiles and asbestos cement pipes that are in good condition and have not deteriorated). MassDEP regulates non-friable ACM because if these materials have deteriorated, are significantly damaged, and/or are mishandled, asbestos fibers may be released to the ambient air.

This guidance document[1] and attached "Frequently Asked Questions" section explains how to safely remove and dispose of asbestos cement pipes in compliance with the MassDEP asbestos regulations. Asbestos cement pipes often are found in underground utility conduits, and municipal water, sewer and drainage systems. Asbestos cement pipes

[1] This document is intended solely as guidance for the removal and disposal of asbestos cement pipes. This guidance does not constitute final agency action, and is not "regulation" as that term is used in M.G.L. c. 30A. This guidance document may not be relied upon to create rights, duties, obligations or defenses, implied or otherwise, enforceable by any party in any administrative proceeding with the Commonwealth.

buried below ground surfaces are considered non-friable if they are in good condition. This guidance document describes how to safely remove asbestos cement pipes without containing the work area or using air cleaning. If the asbestos removal methods prescribed by this guidance document are not followed then the requirements for containment and air cleaning must be adhered to in accordance with all applicable federal, state and local regulations. It should be noted, that active asbestos cement pipe that is exposed and is not intended to be replaced or removed and is not disturbed by repair or replacement activities may remain in place and backfilled.

II. Guidance Provisions

a. Notification

A notification must be submitted to MassDEP on an Asbestos Notification Form ANF-001 at least 10 working days prior to the commencement of asbestos cement pipe removal [see 310 CMR 7.15(1)(b)]. It is a violation of MassDEP's regulations to remove any asbestos cement pipe prior to the end of the 10 working day waiting period, unless an emergency waiver number is obtained from MassDEP. A person(s) properly trained in accordance with Mass DOS regulations at 453 CMR 6.00 and OSHA regulations, can perform the work right away if you call your regional MassDEP office to obtain an emergency waiver of the ten (10) working day notification period (see response to question number 26 in the "Frequently Asked Questions" section of this guidance document for appropriate MassDEP regional telephone numbers). The ANF-001 is available on MassDEP's web site at: http://www.mass.gov/dep/air/approvals/anf001.pdf. The easiest way to file an asbestos notification is to file it online via MassDEP's website. For additional information about online filing, go to: http://www.mass.gov/dep/service/compliance/edeponlf.htm. You can also call 617-292-5638 for additional information about online filing. More detailed information on notifications is provided in the "Frequently Asked Questions" section of this guidance document.

A notification fee, currently $85.00, is required when filing an ANF-001. However, cities, towns, counties, districts of the Commonwealth, municipal housing authorities, other state agencies and owner-occupied residential properties with four or fewer units are fee exempt and do **not** have to pay the asbestos notification fee.

b. Licensing and Training

Massachusetts Division of Occupational Safety's regulations at 453 CMR 6.00 contain the:

i. Standards of competency for persons or entities engaged in or performing removal, enclosure or encapsulation of asbestos or asbestos-containing material.

ii. Standards for the licensure of persons, firms, corporations or other entities who or which enter into, engage in or work at the business of

removal, enclosure or encapsulation of asbestos or asbestos-containing material, and for the certification of asbestos workers, supervisors, consultants, providers of asbestos analytical services, and others performing asbestos work.

iii. Standards for the certification of entities engaged in the business of training others, where such training is a condition of licensure or certification.

Please contact the Massachusetts Division of Occupational Safety for **all** licensing and training questions. The following is contact information for Massachusetts Division of Occupational Safety's Asbestos Program:

Massachusetts Division of Occupational Safety
Charles Hurley Building
19 Staniford Street, 2nd Floor
Boston, MA 02114
Telephone: 617-626-6960
Fax: 617-626-6965
Web Site: www.mass.gov/dos

c. Personal Protection

It is recommended that private sector employees engaged in work operations involving asbestos cement pipe be provided with the medical monitoring and personal protective equipment specified in the OSHA Construction Standard for Asbestos, 29 CFR Part 1926.1101. Employees of the Commonwealth or any of its political subdivisions will be provided with the medical monitoring and personal protection specified in the USEPA Worker Protection Rule, 40 CFR Part 763, Subpart G and 453 CMR 6.15.

d. Handling Practices

Expose the asbestos cement pipe without disturbing the pipe. Excavate no closer than 6 inches of the pipe. Carefully uncover the remainder of the pipe by hand or with a shovel. An assessment should then be made to determine if the pipe is damaged, cracked or broken.

i. Not Damaged (intact and not deteriorated):

1. Place 6 mil (0.006 inch) thick polyethylene ("poly") sheeting under the asbestos cement pipe to prevent soil contamination.
2. Adequately wet the asbestos cement pipe with amended water using surfactant or liquid soap before and during removal to avoid creating airborne dust.
3. Remove the asbestos cement pipe to the nearest coupling (bell or compression fitting).
4. Slide the pipe apart at the joints (no saw cutting) or use other methods that do not cause the pipe to become friable or release asbestos fibers.
5. Wrap the wet asbestos cement pipe in two layers of 6 mil polyethylene sheeting, seal with duct tape and label in

accordance with OSHA requirements[2]. This can be done in the trench or adjacent to the trench.

6. Refer to Section e for packaging, labeling and disposal requirements.

ii. Damaged (not intact, deteriorated, or when saw cutting and/or tapping is necessary)

1. Place 6 mil (0.006 inch) thick polyethylene ("poly") sheeting under the asbestos cement pipe to prevent soil contamination.
2. Adequately wet asbestos cement pipe with amended water where cutting or breaking will occur.
3. Saw cutting of asbestos cement pipe shall only be conducted within a "mini-containment" in accordance with 310 CMR 7.15 and DOS regulations at 453 CMR 6.00 unless such activity is conducted using HEPA exhausted, shrouded cutting equipment.
4. Wrap wet asbestos cement pipe in two layers of 6 mil polyethylene sheeting, seal with duct tape and label. This can be done either in the trench or adjacent to the trench.
5. Manage wrapped asbestos cement pipe, polyethylene sheeting and any other material contaminated with visible asbestos debris as ACWM in accordance with 310 CMR 7.15 and 310 CMR 19.061.
6. Refer to Section e for packaging, labeling and disposal requirements.

e. Packaging, Labeling, and Disposal

All asbestos containing waste material (ACWM) must be packaged, labeled and disposed of in accordance with 310 CMR 7.15 and 310 CMR 19.061.

i. Properly wrapped and labeled ACWM pipe as well as all other containerized ACWM and debris must be placed in a roll-off container(s), or covered trucks, trailers or vans that are lined with 2 layers of 6 mil polyethylene sheeting.

1. The container should be an enclosed leak-tight container and locked having proper labels and Department of Transportation (DOT) placards as required.
2. If open top roll-off containers are used, they must be properly sealed, labeled and secured inside a locked fenced area to prevent access by unauthorized personnel and covered to prevent water accumulation.

ii. Package, transport and dispose of ACWM in accordance with local, state, and federal regulations.

iii. Complete waste shipment records must be retained by the owner, municipality or contractor for 2 years.

iv. Dispose of ACWM at a landfill permitted to accept ACWM.

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[2] Here and throughout this Guidance Document, "label", "properly labeled" or "labeled" means in accordance with MassDEP's Asbestos Regulations at 310 CMR 7.15, EPA's Asbestos NESHAP 40 CFR Part 61, Subpart M, and OSHA Asbestos Standard at 29 CFR 1910.1001 and 29 CFR 1926.1101.

FREQUENTLY ASKED QUESTIONS ABOUT ASBESTOS CEMENT PIPE REMOVAL

1. **What is Asbestos? Is it hazardous to your health?**
Asbestos is a naturally occurring fibrous mineral consisting of any one of a number of silicates. Asbestos has been and is still used in a variety of products because of its physical properties, which make it resistant to heat, fire, and many caustic chemicals. Asbestos has been used extensively as fireproofing, an insulating agent, and for decorative purposes, among many other uses.

   The physical properties that give asbestos its resistance to heat and decay are linked with several adverse human effects. Asbestos tends to break into a dust of microscopic fibers. Because of their size and shape, these tiny fibers can remain suspended in the air for long periods of time and can easily penetrate bodily tissue when inhaled or ingested. Because of their durability, these fibers can remain in the body for many years.

   Asbestos is known to cause asbestosis and various forms of cancer. **Asbestosis** is a chronic disease of the lungs that makes breathing progressively more difficult, and can lead to death. Cancer can result from breathing asbestos fibers and **lung cancer** is the most frequent. **Mesothelioma**, an incurable cancer of the chest and abdominal membranes, almost never occurs without exposure to asbestos. Asbestos-related diseases have a long latency period and may not show up until 10 to 40 years after exposure. Each exposure increases the likelihood of developing an asbestos-related disease.

2. **How do I know whether cement pipes contain asbestos?**
Cement pipes used for public drinking water, waste water, roof drains or underground conduits may contain asbestos and should be handled in accordance with MassDEP's asbestos regulations and this guidance document if suspected or are confirmed to contain asbestos. It is the obligation of anyone removing materials that contain asbestos to handle them in accordance with applicable laws and regulations. Ignorance or avoidance of this responsibility does not remove this obligation.

   If you want to be certain whether cement pipes do or do not contain asbestos, you can have the cement pipes tested by a certified laboratory. Material that contains 1% or more asbestos as determined by a laboratory using USEPA approved methods is regulated asbestos-containing material. You can hire an asbestos consultant or laboratory to collect a sample and have it analyzed. You also may collect the sample yourself and bring it to a certified laboratory for analysis. Prior to collecting samples, consult with the laboratory on how to safely collect the sample and how large the sample needs to be. The Massachusetts Division of Occupational Safety (DOS) licenses and certifies asbestos testing laboratories and other types of asbestos professionals. Visit DOS's website at www.mass.gov/dos or call DOS at 617-626-6960 for a list of licensed asbestos laboratories.

3. **Does MassDEP have to be notified prior to beginning an asbestos cement pipe removal project?**
   Yes, except in cases of emergency situations (see Question number 4), MassDEP must be notified prior to removing asbestos cement pipes. Notification is required no matter who is doing the removal or how much asbestos cement pipe is being removed.

4. **We have an emergency and the pipe(s) need to be repaired immediately. Can we make the necessary repairs prior to submitting notification to MassDEP?**
   Yes, this would be allowed through MassDEP's "emergency waiver process". A person(s) properly trained in accordance with Mass DOS regulations at 453 CMR 6.00 and OSHA regulations, can perform the work right away if you call your regional MassDEP office to obtain an emergency waiver of the ten (10) working day notification period (see response to question number 26 for appropriate MassDEP regional telephone numbers). Please contact MassDOS to determine what training requirements may be required.

   If the emergency occurs after hours or on a weekend, leave a detailed message including your contact information on voice mail for the MassDEP inspector and proceed with the repairs as detailed in this document. You can then follow-up with MassDEP on the following business day. You will still be required to submit an asbestos notification form ANF-001 within 24 hours of the removal.

   In addition you can also conduct the work without the required 10 working day notification period if you have a MassDEP approved asbestos blanket notification. Information regarding asbestos blanket notifications may be found under the heading "BWP AQ 05 - Application for Asbestos Blanket - Form and Guidance" at the following link: www.mass.gov/dep/air/approvals/aqforms.htm#asbestos.

5. **Is there a notification form I should use?**
   Notification for asbestos removal must be made by completing and submitting to MassDEP the MassDEP approved Asbestos Notification Form ANF-001 (also known as BWP AQ-04). The Asbestos Notification Form is available on MassDEP's web site at www.mass.gov/dep/air/approvals/aqforms.htm#asbestos. The easiest way to file an asbestos notification is to file it online via MassDEP's website. See question number 10 below.

6. **When must the notification be submitted?**
   The regulations require that the notification must be submitted at least 10 working days in advance of the start of the removal project. "Working days" do not include Saturdays, Sundays or any day that MassDEP offices are closed for business, such as legal holidays.

7. **When does the 10 working day waiting period begin and end?**
   The 10 working day waiting period begins on the day you file an asbestos notification online (and receive confirmation of electronic submittal) or on the day MassDEP

receives an original paper hardcopy asbestos notification (ANF-001) at the MassDEP Boston office located at One Winter Street.

8. **Will I be notified when I can begin the work?**
No. Unless MassDEP contacts you with a statement of deficiencies about your notification, you can begin work on the "project start date" you specified on the Asbestos Notification Form ANF-001. When completing the ANF-001, be sure that the "project start date" falls after the 10 working day waiting period.

MassDEP recommends that you keep a copy of the completed ANF-001 that you file online or, if you file a paper copy, a copy that shows the number on the notification decal sticker you attached to the notification form prior to submitting the form to MassDEP.

9. **Is a fee required for filing an asbestos notification?**
MassDEP regulations (310 CMR 4.00, Timely Action and Fee Provisions) establish an $85 fee per asbestos notification filed. However, cities, towns, counties, districts of the Commonwealth, municipal housing authorities, other state agencies and owner-occupied residential properties with four or fewer units, are not subject to asbestos notification fees.

10. **How do I submit the ANF-001 to the MassDEP?**
To submit an Asbestos Notification Form ANF-001, do one of the following:

1. File the ANF-001 online at MassDEP's website. If you have not already done so, register online with eDEP at: www.mass.gov/dep/service/compliance/edeponlf.htm. It should take no more than five minutes to complete the registration process, and you can begin online filing of your notifications right away.

2. For paper filers, follow the mailing directions for the ANF-001 and mail the form (with attached notification decal[3]) to the specified post office box. Use either regular, certified or US Postal Service Express mail. Forms are picked up from the post office box every working day. Private delivery services cannot deliver to the Post Office box.

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[3] Fee decals may only be purchased in person at the reception area on the second floor of MassDEP's One Winter Street Boston Office. For fee-exempt asbestos removal jobs, EXEMPT notification decals may be picked up (free of charge) at the reception area of MassDEP's One Winter Street Boston Office or at any regional MassDEP office.

For decals requiring a payment, payment must be in the form of a check or money order made payable to "Commonwealth of Massachusetts." Cash and credit cards cannot be accepted.

Each notification decal contains a unique number that is used to track the notification. Forms without decals will not be accepted.

3. Hand deliver the ANF-001 (with attached notification decal) to the receptionist on the 2nd floor of MassDEP's Boston Office at One Winter Street, Boston, MA 02108.

11. Do I need to notify other government agencies in addition to the MassDEP?

You may be required to notify the local Building Department or Board of Health in the city or town where the asbestos is being removed. Always contact local officials to ask what notification or permits are required. Properly completing and submitting the ANF-001 to MassDEP satisfies state and federal notification requirements for this type of asbestos containing material.

12. Do I need to hire an asbestos contractor to repair and/or remove asbestos cement pipe?

Massachusetts Division of Occupational Safety's regulations at 453 CMR 6.00 contains the:

- **i.** Standards of competency for persons or entities engaged in or performing removal, enclosure or encapsulation of asbestos or asbestos-containing material.
- **ii.** Standards for the licensure of persons, firms, corporations or other entities who or which enter into, engage in or work at the business of removal, enclosure or encapsulation of asbestos or asbestos-containing material, and for the certification of asbestos workers, supervisors, consultants, providers of asbestos analytical services, and others performing asbestos work.
- **iii.** Standards for the certification of entities engaged in the business of training others, where such training is a condition of licensure or certification.

Please contact the Massachusetts Division of Occupational Safety for all licensing and training questions. The following is contact information for Massachusetts Division of Occupational Safety's Asbestos Program:

Massachusetts Division of Occupational Safety
Charles Hurley Building
19 Staniford Street, 2nd Floor
Boston, MA 02114
Telephone: 617-626-6960
Fax: 617-626-6965
Web Site: www.mass.gov/dos

13. Can I crush the asbestos cement pipe in the trench and place new pipe over it?

No, crushing of an ACM is prohibited under 310 CMR 7.15. Further, USEPA has determined that backfilling and burial of the crushed asbestos cement pipe would cause these locations to be considered active disposal sites and therefore subject to 40 CFR 61.154. Furthermore, if no additional asbestos-containing waste material is buried at the location for a year, the site would become an inactive waste disposal site subject to the requirements of 40 CFR 61.151(e) and 40 CFR 61.154(h).

Consequently, the owner of the land would be required to comply with the requirements for active and inactive waste disposal sites.

14. Can I "ream" or "pipe burst" new water supply pipe through existing asbestos cement pipe?

This is not allowed because reaming or pipe bursting through an existing asbestos cement pipe would cause the existing asbestos cement pipe to become crushed and "friable" (see response to question number 13 above).

15. What if the trench is filled with water and prevents the placement of polyethylene sheeting below the asbestos cement pipe (as required in Section IIc – Handling Practices)?

If the trench is filled with water, the placement of polyethylene sheeting as required in Section II.d – Handling Practices may be waived. However, any visible debris must be managed in accordance with Section II.e – Packing, Labeling and Disposal requirements.

16. What do we do with the water in the trench?

For work on the intact asbestos cement pipe(s) first try to pump the water out to a storm drain prior to any work. If there is substantial damage to the AC pipe and there are numerous pieces immersed in standing water then the contaminated water should be pumped out and filtered through a 5 micron filter before the water is discharged to a storm drain.

17. Am I required to remove asbestos cement pipe that will not be disturbed by repair or replacement activities?

MassDEP requires the removal of only asbestos cement pipe that is exposed and will be disturbed during repair or replacement activities.

When a section of asbestos cement pipe is being repaired or replaced the remaining portions of that pipeline are not required to be removed provided they are not exposed by excavation activity.

Additionally, if a section of asbestos cement pipe that is being actively used (e.g., an utility conduit) is exposed by excavation, but will not be impacted by the repair or replacement work, it may remain in left place and backfilled.

18. Where can I obtain the packaging and labeling materials?

The OSHA required asbestos warning labels and asbestos waste bags may be obtained from industrial supply houses, insulation supply houses, or may be purchased directly from licensed asbestos contractors. Polyethylene sheeting and duct tape are widely available from hardware, home supply and other stores.

19. Can I store asbestos cement pipe?

Temporary storage of asbestos cement pipe waste material that has been properly wetted, sealed and labeled shall not be stored for more than thirty (30) days.

Temporary storage of asbestos cement pipe waste material is permitted for up to thirty (30) days at a secured location within the district where the asbestos cement pipe was removed. The storage location shall be secured (e.g. locked fenced area) and maintained in accordance with all federal, state and local requirements. Contact local officials to determine if temporary storage of asbestos cement pipes is allowed in your municipality.

Virgin asbestos cement pipe is not considered an asbestos-containing waste material. As such virgin asbestos cement pipe is not subject to these temporary storage limitations. Measures should be taken to ensure that virgin asbestos cement pipe does not become deteriorated by constant exposure to the elements. Should asbestos cement pipe become deteriorated and not suitable for use, then it would be considered asbestos-containing waste material and subject to all the applicable packaging, labeling, storage and disposal requirements.

20. Can I dispose of the asbestos cement pipes with my other solid waste?

No. The asbestos cement pipes must be handled as a special waste (requiring proper packaging, labeling, and disposal) and may only be taken to a facility that is permitted to accept asbestos-containing waste material (ACWM).

21. How can I find a place to dispose of the asbestos cement pipes?

The best option is to hire a waste hauler or asbestos contractor to transport the asbestos cement pipes to a disposal facility. Many waste haulers and asbestos contractors are familiar with various disposal facilities and frequently transport wastes to out-of-state facilities permitted to accept ACWM.

You also can contact a landfill directly and arrange to transport the waste to the landfill yourself. As of the issuance date of this document, Northampton Landfill is the only landfill in Massachusetts that accepts ACWM and it does so on a case by case basis.

ACWM may not be sent to an incinerator or to a construction and demolition debris processing facility. As of the issuance date of this document, there are no Massachusetts transfer stations permitted to accept ACWM.

22. How do I find an asbestos waste hauler or asbestos contractor?

The Division of Occupational Safety (DOS) issues licenses to asbestos contractors and can provide you with a list of asbestos contractors having a valid license. Visit DOS's website at www.mass.gov/dos and click on "Asbestos Program" or call DOS at 617-626-6960. Asbestos waste haulers may be located in the Yellow Pages. Try looking under topics such as "Rubbish" or "asbestos." Any firm hauling ACWM must be registered with the Federal Highway Administration's Motor Carrier Division. Call the nearest regional MassDEP office for additional help.

23. Can I transport the asbestos cement pipes myself?

Waste that has been packaged and labeled in accordance with Section II.e. – Packaging, Labeling and Disposal, may be transported in a covered truck, trailer or van to **a secured location within the district where the asbestos cement pipe was removed for temporary storage as outlined in question 19.** If a van is used, the waste should be transported in a compartment separate from the driver or passenger seats. A pick up truck bed should be covered with an impermeable tarpaulin cover and secured so that it does not allow the accumulation of rain water. The waste containers should not be loaded above the side rails in any truck or trailer.

24. Is there any paperwork required for transporting the asbestos cement pipes?

Yes. The U.S. EPA's National Emission Standard for Hazardous Air Pollutants (NESHAP) for asbestos requires that a Waste Shipment Record (WSR) document all ACWM transport. Waste hauling companies and/or asbestos removal companies have these forms. The WSR must be signed by each company or person involved with removal, transportation and disposal of the ACWM, including the facility owner or "generator" of the asbestos. The asbestos removal contractor or persons conducting the AC pipe removal must ensure that a copy of the WSR is returned to the generator within 35 days of the date of the asbestos cement pipe removal. If the ACWM generator does not receive the WSR in that time then the generator should contact the transporter and the nearest MassDEP office. WSRs that the generator receives from the transporter should be maintained in your files for at least 2 years. Landfills also need to retain a copy of the WSR form for its records. The completed WSR is not required to be submitted to any regulatory agency but MassDEP may request a copy of the WSR from the owner of the asbestos containing waste material or the contractor who removed and disposed of it.

The U.S. Department of Transportation (DOT) requires that transporters of more than one pound of asbestos carry identification papers for all shipments. The state police enforce this requirement.

25. Does MassDEP have a document containing general information about asbestos?

Yes. "Asbestos Information and Resource Guide" is available on MassDEP's website at www.mass.gov/dep/air/asbguid.htm. The guide includes contact information for various government agencies responsible for asbestos, a list of regulations governing asbestos, and general information about asbestos and asbestos removal.

26. How do I contact MassDEP for more information?

For more information on asbestos or other environmental issues, please click on MassDEP's website at www.mass.gov/dep/about/contacts.htm or contact the following MassDEP officials:

Boston:
James McQuade – Asbestos Program Coordinator
Tel. 617-348-4095
E-mail: James.McQuade@state.ma.us

Central Region
Gregg Levins
Tel. 508-767-2768
E-mail: Gregory.Levins@state.ma.us

Northeast Region
John Macauley
Tel. 978-694-3262
E-mail: John.Macauley@state.ma.us

Southeast Region
Andrew Cooney
Tel. 508-946-2844
E-mail: Andrew.Cooney@state.ma.us

Western Region
Robert Shultz
Tel. 413-755-2210
E-mail: Robert.Shultz@state.ma.us

27. How do I contact Massachusetts DOS for more information?

For more information on Massachusetts DOS asbestos training, certification and/or licensing requirements, please contact:

Massachusetts Division of Occupational Safety
Charles Hurley Building
19 Staniford Street, 2nd Floor
Boston, MA 02114
Telephone: 617-626-6960
Fax: 617-626-6965
Web Site: www.mass.gov/dos

SAMPLE WASTE SHIPMENT RECORD

Generator	1. Work site name and mailing address	Owner's name	Owner's telephone no.
	2. Operator's name and address		Operator's telephone no.
	3. Waste disposal site (WDS) name, mailing address, and physical site location		WDS phone no.
	4. Name, and address of responsible agency		
	5. Description of materials	6. Containers No. Type	7. Total quantity m^3 (yd^3)
	8. Special handling instructions and additional information		
	9. OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations.		
	Printed/typed name & title	Signature	Month Day Year
Transporter	10. Transporter 1 (Acknowledgment of receipt of materials)		
	Printed/typed name & title Address and telephone no.	Signature	Month Day Year
	11. Transporter 2 (Acknowledgment of receipt of materials)		
	Printed/typed name & title Address and telephone no.	Signature	Month Day Year
Disposal Site	12. Discrepancy indication space		
	13. Waste disposal site owner or operator: Certification of receipt of asbestos materials covered by this manifest except as noted in item 12.		
	Printed/typed name & title	Signature	Month Day Year

(Continued)

Figure 4. Waste Shipment Record

INSTRUCTIONS

Waste Generator Section (Items 1-9)

1. Enter the name of the facility at which asbestos waste is generated and the address where the facility is located. In the appropriate spaces, also enter the name of the owner of the facility and the owner's phone number.

2. If a demolition or renovation, enter the name and address of the company and authorized agent responsible for performing the asbestos removal. In the appropriate spaces, also enter the phone number of the operator.

3. Enter the name, address, and physical site location of the waste disposal site (WDS) that will be receiving the asbestos materials. In the appropriate spaces, also enter the phone number of the WDS. Enter "on-site" if the waste will be disposed of on the generator's property.

4. Provide the name and address of the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program.

5. Indicate the types of asbestos waste materials generated. If from a demolition or renovation, indicate the amount of asbestos that is

   - Friable asbestos material
   - Nonfriable asbestos material

6. Enter the number of containers used to transport the asbestos materials listed in item 5. Also enter one of the following container codes used in transporting each type of asbestos material (specify any other type of container used if not listed below):

   DM - Metal drums, barrels
   DP - Plastic drums, barrels
   BA - 6 mil plastic bags or wrapping

7. Enter the quantities of each type of asbestos material removed in units of cubic meters (cubic yards).

8. Use this space to indicate special transportation, treatment, storage or disposal or Bill of Lading information. If an alternate waste disposal site is designated, note it here. Emergency response telephone numbers or similar information may be included here.

9. The authorized agent of the waste generator must read and then sign and date this certification. The date is the date of receipt by transporter.

NOTE: The waste generator must retain a copy of this form.

(continued)

Figure 4. Waste Shipment Record

Transporter Section (Items 10 & 11)

10. & 11. Enter name, address, and telephone number of each transporter used, if applicable. Print or type the full name and title of person accepting responsibility and acknowledging receipt of materials as listed on this waste shipment record for transport. Enter date of receipt and signature.

NOTE: The transporter must retain a copy of this form.

Disposal Site Section (Items 12 & 13)

12. The authorized representative of the WDS must note in this space any discrepancy between waste described on this manifest and waste actually received as well as any improperly enclosed or contained waste. Any rejected materials should be listed and destination of those materials provided. A site that converts asbestos-containing waste material to nonasbestos material is considered a WDS.

13. The signature (by hand) of the authorized WDS agent indicates acceptance and agreement with statements on this manifest except as noted in item 12. The date is the date of signature and receipt of shipment.

NOTE: The WDS must retain a completed copy of this form. The WDS must also send a completed copy to the operator listed in item 2.

Figure 4. Waste Shipment Record

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SECTION 03 01 05

CONCRETE REPAIR

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all labor, materials, tools and equipment necessary to repair new concrete areas when permitted by the Engineer and to fill form tie holes, both as per Section 03 35 00 -- Concrete Placing, Curing, And Finishing, and to repair deteriorated concrete areas as defined on the Drawings and in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 03 35 00 -- Concrete Placing, Curing, And Finishing

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. ASTM C78/C78M Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

2. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens)

3. ASTM C496/C496M - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens

4. ASTM C882/C882M - Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear

5. ASTM C884/C884M - Thermal Compatibility between Concrete and Epoxy-Resin Overlay

6. ASTM C1202 - Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration

7. ASTM G109 - Determining the Effects of Chemical Admixtures on the Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data and Manufacturer's Instructions

1. Trowel-grade polymer modified portland cement repair mortar.

2. Non-sag polymer modified portland cement repair mortar.

C. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Certifications

1. Provide a notarized certificate stating that the repair material meets the specified requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Deliver the specified product in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers.

C. Store and condition the specified product as recommended by the manufacturer.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.09 JOB CONDITION

A. Environmental Conditions

1. Do not apply material if it is raining or snowing or if it appears imminent.

B. Protection

1. Precautions should be taken to avoid damage to any surface near the Work zone due to mixing and handling of the specified repair material.

PART 2 – PRODUCTS

2.01 GENERAL

A. Acceptable level of quality: equivalent to SikaTop 122 Plus (trowel grade mortar) and SikaTop 123 Plus (non-sag mortar), as manufactured by Sika Corporation.

2.02 MORTAR PERFORMANCE CRITERIA

A. Mixed Properties

1. Application Time: Approximately 15 minutes.

2. Finishing Time: 20-60 minutes.

3. Color: concrete gray.

B. Cured Properties

1. Compressive Strength (ASTM C109/C109M)

a. 1 day: 3000 psi min.

b. 28 day: 7000 psi min.

2. Splitting Tensile Strength (ASTM C496/C496M) at 28 days: 750 psi min.

3. Flexural Strength (Modulus of Rupture) (ASTM C78/C78M) at 28 days: 2000 psi min.

4. Bond Strength (ASTM C882/C882M, modified) at 28 days: 2200 psi min.

5. Thermal Compatibility (ASTM C884/C884M, modified): passes test

6. Permeability (ASTM C1202) at 28 days: approximately 500 coulombs

7. Cracked Beam Corrosion Tests (ASTM G109, modified): reduced corrosion rates 63% versus control specimens.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION

A. Areas to be repaired shall be mechanically prepared, clean, sound and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Remove all dirt, oil, grease and all bond-inhibiting materials from the

surface. Except where tie holes are filled, saw cut perimeter 1/8-inch minimum when a neat mortar is to be applied, and 1 inch minimum when an extended mortar is to be applied. Prepare concrete substrate to obtain a minimum surface profile of 1/16-inch in depth with a new aggregate fractured surface. This shall be done by steel shotblasting, abrasive (sand) blasting, or waterjetting (hydrodemolition). Use of scabblers, bush hammers, or pneumatic hammers is not permitted. Be sure the area to be repaired is not less than 1/8-inch in depth. The substrate shall be saturated surface dry with no standing water.

B. Cracks in the substrate in the area of the patching or overlay Work shall be treated as directed by the Engineer.

3.02 MIXING AND APPLICATION

A. Mix and apply in strict accordance with, and adhere to all limitation and cautions within, the manufacturer's printed literature. The following describes the specific procedures applicable for the Sika products.

B. Trowel-Grade Polymer Mortar

1. Pour all of Component "A" into mixing container. Add all of the Component "B" while mixing. For extended mix, introduce 3/8 inch coarse aggregate at desired quantity. Mix to uniform consistency, maximum 3 minutes. Addition rate must not exceed 42 pounds per bag. The aggregate must be non-reactive, clean, well-graded, saturated surface dry, and have low absorption/high density.

2. Scrub mortar into the substrate, filling all pores and voids. Force material against edge of repair, working toward center. After filling repair, consolidate, then screed. Allow mortar or concrete to set to desired stiffness, and finish with wood or sponge float for a smooth surface. The minimum application thickness is 1/8 inch for a neat mortar, and 1 inch if extended. The maximum application thickness in a single lift is 1 inch for a neat mortar, and 3 inches if extended. Multiple lifts may be required in some areas of application. Where multiple lifts are required, the top surface of the preceding lift shall be scored to produce a roughened surface. The preceding lift shall be allowed to reach final set prior to applying the next lift.

C. Non-Sag Polymer Mortar:

1. Pour all of Component "A" into mixing container. Add all Component "B" while mixing. Mix to uniform consistency, maximum 3 minutes

2. Scrub mortar into the substrate, filling all pores and voids. Force material against edge of repair, working toward center. After filling repair, consolidate, then screed. Allow mortar or concrete to set to desired stiffness, and finish with wood or sponge float for a smooth surface. The

minimum application thickness is 1/8-inch. The maximum application thickness in a single lift is 1-1/2 inches. Multiple lifts may be required in some areas of application. Where multiple lifts are required, the top surface of the preceding lift shall be scored to produce a roughened surface. The preceding lift shall be allowed to reach final set, 30 minutes minimum, before applying the next lift.

D. Curing: Curing is required. Moist cure with wet burlap and polyethylene, a fine mist of water or a water-based compatible curing compound. Curing compounds adversely affect the adhesion of following layers of mortar. Do not use solvent-based curing compounds. Moist curing should commence immediately after finishing. Protect newly applied material from direct sunlight, wind, rain and frost.

E. Post-Repair Sounding: All repaired areas shall be hammer-sounded in the presence of the Engineer after curing period is complete. Any repaired areas which exhibit hollow sounds indicating delamination or disbonding of repair mortar from concrete substrate shall be removed and replaced until a successful, sound repair is achieved as approved by the Engineer.

3.03 CLEANING

A. Leave finished Work and Work area in a neat, clean condition without evidence of spillovers on adjacent areas.

3.04 MANUFACTURER'S FIELD SERVICES

A. Furnish the services of a competent field representative of the manufacturer as required by the Engineer. Provide that the field representative is present at the Work Site prior to commencement of application to instruct the Contractor, to demonstrate proper application and inspection procedures, and to inspect the finish of the prepared surfaces prior to application.

END OF SECTION

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SECTION 03 11 00

CONCRETE FORMING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all materials, tools, equipment and labor required for the design, preparation and cleaning, construction, and removal of all concrete formwork, and the installation of all concrete embedment's furnished under other sections, necessary for the proper completion of the Work in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. ACI 117 (2010) – Specifications for Tolerances for Concrete Construction and Materials and Commentary

2. ACI 301 (2010) – Specifications for Structural Concrete

3. U.S. Army Corps of Engineers – COE CRD-C 572 – Corps of Engineers Specifications for Polyvinylchloride Waterstops

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data and Manufacturer's Instructions

1. Form Ties

2. Form Release Agent

3. Waterstops, including details at all corners and intersections

C. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Design, erect, shore, brace and maintain formwork in accordance with ACI 301 to support all loads, including construction loads, until concrete structures can support such loads.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Deliver, store and install all materials so as not to degrade quality, serviceability and appearance.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General

1. Formwork shall conform dimensionally to the concrete Work as shown on the Drawings. To minimize the number of panel joints, formwork panels shall be of the largest practicable sizes. Formwork shall be sufficiently tight to prevent leakage.

2. Undamaged smooth form facing materials such as plywood, hardboard, metal and plastic, that will produce a smooth form finish, shall be used. Formwork shall not result in fins or offsets exceeding 1/8-inch. If used, aluminum forms with unoxidized surfaces shall be pretreated with a paste made of calcium hydroxide and water followed by water rinsing, repeated until hydrogen bubbles do not form.

B. Form Release Agent: Form release agent shall be non-grain-raising, non-staining, and shall not leave a residue on the concrete nor adversely affect bonding of materials to be applied thereto.

C. Form Ties:

1. Form ties shall be adjustable length, sized to withstand construction loads, and upon removal shall prevent concrete spalling.

2. The portion of the tie remaining embedded in the concrete upon removal shall be at least 1 1/2-inches from both concrete faces. The form tie

assembly shall be provided with cone-shaped depressions at the concrete surfaces of at least 1-inch diameter and 1 1/2-inches deep.

PART 3 – EXECUTION

3.01 CONSTRUCTION

A. Tolerances: Tolerances shall be in accordance with ACI 117.

B. Form Alignment: At locations where continuous surfaces are formed in successive units, forms shall be tightly fitted over the hardened concrete surface to obtain accurate surface alignment and to prevent leakage of mortar and the formation of fins, ridges, and other defects.

C. Chamfered Edges:

1. All exposed concrete corners shall be formed with beveled strips to provide 3/4-inch chamfers unless otherwise shown, specified, or directed by the Engineer.

2. Where concrete walls, columns, and beams abut masonry walls the chamfer shall be omitted.

3. Where masonry walls are flush with the face of supporting concrete curbs or walls, the chamfer shall be omitted.

4. Chamfering by grinding is prohibited.

D. Openings:

1. Form openings in concrete where required for other Work. Upon failing to form such openings, provide them in a manner approved by the Engineer at no additional cost to the Owner.

2. Provide 6-inch PVC waterstop at the perimeter of such openings required to be watertight.

3. Except as otherwise specified, all such openings shall be filled with concrete after the Work to be installed therein is complete.

E. Cleanouts and Access Panels:

1. Temporary openings shall be provided to facilitate cleaning and inspection prior to concrete placement, including at the bottom of wall forms. Cleanout openings are not permitted in exposed concrete (concrete exposed to view upon completion of the Work, whether or not it is painted) without the approval of the Engineer.

2. All refuse, sawdust, shavings, etc. shall be removed, and the forms broom-cleaned before concrete placement.

F. Form Release Agent:

1. Forms shall be coated with the approved form release agent before placement of reinforcement. Do not apply form release agent at locations of monolithic construction joints, which are construction joints with all reinforcement continuous through the joint. Excess agent applied to the forms, and any and all on the reinforcement and other surfaces requiring a concrete bond, shall be removed.

2. Forms for unexposed surfaces may be thoroughly wetted in lieu of the approved form release agent immediately before concrete is placed, however form release agent shall be used in freezing weather.

3.02 INSTALLATION OF EMBEDDED ITEMS

A. General:

1. Coordinate the setting of anchor bolts, inserts, wall pipe, sleeves, and other embedded items. Before placing concrete ensure that all items are accurately located and firmly secured against displacement.

2. All items shall be thoroughly cleaned and free of loose rust, mill scale, dirt, grease, etc.

B. Electrical Conduit: Electrical conduit may be embedded in concrete provided the following conditions are met. Conduit runs that cannot satisfy these conditions shall be run exposed.

1. Outside diameter of conduit shall not exceed 1/3 of concrete thickness.

2. Conduit shall not be placed closer than three diameters on center.

3. Conduit shall not significantly impair the strength of the construction.

4. Conduit shall not be embedded in structural concrete slabs less than 4-inches thick.

5. Only two conduits may cross at any point. The sum of the outside diameter of the crossing conduits shall not exceed 1/3 of the concrete thickness.

6. A 1 1/2-inch minimum concrete cover shall be provided for conduits in structural slabs.

7. Conduit shall not be located between bottom of reinforcement and bottom of slab.

8. Aluminum conduit shall not be embedded in concrete.

9. Conduit shall be installed such that cutting, bending, and/or displacement of reinforcement from its proper location is not necessary.

3.03 REMOVAL

A. Form Removal:

1. Forms shall be removed while ensuring the complete safety of the structure.

2. Newly unsupported portions of the structure shall not be subjected to heavy construction or material loading.

3. The Contractor shall be Responsible for the proper removal of forms and bracing.

4. Spalling of concrete surfaces shall be prevented.

5. When forms are removed before the specified curing period (as specified in SECTION 03 35 00 CONCRETE PLACING, CURING, AND FINISHING) is complete, measures shall be taken to continue curing and providing thermal protection for the concrete.

6. Forms may be removed when the cumulative time during which the temperature of the air surrounding the concrete is above 50 ^{o}F is 24 hours for walls and similar parts of the Work not supporting the weight of the concrete.

B. Tie Holes: Filling of form tie holes and concrete finishing are specified in SECTION 03 35 00, CONCRETE PLACING, CURING, AND FINISHING.

C. Cleaning and Repair of Forms: Parts of forms reserved for reuse shall be inspected, cleaned and repaired. Any and all parts dented, deformed or otherwise rendered unfit for reuse shall be discarded.

END OF SECTION

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SECTION 03 16 00

CONCRETE SPECIALTIES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all materials, tools, equipment, and labor necessary for the construction of concrete specialties as specified, as shown on the Drawings, and as necessary for the proper completion of the Work in accordance with this section and applicable reference standards listed in Article 1.03.

2. Concrete expansion and adhesive anchors are specified herein, but shall be provided and installed under each section that corresponds to the materials and equipment that is to be anchored.

B. Related Requirements

1. Section 03 30 00 Cast-In-Place Concrete

2. Section 03 30 20 Concrete Placing, Curing and Finishing

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Society for Testing and Materials (ASTM)

a. ASTM A1064/1064M Standard Specification Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

b. ASTM C1107/C1107M Standard Specification for Packed Dry, Hydraulic-Cement Grout (Non-shrink)

c. ASTM D4832 Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders

2. ICC Evaluation Service (ICC-ES)

a. ICC-ES AC58 Acceptance Criteria for Adhesive Anchors in Masonry Elements

b. ICC-ES AC308 Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements

3. American Concrete Institute (ACI)

a. ACI 355.2 Qualification of Post-Installed Mechanical Anchors in Concrete

b. ACI 355.4 Qualification of Post-Installed Adhesive Anchors in Concrete

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Non-Shrink Grout

2. Expansion Anchors

3. Epoxy Adhesive Anchors

a. ICC-ES AC58 report

b. ICC-ES AC308 report

c. Allowable and ultimate loads

d. Storage requirements

e. Gel and cure times as a function of temperature

f. Installation temperature requirements for cartridges and base material

g. Drilling method

h. Drill bit diameter and depth of hole for each size anchor

i. Hole cleaning procedure and required condition of hole

j. Requirements for discarding initial discharge to ensure proper mixing

k. Hole filling procedure

l. Time period when anchor cannot be contacted or otherwise disturbed

C. Certifications

1. ACI/CRSI Adhesive Anchor Installer Certification or equivalent as approved by the Engineer, for installation of adhesive anchors horizontally or upwardly inclined to resist sustained tension loads.

D. Shop Drawings

1. Reinforcement

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Qualifications: per Division 01 General Requirements for anchor installation and as follows.

1. Anchors shall be installed by qualified personnel trained to install adhesive anchors.

2. Adhesive anchors shall be installed in strict accordance with the Manufacturer's Printed Installation Instructions (MPII).

3. Each installer shall have the MPII in their possession at all times.

C. Adhesive Anchors

1. In structures assigned to Seismic Design Category C, D, E, or F as noted on the Drawings: qualified for earthquake loading (use in cracked concrete) in accordance with ACI 355.4.

2. Anchors installed horizontally or upwardly inclined: qualified in accordance with ACI 355.4 requirements for sensitivity to installation direction.

3. Installation of anchors horizontally or upwardly inclined to resist sustained tension loads: performed by personnel certified by an applicable certification program that includes written and performance tests in accordance with ACI/CRSI Adhesive Anchor Installer Certification program, or equivalent as approved by the Engineer.

D. Expansion Anchors

1. In structures assigned to Seismic Design Category C, D, E, or F as noted on the Drawings: qualified for earthquake loading (use in cracked concrete) in accordance with ACI 355.2.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GROUT

A. Grout shall be non-metallic, cementitious non-shrink grout meeting ASTM C1107/C1107M, grade C. Grout shall be Five Star Grout by U.S. Grout Company, Crystex or Premier by L&M Construction Chemicals, Inc., Sure-Grip High Performance Grout, by Dayton Superior, or approved equal.

2.02 EPOXY ADHESIVE ANCHORS

A. Approved for use in cracked concrete.

B. Epoxy adhesive for anchoring reinforcement to concrete shall be a 2-component solid epoxy based system supplied in manufacturer's standard side-by-side cartridge and dispensed through manufacturer's standard static-mixing nozzle. Epoxy adhesive shall be SET-XP or ET-HP by Simpson Strong Tie Co., Inc., HIT-RE 500-SD by Hilti, Inc., or approved equal.

C. Epoxy adhesive shall pass the creep test requirements of ICC-ES AC58.

D. The embedment depth shall be per the manufacturer's requirements and the ultimate strength exceeds the tensile strength of the bar, and the ultimate strength divided by a minimum factor of safety of 3.75 is at least 40 percent of the yield strength of the bar.

2.03 EXPANSION ANCHORS

A. Approved for use in cracked concrete: Hilti Kwik Bolt TZ, Hilti HSL, or approved equal.

B. For anchoring aluminum, all submerged locations, and as noted on the Drawings, AISI 316 stainless steel.

C. Where noted on the Drawings as galvanized: ASTM A123/A123M, Class C.

2.04 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 GROUTING

A. Grouting is required for structural, mechanical, and electrical items, and shall be in accordance with the manufacturer's recommendations.

B. Concrete surfaces to receive grout shall be cleaned of all contamination and debris. Surface roughening shall be required if laitance or poor concrete is evident.

C. Grout placement shall be rapid and continuous such that grout completely fills the space to be grouted, absent of air pockets.

D. Grout may be placed by gravity or pumped. When practical, grout shall be placed from one side and made to flow to the open side to prevent the formation of air pockets.

3.02 EXISTING CONCRETE

A. Where equipment pads are to be constructed, grouting is to be performed, and concrete fills are to be placed against existing concrete, the following surface preparation shall be required.

1. The existing concrete surface shall be cleaned of all contamination and debris, and roughened by steel shot blasting, abrasive sand blasting, or water jetting. Use of scabblers, scarifiers, bush hammers, and pneumatic hammers is not permitted.

2. The existing concrete surface shall be water-saturated for a minimum of 6 hours, after which the excess water shall be removed immediately prior to placement of new concrete or grout.

3. In areas where equipment pads are to be constructed and concrete fills are to be placed, apply epoxy-bonding compound (as specified in Section 03 35 00) to prepared concrete surface prior to concrete placement.

3.03 EPOXY ADHESIVE ANCHORS

A. Adhesive anchors shall be installed in concrete having a minimum age of 21 days at time of installation.

B. All cartridges shall have the expiration date clearly visible. Material past its expiration date shall not be used, and shall be immediately removed from the Site.

C. Embedded reinforcement shall be located with the proper equipment prior to drilling to ensure that each drilling location does not coincide with existing reinforcement. Drilling through reinforcement shall be prohibited.

D. Diamond drill bits are not permitted. Hammer drills shall be used.

E. The initial material extruded from each cartridge shall be discarded in accordance with the manufacturer's instructions to ensure that all material is properly mixed.

F. Depth stop shall be used to ensure correct drilling depth. Drilled holes shall be blown out with air, thoroughly wire brushed with a repeated back and forth movement, blown out, thoroughly wire brushed, and blown out again. Adhesive shall be injected, starting from the bottom of the hole and slowly withdrawn as filling progresses to prevent air pockets.

G. Anchored reinforcement shall remain completely undisturbed between the manufacturer's specified gel time and the full cure time. Zero load shall be applied during this time.

3.04 EXPANSION ANCHORS

A. Embedded reinforcement shall be located with the proper equipment prior to drilling to ensure that each drilling location does not coincide with existing reinforcement. Drilling through reinforcement is prohibited.

B. Diamond drill bits are not permitted. Hammer drills shall be used.

3.05 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Manufacturer's Field Services

1. Adhesive Anchors

a. Except where specified to be performed by personnel certified by an applicable program such as the ACI/CRSI Adhesive Anchor Installer Certification program or equivalent, as approved by the Engineer, the Contractor shall furnish the services of a competent manufacturer's field representative who shall be present at the Work Site prior to beginning installation in order to instruct the Contractor and the Engineer on proper installation and inspection procedures. Such instruction shall include a full and complete demonstration.

b. Installation of anchors horizontally or upwardly inclined to resist sustained tension loads shall be continuously inspected by the Engineer's special inspector approved for that purpose. The special inspector shall furnish a report to the Engineer that the Work covered by the report has been performed and that the materials and installation procedures conform to the Contract Documents and the Manufacturer's Printed Installation Instructions (MPII).

c. Proof loading: performed where required per ACI 355.4.

3.06 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 03 20 00

CONCRETE AND MASONRY REINFORCEMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all materials, tools, equipment, and labor necessary for the fabrication and installation of all reinforcement (except installation only of reinforcement for masonry construction which is included in Section 04 20 00 Unit Masonry) as shown on the Contract Drawings, as specified herein, and as necessary for the proper completion of the Work in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 04 20 00 -- Unit Masonry

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. ACI 117 (2010) – Specifications for Tolerances for Concrete Construction and Materials and Commentary

2. ACI SP-66 (2004) – ACI Detailing Manual

3. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

4. ASTM 1064/1064M – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

5. AWS D1.4/D1.4M (2011) – Structural Welding Code – Reinforcing Steel

6. CRSI 10MSP – Manual of Standard Practice

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. A letter from the masonry contractor indicating that they have reviewed the shop drawings, the masonry specifications, and the Contract Drawings for the Work.

C. Product Data

1. Certified Mill Reports

D. Shop Drawings

1. Reinforcement Drawings - comply with ACI SP-66, and include the following information:

a. Sizes, dimensions, and locations for reinforcement and supports

b. Bending diagrams and schedules

c. Splices

d. Cover and clearances

e. Class designation and details of bar supports

f. Pertinent reinforced concrete details with dimensions and elevations

g. Items furnished by other trades and/or under other sections of the specification that are to be cast in concrete where interference with reinforcing may occur

h. Reinforcement of walls shall be shown on wall elevations with required sections and reinforcement of slabs on plan views with required sections. Provide plan details where walls intersect.

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Fabricate reinforcement in accordance with ACI 117.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Deliver reinforcement in bundles with tags indicating size, length, and identification mark.

C. Store materials off the ground to prevent soiling and to facilitate subsequent inspection and handling.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 STEEL REINFORCEMENT

A. General: "Steel reinforcement" shall include all bars, anchorages, stirrups, dowels, ties, tie-wire, chairs and other steel supports, and spacers as noted on the Contract Drawings, specified herein, and as required for the proper completion of the Work.

B. Materials:

1. Reinforcement bars shall be formed from new billet steel conforming to ASTM A 615/A 615M, Grade 60 except as otherwise specified.

2. Plain wire fabric shall conform to ASTM 1064/1064M. Flat sheets shall be used; rolls are not permitted.

C. Tie Wire shall conform to FS QQ-W-461 annealed black, 16-gauge minimum.

D. Bar Supports

1. Chairs, bolsters, spacers and other supports to properly position reinforcement shall conform to the "Bar Support" recommendations of CRSI 10MSP, and shall be of adequate strength and design to prevent displacement of reinforcement and discoloration of concrete.

2. Supports shall be Class 3, except where concrete surfaces are exposed to view, weather and/or moisture where they shall be Class 1 - Plastic Protected.

3. Supports for bottom reinforcement of slabs-on-soil shall be chairs with integral plates, or precast concrete blocks not less than 4-inches square with a compressive strength equal to that of the surrounding concrete. Precast blocks may only be used to support reinforcement not more than 3-inches from the bottom of the slab.

E. Fabrication:

1. Steel reinforcement shall be fabricated to the sizes, shapes and dimensions shown on the Contract Drawings, details and schedules. All bending shall

be in accordance with CRSI 10MSP. All steel shall be bent cold and shall not be bent or straightened in a manner that will injure the metal. Bars with kinks or bends not so detailed shall not be used.

2. Bends for stirrups and ties shall be made around a pin having a diameter not less than four times the diameter of the bar. Bends for other bars shall be made around a pin having a diameter not less than six times the diameter of the bar, except that for bars larger than 1-inch the pin shall be not less than eight times the diameter of the bar.

PART 3 – EXECUTION

3.01 INSTALLATIONS

A. Reinforcement:

1. Tolerances shall conform to ACI 117.

2. Placement

   a. Reinforcement shall be accurately positioned both horizontally and vertically, and shall be properly secured and sufficiently rigid to prevent displacement during concrete placement.

   b. Reinforcement shall be securely tied at intersections with tie wire or clips in a manner that will keep all metal away from exposed concrete surfaces.

3. Splices

   a. Reinforcement splices shall be as shown on the Contract Drawings. Where not shown, splices shall be located away from areas of maximum stress, and shall be approved by the Engineer.

   b. Only when permitted by written approval of the Engineer, welding shall be in accordance with AWS D1.4/D1.4M.

4. All reinforcement within an area of a continuous concrete placement shall be installed, supported, and secured before beginning the concrete placement.

5. Reinforcement Adjustment

   a. Adjust to within allowable tolerances to avoid interference with other reinforcement, conduits, and/or embedded items.

   b. Reinforcement shall not be moved beyond allowable tolerances without the Engineer's approval.

   c. Reinforcement shall not be heated, bent or cut without approval Engineer's approval.

B. Wire Fabric

1. Shall be installed in longest practicable sheet.

2. Adjoining sheets shall be lapped a minimum of one and one-half wire spacings and securely wired together.

3. End laps in adjacent sheets shall be offset.

C. Cleaning: All reinforcement shall be entirely free from flaking rust, loose mill scale, grease, dirt, etc. that might reduce its bond with the concrete.

D. Relation of Bars to Concrete Surfaces: Concrete cover for reinforcement shall conform to the dimensions shown on the Contract Drawings.

E. Observation of Reinforcement: Notify the Engineer at least 24 hours before placing concrete. All reinforcement within the area of one day's concrete placement shall be tied in place, and observed by the Engineer, prior to commencing concrete placement.

END OF SECTION

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all materials, tools, equipment and labor necessary for furnishing the cast-in-place concrete as shown on the Contract Drawings, as specified herein, and as necessary for the proper completion of the Work in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

B. ACI 117 (2010) - Specifications for Tolerances for Concrete Construction and Materials and Commentary

C. ACI 301 (2010) - Specifications for Structural Concrete

D. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field

E. ASTM C33/C33M - Standard Specification for Concrete Aggregates

F. ASTM C40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete

G. ASTM C88 - Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

H. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete

I. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete

J. ASTM C150/C150M - Standard Specification for Portland Cement

K. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

L. ASTM C231/C231M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

M. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete

N. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete

O. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements

P. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

Q. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars

R. ASTM C1157/C1157M - Standard Specification for Hydraulic Cement

S. ASTM C1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

T. ASTM C1293 - Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction

U. ASTM C1567 - Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)

V. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete

W. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Admixtures

2. Concrete Mixture Design for each concrete mixture proposed for use in the Work.

C. Test Reports

1. Cement

a. Certified mill reports

2. Aggregate

a. Aggregate test data shall not be older than 90 days, except test data for soundness per ASTM C88 and alkali reactivity per ASTM C1260, ASTM C1293, or ASTM C1567 shall not be older than 1 year.

b. Fine and coarse aggregate data for all aggregates proposed for use, including sources, sieve analyses per ASTM C33/C33M, potential alkali reactivity (not required if a cement containing less than 0.60% alkalies is used, per ASTM C33/C33M) per ASTM C1260, ASTM C1293, or ASTM C1567, and soundness per ASTM C88. Test data of organic impurities for fine aggregate per ASTM C40.

3. Concrete

a. Test data supporting proportions of design mixes, for each concrete mix proposed for use in the work, based upon laboratory trial batches or field test records that are in strict accordance with ACI 301 Section 4, "Concrete Mixtures". Data shall include sources of cement and aggregates. Field test data used to determine the standard deviation used for establishing the required average design strength shall be from within the previous twelve (12) months. Field test data documenting that the proposed concrete proportions will produce an average compressive strength equal to or greater than the required average compressive strength shall be from within the past twelve (12) months. Laboratory trial batch data shall be from within the previous twenty-four (24) months. All data shall be submitted within forty-five (45) days after Notice to Proceed, or at least fourteen (14) days before initial placement of concrete, whichever is earlier.

b. Fly ash source and test reports showing fly ash to be in compliance with these Specifications. Reports shall be for actual fly ash to be used in the Work.

c. Ground granulated blast-furnace slag source and test reports showing slag to be in compliance with these Specifications. Reports shall be for actual slag to be used in the Work.

D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. ACI 301 is hereby made a part of this specification, except as otherwise modified by the Contract Documents.

C. No more than one single commercial ready mix plant shall be used throughout the Work.

D. Approvals

1. Concrete Work shall not begin until test results and design mixtures have been reviewed by the Engineer. The Engineer's review shall not constitute "approval"; the Contractor shall be responsible for meeting all concrete performance requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Supply concrete from a commercial ready mix plant and mix and deliver in accordance with the requirements of ASTM C 94/C 94M and these Specifications.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 CONCRETE MATERIALS

A. General:

1. All concrete shall be designed to have a minimum 28-day compressive strength of 4,000 pounds per square inch, except as otherwise noted in the Contract Documents.

2. Proportions of aggregate to cement shall produce a mixture of the required strength and slump that will produce the specified finishes and not segregate.

B. Cement:

1. Cement shall meet the requirements of ASTM C150/C150M, Type II or ASTM C595/C595M IP(MS), IS(<70)(MS). However, ASTM C595/C595M cements that contain ASTM C1157/C1157M cement are not permitted.

C. Supplementary Cementitious Materials:

1. Fly Ash shall conform to the following.

   a. ASTM C 618, Class F.

   b. Maximum loss of ignition: 3.0 percent.

2. Ground granulated blast furnace slag shall conform to the following.

   a. ASTM C 989.

   b. Slag activity classification: Grade 100 or 120.

D. Aggregate

1. All aggregates shall conform to ASTM C 33, as amended herein. Evidence of a satisfactory service record in lieu of testing for alkali reactivity is not permitted.

2. The use of crushed hydraulic cement concrete for aggregate is not permitted.

3. Aggregate tested in accordance with ASTM C1260 having a fourteen (14) day expansion greater than 0.10 percent shall be considered to be potentially reactive and shall not be used, except if when tested in accordance with ASTM C1567 the fourteen (14) day expansion is not greater than 0.10 percent, or if when tested in accordance with ASTM C1293 the 2-year expansion is not greater than 0.04 percent, or if a cement containing less than 0.60% alkalies is used per ASTM C33/C33M.

4. Fine Aggregates

   a. Fine aggregates shall consist of sand or screenings of gravel or crushed stone, well graded from fine to coarse; clean and free from soft particles, clay, loam and organic matter, with the volume removed by sedimentation not more than three percent. When tested in accordance with ASTM C 40 for organic impurities, the color of the supernatant liquid above the test sample shall show not darker than organic plate No. 3.

b. Fine aggregate shall conform to the following grading:

U.S. Standard Sieve	Percent Passing
Size 3/8 inch	100
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	5 -30
No. 100	0-10

c. Fine aggregate shall not have more than 45 percent retained between any two consecutive sieves listed above, and the fineness modulus shall not be less than 2.3 nor more than 3.1.

5. Coarse Aggregates

a. Coarse aggregates shall consist of crushed stone or washed gravel of clean, hard, durable, uncoated particles, free from dust, dirt, or other deleterious substances; and free from thin, flat or elongated particles. Nominal maximum aggregate size shall be 1½ inch for all slabs placed on soil, foundation mats, footings, and walls that are at least 15 inches thick, except where the clear spacing between reinforcement bars is less than 2 inches. Nominal maximum aggregate size shall be ¾ inch at all other locations, except as specified elsewhere or upon written approval of the Engineer.

b. Coarse aggregate shall conform to the grading given in Table 2 of ASTM C 33 for sizes (nominal maximum aggregate sizes) No. 467 (1½"), No. 57 (1"), No. 67 (3/4"), No. 7 (1/2"), and No. 8 (3/8").

E. Water shall be potable.

F. Admixtures shall be used as follows, and the use of products other than those listed will be allowed only with the written approval of the Engineer.

1. The air-entraining admixture shall be chloride free conforming to ASTM C 260.

2. Mid-Range Water Reducing Agents shall conform to ASTM C 494/C 494M, Type A. The air entraining effect of the water reducing agent shall be taken into account.

3. Water Reducing-Retarding Agents. When the ambient temperature rises above 70 ^{o}F, the water reducing agent shall be replaced in whole or in part with a water reducing-retarding agent conforming to ASTM C 494/C 494M, Type D. The admixture shall be used in such amounts to produce concrete with a set time equal to that which it would have at 70 ^{o}F without the retarder.

4. Set Accelerator. Where a set accelerator is allowed under the provisions of SECTION 03 35 00, CONCRETE PLACING, CURING, AND FINISHING, it shall be non-chloride type conforming to ASTM C 494/C 494M, Type C or E.

5. Superplasticizer may be approved for use in any part of the structure, and shall conform to ASTM C 494/C 494M, Type F or G. Admixture may be added in plant or field depending on haul time and ambient temperatures.

PART 3 – EXECUTION

3.01 TESTING AND INSPECTION

A. General

1. Concrete materials and concreting operations shall be tested and inspected as the Work progresses. Failure to detect defective Work or material shall in no way preclude later rejection upon discovery.

2. The use of testing services shall in no way relieve the Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents.

B. Responsibilities and Duties of General Contractor:

1. Design Concrete Mixtures.

a. Concrete mixtures shall be designed in accordance with Section 4, "Concrete Mixtures" of ACI 301.

b. Ingredient Tests. Prior to making design mixtures, the Testing Laboratory conforming to ASTM E 329, shall conduct the following tests in accordance with the References:

1) Cement: Specific gravity and brand name of cement.

2) Aggregates: Sieve analysis, specific gravity, soundness, absorption, potential alkali reactivity, moisture content of fine and coarse aggregate, and fineness modulus of fine aggregate.

c. Design mixtures shall indicate water to cementitious materials ratio, water content, admixture content, cement content, aggregate content, aggregate gradations, slump, air content and strength. Design mixtures and related tests shall be in accordance with the procedures referred to in the applicable references cited herein.

d. The testing laboratory shall recommend the design mixtures to be used for each application of concrete that will produce concrete of specified strengths and finishes with slumps and workability to meet all placing conditions.

2. Furnish necessary labor to assist the testing laboratory and Engineer in obtaining and handling samples at the Project site and other sources of materials.

3. Advise the testing laboratory and the field observers at least twenty-four (24) hours in advance of placing concrete to allow for the scheduling of observation and testing.

4. On the project site: provide space to accommodate, and a source of electrical power to service, facilities to be provided by Owner's testing agency for proper initial curing and storage of concrete test cylinders to be lab-cured (not those to be field-cured, see SECTION 03 35 00, CONCRETE PLACING, CURING AND FINISHING) as required by ASTM C31/C31M for 48 hours after casting.

5. (Facilities to be provided at the Project site by the Owner's testing agency shall meet the following requirements. Cylinders to be lab-cured (not those to be field-cured, see SECTION 03 35 00, CONCRETE PLACING, CURING AND FINISHING) shall be stored in a temperature range from 60 to 80°F in an environment preventing moisture loss from the specimens. Various methods are effective in maintaining the specified moisture and temperature conditions during the initial curing period. Examples include immediate immersion of molded specimens with plastic lids in water saturated with calcium hydroxide (except that cardboard and other molds that expand when immersed in water should not be used), storage in wooden boxes, placement in damp sand pits, etc. All specimens shall be shielded from direct sunlight and, if used, radiant heating devices. The storage temperature shall be controlled by use of heating and cooling devices, if necessary, and the temperature shall be recorded with a maximum-minimum thermometer.)

6. Provide and maintain adequate facilities for safe storage and proper curing of concrete test specimens on the Project site for 48 hours after casting, as required by ASTM C 31/C 31M. Cylinders shall be stored in a temperature range from 60 to 80°F in an environment preventing moisture loss from the specimens. Various methods are effective in maintaining the specified moisture and temperature conditions during the initial curing period. Examples include immediate immersion of molded specimens with plastic lids in water saturated with calcium hydroxide (except that cardboard and other molds that expand when immersed in water should not be used), storage in wooden boxes, placement in damp sand pits, etc. All specimens shall be shielded from direct sunlight and, if used, radiant heating devices. The storage temperature shall be controlled by use of

heating and cooling devices, if necessary. The temperature shall be recorded with a maximum-minimum thermometer.

3.02 CONCRETE MIXTURE

A. Water to Cementitious Materials Ratio: The water to cementitious materials ratio shall not exceed 0.45 except as otherwise noted in the Contract Documents.

B. Fly Ash: Use of fly ash is optional. When used, the amount of fly ash shall not be less than 15 percent nor more than 25 percent of weight of cement plus fly ash.

C. Ground Granulated Blast-Furnace Slag (GGBF Slag): GGBF slag use is optional. When used, the amount of slag shall not be less than 25 percent nor more than 50 percent of weight of cementitious material.

D. Fly Ash and GGBF Slag: When both fly ash and GGBF slag are used, the minimum amount of portland cement shall be 337 pounds per cubic yard of concrete. The combined fly ash and GGBF slag shall not exceed 50 percent of the total cementitious materials, and the fly ash shall not exceed 25 percent thereof.

E. Water Content

1. Any and all residual, wash, and/or other water in drums shall be completely discharged (drums backed out) prior to concrete batching.

2. After truck is loaded, no slump adjustment shall be made at wash down, "slump rack," and/or by any other means prior to arrival at point of delivery of Project site. Any and all water added after arrival at point of delivery of Project site shall be accurately metered and recorded on the batch ticket prior to providing the batch ticket to the Contractor and/or Engineer's representative.

3. The amount of water carried on the aggregate, and the effect of admixtures, shall be included in the water content. The water carried on the aggregate shall be determined periodically by test, and the amount of free water on the aggregate subtracted from water added to the mixture.

4. In all cases the amount of water to be used shall be the minimum amount required to produce a plastic mixture of the strength specified and of the required density, uniformity and workability. The consistency of any mixture shall be at that required for the specific placing conditions and methods.

F. Concrete Slumps

1. Unless otherwise specified, at the point of delivery concrete shall have a slump of 4 inches, determined in accordance with ASTM C 143/C 143M. Slump tolerances shall meet the requirements of ACI 117.

2. When Type F or G high-range water-reducing admixture conforming to ASTM C 494/C 494M is used, concrete shall have a slump of 2 to 4 inches before the admixture is added, and a maximum slump of 8 inches at the point of delivery after the admixture is added.

G. Air Entrainment

1. All concrete, except as noted below, shall be air entrained. Air entraining admixture shall be used strictly in accordance with the manufacturer's directions and these Specifications to produce a total entrained air content, determined in accordance with the procedure given in ASTM C 173/C 173M or ASTM C 231, as follows:

Nominal Maximum Size Coarse Aggregate (inches)	Air Content By Volume (percent ± 1.5)
3/8	7.5
½	7.0
¾	6.0
1	6.0
1-1/2	5.5

2. Interior concrete slabs to be hard-troweled shall have a maximum air content of 3.0 percent. After the curing period (at which time they are protected), such slabs shall be protected from freezing temperatures for a minimum of 8 weeks. Thereafter, and for the duration of the Contract, if such slabs might be subject to freezing temperatures, they shall be fully sheltered from rain, snow and all other water sources.

END OF SECTION

SECTION 03 35 00

CONCRETE PLACING, CURING, AND FINISHING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all materials, tools, equipment and labor required for the placing, curing and finishing of all cast-in-place concrete as shown on the Contract Drawings, as specified herein, and as necessary for the proper completion of the Work in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

B. During the progress of the Work, an independent, accredited and certified testing laboratory shall conduct concrete testing as specified herein, including the preparation and testing of concrete cylinders. All such testing shall be paid for by the Owner.

C. The Engineer may order load and/or core tests in accordance with ASTM C 42/C 42M. Such testing shall be paid for by the Owner if the concrete is proven to meet the requirements of the Contract Documents, and by the Contractor otherwise. The Contractor shall also pay for all testing costs associated with any and all Work to be replaced.

1.03 REFERENCES

A. Reference Standards

1. ACI 117 (2010) - Specifications for Tolerances for Concrete Construction and Materials and Commentary

2. ACI 301 (2010) - Specifications for Structural Concrete

3. ACI 306.1 (1990; R2002) Standard Specification for Cold Weather Concreting

4. ACI 308.1 (2011) Standard Specification for Curing Concrete

5. ACI 350.1 (2010) - Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures

6. ACI 306R (2010) - Cold Weather Concreting

7. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field

8. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

9. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

10. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete

11. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar

12. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete

13. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete

14. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

15. ASTM C231/C231M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

16. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

17. ASTM C404 - Standard Specification for Aggregates for Masonry Grout

18. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation

19. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

20. ASTM C920 - Standard Specification for Elastomeric Joint Sealants

21. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete

22. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

23. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion

24. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials

25. ASTM D2240 - Standard Test Method for Rubber Property - Durometer Hardness

26. ASTM E 1155 - Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers

27. ASTM E 1745 - Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data and Manufacturer’s Instructions

1. Delivery Tickets

a. Provide duplicate delivery tickets AT TIME OF DELIVERY, one for the Contractor and one for the Engineer, for each truckload of concrete delivered.

b. Serial number of ticket.

c. Date and Project location.

d. Name and location of ready mixed concrete plant.

e. Truck number, time loaded, cubic yardage delivered.

f. Dispatcher's name.

g. Mixture design, cement type, and admixtures with brand names.

h. Types and quantities of cement, fly ash and/or slag (if included in approved mix design) and admixtures. Quantities of water and fine

and coarse aggregate including moisture content, and nominal maximum aggregate size.

i. Water added subsequent to plant batching, if any. (Only applicable if total water per mixture design is not added at plant. Addition of water such that the water content of the approved mixture design is exceeded will be strictly prohibited.)

j. Concrete temperature upon delivery.

k. Unloading time and location.

2. Curing Paper

3. Epoxy Bonding Compound

4. Evaporation Retardant

5. Curing and Sealing Compound

C. Source and Field Quality Control Submittals

1. Methods to be used to protect concrete placed during cold weather. The Engineer's review shall not constitute "approval" as the Contractor shall be responsible for the protection of concrete placed during cold weather.

2. Methods to be used to protect concrete placed during hot weather. The Engineer's review shall not constitute "approval" as the Contractor shall be responsible for the protection of concrete placed during hot weather.

D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. ACI 301 is hereby made a part of this specification, except as otherwise modified within the Contract Documents.

C. Evaluation of Concrete:

1. Concrete strength shall be evaluated in accordance with ACI 301 Section 1.6.5, "Evaluation of concrete strength tests", and Section 1.6.6, "Acceptance of concrete strength". The Engineer may order concrete that fails to meet the acceptance criteria removed and replaced at no additional cost to Owner.

2. Sampling and Testing

a. During the progress of the Work, an independent, accredited and certified testing laboratory shall conduct concrete testing as specified herein. All such testing shall be paid for by the Owner. Concrete samples shall be taken in accordance with ASTM C172 for slump, entrained air, unit weight, and strength tests.

b. Pumped concrete shall be sampled and tested for slump and air content at the point of placement, as opposed to at the point of delivery. Upon the Engineer's approval: once the slump loss and the loss of entrained air due to pumping is established, correlated acceptance limits at the point of delivery, where sampling and testing may then be performed, shall be made applicable. When the pumpline configuration is changed significantly, sampling and testing shall again be performed at the point of placement until new acceptance limits at the point of delivery may be determined.

c. Concrete slump shall be measured in accordance with ASTM C143/C143M.

d. Tests for air content shall be performed in accordance with ASTM C173/C173M or ASTM C231/C231M, every time a set of concrete cylinders is prepared. Tests for air content shall also be performed after any and all slump adjustments are made.

e. Temperature shall be measured in accordance with ASTM C1064/C1064M.

f. Lab-Cured Cylinders

1) Lab-cured cylinders are required for all concrete on the project, and shall be in addition to field-cured cylinders, where provided.

2) Concrete cylinders shall be prepared in accordance with ASTM C31/C31M and be 6 inches diameter by 12 inches tall. One set of 4 cylinders shall be prepared for each 100 cubic yards, or fraction thereof, of each different mix placed in each single day. Cylinders shall be transported to the testing lab within 48 hours of forming, but not sooner than 8 hours after final set. See SECTION 03 30 00, CAST-IN-PLACE CONCRETE for initial storage and curing requirements of cylinders. Cylinders shall be tested for compressive strength in accordance with ASTM C39/C39M. One cylinder shall be tested at 7 days, two at 28 days, and one at 56 days. Test results shall be submitted

directly to both the Engineer and the Engineer's on-site representative for review.

3. Construction will be considered potentially deficient if concrete fails to meet any requirements that affect the strength and durability of the structure, including but not necessarily limited to:

   a. Low strength concrete per ACI 301, Section 1.6.5, "Evaluation of concrete strength tests", and Section 1.6.6, "Acceptance of concrete strength".

   b. Water-to-cementitious materials ratio higher than that of the specified mix.

   c. Reinforcing steel size, quantity, strength, position or arrangement that does not meet the requirements of the Contract Documents.

   d. Reinforced concrete that differs from the dimensions or locations shown on the Contract Drawings.

   e. Curing that does not meet the requirements of the Contract Documents, including premature formwork removal.

   f. Hot or cold weather concreting that doesn't meet the requirements of the Contract Documents.

   g. Mechanical damage from accidents or fire.

   h. Poor construction practices.

1.07 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.08 ENVIRONMENTAL CONDITIONS

A. Protection

1. Provisions shall be made for maintaining new concrete in a continuously moist condition for at least seven days after placement.

2. Fresh concrete shall be protected from freezing, premature drying, flowing water, and mechanical injury.

3. Concrete shall not be placed while rain, sleet, or snow is falling unless acceptable protection is provided. Precipitation shall not be allowed to enter into the concrete mix or damage concrete surfaces.

B. Cold Weather Requirements

1. ACI 306.1 is hereby made a part of this specification, except as otherwise modified within the Contract Documents.

2. Cold weather concreting provisions shall be followed during cold weather: any and all periods when for more than three consecutive days the average daily outdoor temperature drops below 40 ^{o}F. (The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight.) When temperatures higher than 50 ^{o}F occur during more than half of any 24-hour duration, the period shall not be regarded as cold weather.

3. When freezing temperatures may occur during periods not defined as cold weather, concrete surfaces shall be protected against freezing for at least the first 24 hours after placing.

4. Concrete shall not be placed on frozen subgrade. Insulate or heat subgrade to ensure temperature above 32 ^{o}F when concrete is placed.

5. All embedments having a cross sectional area of 1.0 square inch or greater, and including #9 reinforcing bars, shall be at a temperature not less than 10 ^{o}F at time of concrete placement.

6. Thermal protection must be provided immediately after concrete placement. Procedures for covering, insulating, housing, and/or heating concrete shall be prearranged. Except when supplemental heat is provided, the R-value of the insulation shall be per the recommendations of chapter 9 of ACI 306R.

7. Accelerating admixtures shall be approved at the Engineer's discretion, however those containing calcium chloride shall not be permitted.

8. When combustion heaters are used, flue gases shall be vented to the exterior of enclosures.

9. Concrete shall be placed and maintained at the following minimum concrete placement temperatures (measured at concrete surface):

   a. Sections of less than 12 inch minimum dimension: 55 ^{o}F.

   b. Sections of 12 to 36 inch minimum dimension: 50 ^{o}F.

10. The concrete placement temperature shall not be higher than the minimum concrete placement temperature by more than 20 ^{o}F.

11. The minimum concrete temperature as mixed shall be: 5 ^{o}F higher than the minimum concrete placement temperature when the air temperature is

above 30 °F; 10 °F higher when the air temperature is between 0 and 30 °F; and 15 °F higher when the air temperature is less than 0 °F.

12. The temperature shall be monitored at the surface of the concrete, including at corners and edges, which are more vulnerable to freezing. The concrete surface temperature and the corresponding outside air temperature shall be recorded a minimum of twice per each 24 hour period.

13. Concrete shall be maintained at the minimum specified temperatures for a protection period of 6 days. When an approved accelerating admixture is used the protection period may be reduced to 4 days.

14. Slabs, regardless of air content, shall not be exposed to freezing temperatures when exposed to rain, snow or other water sources, prior to reaching a compressive strength of 3500 psi. For hard-troweled slabs (which have a maximum air content of 3.0%) see Section 3.07, paragraph C.3 for additional requirements.

15. Concrete shall be cooled gradually at the end of the protection period. The maximum allowable temperature drop at the concrete surface during the first 24 hours after the protection period shall be: 50 °F for concrete sections of less than 12 inch minimum dimension; and 40 °F for concrete sections of 12 to 36 inch minimum dimension.

C. Hot Weather Requirements

1. The temperature of the concrete when placed shall not exceed 90 °F. When the air temperature is 90 °F and above, procedures to cool mixture ingredients may be warranted. These include: providing shaded storage for aggregate, frequent sprinkling or fog spraying of coarse aggregate, and using chilled batch water and/or ice. Forms and reinforcement shall be sprinkled with cold water just prior to concrete placement. When possible, placement of slabs should be scheduled after walls and roof structure are in place in order to minimize problems associated with direct sunlight and/or drying winds. Newly placed concrete shall be protected from the direct sunlight.

2. Records shall be maintained of: time and location of concrete placement, air temperature, weather conditions (i.e. calm, windy, clear, and/or cloudy), relative humidity, and concrete temperature as delivered and after placement.

3. When the air temperature is 90 °F and above: the time between the addition of water to cement or cement to aggregate (whichever occurs

first) and the time of concrete placement shall not exceed 60 minutes, except upon approval of the Engineer when all tests for air content, slump and temperature are acceptable.

PART 2 – PRODUCTS

2.01 CURING AND SEALING COMPOUND

A. Use of curing and sealing compound shall be permitted except where prohibited in Part 3 of this Section. It shall conform to ASTM C1315, Type 1, Class A, NCHRP-244. Certi-Vex Guard Clear, by Vexcon Chemicals; or approved equal shall be provided.

2.02 CURING PAPER

A. Curing paper shall conform to ASTM C171, for regular or white waterproof paper.

2.03 EPOXY BONDING COMPOUND

A. Epoxy bonding compound shall conform to ASTM C 881/C 881M, contain 100 percent solids, and be moisture tolerant. Uniweld, by Permagile Industries, Inc.; Sikadur 32 Hi-Mod or Sikadur 32 Hi-Mod LPL, by Sika Corporation; Sure-Bond (J-58, or J-58 LPL), by Dayton Superior; or approved equal shall be provided.

2.04 EVAPORATION RETARDANT

A. Evaporation retardant shall be E-CON as manufactured by L&M Construction Chemicals, Inc.; SikaFilm by Sika Corporation; Confilm by Master Builders; or approved equal.

PART 3 – EXECUTION

3.01 CONCRETE PLACEMENT AND JOINTING

A. Tolerances: Tolerances shall conform to all requirements of ACI 117 except as otherwise modified by the Contract Documents.

B. Placing

1. Concrete shall be handled from the truck to the place of final deposit as rapidly as practicable by methods preventing segregation and/or loss of ingredients.

2. The time between the addition of water to cement, or cement to aggregates (whichever occurs first), and the placement of concrete shall not exceed 90 minutes. When air temperature is 90 ^{o}F and above, this time shall be

reduced to 60 minutes. These times may be exceeded only upon approval of the Engineer, and only if all tests for air content, slump, and temperature are also acceptable.

3. Water shall be removed from all forms and excavations and the Work shall be kept dry during placement. No water shall be thrown on, allowed to flow over, or rise upon the concrete until it is thoroughly set.

4. Prior to placement of slabs on soil, the subgrade shall be moist with no free water and no muddy or soft spots.

5. The concrete shall be directly deposited as close as possible to its final location, and shall be deposited in such manner so as to maintain a homogeneous, plastic, approximately horizontal surface.

6. Where concrete may contact soil while being placed, free fall shall be limited to a maximum of 3 feet. Concrete that has been contaminated by soil and/or other foreign matter shall be rejected. The accumulation of concrete on the forms and/or on reinforcement above the level of placement shall be avoided. The splashing of concrete upon formwork that is set for a subsequent concrete placement shall be prevented due to the resulting marks on the finished concrete.

7. Retempering of concrete and concrete placement against partially hardened concrete shall not be permitted. A concrete placement, once started, shall be carried out as a continuous operation until the placement of the entire section between construction joints is complete.

C. Runways: Runways shall be provided for wheeled concrete handling equipment which shall not be wheeled over reinforcement. Runways shall not be supported upon reinforcement that is part of the Work.

D. Chuting

1. Minimum slope shall be 3 horizontal to 1 vertical and maximum slope shall be 2 horizontal to 1 vertical. Between these limits, the slope shall be that which will prevent segregation and ensure continuous flow.

2. A baffle shall be provided at the end of the chute to prevent segregation. If the end of the chute is more than 3 feet above the surface of deposit, a spout shall be used. The spout shall be kept full of concrete with the end kept as near as practical to the surface of deposit.

3. The chute shall be steel or steel lined, and sections shall have the same slope throughout. Aluminum chutes are not permitted.

4. The chute shall be thoroughly flushed with water before and after each use, the water discharged outside the forms.

E. Pumping: The inside diameter of pipes and hoses used to convey the concrete shall be a minimum of three times the maximum size aggregate of the mixture. In order to minimize altering the concrete properties, long vertical sections at the end of the pumpline shall be avoided. A horizontal hose run, a hose loop, or a slide gate at the end of the hose may be used to reduce loss of entrained air.

F. Compaction

1. Provide at least one standby vibrator, and at least one for each three in use.

2. Concrete shall be placed in layers not exceeding 12 inches in depth. Each layer shall be compacted by mechanical internal vibrating equipment supplemented by hand spading, rodding, and tamping as required.

3. Vibrators shall be relocated frequently, and over-vibration resulting in segregation shall be prevented. Vibrators shall not be used to move concrete within the forms. Concrete shall be thoroughly consolidated around reinforcement, embedments, and into the corners of the forms.

4. Ensure that vibrator is kept several inches clear of waterstops.

5. Where internal vibration is impractical, the use of form vibrators will be considered, and will be allowed only with the Engineer's written approval. When allowed, the vibrator shall be placed so that motion is horizontal.

G. Construction Joints

1. Unless noted otherwise in the Contract Documents, "construction joint" shall refer to a monolithic construction joint in which the surface between successive placements is prepared to enhance bond and shear transfer, and all reinforcement is continuous. Construction joints shall be located where shown on the Drawings, or, if not shown, locations shall be approved by the Engineer. Where required to be watertight, waterstops as specified in SECTION 03 11 00, CONCRETE FORMING shall be used.

2. Horizontal construction joints: laitance shall be removed immediately after initial set and the surface shall roughened in an acceptable manner that exposes the aggregate uniformly and doesn't leave laitance or loose aggregate. After the concrete has set to a degree that precludes laitance removal by shovels or scrapers, the Contractor shall remove it, and create a roughened surface, by waterjetting or other effective method. The use of pneumatic hammers is not permitted.

3. Vertical construction joints: the surface shall be thoroughly cleaned of laitance by waterjetting, or by wire brushing followed by air blasting.

4. Before concrete is placed against set concrete, the surface shall be thoroughly wetted with standing water removed. Horizontal construction joints shall be in a saturated surface dry condition: saturated for a minimum of 6 hours, with standing water removed.

5. Where noted on the Contract Drawings, and as approved by the Engineer where an unplanned interruption within a concrete placement has occurred, epoxy bonding compound shall be used in accordance with the manufacturer's instructions.

6. Reinforcement shall be continuous at construction joints unless otherwise shown on the Contract Drawings. Waterstops shall be provided where called for in the Contract Documents. All necessary precautions to ensure that the waterstop is properly located and aligned and remains so during concrete placement shall be taken. In the event that the waterstop is improperly located, allowing a tolerance of plus or minus 1/2-inch, the Engineer may order the waterstop extended, or replaced, or such other action as deemed necessary, and at no additional cost to the Owner.

H. Concrete Fills

1. New unformed concrete surfaces upon which concrete is placed shall receive a rough (broom, scratched, rough screed, or rough wood float) finish.

I. Existing Concrete

1. Where concrete is placed against existing concrete, the following surface preparation shall be required.

2. The existing concrete surface shall be cleaned of all contamination and debris, and roughened by steel shotblating, abrasive (sand) blasting, or waterjetting (hydrodemolition). Use of scabblers, scarifiers, bush hammers, or pneumatic hammers is not permitted.

3. The existing concrete surface shall be water-saturated for a minimum of six hours, after which the excess water shall be removed immediately prior to placement of new concrete.

4. Apply epoxy-bonding compound to prepared concrete surface prior to concrete placement.

3.02 CURING AND PROTECTION

A. Temperature

1. When the ambient temperature falls below 40 ºF or rises above 95 ºF, a record shall be kept of concrete temperatures and of protection given to concrete during placement and curing.

2. The temperature of in-place concrete shall be the surface temperature of the concrete. The surface temperature may be determined by placing temperature sensors in contact with concrete surfaces or between concrete surfaces and covers used for curing, such as insulation blankets or plastic sheeting.

B. Curing

1. ACI 308.1 is hereby made a part of this Section, except as otherwise modified within the Contract Documents.

2. During cold weather as previously defined, except when a heated protective enclosure is provided, the application of water shall not be required.

3. Provisions shall be made for maintaining new concrete in a continuously moist condition for a minimum of 7 days. Curing shall commence as soon as possible after final finishing when it will not mar, erode, or stain the concrete surface.

4. Curing shall be accomplished by the use of curing paper, curing compounds (except as noted below), wet methods (ponding, fog spray, damp sand or burlap, sprinkling, soaker hoses) or other methods.

5. Water used for curing shall be no more than 20 ºF cooler than the concrete surface temperature.

6. Concrete slabs to receive a coating or bonded finish, including chemical hardeners, that aren't wet cured, shall be covered with curing paper as specified, laid with side joints lapped 4 inches and end joints lapped 6 inches. Paper shall be applied no earlier than 24 hours and no later than 30 hours after finishing the slab and shall be left in place at least seven days. (Wet methods shall be used for the first 24-30 hours.) The slab surface shall be maintained in a wet condition beneath the paper at all times. Joints shall be taped and paper shall be weighted to prevent displacement. Tears during the first 7 days after a slab is completed shall be immediately repaired.

7. Curing paper shall also be used to protect newly poured concrete floors from damage. Where heavy tools and/or equipment may be used, provide additional protection as required. Only light traffic will be permitted until 7 days after concrete placement. Slabs shall be protected from damage for the Contract duration, with any and all damage repaired by the Contractor at no additional cost to the Owner.

8. The use of a curing compound on surfaces to receive applied toppings, chemical hardeners, water repellents, coatings, or a rubbed or bonded finish will not be allowed. Where used, curing compound shall be applied immediately following the disappearance of the surface water sheen after the final finishing pass for slabs, and immediately upon removal of forms for formed concrete. It shall applied uniformly by spray, leaving no pinholes or gaps, at a coverage rate of 250-350 square feet per gallon for the first coat. A second coat of 300-400 square feet per gallon shall be applied after the first coat has dried. The above application rates are based on A.C. Horn; other manufacturer's recommendations may vary.

9. Soaker hoses shall be used at tops of walls and columns before forms are removed. Wood forms shall be kept continuously wet in hot weather.

3.03 DEFECTIVE CONCRETE

A. The Engineer may direct the Contractor to remove and replace, at no additional cost to the Owner, concrete Work that is not formed as shown and/or specified in the Contract Documents, or that contains a defective surface.

B. Upon the Engineer's approval, minor imperfections may be patched as specified herein.

3.04 REPAIR OF SURFACE DEFECTS AND PATCHING

A. Immediately after form removal, all form ties shall be cut off, all fins and irregularities removed, and all defective areas, holes, honeycombs, cavities and irregularities cleaned and patched in accordance with SECTION 03 01 05, CONCRETE REPAIR. (Bugholes larger than 3/4 inch in any dimension shall be considered a defect.) Exposed patchwork shall be rubbed where and as specified herein or otherwise treated to match adjacent surfaces, and cured and protected as specified for concrete.

B. Filling Form Tie Holes: Tie holes shall be filled solid with mortar in the same manner as specified under patching above.

3.05 FINISH OF FORMED SURFACES

A. General

1. Concrete surfaces "exposed to view" shall be defined as those exposed to view upon completion of the Work, whether or not a painted finish is specified. Surfaces which will be covered by fill, such as exterior faces of walls, shall not be considered exposed to view.

2. Surface tolerance classes indicated herein are specified in ACI 117, and include abrupt surface irregularities that are measured within 1-inch of the irregularity, and gradual surface irregularities measured as the maximum gap between the concrete and the near surface of a 5-foot straight-edge, measured between contact points.

B. Surface Finish-1.0 (SF-1.0)

1. SF-1.0 shall be provided for formed surfaces not exposed to view for concrete not containing liquids and/or gases, and not below design groundwater elevation. Provide SF-1.0 to exterior face of foundation walls in areas that are to be below finish grade.

2. Patch voids larger than 1 1/2-inch wide or 1/2-inch deep.

3. Remove projections larger than 1-inch.

4. Tie holes need not be patched.

5. Surface tolerance Class D, with formed surface irregularities not more than 1-inch.

C. Environmental Surface Finish-3.0 (ESF-3.0)

1. ESF-3.0 shall be provided for formed surfaces exposed to view. ESF-3.0 shall be followed with a grout-cleaned rubbed finish as described below. Provide ESF-3.0 to exterior face of foundation walls in areas that are to be above finish grade, and to interior face of foundation walls.

2. Remove projections larger than 1/8-inch.

3. Fill tie holes.

4. Surface tolerance Class A, with formed surface irregularities not more than 1/8-inch.

D. Grout-cleaned rubbed finish

1. All interior and exterior concrete surfaces that: are exposed to view shall receive a grout-cleaned rubbed finish and shall have a smooth and even surface, free of bug holes, when completed.

2. Wet the surface, and apply a thin coat of medium consistency neat cement slurry to the concrete surface by means of bristle brushes to provide a bonding coat. Before the slurry has dried or changed color, grout comprising one part cement to 1 1/2 parts sand meeting ASTM C144 or ASTM C404, with sufficient water to produce the consistency of thick paint, shall be applied and scrubbed into voids, with excess removed. The cement shall be that used in the concrete mix adjusted with white cement as necessary to match color of exposed concrete. Grout shall be applied with slightly damp pads of coarse burlap approximately 6 inches square used as a float, and shall be well scrubbed into the surface to provide a dense mortar.

3. The mortar shall be allowed to partially harden for 1 to 2 hours depending upon weather conditions. Work in direct hot sunlight shall be avoided. In hot dry conditions the concrete shall be kept damp during this period with a fine fog spray. Grout shall not be allowed to remain on the surface too long as it will become very difficult to remove. Grout shall not be left on the concrete overnight.

4. After the grout has hardened sufficiently, all that can be removed with a trowel shall be.

5. The surface shall then be allowed to dry thoroughly, and be rubbed vigorously with clean, dry burlap to completely remove any dried grout. There should be no visible film of grout remaining after rubbing.

6. The entire rubbing operation shall be completed in a single working day. Sufficient time shall be allowed for this.

7. On the following day the concrete shall again be wiped clean with dry burlap to remove dust. The use of burlap containing old hardened mortar may be used since it will act as a mild abrasive. After this treatment no build-up film should remain on the surface, but if it does, a fine abrasive stone shall be used to remove it without breaking through the surface film of the parent concrete. Do not work up a lather.

8. After application of the surface grout, the surface shall be thoroughly washed down with stiff brushes and the concrete maintained in a continuously damp condition for at least three days above 50 ^{o}F by the

periodic application of a fine fog spray, the use of damp fabric covered with polyethylene or other methods.

3.06 FINISHING OF RELATED UNFORMED SURFACES

A. Tops of exposed walls and similar unformed surfaces shall be struck off smooth and hand steel troweled to produce a smooth hard level surface. Line and elevation shall be pre-established by means of preset wood screeds which shall be removed during the troweling operation.

B. After troweling is completed and after the curing period, the surface shall be dry honed to a smooth non-directional surface texture satisfactory to the Engineer.

3.07 FINISH OF SLABS

A. General

1. Slabs shall be true to the gradient and elevation shown on the Contract Drawings. Flat Slabs shall be level with a tolerance of 1/8 inch in 10 feet. Sloped slabs shall be true to the gradient shown, within a tolerance of 1/8 inch in 10 feet. Slabs shall be pitched to drains as indicated on the Contract Drawings.

2. Where a dry shake application of cementitious waterproofing is applied, it shall be incorporated into the finishing operation. Refer to the applicable section in DIVISION 7 - THERMAL AND MOISTURE PROTECTION of the Specifications for requirements pertaining to this Work.

3. The evaporation retardant specified may be used in accordance with manufacturer recommendations to control plastic shrinkage cracking and as an aid in slab finishing operations. Conditions that may warrant its use include: high temperature, low humidity, high winds, and direct sunlight.

4. Loss of bleed water and surface drying shall be allowed to proceed naturally. Means to accelerate drying such as applying dry cement, sand, or other materials shall be prohibited.

B. Floated Finish

1. Slabs to receive a seamless floor finish or roofing, and all tank bottom slabs, shall receive a floated finish. Floating shall also precede a troweling, where a troweled finish is required as specified below. After consolidating, screeding and leveling, the slab shall not be worked further until it is ready for floating.

2. Floating shall begin when the water sheen has disappeared, and when the slab has stiffened sufficiently to allow proper operation of a power-driven float. Hand floating with wood, aluminum or magnesium floats shall be used at locations inaccessible to the power-driven float.

3. Surface trueness shall be verified at this stage with a 10 foot straightedge applied in multiple angles. High spots shall be cut down and low spots filled so that the finished surface is true. The slab shall then be immediately refloated to a uniform, smooth, granular texture.

C. Troweled Finish

1. All interior slabs left exposed (except as otherwise specified elsewhere) shall receive a troweled finish.

2. The surface shall be finished with power floats as specified above for floated finish, followed by power trowels, and finally hand trowels. The first power troweling shall produce a smooth surface relatively free of defects but which may contain trowel marks. Subsequent trowelings shall be by hand after the surface has sufficiently hardened. The surface shall be thoroughly consolidated by the hand troweling, and final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The finished surface shall be free of trowel marks and uniform in texture and appearance.

3. Interior concrete slabs to be hard-troweled shall have a maximum air content of 3.0 percent. After the curing period, they shall be protected from freezing temperatures for a minimum of 8 weeks. Thereafter, and for the duration of the Contract, if such slabs might be subject to freezing temperatures, they shall be fully sheltered from rain, snow and all other water sources.

4. Subsequent trowelings shall be by hand after the surface has sufficiently hardened. The surface shall be thoroughly consolidated by the hand troweling, and final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The finished surface shall be free of trowel marks and uniform in texture and appearance.

D. Broom Finish: A broom finish shall be provided for all exterior slabs, sidewalks, platforms, ramps, exterior stairs and as specified herein or shown on the Contract Drawings. After floating, and between initial and final set, the surface shall be given a coarse transverse scored texture by drawing a broom across the surface.

E. Scratched Finish: After consolidating, screeding and leveling, the surface shall be roughened with stiff brushes or raked before final set. At sloped surfaces

scratches shall be made parallel to the direction of slope, to facilitate subsequent cleaning.

F. Wood Float Finish: A wood float finish, a broom finish with open pores, or a finish as otherwise required by the waterproofing manufacturer shall be provided for concrete slabs that will receive a wet slurry application of cementitious waterproofing.

3.08 CLEANING CONCRETE

A. Cleaning during progress of the Work shall not be permitted. Cleaning shall not commence until the structure is entirely completed.

B. Rust and other stains and discolorations shall be removed with a non-etching cleaning agent used in accordance with the manufacturer's instructions. Cleaning of all surfaces to receive a painted finish is also required.

C. Rust stains may be removed by applying a bleaching agent such as oxalic acid. Acid etching, sandblasting, or cleaning by other methods may be used as approved by the Engineer.

END OF SECTION

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SECTION 04 20 00

UNIT MASONRY
(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide services, material and equipment necessary to complete the masonry Work as shown on the Drawings, specified herein, and required to complete the Work in accordance with this Section and applicable reference standards listed in Article 1.03.

   a. Furnishing and installing concrete masonry units (CMU).

   b. Furnishing and installing masonry joint reinforcing, and ties and anchors.

   c. Building into masonry embedded items such as anchors, anchor bolts, inserts, flashing, etc. furnished and located by the Contractor.

   d. Building into masonry door and window frames, louvers, vents, conduits, etc., furnished and set by the Contractor.

   e. Furnishing and installing membrane wall flashing, and other specified items.

   f. Repointing masonry joints.

B. Related Requirements

1. Section 07 19 00 – Water Repellents

2. Section 09 24 23 – Cement Stucco

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. ACI 530.1 (2005) - Specification for Masonry Structures

2. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement

3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

4. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement

5. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete

6. ASTM C90 - Loadbearing Concrete Masonry Units

7. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units

8. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

9. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete

10. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar

11. ASTM C150/C150M - Standard Specification for Portland Cement

12. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes

13. ASTM C270 - Standard Specification for Mortar for Unit Masonry

14. ASTM C404 - Standard Specification for Aggregates for Masonry Grout

15. ASTM C476 - Standard Specification for Grout for Masonry

16. ASTM C1329/C1329M - Standard Specification for Mortar Cement

17. ASTM C1384 - Standard Specification for Admixtures for Masonry Mortars

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Grout Ingredients

2. Masonry Units: CMU

3. Mortar Ingredients

4. Joint Reinforcement and Wall Ties

C. Certificates

1. Certifications shall be signed, dated, and notarized, and for the Work of this specific Project. New certifications shall be submitted any and all times there is a change in material or material Supplier.

2. Grout Ingredients

3. Masonry Units: CMU

4. Mortar Ingredients

5. Joint Reinforcement and Wall Ties

D. Design Data/Submittals

1. Mortar mix designs in accordance with the proportion specification of ASTM C 270 for each mortar mix.

2. Grout mix designs in accordance with the proportion specification of ASTM C 476.

E. Source and Field Quality Control Submittals

1. Methods to be used to protect masonry during cold weather. The Engineer's review shall not constitute "approval" as the Contractor shall be responsible for the protection of masonry during cold weather.

2. Methods to be used to protect masonry during hot weather. The Engineer's review shall not constitute "approval" as the Contractor shall be responsible for the protection of masonry during hot weather.

F. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Masonry materials and construction shall conform to ACI 530.1 except as modified by the Contract Documents.

C. Mock-ups: Prior to commencement of Work, a sample panel.

1. Only materials and procedures approved for the Work shall be used.

2. The sample panel shall be approved by the Engineer prior to the commencement of the Work. It will be the standard of comparison for masonry Work built of the same materials, and shall not be destroyed until the Work is complete and is accepted by the Engineer.

3. The sample panel shall be approximately 8 feet long by 4 feet tall, and shall be constructed in the presence of the Engineer or his designated representative.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Cement, lime, and all other cementitious materials shall be delivered to the Site in unbroken packaging that is plainly labeled with brand and manufacturer, and stored in dry weathertight enclosures. They shall be stored and handled in a manner so as to prevent contamination by foreign materials, water and dampness.

C. Masonry units shall be handled with care in order to prevent chipping and other damage. Damaged units shall not be used in exposed Work.

D. Materials stored on newly constructed floors shall be placed such that the load does not exceed 50 psf.

E. CMU shall be shipped with each pallet wrapped in polyethylene plastic film. The wrapping shall not be removed until the CMU is to be placed in the wall so as to prevent moisture absorption.

F. CMU left exposed overnight, in the rain or is otherwise allowed to pick up moisture will be rejected and shall be removed from the Site.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.09 ENVIRONMENTAL CONDITIONS

A. Masonry Work shall not be performed when climatic conditions or the limitations of the facilities furnished by the Contractor prevent setting and curing of mortar joints or obtaining proper bond.

B. Hot weather. When the ambient temperature exceeds 100 degrees F, or exceeds 90 degrees F with wind velocity exceeding 8 mph, the hot weather procedures of ACI 530.1 shall be implemented.

C. Cold weather. When the ambient temperature is below 40 degrees F, the cold weather procedures of ACI 530.1 shall be implemented. Admixtures shall meet ASTM C 1384 or ASTM C 494/C 494M, Type C, and shall not be used without the Engineer's written approval. Type III cement may be substituted for Type I and Type II cement in masonry grout.

D. Masonry not constructed in accordance with the protective measures listed above will be considered defective and rejected.

PART 2 – PRODUCTS

2.01 GENERAL

A. Gauges

1. Wire gauge standard: United States Steel Wire

2. Sheet gauge standard: U.S. Standard.

B. Materials

1. Cement: portland cement conforming to ASTM C 150/C 150M, Type I or Type II. Alternatively, for mortar the cement may be mortar cement as specified herein.

2. Hydrated Lime shall conform to ASTM C 207, Type S, and shall not contain air-entrainment additives.

3. Aggregates for mortar shall conform to ASTM C 144.

4. Aggregates for grout shall conform to ASTM C 404.

5. Water shall be clean, fresh and potable.

6. Concrete Masonry Units (CMU)

a. CMU shall be supplied by a single manufacturer that is capable of providing all types, sizes, shapes, and textures described below.

b. CMU shall conform to ASTM C90. CMU shall be lightweight with a concrete density of less than 105 pounds per cubic foot, except as specified herein for veneer block. Surfaces shall be smooth and dense. The minimum CMU net section compressive strength shall be 1900 psi (average of three units) and 1700 psi (individual unit) measured in accordance with ASTM C140. The minimum masonry assemblage compressive strength at 28 days, f'm, shall be 1500 psi as measured on the net section. Bond beam units, lintel units and all other special shapes shall be furnished as required, and the exposed face shall closely match that of the stretcher units.

c. Stretcher units of 6 inches and greater nominal thickness shall be two-core units. Open-ended units shall be permitted in order to facilitate positioning units at vertical reinforcement.

d. The minimum fire rating for CMU of 8 inches and greater nominal thickness shall be 2 hours.

e. CMU of 4 inch nominal thickness for exterior veneer shall conform to ASTM C 90, and shall be normal weight, three-core units with a dense surface and a four rib split-rib, split-face, and ground face units as indicated on the Drawings. Special CMU shapes such as, but not limited to, jamb blocks, sill blocks, sash blocks, and corner blocks shall be furnished as required. The exposed face of special blocks shall match closely regular veneer block in size, texture, and color. All veneer units shall have integral water repellent, as specified for mortar, added during manufacturing. Veneer block color shall be as selected by the Engineer from the full range of available colors.

7. Joint Reinforcement and Wall Ties

a. Masonry joint reinforcement and wall ties shall be factory fabricated from cold-drawn steel wire conforming to ASTM A 82/A 82M, galvanized after fabrication in accordance with ASTM A 153/A 153M.

b. Joint reinforcement shall conform to ASTM A 951/A 951M and shall be fabricated of W1.7 (9-gauge, 0.148 inch diameter) wire in a ladder-type configuration. Smooth cross wires, at a maximum spacing of 16 inches, shall be welded to deformed longitudinal wires. The out-to-out dimension of the longitudinal wires shall be approximately 2 inches less than the nominal thickness of the wythe. Prefabricated corners shall be used. Joint reinforcement shall be supplied in flat sections 10 feet to 20 feet in length.

c. For exterior cavity walls, joint reinforcement shall be fabricated as specified above, and contain adjustable two-piece, W2.8 (3/16 inch diameter), eye-and-pintles spaced not more than 16 inches on center. The eye section shall be welded to the joint reinforcement and shall extend 1/4 inch beyond the face of the wall insulation. The pintle section shall cover one half of the veneer mortar bed.

d. For CMU veneer wythe, reinforcement shall be 2-rod ladder-type, fabricated as specified above.

8. Mortar

a. Aggregate shall be measured in a damp, loose condition.

b. Except as noted below, mortar for concrete masonry shall conform to ASTM C 270, Type S, consisting of the following proportions by volume:

1) 1 part Type S mortar cement
2-1/4 to 3 parts aggregate, or

2) 1/2 part portland cement
1 part Type N mortar cement
2-1/4 to 3 times the sum of the cement volumes, parts aggregate, or

3) 1 part portland cement
1/4 to 1/2 part hydrated lime
2-1/4 to 3 times the sum of the cement and lime volumes, parts aggregate

c. Mortar for veneer shall conform to ASTM C 270, Type N, and shall consist of the following proportions by volume:

1) 1 part Type N mortar cement
2-1/4 to 3 parts aggregate, or

2) 1 part portland cement
1/2 to 1-1/4 parts hydrated lime
2-1/4 to 3 times the sum of the cement and lime volumes, parts aggregate

d. Mortar pigment for coloring CMU veneer mortar shall be chemically pure inorganic oxides in compounds suitably prepared for use in masonry mortar. Colors shall be selected by the Engineer. Integral type waterproofing for use in all exterior mortar shall be metallic sterate type, Hydrocide Powder by Sonneborn Conteck; Omicron Mortarproofing by Master Buildings Inc.; Integral Waterpeller or equal.

9. Grout

a. Grout shall conform to ASTM C 476. Aggregate shall be measured in a damp, loose condition.

b. Grout shall consist of the following proportions by volume as applicable:

1) Fine Grout:

1 part portland cement
0 to 1/10 part hydrated lime
2-1/4 to 3 times the sum of the cement and lime volumes, parts fine aggregate

2) Coarse Grout:

1 part portland cement
0 to 1/10 part hydrated lime
2 1/4 to 3 times the sum of the cement and lime volumes, parts fine aggregate
1 to 2 times the sum of the cement and lime volumes, parts coarse aggregate

10. CMU Lintels

a. CMU lintels shall be provided where shown on the Drawings and above all openings required by other trades.

b. They shall be formed of U-shaped channel bond beam units with solid bottoms.

c. Unless indicated otherwise, they shall be reinforced with a minimum of 2, #5 bars, and filled solid with grout. Reinforcement shall extend a minimum of 40 times the diameter of the bar past the face of openings, except it shall terminate 2 inches from control joints.

d. Exposed Work shall be of the same material and texture as the adjoining masonry.

e. Lintels may be built on the ground or assembled in place. Lintels built on the ground shall be allowed to set at least 6 days before being moved and shall have at least 8 inches of bearing at each end when placed, with the reinforcement extended as noted above.

11. CMU Bond Beams

a. CMU bond beams shall be provided where shown on the Drawings

b. They shall be constructed of knockout web (not low web) bond beam units with open bottoms.

c. Unless indicated otherwise, they shall be reinforced with a minimum of 2, #5 bars, and filled solid with grout. Wire mesh shall be placed in the bed joint to contain the grout.

d. Exposed Work shall be of the same material and texture as the adjoining masonry.

12. Weeps and Cavity Vents: Full head joint weeps and cavity vents shall be formed using Dur-O-Wall DA1006 Cell Vents, Hohmann & Barnard QV Quadro Vent, or equal.

13. Cavity Drainage Material: Cavity drainage material shall be 2 inch thick free drainage mesh; made from polyethyleme strands and shaped to avoid

being clogged by mortar droppings. Mortar net as manufactured by Mortar Net USA or equal. Provide at all through wall flashings.

14. Self Adhered Wall Flashing

a. Self adhered wall flashing shall be a 40-mil membrane comprising a polyethylene or PVC membrane integrally bonded to a rubberized asphalt adhesive.

b. Provide primer and rubberized asphalt mastic for sealing edges.

c. Self adhered wall flashing shall be Perm-A-Barrier Flashing by Grace Construction Products, Hyload S/A Flashing by Hyload, or equal.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Inspection: Examine all areas scheduled for Work to determine whether existing masonry and/or other conditions will adversely affect execution of the Work including meeting specified tolerances. Report any such conditions to the Engineer.

B. Workmanship

1. Construct level, square, plumb and true within the following tolerances.

a. Dimensions

1) Cross section and elevation:
-1/4 inch, +1/2 inch

2) Mortar joint thickness:
-1/8 inch, +1/8 inch: bed joints
-1/4 inch, +3/8 inch: head joints

3) Grout space and cavity width:
-1/4 inch, +3/8 inch

b. Elements:

1) Variation from level:
-1/4 inch, +1/4 inch: bed joints within 10 feet
-1/2 inch, +1/2 inch: bed joints maximum
-1/4 inch, +1/4 inch: top surface of bearing walls, in 10 feet
-1/2 inch, +1/2 inch: top surface of bearing walls, maximum

2) Variation from plumb:

-1/4 inch, +1/4 inch in 10 feet
-3/8 inch, +3/8 inch in 20 feet
-1/2 inch, +1/2 inch maximum

3) True to a line:
-1/4 inch, +1/4 inch in 10 feet
-3/8 inch, +3/8 inch in 20 feet
-1/2 inch, +1/2 inch maximum

4) Alignment of walls (bottom versus top):
-1/2 inch, +1/2 inch

c. Location of elements:

1) Indicated in plan:
-1/2 inch, +1/2 inch in 20 feet
-3/4 inch, +3/4 inch maximum

2) Indicated in elevation:
-1/4 inch, +1/4 inch in story height
-3/4 inch, +3/4 inch maximum

2. The tolerance for the placement of reinforcing steel in walls and other flexural members when the distance from the centerline of reinforcing to the opposite face of masonry, "d", is not more than 8 inches shall be plus or minus 1/2 inch. For "d" greater than 8 inches but not more than 24 inches, the tolerance shall be plus or minus 1 inch. Tolerances shall be considered in conjunction with the cover requirements specified herein.

3. Elevations shall be checked by instrument as often as necessary to maintain the tolerances specified.

4. Anchors, ties, accessories and other items to be built into the Work shall be installed as the masonry Work progresses. Cutting and fitting of masonry, including that required to accommodate the Work of others, shall be done with masonry saws or other approved methods which provide cuts that are straight and true.

5. Mortar shall be used within 2 hours of initial mixing. Pigmented mortar shall not be re-tempered. No mortar shall be used after it has begun to set.

6. Grout shall be placed within 1 1/2 hours of introduction of water into the mix, and before initial set. Grout shall not be re-tempered by the addition of water.

7. During erection, walls shall be kept dry by covering the top with a strong, waterproof membrane at the end of each day or shutdown. Partially completed walls shall be covered at all times when Work is not in progress. Cover shall extend a minimum of 2 feet down both sides, and shall be securely held in place.

8. Unfinished Work shall be stepped back for joining with new Work.

9. Hollow concrete masonry units shall be protected against wetting prior to use, and shall be dry when laid. Each unit shall be adjusted to its final position while mortar is still soft and plastic. Any unit disturbed after mortar has stiffened shall be removed and relaid with fresh mortar. Vertical cells to be filled with grout shall be aligned to provide a continuous unobstructed opening.

C. CMU Construction:

1. CMU backup shall be laid in full running bond. Mortar joints at CMU shall be 3/8 inch thick. Units shall be laid with full mortar coverage on horizontal and vertical face shells. Webs shall also be bedded in all courses where adjacent to cells or cavities filled with grout, and shall be bedded in the starting course on solid foundation walls or floors. Remove mortar protruding more than ½ inch into cells or cavities to be filled with grout. Corners shall interlock: alternating courses shall overlap in running bond.

2. Joint reinforcement shall be placed so that the longitudinal wires are located over face-shell mortar beds, and are fully embedded in the mortar for their entire length. Joint reinforcement shall have a minimum clear cover of 5/8 inch when exposed to earth or weather and 1/2 inch otherwise. Reinforcement shall be lapped a minimum of 6 inches. Reinforcing shall be placed in the second and in each alternate course. At openings, reinforcement shall be provided in the first course above and below the opening, extending at least 2 feet beyond the opening on each side. Reinforcing shall be interrupted at all control joints.

3. Steel bar reinforcement shall be completely embedded in grout. Place reinforcement in grout spaces prior to grouting. Pushing reinforcement into grout shall be strictly prohibited. Fasten reinforcement together and provide hot-dip galvanized reinforcing bar supports and spacers to prevent reinforcement displacement beyond the permitted tolerances. Where units are placed where vertical reinforcing projects, the block shall be either positioned into place over the top of the vertical bar, or open-ended units shall be provided. The clear distance between parallel bars shall not be less than the nominal diameter of the bar, nor less than 1 inch. Steel reinforcement shall be positioned as follows:

a. The thickness of grout between the reinforcement and the masonry units shall not be less than 1/4 inch for fine grout or 1/2 inch for coarse grout.

b. Where masonry wythe contains a single row of reinforcement, it shall be positioned at the center of the units, equidistant from each masonry face.

c. Splice lengths for bar reinforcing shall conform to the following:

1) #4 bars 24 inches

2) #5 bars 30 inches

3) #6 bars 36 inches

4. Grout

a. At the time of placement, the grout shall have a slump between 8 inches and 11 inches as determined by ASTM C 143/C 143M.

b. Grout lifts shall not exceed 5 feet. Grout pours shall meet the height limitations of ACI 530.1. (A grout pour is defined as the total height grouted prior to the erection of additional masonry, and consists of one or more grout lifts.) The level of grout for each grout pour shall be stopped 1 1/2 inches from the top of the masonry.

c. Grout shall be consolidated in place between grout lifts by vibration or other approved methods to ensure complete filling of cells.

d. For grout pours exceeding 5 feet, clean-outs are required at the base of each grout pour.

D. Veneer Construction

1. Blocks from various pallets shall be blended to ensure that there is a maximum mixing of dark and light face bricks. In no case shall two dark or two light range units be laid next to one another in either the horizontal or vertical direction.

2. Veneer shall be laid in stack bond with complete filled mortar joints. The ends of masonry shall be buttered with sufficient mortar to fill the head joints. Closures shall be rocked into place with the head joints thrown against the two adjacent, in place units. Grout or mortar shall be prevented from staining the face of masonry to be exposed. Should grout or mortar contact the face of such masonry, it shall be removed immediately.

3. Veneer wythe joint reinforcement and/or ties shall be embedded as described in this section. For CMU veneer wythe, two rod ladder-type

reinforcing shall be placed in the alternate courses which do not have pintle ties. Reinforcing shall be interrupted at all control joints. Provide ties within 12 inches of control joints and openings. Pintle to tie vertical offset shall not exceed 1 1/4 inches.

4. Pounding corners and jambs to fit stretcher units after they are set shall be avoided. Where an adjustment must be made after the mortar has started to harden, the mortar shall be removed and replaced with fresh mortar.

5. Any mortar fins which protrude into the cavity space as the wall is built shall be troweled flat onto the inner face.

6. Maintain cavity free of mortar droppings.

E. Weep Vents

1. Weep vents at the bottom of all cavity walls shall be spaced at 32 inches on center immediately above flashing. Weep vents over all openings shall be similar except spaced at 16 inches on center.

2. Weep vents at the top of all veneer cavities shall be spaced 32 inches on center.

F. Insulation: All exterior walls shall be insulated. The backup CMU shall be erected first and the wire reinforcement installed as the Work progresses. Joints of the backup CMU wall shall be struck off smooth and level. The insulation shall be placed between wall ties, with long ends horizontal and ends and edges butted. Insulation shall be adhered to the wall with mastic adhesive that is compatible with the dampproofing and recommended by the insulation manufacturer.

G. Cutting and Fitting: Wherever possible, full units shall be used in lieu of cut units. Where cut units are required to accommodate the design, cutting shall be done by masonry mechanics using power masonry saws, except that cutting of units in unexposed Work may be accomplished with masonry hammers and chisels. Wet-cut units shall be dried to the same surface-dry appearance as uncut units before being placed in the Work. Cut edges shall be clean, true, and sharp. Openings to accommodate pipes, conduits, and other accessories shall be neatly formed so that framing or escutcheons required will completely conceal the cut edges. Insofar as practicable, all cutting and fitting shall be accomplished while masonry Work is being erected.

H. Penetrations: Conduits, pipes and sleeves in masonry shall be no closer than 3 diameters on center.

I. Self Adhered Wall Flashing: Apply self adhered wall flashing only when surface temperatures are above 25 ^{o}F. Where flashing is to be laid on or against masonry, the surface of the masonry shall be smooth, clean, dry and sound, and free from sharp projections. Apply primer to substrate where recommended by flashing

manufacturer. Flashing shall be continuous and installed in accordance with the details shown on Drawings and manufacturer's recommendations. Seal all top termination edges with a bead of flashing mastic. Membrane flashing at masonry openings shall be extended a minimum of 8 inches beyond the opening. The flashing ends shall be turned up to form a pan.

J. Tooling: Mortar joints which have become "thumb-print" hard shall be tooled with a round jointer. The jointer shall be slightly larger than the width of the mortar joint so that complete contact is made along the edges of the units, compressing and sealing the surface of the joint. Joints in unexposed surfaces shall be cut flush.

K. Caulking Recesses: Outside joints around the perimeter of exterior door, louver and window frames shall be cleaned out ready for placement of caulking specified elsewhere herein.

L. Pointing and Cleaning: At the completion of the Work, holes in joints of masonry surfaces to be exposed, except weep holes, shall be filled with mortar and suitably tooled. Masonry walls shall be dry brushed at the end of each days' Work and after final pointing and shall be left clean and free from mortar spots and droppings. Defective joints shall be repointed.

M. Cleaning Masonry Veneer: The exposed face of veneer masonry shall be cleaned thoroughly from top down of all stains, mortar deposits and efflorescence. Proprietary cleaning compounds that are proposed for use shall be approved by the Engineer. Before applying the cleaning agent, it shall be applied to a sample wall area of approximately 20 square feet in a location approved by the Engineer. No further cleaning Work may proceed until the sample application has been approved. Note that colored mortars are adversely affected by strong acid solutions. High pressure water cleaning shall not be used.

N. Final Cleanup: At the conclusion of masonry Work, remove all scaffolding and equipment used in the Work, clean up all debris, refuse, and surplus material and remove same from premises. Remove sample panel from premises after acceptance of the Work by the Engineer.

3.02 REPOINTING

A. Conditions that require repointing include:

1. Crumbling mortar

2. Missing or loose mortar

3. Hairline, visible cracks in mortar or CMU

4. Mortar erosion greater than 1/4 inch

B. Joint Preparation

1. Tools: Use of power chisels, or any other power tool, which might damage masonry, is not permitted. Provide chisels sized for narrow mortar joints.

2. Removal of Old Mortar: Hand tools shall be sized for joints of less dimension than actual. Subcontractor shall exercise all necessary diligence to avoid abrading joint faces at the outer edge of the arris, and to not chip edges or otherwise widen joints at the arris. Use only chisels of constant rectangular shape for cutting. Cold chisels or other tapered end cutting tools will not be permitted.

   a. Remove old mortar to a depth of 1 1/2 times the thickness of the joint or 3/4 inch, whichever is greater.

   b. Remove mortar from both surfaces of the adjacent masonry and square out at the back of the joint.

   c. Remove all loose mortar, even if it is deeper than the depths indicated, to reach sound, existing mortar.

3. Rinsing: Thoroughly rinse raked joints with water to remove fine particles. Do not use compressed air. Clean and rinse joints sufficiently before filling the joints and allow evaporation of any free standing water in the joints.

C. Prehydrated Mortar Preparation

1. Dry Ingredients: Mix sand, cement and hydrated lime thoroughly for at least three minutes before adding any water and until the even color of the mixed materials indicates that they have been thoroughly distributed throughout the mass.

2. Water: After mixing dry ingredients, then mix again adding only enough water to produce a damp workable mix which will retain its form when pressed into a ball. After 1 to 2 hours, add sufficient water to bring it to the proper consistency; that is, somewhat drier than conventional masonry mortars.

3. Mortar Color, Appearance, and Joint Width: Mortar color shall be adjusted as required to match the shade and color of the existing mortar. Mortar joint width and appearance shall match that of existing mortar. Prior to proceeding with repointing, Contractor shall perform a “mock up” of proposed mortar to be approved by the Engineer. Failure to match existing mortar color, joint width, and appearance will result in rejected/defective work and shall be redone as approved by the Engineer.

4. Use of Hardened Mortar: Clean mixing equipment thoroughly after each use to prevent hardened or partially hardened lumps of mortar from contaminating new batch.

5. Mortar Additives: No additional substances shall be added to the mortar without the written permission of the Engineer.

6. Batch Life. Use mortar within twenty minutes of mixing. Do not add water (retemper) in the attempt to make the mortar workable.

D. Joint Moistening: If the joints have dried since being rinsed, moisten again with a fine water spray. Allow no free standing water to be present.

E. Joint Filling:

1. Apply mortar from mortar board to joint with pointing tool sufficiently narrow to enter the joint, and to achieve good compaction.

2. Apply mortar in layers not exceeding 3/8 inch in depth. Apply first layers to deepest voids only, to enable applying each subsequent layer to a uniform depth.

3. Apply each layer fully compacted into the joint and allow to become thumbprint hard prior to the application of the next layer.

F. Joint Finishing:

1. Tool final layer of mortar to match existing joints, after it has become thumbprint hard, to slightly exceed depth of recess of adjacent sound joints. Mortar joints shall be tooled so that the arris stands free of the joint face. No feathering of mortar edges will be permitted. Rod and caulk cracks where required with sealant. Repointing of cracks in the face of CMU block shall be finished flush with adjacent CMU surfaces.

2. Expose aggregate of mortar joints to match adjacent sound joints by applying water with stiff bristle brush just after mortar has set but before it has dried.

3. Remove excess mortar from masonry just after it has set but before it has dried to prevent smearing. As needed, use natural bristle brush and/or wood paddle, with water. Use of muriatic acid or any acid based masonry cleaners is prohibited.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide the following metal fabrications in accordance with this Section and applicable reference standards listed in Article 1.03.

a. Reinforcement plates

b. Anchor bolts

c. Steel lintels

B. Related Requirements

1. Section 04 20 00, Unit Masonry

2. Section 09 90 00, Painting and Coating

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Institute of Steel Construction (AISC)

a. AISC 303 Code of Standard Practice for Steel Buildings and Bridges

2. American National Standards Institute (ANSI)

a. A14.3 American National Standard for Ladders-Fixed-Safety Requirements

3. American Welding Society (AWS)

a. AWS D1.1/D1.1M Structural Welding Code - Steel

b. AWS D1.2/D1.2M Structural Welding Code - Aluminum

c. AWS D1.6/D1.6M Structural Welding Code - Stainless Steel

4. ASTM International (ASTM)

a. ASTM A6/A6M Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

b. ASTM A36/A36M Standard Specification for Carbon Structural Steel

c. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

d. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

e. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

f. ASTM A239 Standard Practice for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel Articles

g. ASTM A325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

h. ASTM A500/A500M Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

i. ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts

j. ASTM A572/A572M Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

k. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

l. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

m. ASTM A992/A992M Standard Specification for Structural Steel Shapes

n. ASTM A36/A36M Standard Specification for Carbon Structural Steel

o. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

p. ASTM B211 Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire

q. ASTM B308/B308M Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles

r. ASTM D6386 Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting

s. ASTM F436 Hardened Steel Washers

t. ASTM F959 Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners

u. ASTM F1554 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

v. ASTM F1852 Standard Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

5. National Association of Architectural Metal Manufacturers (NAAMM)

a. AMP 500 Metal Finishes Manual

b. MBG 531 Metal Bar Grating Manual

c. MBG 533 Welding Specification for Fabrication of Steel, Aluminum, & Stainless Steel Bar Grating

6. Research Council on Structural Connections (RCSC) “Specification for Structural Joints Using ASTM A325 and A490 Bolts”

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Shop Drawings

1. Details of connections, copes, splices, holes, hardware, finish, and other pertinent information

2. Anchor bolt embedment drawings

3. Indicate welds by standard AWS symbol

4. Indicate bolts and identify slip-critical connections as applicable

5. Identify areas of slip-critical connections to be masked from shop painting

C. Samples and Mockups: as specified in Article 1.06.

D. Manufacturer Instructions

E. Source and Field Quality Control Submittals

F. Certificates

1. Mill test reports for structural shapes, bolts, nuts, and washers

2. Welding certifications for welding procedures and personnel

G. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Assemble and ship ASTM F1852 and galvanized ASTM A325 bolt assemblies in the same container. Do not re-lubricate ASTM F1852 tension-control bolt assemblies

C. Carefully unload material and equipment and stack to prevent deformation and damage. Store items on substantial pallets, dunnage, or other supports and spacers, free from the earth and properly drained, preventing splattering with dirt and other foreign matter

D. Store material and equipment to permit easy access for inspection and identification. Protect from deterioration and maintain markings

E. Provide protective storage for fastener components. Protect fastener components removed from protective storage from dirt and moisture in closed containers at the location of installation. Do not clean or modify fastener components from as-delivered condition. Do not use fastener components accumulating rust or dirt, and remove from the Site

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.09 WARRANTY

A. Special Warranty/Extended Correction Period

1. Hatch covers: 5-year manufacturer’s warranty covering proper operation and defects in material or workmanship.

PART 2 – PRODUCTS

2.01 GENERAL

A. Make field measurements prior to fabrication to ensure proper fit. Report discrepancies in existing conditions that require detail changes to Engineer prior to fabrication

B. Assemble built-up Work in sections in the shop as much as practicable and match mark components for field assembly

C. Bolt holes (including those for attaching wood blocking and other components): by fabricator and not made or modified by burning

D. Gauges

1. For iron sheets and steel: U.S. Standard

2. For non-ferrous products: Brown & Sharpe

3. For wire: United States Steel Wire

E. Weld carbon steel per ANSI/AWS D1.1, with electrodes with a tensile strength of 70 ksi

F. Weld stainless steel per AWS D1.6/D1.6M

G. Steel

1. Comply with AISC 303

2. Steel mill material tolerances: per ASTM A6/A6M

3. Steel W-shapes: ASTM A992/A992M (50 ksi yield strength)

4. Steel channels and angles: ASTM A992/A992M (50 ksi yield strength) ASTM A572/572M grade 50, or ASTM A36/36M

5. Other steel shapes, plates and bars: ASTM A36/A36M

6. Steel pipe: ASTM A53/A53M, Grade B

7. Hollow structural shapes: ASTM A500/A500M, Grade B

H. Bolts: ASTM A325 Type I, heavy-hex

I. Nuts: ASTM A563, heavy-hex

J. Washers: ASTM F436 hardened steel

K. Tension-control bolt assemblies: ASTM F1852 Type I, heavy-hex

L. Direct tension indicators: ASTM F959, Type 325, compressible washer type

M. Threaded rods: ASTM A36/A36M

N. Aluminum items: Fabricated from bars, plates, pipes, rolled and extruded shapes conforming to the following alloy designation unless otherwise specified

1. Standard structural shapes: Rolled 6061-T6 per ASTM B308/B308M

2. Rolled rod and bar: 6061-T6 per ASTM B211

3. Sheets, Plates, Checkered Plates: 6061-T6 per ASTM B209

4. Bolts: 2024-T4

5. Nuts: 6061-T6

6. Washers: Alclad 2024-T4

O. Stainless steel items: Type 316 (Type 316L if welded)

2.02 EXPANSION BOLTS

A. Furnish per Section 03 16 00

2.03 ADHESIVE ANCHORS

A. For concrete: per Section 03 16 00.

B. For hollow masonry, acceptable level of quality: Equivalent to Hilti HIT HY20 Adhesive Anchors

2.04 MISCELLANEOUS STEEL ITEMS

A. Fabricate and furnish miscellaneous steel items, galvanized angles, relieving angles, plates, channels, and all required fastenings per Drawing details. Miscellaneous steel items shall be galvanized as specified herein

2.05 ANCHOR BOLTS

A. ASTM F1554 Grade 36 steel, galvanized except where stainless steel specified, headed and threaded

B. Type 316 stainless steel: to attach aluminum and in all submerged locations, including washers and nuts

C. Sizes: per Drawings

2.06 STEEL LINTELS

A. Material: Galvanized steel in sizes and shapes per Drawings

B. Minimum bearing on the masonry: 8 inches, except as otherwise shown on Drawings

C. Lintel angles bolted to masonry or concrete lintels supporting masonry veneer: provide standard short slotted (SSL) bolt holes spaced per Drawings to permit longitudinal thermal expansion and contraction of lintel angles

2.07 SHOP COATING

A. Prepare ferrous items and paint per Section 09 90 00, except where otherwise specified

B. Do not prime paint galvanized steel not specified to be painted, stainless steel, surfaces embedded in concrete or masonry (except for partially embedded components, extend priming 2 inches into the embedment), surfaces to be field welded, and faying surfaces at bolted connections designated as slip-critical.

C. Coat items specified as galvanized by the hot-dip process per ASTM A123/A123M, ASTM A153/A153M, or ASTM A653/A653M, as applicable, in molten zinc, to produce a continuous coating of uniform thickness of weight required by the referenced standards

1. Coating: Commercial quality, free from injurious defects, flux and uncoated spots, and per ASTM A239: capable of enduring not less than 4 immersions in copper sulfate without penetration of the coating

2. Identify galvanized items with a stamp showing the name of the galvanizer, the weight of the coating, and applicable ASTM compliance

D. Galvanized steel specified to be painted

1. Do not quench.

2. Phosphatize and prepare to be painted per ASTM D6386

3. Prime with paint compatible with the finish paints specified in Section 09 90 00

2.08 SOURCE OF QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 DISSIMILAR MATERIAL

A. Keep aluminum surfaces from direct contact with metals other than stainless steel by painting the dissimilar metal with a coating of zinc chromate paint, or provide non-absorptive tape between dissimilar metals

B. Paint aluminum with a coat of bituminous paint where aluminum is embedded in, or comes in contact with concrete, masonry or by-products of these materials

3.02 STEEL CONNECTIONS

A. Comply with RCSC "Specifications for Structural Joints Using ASTM A325 or A490 Bolts"

B. Design bolted connections as N-type bearing connections, installed snug-tight, except where shown as slip critical on Drawings

C. Minimum size: 3/4 inch

D. Minimum number of bolts per connection: 2

E. Slip critical joints are required per Drawings and at connections that include oversized holes or slotted holes (including braces) except where the direction of the load is normal to the slot

F. Where bolts are specified to be installed loose or finger tight, snug-up the connection to ensure that plies are in contact. Then back off the between 1/2 and 1 turn to permit intended movement of the connection. Provide double nuts on bolts prevent loosening

G. Weld steel per AWS D1.1/D1.1M. Grind exposed welds smooth

3.03 INSTALLATION

A. Verify elevations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates, and other embedments. Clean concrete and masonry bearing surfaces of bond reducing materials and roughen surfaces prior to setting plates

B. Concrete embedments: Installed under Section 03 11 00

C. Use stainless steel hardware when anchoring aluminum and in submerged locations

D. Steel lintels and masonry embedments: Installed under Section 04 20 00

3.04 BOLTS

A. Install bolts snug tight except where indicated as slip critical, using bolts of the proper length. Install bolt at least flush with the outer face of the nut. Cut off bolts projecting more than 5/8 inch beyond the nut in exposed work as close to nut as possible and as directed

B. Provide required cutting, fitting, drilling and tapping. Do not use thermal cutting during installation and erection except as approved. Do not make or modify bolt holes by burning

3.05 FIELD TOUCH UP

A. Where galvanized steel is field cut and locations where galvanized coating is removed: Touch up steel surface up with zinc rich paint meeting ASTM A780 and containing a minimum of 65% zinc at locations

3.06 CLEANING

A. Immediately after installation, round or chamfer sharp edges and grind burrs, jagged edges and surface defects smooth. Remove weld splatter

3.07 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.08 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 06 10 00

ROUGH CARPENTRY

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Providing all materials, tools, equipment and labor required to furnish, fabricate and complete the rough carpentry Work as shown on the Drawings, specified herein, and evidently required to complete the Work in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. ASME International (ASTM)

2. ASTM International (ASTM)

3. American Wood Protection Association (AWPA)

4. ICC-Evaluation Services

5. National Institute of Standards and Technology (NIST)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Wood Treatment Data

2. Water-Borne-Treated Products

3. Chemical Treatment Manufacturer Warranty

C. Certificates

1. For dimension lumber, indicating species and grade for each use, and compliance with minimum specified allowable unit stresses per values approved by the American Lumber Standards Committee.

2. For each type of preservative-treated wood product include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

C. For lumber and plywood pressure-treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 – PRODUCTS

2.01 LUMBER GENERAL

A. Lumber Standards: Furnish lumber manufactured to comply with NIST PS 20 and with applicable grading rules of inspection agencies certified by ALSC Board of Review.

B. Inspection Agencies: Inspection agencies include the following:

1. RIS - Redwood Inspection Service.

2. SPIB - Southern Pine Inspection Bureau.

3. WCLIB - West Coast Lumber Inspection Bureau.

4. WWPA - Western Wood Products Association.

5. NELMA - Northeastern Lumber Manufacturers Association.

6. NSLB - Northern Softwood Lumber Bureau.

7. NLGA - National Lumber Grades Authority.

C. Each piece of lumber shall factory-marked with grade stamp of inspection agency indicating grade, species, and moisture content at time of surfacing and milling.

D. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by NIST PS 20 for moisture content specified for each use.

1. Provide dressed lumber, S4S, unless otherwise indicated.

2. Provide lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes 2 inches or less in nominal thickness, unless otherwise indicated.

2.02 DIMENSION LUMBER

A. For structural framing (2 to 4 inches nominal thickness) provide the following (size factors NOT included):

B. Allowable bending stress of 575 psi minimum (661 psi under repetitive member use); allowable compressive stress parallel to the grain of 825 psi minimum; and a modulus of elasticity of 1,100,000 psi minimum. These values are for No. 2 Eastern Softwoods graded under NELMA or NSLB. Other species and grading meeting these properties are acceptable.

2.03 BOARDS

A. Concealed Boards: 15 percent maximum moisture content: Hem-Fir (North), Spruce-Pine-Fir (South), Spruce-Pine-Fir; Construction or 2 Common, grade per NELMA, NLGA, WCLIB, or WWPA.

2.04 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber for support and attachment of other construction, including: nailers, blocking, furring, and similar members. Provide 19 percent maximum moisture content at time of dressing & shipment; Hem-Fir, Hem-Fir (North), Spruce-Pine-Fir (South), Spruce-Pine-Fir; Construction or No. 2 grade per NELMA, NLGA, WCLIB, or WWPA.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

2.05 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Where exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153/A 153M or of Type 304 stainless steel. Where in contact with pressure-treated wood, use hot-dip galvanized or Type 316 stainless steel, and as noted.

B. Nails, Brads, and Staples: ASTM F 1667. Nails shall be common nails, except as otherwise noted.

C. Power Driven Fasteners: NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Anchor Bolts: Steel bolts complying with ASTM F 1554, Grade 36; with ASTM A 563 hex nuts and where indicated, flat washers.

2.06 PRESERVATIVE TREATED WOOD

A. Where lumber or plywood is indicated as pressure-treated, preservative-treated, or is specified herein to be treated, comply with applicable requirements of AWPA C2 (Lumber) and AWPA C9 (Plywood).

B. Pressure-treat items with water-borne preservative chemicals, legal for use in the Project state, with a minimum chemical preservative retention of 0.25 pcf. After treatment, kiln-dry lumber and plywood to a maximum moisture content, of 19 percent for lumber and 15 percent for plywood. Discard materials that are warped or that do not comply with requirements for untreated materials.

C. Treat indicated items and: blocking, furring, stripping, and similar members in contact with masonry or concrete.

PART 3 – EXECUTION

3.01 INSTALLATION-GENERAL

A. Discard pieces with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb and true to line and cut and fitted.

C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Securely attach rough carpentry Work to substrate by anchoring and fastening as indicated.

E. Countersink nail heads on exposed carpentry Work and fill holes.

F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish Work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

3.02 WOOD NAILERS AND BLOCKING

A. Install wood nailers and blocking were shown and where required for attachment of other Work. Form to shapes as shown and as required for true line and level of Work to be attached. Coordinate location with other Work involved.

B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry Work. Where possible, anchor to formwork before concrete placement.

3.03 FRAMING-GENERAL

A. Anchor and nail as shown, and to comply with NER-272.

B. Do not splice structural members between supports.

END OF SECTION

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SECTION 07 19 00

WATER REPELLENTS
(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide water repellent treatment to all exterior exposed concrete masonry in accordance with this Section and applicable reference standards listed in Article 1.03.

2. Coat all exterior masonry surfaces. This includes back faces of parapets, top of walls, edges and returns adjacent to windows and door frames and free standing walls.

B. Related Requirements

1. Section 04 20 00 – Unit Masonry

2. Section 09 24 23 – Cement Stucco

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.04 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data for water repellent

C. Certificates

1. Manufacturer Warranty

2. Material Safety Data Sheets

D. Manufacturer instructions including preparation, application, recommended equipment to be used, safety measures, and protection of completed application.

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Qualifications

1. Manufacturer's qualifications: Minimum five years record of successful in-service experience of water repellent treatments manufactured for concrete masonry application.

2. Applicator's qualifications: Minimum five years successful experience in projects of similar scope using specified or similar treatment materials and manufacturer's approval for application.

C. Performance Requirements

1. Water absorption: ASTM C 140. Comparison of treated and untreated specimens.

2. Moisture vapor transmission: ASTM E 96. Comparison of treated and untreated specimens.

3. Water penetration and leakage through masonry: ASTM E 514.

D. Evidence to support request for substitution

1. The difference between the specified product and the proposed substitution

2. A comparative analysis of the specified product and the proposed substitution, including tabulations of the composition of pigment and vehicle

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Deliver materials in original sealed containers, clearly marked with the manufacturer's name, brand name, type of material, batch number, percent solids by weight and volume, and date of manufacturer. Store materials off the ground, in a dry area where the temperature will be not less 50 degrees F nor more than 85 degrees F.

1.07 WARRANTY

A. Provide a warranty, issued jointly by the manufacturer and the applicator of the water repellent treatment against moisture penetration through the treated structurally sound surface for a period of 5 years covering material, labor, and equipment necessary to remedy problems.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Water repellent solution shall be a clear, non-yellowing, deep-penetrating, VOC compliant solution. Material shall not stain or discolor and shall produce a mechanical and chemical interlocking bond with the substrate to the depth of the penetration.

2.02 WATER REPELLENTS

A. Series 632 Prime-A-Pell H20 Concentrate by Chemprobe.

B. Silane, 20 Percent Solids: Penetrating water repellent. A monomeric compound containing approximately 20 percent alkyltrialkoxysilanes with alcohol, mineral spirits, water, and other proprietary solvent carrier.

1. Composition: Modified alkylalkoxysilane.

2. Active alkylalkoxysilane content: ASTM D 2369 20 percent by weight, plus or minus 1 percent.

3. Appearance: White, milky liquid.

4. Average depth of penetration: Up to 3/8 inch depending on substrate.

5. VOC content: Less than 350 grams per liter.

6. Flash point, ASTM D 3278.

7. Specific gravity, at 78 degrees F: 0.96 to 0.98.

8. Density: 0.0 to 8.2 pounds per gallon.

2.03 PERFORMANCE CRITERIA

A. Silane, 20 Percent Solids:

1. Water absorption test: ASTM C 642 and ASTM E 514.

2. Moisture vapor transmission: ASTM D 1653, 28.33 perms or 51.61 percent maximum compared to untreated surfaces.

3. Scaling resistance: ASTM C 672/C 672M, non-air-entrained concrete, zero rating, no scaling, 100 cycles treated concrete.

4. Resistance to chloride ion penetration: AASHTO T 259 and AASHTO T 260.

5. Water penetration and leakage through masonry, ASTM E 514percentage reduction of leakage: 97 percent minimum.

6. Resistance to accelerated weathering, ASTM G 53 testing 2,500 hours: No loss in repellency.

7. Drying time under normal conditions: Four hours per 75 degrees F.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine masonry surfaces to be treated to ensure that:

1. visible cracks, voids or holes have been repaired;

2. mortar joints in masonry are tight and sound, have not been re-set or misaligned and show no cracks or spalling;

3. moisture contents of walls does not exceed 15 percent when measured on an electronic moisture register, calibrated for the appropriate substrate; and

4. concrete surfaces are free of form release agents, curing compounds and other compounds that would prevent full penetration of the water repellent material.

B. Do not start water repellent treatment Work until all deficiencies have been corrected, examined and found acceptable to the Engineer and the water repellent treatment manufacturer. Do not apply treatment to damp, dirty, dusty or otherwise unsuitable surfaces. Comply with the manufacturer's recommendations for suitability of surface.

3.02 PREPARATION

A. Surface Preparation: Prepare substrates in accordance with water repellent treatment manufacturer's recommendation. Clean surfaces of dust, dirt, efflorescence, alkaline, and foreign matter detrimental to proper application of water repellent treatment.

B. Protection: Provide masking or protective covering for materials which could be damaged by water repellent treatment

1. Protect glass, glazed products, and prefinished products from contact with water repellent treatment.

2. Protect landscape materials with breathing type drop cloths: plastic covers are not acceptable.

C. Compatibility

1. Confirm treatment compatibility with each type of joint sealer within or adjacent to surfaces receiving water repellent treatment in accordance with manufacturer's recommendations.

3.03 SAFETY METHODS

A. Apply coating materials using safety methods and equipment in accordance with manufacturer's application recommendations and the following:

B. Toxic Materials: To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

1. The coating manufacturer when using solvents or other chemicals. Use impermeable gloves, chemical goggles or face shield, and other recommended protective clothing and equipment to avoid exposure of skin, eyes, and respiratory system. Conduct Work in a manner to minimize exposure of building occupants and the general public.

2. 29 CFR 1910.1000.

3. Threshold Limit Values (R) of the American Conference of Governmental Industrial Hygienists.

4. Manufacturer's material safety data sheets.

3.04 ENVIRONMENTAL CONDITIONS

A. Apply coating materials using safety methods and equipment in accordance with manufacturer's A. Weather and Substrate Conditions: Do not proceed with application of water repellents under any of the following conditions, except with written recommendations of manufacturer.

1. Ambient temperature is less than 40 degrees F.

2. Substrate faces have cured less than one month.

3. Rain or temperature below 40 degrees F are predicted for a period of 24 hours before or after treatment.

4. Earlier than three days after surfaces are wet.

5. Substrate is frozen or surface temperature is less than 40 degrees F and falling.

B. Moisture Condition: Determine moisture content of substrate meets manufacturer's requirements prior to application of water repellent material.

3.05 SEQUENCING AND SCHEDULING

A. Masonry Surfaces: Do not start water repellent coating until all joint tooling, pointing and masonry cleaning operations have been completed. Allow masonry to cure for at least 60 days under normal weather conditions before applying water repellent.

B. Sealants: Do not apply water repellents until the sealants for joints adjacent to surfaces receiving water repellent treatment have been installed and cured.

1. Water repellent Work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the Work.

2. Provide manufacturers' test results of compatibility.

3.06 MIXING

A. Mix water repellent material thoroughly in accordance with the manufacturer's recommendations. Mix, in quantities required for that days' Work, all containers prior to application. Mix each container the same length of time.

3.07 APPLICATION

A. Water Repellent Treatment: In strict accordance with the manufacturers written requirements. Do not start application without the manufacturer's representative being present or his written acceptance of the surface to be treated.

1. Spray Application: Spray apply water repellent material to exterior masonry surfaces using low-pressure airless spray equipment in strict accordance with manufacturer's printed application, instructions, and precautions. Maintain copies at the job Site. Apply flood coat in an overlapping pattern allowing approximately 200 to 250 mm (8 to 10 inch) rundown on the vertical surface. Maintain a wet edge at all overlaps, both vertical and horizontal. Hold gun maximum 450 mm (18 inches) from wall.

2. Brush or Roller Application: Brush or roller apply water repellent material only at locations where overspray would affect adjacent materials and where not practical for spray applications.

3. Covered Surfaces: Coat all exterior masonry surfaces including back faces of parapets, tops of walls, edges and returns adjacent to window and door frames, window sills, and free-standing walls.

4. Rate of Application: Apply materials to exterior surfaces at (150 SQ. FT./GAL.) coverage rate.

5. Number of Coats: The sample panel test shall determine the number of coats required to achieve full coverage and protection.

6. Appearance: If unevenness in appearance, lines of Work termination or scaffold lines exist, or detectable changes from the approved sample panel occur, the Engineer may require additional treatment at no additional cost to the Owner. Apply any required additional treatment to a natural break off point.

3.08 CLEANING

A. Clean all runs, drips, and overspray from adjacent surfaces while the water repellent treatment is still wet in a manner recommended by the manufacturer.

3.09 FIELD QUALITY CONTROL

A. Do not remove drums containing water repellent material from the Site until completion of all water repellent treatment and authorized by the Engineer.

END OF SECTION

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SECTION 07 50 00

MEMBRANE ROOFING
(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide flexible sheet roofing (FSR) as indicated on Drawings and hereby defined to include non-traffic-bearing sheet membrane system intended for weather exposure as primary roofing in accordance with this Section and applicable reference standards listed in Article 1.03.

   a. Types of roofing systems specified in this section utilizing flexible sheet roofing membranes include totally adhered systems.

2. Flexible sheet roofing membranes include Ethylene propylene diene terpolymer (EPDM)

3. Roof insulation related to flexible sheet roofing is specified in this section.

B. Related Requirements

1. Section 07 60 00 Flashing and Sheet Metal

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.04 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Preconstruction Submittals

1. Pre-Roofing Conference Records

C. Product Data

1. Flexible Sheet Roofing System Materials

D. Shop Drawings

1. Roof Configuration
2. Perimeter Details
3. Tapered Insulation Layout

E. Manufacturer Instructions

1. Flexible Sheet Roofing System Materials

F. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Manufacturer: Obtain primary flexible sheet roofing from a single manufacturer. Provide secondary materials as recommended by manufacturer of primary materials.

C. Installer: A firm with not less than 5 years of successful experience in installation of roofing systems similar to those required for this Project and which is acceptable to or licensed by manufacturer of primary roofing materials. Firm shall be qualified as a No-Dollar-Limit (NDL)-approved contractor by manufacturer.

D. Assign Work closely associated with flexible sheet roofing, including (but not limited to) insulation, flashing and counter flashing, and joint sealers, to Installer of flexible sheet roofing.

E. Pre-Roofing Conference: Prior to installation of roofing and associated Work, meet at Project Site, or other mutually agreed location, with Installer, and other entities concerned with roofing performance, including (where applicable) Engineer and Owner. Record discussions and agreements and furnish copy to each participant. Provide at least 72 hours advance notice to participants prior to convening pre-roofing conference.

F. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification necessary in connection with fire and extended coverage insurance on roofing and associated Work.

G. UL Listing: Provide labeled materials which have been tested and listed by UL in "Building Materials Directory" for application indicated, with "Class A" rated materials/system for roof slopes shown.

H. Thermal Resistivity: Where thermal resistivity properties of insulating materials are designated by R-values, they represent the rate of heat flow through a homogenous material exactly 1" thick, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature difference in degrees F between the two exposed faces required to

cause one BTU to flow through one square foot per hour at mean temperatures indicated.

I. Thermal Resistance: Where thermal resistance properties of insulating materials are designated by R-values they represent the rate of heat flow through a material of thickness indicated, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one square foot per hour at mean temperatures indicated.

J. Pull-Out Tests for Replacement Roofs: Perform pull-out tests on all wood fiber decks (as applicable) to insure proper fastener selection. Submit results of testing and fastener selection to the Engineer for review.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.07 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

B. Weather: Proceed with roofing Work when existing and forecasted weather conditions permit Work to be performed in accordance with manufacturers' recommendations and warranty requirements.

1.08 WARRANTY

A. Provide roofing manufacturer's standard FM 1-90 wind uplift written warranty, signed by manufacturer of primary roofing materials and his authorized Installer, agreeing to replace/repair defective materials and workmanship.

B. Extended Warranty Period: 15 years no-dollar-limit (NDL) after date of Substantial Completion.

PART 2 – PRODUCTS

2.01 GENERAL

A. Performance: Provide roofing materials recognized to be of generic type indicated and tested to show compliance with indicated performances, or provide other similar materials certified in writing by manufacturer to be equal or better than specified in every significant respect and acceptable to Engineer.

B. Compatibility: Provide products which are recommended by manufacturers to be fully compatible with indicated substrates or provide separation materials as required to eliminate contact between incompatible materials.

2.02 EPDM FSR MEMBRANE

A. Ethylene propylene diene monomers formed into uniform, flexible sheets, complying with the following:

1. Tensile Strength (ASTM D 412): 1400 psi.
2. Ultimate Elongation (ASTM D 412): 300 percent.
3. Brittleness Temperature (ASTM D 746): negative 49 deg.F.
4. Tear Resistance (ASTM D 624): 125 lbs. per lin. inch.
5. Resistance to Ozone Aging (ASTM D 1149): No cracks after 168 hours exposure of 50% elongated samples at 104 deg.F and 100 pphm ozone.
6. Resistance to Heat Aging (ASTM D 573): Maximum reduction in elongation of 30% maximum loss of tensile strength of 15% (168 hours at 240 deg.F).
7. Thickness: 60 mils, nominal.
8. Exposed Face Color: Black

B. Fully Adhered EPDM Membrane:

1. Manufacturers: Subject to compliance with requirements, provide products by Carlisle Syntec Systems or approved equal.

2.03 MISCELLANEOUS MATERIALS FOR FSR

A. Sheet Seaming System: Manufacturer's standard materials for sealing lapped joints, including edge sealer to cover exposed spliced edges as recommended by manufacturers of FSR system.

B. Tapered Edge Strips and Flashing Accessories: Types recommended by manufacturer of FSR material, provided at locations indicated and at locations recommended by manufacturer, including adhesive tapes, flashing cements, and sealants.

C. Mechanical Fasteners: Metal plates, caps, battens, accessory components, fastening devices, toggle bolts, and adhesives to suit substrate and as recommended by FSR membrane manufacturer. Perform pull-out tests on wood fiber decks to insure proper fastener selection. Submit results of pull-out tests to the Engineer for review with the fastener recommended by the FSR manufacturer.

D. Membrane Adhesive: As recommended by FSR membrane manufacturer for particular substrate and Project conditions, formulated to withstand min. 60 psf uplift force.

2.04 INSULATING MATERIALS

A. General: Provide insulating materials to comply with requirements indicated for materials and compliance with referenced standards; in sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths and lengths.

B. Polyisocyanurate Board Roof Insulation: Rigid, cellular thermal insulation with polyisocyanurate closed-cell foam core and manufacturer's standard facing laminated to both sides; complying with FS HH-I-1972/2, Class 1; aged R-values as designated at mean temperatures indicated, after conditioning per RIC/TIMA Bulletin #281-1; and as follows:

C. Thermal Resistance: 22 at 75 deg. F for 3" thick insulation board.

2.05 MISCELLANEOUS INSULATION MATERIALS

A. Adhesive for Bonding Insulation: Type recommended by insulation manufacturer and complying with fire resistance requirements.

B. Mechanical Anchors: Fasteners for metal deck shall Olympic fastening system compatible with the deck material or as recommended by insulation manufacturer for deck type and complying with fire and insurance rating requirements. New metal deck is 22 Ga.

2.06 MISCELLANEOUS ROOFING ACCESSORIES

A. Flashing Material: EPDM-compatible with manufacturer's flexible sheet membrane system.

B. Batten Strips: As supplied by roof membrane manufacturer.

C. Pre-Fab Pipe Flashing: As supplied by roof membrane manufacturer.

D. Roof Curbs: Wood as shown.

E. Expansion Joint: As supplied by roof membrane manufacturer.

PART 3 – EXECUTION

3.01 PREPARATION OF SUBSTRATE

A. Comply with manufacturers' instructions for preparation of substrate to receive FSR system.

B. Install flashings and accessory items as shown and as recommended by manufacturer even though not shown.

C. Prevent compounds and debris from entering and clogging drains and conductors, and from spilling or migrating onto surfaces of other Work.

3.02 INSTALLATION

A. Comply with manufacturers' instructions, except where more stringent requirements are indicated.

3.03 INSULATION INSTALLATION

A. Extend insulation in one layer, except where indicated over entire surface to be insulated, cutting, and fitting tightly around obstructions. Form crickets and tapered areas with additional material as shown and as required for proper drainage of membrane.

B. Stagger all joints in one direction for each course. For multiple layers, stagger joints both directions between courses.

C. Do not install more insulation each day than can be covered with membrane before end of day and before start of inclement weather.

D. Secure roof insulation to substrate with mechanical anchors of type and spacing as required to meet wind requirements specified in Warranty Section 1.09.

3.04 FSR MEMBRANE INSTALLATION

A. General: Start installation only in presence of manufacturer's technical representative if required for issuing warranty.

B. Adhesive Adhered FSR: Install membrane by unrolling over prepared substrate, lapping adjoining sheets as recommended by manufacturer. Apply adhesive to surfaces to be bonded and roll FSR into place when adhesive has properly cured. Treat seams with in-seam tape per manufacturer’s recommendations and apply sealant to exposed sheet edges, tapering application as recommended by manufacturer. Install mechanical fasteners, flashings and counter flashings, and accessories at locations and as recommended by manufacturer.

END OF SECTION

SECTION 07 60 00

FLASHING AND SHEET METAL
(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide finished sheet metalwork forming weather tight construction without waves, warps, buckles, fastening stresses or distortion, which allows for expansion and contraction, in accordance with this Section and applicable reference standards listed in Article 1.03.

2. Sheet metal mechanic is Responsible for cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the Work of other trades.

3. Coordinate installation of sheet metal items used in conjunction with roofing with roofing Work to permit continuous roofing operations.

B. Related Requirements

1. Section 07 50 00 Membrane Roofing

1.02 REFERENCES

A. MA 271 CMR: Rules and Regulations Governing Sheet Metal Workers

1.03 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Flashing and Sheet Metal

C. Samples and Mockups: color palettes for metal flashing.

D. Manufacturer Instructions

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness, and wet-storage stains upon delivery to the job Site. Remove from the Site and replace damaged materials that cannot be restored to like-new condition. Handle sheet metal items to avoid damage to surfaces, edges, and ends. Store materials in dry, weather-tight, ventilated areas until immediately before installation.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Do not use lead, lead-coated metal, or galvanized steel. Use any metal listed by SMACNA Arch. Manual for a particular item, unless otherwise specified or indicated. Conform to the requirements specified and to the thicknesses and configurations established in SMACNA Arch. Manual for the materials. Different items need not be of the same metal, except that if copper is selected for any exposed item, all exposed items must be copper.

B. Furnish sheet metal items in 8 to 10 foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Factory fabricate corner pieces with minimum 12 inch legs. Provide accessories and other items essential to complete the sheet metal installation. Make these accessories of the same materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below:

1. Exposed Sheet Metal Items: Must be of the same material. Consider the following as exposed sheet metal: cap, valley, steeped, base, and eave flashings and related accessories.

2. Copper, Sheet and Strip: ASTM B 370, cold-rolled temper, H 00 (standard).

3. Lead-Coated Copper Sheet: ASTM B 101.

4. Steel Sheet, Zinc-Coated (Galvanized): ASTM A 653/A 653M.

5. Zinc Sheet and Strip: ASTM B 69, Type I, a minimum of 0.024 inch thick.

6. Stainless Steel: ASTM A 167, Type 302 or 304, 2D Finish, fully annealed, dead-soft temper.

7. Aluminum Alloy Sheet and Plate: ASTM B 209M, ASTM B 209, Baked enamel finish; 0.050" thick except as otherwise indicated. Brake form to profiles needed.

8. Aluminum Alloy, Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221M (ASTM B 221).

9. Solder: ASTM B 32, 95-5 tin-antimony.

10. Fasteners: Use the same metal or a metal compatible with the item fastened. Use stainless steel fasteners to fasten dissimilar materials.

11. Roof Expansion Joint Cover: Provide factory-manufactured flexible, weatherproof, exterior covers for structural expansion joints. Cover shall be manufactured of 3-ply flexible reinforced hypalon bellow supported by closed cell foam with aluminum mounting flanges factory locked to each edge of bellow. Provide roof expansion joint covers by "Portals Plus" or approved equal.

12. Elastic Sheet Flashing: Manufacturer's standard flexible, elastic, black, non-reinforced, flashing sheet of 60 mil (min.) total thickness. Provide perm-a-barrier wall flashing by Grace Construction Products or approved equal.

2.02 PROTECTION FROM CONTACT WITH DISSIMILAR MATERIALS

A. Copper or Copper-bearing Alloys: Paint with heavy-bodied bituminous paint surfaces in contact with dissimilar metal, or separate the surfaces by means of moisture-proof building felts.

B. Aluminum: Do not allow aluminum surfaces in direct contact with other metals except stainless steel, zinc, or zinc coating. Where aluminum contacts another metal, paint the dissimilar metal with a primer followed by two coats of aluminum paint. Where drainage from a dissimilar metal passes over aluminum, paint the dissimilar metal with a non-lead pigmented paint.

C. Metal Surfaces: Paint surfaces in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Workmanship: Make lines and angles sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

1. Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections. For installation of items not shown in detail or not covered by Specifications conform to the applicable requirements of SMACNA Arch. Manual, Architectural Sheet Metal Manual. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the Work watertight.

B. Nailing: Confine nailing of sheet metal generally to sheet metal having a maximum width of 18 inch. Confine nailing of flashing to one edge only. Space nails evenly not over 3 inch on center and approximately 1/2 inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, include in Shop Drawings, the locations for sleepers and nailing strips required to secure the Work.

C. Cleats: Provide cleats for sheet metal 18 inch and over in width. Space cleats evenly not over 12 inch on center unless otherwise specified or indicated. Unless otherwise specified, provide cleats of 2 inch wide by 3 inch long and of the same material and thickness as the sheet metal being installed. Secure one end of the cleat with two nails and the cleat folded back over the nail heads. Lock the other end into the seam. Where the fastening is to be made to concrete or masonry, use screws and drive in expansion shields set in concrete or masonry.

D. Bolts, Rivets, and Screws: Install bolts, rivets, and screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a watertight connection. Make joints in aluminum sheets 0.050 inch or less in thickness.

E. Seams: Straight and uniform in width and height.

1. Flat-lock Seams: Finish not less than 3/4 inch wide.

2. Lap Seams: Overlap seams not soldered, not less than 3 inch.

3. Flat Seams: Make seams in the direction of the flow.

F. Metal Drip Edge: Provide a metal drip edge, designed to allow water run-off to drip free of underlying construction, at eaves and rakes prior to the application of roofing shingles. Apply directly on the wood deck at the eaves and over the underlay along the rakes. Extend back from the edge of the deck not more than 3 inch and secure with compatible nails spaced not more than 10 inch on center along upper edge.

G. Flashing at Roof Penetrations and Equipment Supports: Provide pre-fabricated flashing for all pipes, ducts, and conduits projecting through the roof surface and for equipment supports, guy wire anchors, and similar items supported by or attached to the roof deck.

H. Stepped Flashing: Stepped flashing shall be installed where sloping roofs surfaced with shingles abut vertical surfaces. Separate pieces of base flashing shall be placed in alternate shingle courses.

3.02 CLEANING

A. Clean exposed sheet metal Work at completion of installation. Remove grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris, and scrub-clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks, and solder or weld marks.

3.03 REPAIRS TO FINISH

A. Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged surfaces caused by scratches, blemishes, and variations of color and surface texture. Replace items which cannot be repaired.

END OF SECTION

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SECTION 07 92 00

JOINT SEALANTS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide joint sealant as shown on Drawings and in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.04 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Shelf Life

2. Curing Time

3. Mixing and Application Instructions

4. Primer Data

C. Samples and Mockups: as specified in Article 1.06.

1. Initial Selection: Submit samples of manufacturer's color charts showing complete range of colors, textures, and finishes available for each material used.

2. Verification: Submit actual representative samples of each sealant material that is to be exposed in the completed Work. Show full color ranges and finish variations expected. Provide sealant samples having minimum size of (4 inches) long.

D. Certificates

1. Material Safety Data Sheets

2. Certification of Compliance

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Compatibility with Substrate: Verify that each of the sealants are compatible for use with joint substrates.

C. Joint Tolerance: Provide joint tolerances in accordance with manufacturer's printed instructions.

D. Mock-Up: Project personnel is Responsible for installing sealants in mock-up prepared by other trades, using materials and techniques approved for use on the Project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Deliver materials to the job Site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, color, and material designation clearly marked thereon. Label elastomeric sealant containers to identify type, class, grade, and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 90 degrees F or less than 0 degrees F.

1.07 ENVIRONMENTAL CONDITIONS

A. Apply sealant when the ambient temperature is between 40 and 90 degrees F.

1.08 WARRANTY

A. Guarantee sealant joint against failure of sealant and against water penetration through each sealed joint for five years.

PART 2 – PRODUCTS

2.01 SEALANTS

A. Typical Interior Sealant: Provide polyurethane sealants that meet requirements of ASTM C 920, Type M, Grade NS, Class 25, Use NT, M, G, A, O. Locations and color of sealant for the following:

LOCATION	COLOR
Small voids between walls or partitions and adjacent lockers, casework, shelving, door frames, built-in or surface-mounted equipment and fixtures, and similar items.	As selected by Engineer
Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces.	As selected by Engineer
Joints of interior masonry walls and partitions which adjoin columns, pilasters, concrete walls, and exterior walls unless otherwise detailed.	As selected by Engineer
Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.	As selected by Engineer
. Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occurring where substrates change.	As selected by Engineer

B. Exterior Sealant: For joints in vertical and horizontal surfaces, polyurethane sealant that meets requirements of ASTM C 920, Type M, Grade NS, Class 25, Use M, G, A, O. Provide locations and colors of sealant as follows:

LOCATION	COLOR
Joints and recesses formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations.	As selected by Engineer

Joints between new and existing exterior masonry walls.	As selected by Engineer
Masonry joints where shelf angles occur.	As selected by Engineer
Expansion and control joints.	As selected by Engineer
Interior face of expansion joints in exterior concrete or masonry walls where metal expansion joint covers are not required.	As selected by Engineer
Voids where items pass through exterior walls.	As selected by Engineer
Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.	As selected by Engineer
Metal-to-metal joints where sealant is indicated or specified.	As selected by Engineer
Joints between ends of gravel stops, fascias, copings, and adjacent walls.	As selected by Engineer

C. General Sealant:

1. Floor Joint Sealant: ASTM C 920, Type M, Grade P or NS, Class 25, Use T. Provide locations and colors of sealant as follows:

LOCATION	COLOR
Seats of metal thresholds for exterior doors.	As selected by Engineer
Control and expansion joints in floors, slabs, ceramic tile, and walkways.	As selected by Engineer

2. Preformed Sealant: Provide preformed sealant of polybutylene or isoprene-butylene based pressure sensitive weather resistant tape or bead sealant capable of sealing out moisture, air and dust when installed as recommended by the manufacturer. At temperatures from minus 34 to plus 71 degrees C (30 to plus 160 degrees F), the sealant must be non-bleeding and no loss of adhesion.

3. Concrete Slab Joint Sealant: For joints in concrete slabs, provide polyurethane elastomertic sealant meeting the requirements of ASTM C 920, Type S, Grade P or NS, Class 25, Use T. Color selected by Engineer from submitted samples.

4. Concrete Wall Joint Sealants: For joints in concrete walls, provide polyurethane elastometeric sealant meeting the requirements on ASTM C 920, Type S, Grade NS, Class 25, Use NT. Color selected by Engineer from submitted samples.

2.02 PRIMERS

A. Provide a non-staining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

2.03 BOND BREAKERS

A. Provide the type and consistency recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

2.04 SEALANT BACK-UP ROD

A. Provide polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Provide 25 to 33 percent oversized backing for closed cell , unless otherwise indicated. Make backstop material compatible with sealant. Do not use oakum and other types of absorptive materials as backstops.

2.05 CLEANING SOLVENTS

A. Provide type(s) recommended by the sealant manufacturer except for aluminum and bronze surfaces that will be in contact with sealant.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION

A. Clean surfaces from dirt frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Remove oil and grease with solvent. Surfaces must be wiped dry with clean cloths. When resealing an existing joint, remove existing calk or sealant prior to applying new sealant. For surface types not listed below, contact sealant manufacturer for specific recommendations.

B. Steel Surfaces: Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish Work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue-free solvent.

C. Aluminum or Bronze Surfaces: Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. For removing protective coatings and final cleaning, use non-staining solvents recommended by the manufacturer of the item(s) containing aluminum or bronze surfaces.

D. Concrete and Masonry Surfaces: Where surfaces have been treated with curing compounds, oil, or other such materials, remove materials by sandblasting or wire brushing. Remove laitance, efflorescence and loose mortar from the joint cavity.

E. Wood Surfaces: Keep wood surfaces to be in contact with sealants free of splinters and sawdust or other loose particles.

3.02 SEALANT PREPARATION

A. Do not add liquids, solvents, or powders to the sealant. Mix multi-component elastomeric sealants in accordance with manufacturer's instructions.

3.03 APPLICATION

A. Joint Width-To-Depth Ratios:

1. Acceptable Ratios:

JOINT WIDTH	JOINT DEPTH	
	Minimum	Maximum
For metal, glass, or other nonporous surfaces:		
1/4 inch (minimum)	1/4 inch	1/4 inch
over 1/4 inch	1/2 of width	Equal to width
For wood, concrete, or masonry:		
1/4 inch (minimum)	1/4 inch	1/4 inch
Over 1/4 inch to 1/2 inch	1/4 inch	Equal to width
Over 1/2 inch to 2 inch	1/2 inch	5/8 inch
Over 2 inch.	(As recommended by sealant manufacturer)	

2. Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or

cut to acceptable widths without damage to the adjoining Work. Grinding is not required on metal surfaces.

B. Masking Tape: Place masking tape on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Remove masking tape within 10 minutes after joint has been filled and tooled.

C. Backstops: Install backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide a joint of the depth specified. Install backstops in the following locations:

1. Where indicated.

2. Where backstop is not indicated but joint cavities exceed the acceptable maximum depths specified in paragraph entitled, "Joint Width-to-Depth Ratios."

D. Primer: Immediately prior to application of the sealant, clean out loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's instructions. Do not apply primer to exposed finish surfaces.

E. Bond Breaker: Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.

F. Sealants: Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and can not be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's printed instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Make sealant uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant, and tool smooth as specified. Apply sealer over the sealant when and as specified by the sealant manufacturer.

3.04 PROTECTION AND CLEANING

A. Protection: Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

B. Final Cleaning: Upon completion of sealant application, remove remaining smears and stains and leave the Work in a clean and neat condition.

1. Masonry and Other Porous Surfaces: Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hour then remove by wire brushing or sanding.

2. Metal and Other Non-Porous Surfaces: Remove excess sealant with a solvent-moistened cloth.

END OF SECTION

SECTION 08 11 00

METAL DOORS AND FRAMES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide metal doors and frames in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 08 71 00 Door Hardware

2. Section 09 90 00 Painting and Coating

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Welding Society (AWS)

2. ASTM International (ASTM)

3. Builders hardware Manufacturers Association (BHMA)

4. National Fire Protection Association (NFPA)

5. Steel Door Institute (SDI/DOOR)

6. Underwriters Laboratories (UL)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Doors

2. Frames

3. Accessories

4. Weather stripping

C. Shop Drawings

1. Doors

2. Frames

3. Accessories

4. Weather stripping

5. Schedule of doors

6. Schedule of frames

7. Submit door and frame locations.

D. Samples and Mockups: as specified in Article 1.06.

1. Factory-applied enamel finish

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Strap knock-down frames in bundles. Provide temporary steel spreaders securely fastened to the bottom of each welded frame. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4 inch airspace between doors. Remove damp or wet packaging immediately and wipe affected surfaces dry. Replace damaged materials with new.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers include the following:

1. Perma-a-Door
2. Stanley
3. Republic Builders Prod. Corp.
4. Everstrait
5. Peachtree
6. Ceco
7. Curries
8. Or equal

2.02 STANDARD STEEL DOORS

A. SDI/DOOR A250.8, except as specified otherwise. Prepare doors to receive door hardware. Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion. Doors shall be 1-3/4 inch thick, unless otherwise indicated. Face sheets, edges, and frames of galvanized steel not lighter than 16 gage, 16 gage, and 14 gage respectively;

2.03 INSULATED STEEL DOOR SYSTEMS

A. Provide 1-3/4 inch thick insulated steel doors and frames, as indicated on Drawings.

B. Insulated steel doors shall have a core of polyurethane foam and an R factor of 10.0 or more (based on a k value of 0.16); face sheets, edges, and frames of galvanized steel not lighter than 16 gage, 16 gage, and 14 gage respectively; magnetic weather stripping; non-removable-pin hinges; thermal-break aluminum threshold; and vinyl door bottom.

C. Doors and frames shall receive phosphate treatment, rust-inhibitive primer, and baked acrylic enamel finish. Doors shall have been tested in accordance with SDI/DOOR A250.4 and shall have met the requirements for Level C.

D. Prepare doors to receive specified hardware.

2.04 ACCESSORIES

A. Moldings: Provide moldings around glass of interior and exterior doors. Provide non-removable moldings on outside of exterior doors and on corridor side of interior doors. Other moldings may be stationary or removable. Secure inside

moldings to stationary moldings, or provide snap on moldings. Muntins shall interlock at intersections and shall be fitted and welded to stationary moldings.

2.05 INSULATION CORES

A. Insulated cores shall be of type specified, and provide an apparent U-factor of .48 in accordance with SDI/DOOR 113 and shall conform to:

1. Rigid Polyurethane Modified Polyisocyanurate Foam: ASTM C 591, Type I or II, foamed-in-place or in board form, with oxygen index of not less than 22 percent when tested in accordance with ASTM D 2863; or

2. Rigid Polystyrene Foam Board: ASTM C 578, Type I or II.

2.06 STANDARD STEEL FRAMES

A. SDI/DOOR A250.8, except as otherwise specified. Form frames to sizes and shapes with either welded corners or knock-down field-assembled corners. Provide steel frames for doors, transoms, sidelights, and mullions, unless otherwise indicated.

1. Welded Frames: Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets. Grind welds smooth.

   Weld frames in accordance with the recommended practice of the Structural Welding Code Sections 1 through 6, AWS D1.1/D1.1M and in accordance with the practice specified by the producer of the metal being welded.

2. Mullions and Transom Bars: Mullions and transom bars shall be closed or tubular construction and be a member with heads and jambs butt-welded thereto or knock-down for field assembly. Bottom of door mullions shall have adjustable floor anchors and spreader connections.

3. Stops and Beads: Form stops and beads from 20 gage steel. Provide for glazed and other openings in standard steel frames. Secure beads to frames with oval-head, countersunk Phillips self-tapping sheet metal screws or concealed clips and fasteners. Space fasteners approximately 12 to 16 inch on center. Miter molded shapes at corners. Butt or miter square or rectangular beads at corners.

4. Anchors: Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated, not lighter than 18 gage.

5. Wall Anchors: Provide at least three bolts for each jamb. For frames which are more than 7.5 feet in height, provide one additional bolt for

each jamb for each additional 2.5 feet or fraction thereof. Provide retrofit frames with bolt holes and dimples for 316 SS expansion bolts.

6. Floor Anchors: Provide floor anchors drilled for 3/8 inch anchor bolts at bottom of each jamb member.

2.07 FIRE AND SMOKE DOORS AND FRAMES

A. NFPA 80 and NFPA 105 and this specification. The requirements of NFPA 80 and NFPA 105 shall take precedence over details indicated or specified.

B. Door and Frame Labels: Fire doors and frames shall bear the label of Underwriters Laboratories (UL), Factory Mutual Engineering and Research (FM), or Warnock Hersey International (WHI) attesting to the rating required. Testing shall be in accordance with NFPA 252 or UL 10B. Labels shall be metal with raised letters, and shall bear the name or file number of the door and frame manufacturer. Labels shall be permanently affixed at the factory to frames and to the hinge edge of the door. Door labels shall not be painted.

2.08 WEATHERSTRIPPING

A. As specified in Section 08 71 00, Door Hardware.

2.09 HARDWARE PREPARATION

A. Provide minimum hardware reinforcing gages as specified in SDI/DOOR A250.6. Drill and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of SDI/DOOR A250.8 and SDI/DOOR A250.6. For additional requirements refer to BHMA A115. Drill and tap for surface-applied hardware at the Project Site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of SDI/DOOR A250.8, as applicable. Punch door frames, with the exception of frames that will have weather stripping gasketing, to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

2.10 FINISHES

A. Hot-Dip Zinc-Coated and Factory-Primed Finish: Fabricate exterior doors and frames from hot dipped zinc coated steel, alloyed type, that complies with ASTM A 924/A 924M and ASTM A 653/A 653M. The coating weight shall meet or exceed the minimum requirements for coatings having 0.4 ounces per square foot, total both sides, i.e., A40. Repair damaged zinc-coated surfaces by the application of zinc dust paint. Thoroughly clean and chemically treat to insure maximum paint adhesion. Factory prime as specified in SDI/DOOR A250.8.

2.11 FABRICATION AND WORKMANSHIP

A. Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable. Design frames in exposed masonry walls or partitions to allow sufficient space between the inside back of trim and masonry to receive caulking compound.

B. Grouted Frames: For frames to be installed in exterior walls, fill with foam insulation.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Frames: Set frames in accordance with SDI/DOOR A250.11. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

B. Doors: Hang doors in accordance with clearances specified in SDI/DOOR A250.8. After erection and glazing, clean and adjust hardware.

C. Fire and Smoke Doors and Frames: Install fire doors and frames, including hardware, in accordance with NFPA 80. Install fire rated smoke doors and frames in accordance with NFPA 80 and NFPA 105.

3.02 PROTECTION

A. Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the Project or replace with new, as directed. Wire brush rusted frames until rust is removed. Clean thoroughly.

B. An all-over coat of rust-inhibitive paint of the same type used for shop coat will be applied by the Painting Subcontractor in accordance with Section 09 90 00.

3.03 CLEANING

A. Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide finish hardware for doors to provide correct functions for intended use, provide related items and services, as indicated on Drawings and in accordance with this Section and applicable reference standards listed in Article 1.03.

2. Furnish hardware schedules and templates as required for fabrication of doors and frames under other Sections.

3. Provide hardware that complies with applicable codes and requirements of authorities that have jurisdiction.

B. Related Requirements

1. Section 07 92 00 Joint Sealants

2. Section 08 11 00 Metal Doors and Frames

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.04 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Submit manufacturer's product data, catalog cuts, descriptive data, UL listings, and other pertinent technical data for each of the products used. Submit certifications of fire-ratings for hardware items located in rated assemblies.

C. Shop Drawings

1. Final hardware and keying schedule. Format schedule vertically. List each door opening using same designations indicated on Drawings.

D. Manufacturer Instructions

1. Installation Templates: Provide installation templates for Work installed or prepared for installation by others.

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Source: For each type of hardware required for the Work of this Section, provide products of a single manufacturer.

C. Consultant: Provide the services of a certified hardware consultant, acceptable to the Engineer, to prepare hardware and keying schedules and to certify that the Work of this Section meets or exceeds requirements of authorities having jurisdiction.

D. Fire-Resistance Ratings: When fire-resistance ratings are indicated or required by authorities having jurisdiction, provide hardware items identical to those which have been tested and labeled for fire-rated use by independent testing agencies acceptable to Engineer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Packaging: Package and label each hardware item separately with all screws, bolts and accessories required for a complete and proper installation. Coordinate the labeling of packages with hardware set numbers.

C. Hardware Storage: Store hardware items in locked spaces. Replace all hardware items lost or damaged. Provide copies of Supplier receipts for hardware items delivered to the Project.

PART 2 – PRODUCTS

2.01 FINISH HARDWARE - GENERAL REQUIREMENTS

A. One manufacturer and catalog number is listed for each type of hardware specified herein. These catalog numbers are listed to set the standard of quality required. Provide the specified hardware item, or an equal product from one of the following manufacturers, which meet or exceed the standard as judged solely by the Engineer.

1. Sargent
2. Hager Companies
3. McKinney
4. H. Soss
5. Stanley
6. Pemko
7. Ives
8. Brookline
9. LCN
10. Yale
11. Reese
12. National Guard Products
13. Zero
14. Glynn-Johnson
15. Or Equal

B. Provide the proper hardware, which permits the swing and hand of each door as indicated on the Drawings.

C. Manufacturer's names or trademarks displayed in a visible location will not be permitted on any piece of hardware.

D. Base Metal: Provide hardware items of stainless steel.

E. Fasteners: Provide concealed fasteners to the greatest extent possible. Do not use through-bolts unless otherwise acceptable to the Engineer.

2.02 HARDWARE FINISHES

A. Samples: Submit samples of each finish to be exposed. Show full range of color and finish variations expected.

1. Provide US 32D dull stainless for all hardware.

2. Provide painted plastic covers on closers.

2.03 LOCKSETS AND LATCHSETS

A. As manufactured by Sargent, or approved equal, that meet or exceed the requirements specified.

B. Provide lock and latchset functions listed in the hardware schedule provided on Drawings.

C. Mortise Locksets and Latchsets: Except where scheduled otherwise, provide Sargent 7900 Mortise lock.

D. Exit Device: Sargent 30 Series where scheduled.

E. Trim: US 32D dull stainless lever trim, ADA compliant.

F. Throws: Provide 1/2 in. minimum. Comply with UL requirements for fire-rated hardware.

G. Strikes: Provide manufacturer's standard box strike with extended curved lip. Finish strikes and lips to match lock or latch.

H. Rabbeted Doors: Provide rabbeted locks and latches where rabbeted door stiles are indicated or required

2.04 KEYING AND LOCK CYLINDERS

A. Contractor shall utilize the services of a professional locksmith, as required to comply with Owner's instructions for keying of Project. Provide Grandmaster Key System, unless otherwise directed by Owner.

B. Provide interchangeable core cylinders, removable by use of special key, for all locking devices on this Project, unless otherwise directed by Owner.

C. Metals: Provide cylinders and keys from stainless steel, brass, or nickel silver.

D. Provide three keys for each lock, 5 Master keys, 5 Grandmaster keys. Provide one blank key for each lock, unless otherwise directed by Owner.

E. Provide three (3) additional cores, keyed only into this system, unless otherwise directed by Owner.

2.05 KEY CONTROL SYSTEM

A. Provide key control system consisting of labels, tags, card index, and metal wall mounted cabinet. Set up control system, label and identify each key, type index cards, and deliver to Owner complete and ready for use.

B. Refer to Hardware Schedule provided on the Drawings for electrical lockset requirements and locations.

2.06 HINGES AND BUTTS

A. Provide the products specified herein or provided an approved equal that meets or exceeds the requirements of these Specifications.

B. Provide stainless steel hinges template produced, full mortise, five knuckle-type, except as otherwise scheduled, and as follows:

1. For major corridor doors, entrance doors, lobby doors, and public toilet room doors, provide four-ball bearing hinges.

2. For all other doors not listed above, provide standard weight, two -ball bearing hinges.

C. Hinge Height: 4-1/2 inch.

D. Hinge Width: Consultant shall determine proper hinge width based upon door thickness and trim conditions. Provide minimum 4-1/2 inch wide hinges.

E. Hinge Quantity: Provide three hinges for doors up to 7 ft.-6 in. high, and one additional hinge for each additional 2 ft.-6 in. of height. Provide one additional hinge for doors over 3 ft.-6 in. wide.

F. Pins: Provide flat button pins matching hinges in finish and material. Provide non-removable pins on out-swinging exterior and corridor doors. Provide non-rising pins for all other hinges.

2.07 CLOSERS

A. Provide the products specified herein or provide an equal that meets or exceeds the requirements of these Specifications.

B. Provide LNC 4010 Series.

C. Provide closers with hold-open features where indicated. Provide closers with built-in door stop function at an adjustable angle where indicated. Hold-open door closers are not permitted to be used on fire door assemblies.

D. Mount closers on the least public side of doors to the greatest extent possible. Provide closers with parallel arms wherever closers are on the stop side of doors which swing out into corridors and public spaces. Where parallel arms are used, provide closers which are one size larger than manufacturer's recommendation.

E. Follow manufacturer's recommendations for size of closer based upon size and weight of door, exposure, and frequency of use.

F. Finish: Closer cylinders, arms, adapter plated, and metal covers shall have a powder coating finish with optimal special rust inhibitor (SRI) primer designed for installations in corrosive environments.

2.08 PROTECTION PLATES AND KICK PLATES

A. Provide the products specified herein or provide and approved equal that meets or exceeds the requirements of these Specification

B. Provide Hager No. 194S armor and kick plates, beveled on all four sides.

C. Width: Provide armor and kick plates which are 1/2 inch less than door width when mounted on the pull side, and 1-1/2 inches less than door width when mounted on stop side.

D. Height: 42 inch high for armor plates, 10 inch high for kick plates.

E. Material: 0.05 inch gage solid metal closely matching lockset/latchset finish. Plated metal door trim units are not acceptable.

2.09 WEATHERSTRIPPING, SOUNDSTRIPPING, AND THRESHOLDS

A. Provide the products specified herein or provide an approved equal that meets or exceeds the requirements of these Specifications.

B. Aluminum Thresholds for General Applications: Provide Catalog # S256A for all thresholds, unless noted otherwise. Provide Catalog #S803A, for exterior wall man-doors, and Catalog #S285A for half saddle thresholds where indicated on the Drawings. Where indicated on the Drawings, provide ADA accessible thresholds.

C. Weather stripping: Provide weather stripping for every exterior door, doors with unheated spaces on one side, and wherever scheduled. Weather stripped doors are required to provide a continuous seal at the entire perimeter of door with no cracks.

1. Drop Seals: Provide Reese Automatic Door Bottom Catalog #372 for metal and FRP doors.

2. Gaskets: Provide Reese Catalog #797B gaskets at door heads and jambs.

2.10 MISCELLANEOUS HARDWARE

A. Provide the products specified herein or provide an approved equal that meets or exceeds the requirements of these Specifications.

B. Astragals: Provide Reese Catalog #87C.

C. Drip Caps: For doors that swing directly out into the rain, provide Reese Catalog #R199A drip cap.

D. Silencers: For wood frames, provide Hager Companies No. 307D grey resilient silencers. For steel doors, provide Hager Companies No. 308D grey resilient silencers. Provide three silencers for single doors, and two silencers for doors hinged in pairs.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine doors, frames and conditions under which the Work of this Section will be performed. Notify Contractor in writing of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Commencing Work means Installer accepts substrates and conditions.

3.02 INSTALLATION

A. Hardware schedule: as shown on the Drawings.

B. Installation Templates: Provide installation templates for Work installed or prepared for installation by others.

C. Comply with manufacturers' instructions and recommendations, except where more restrictive requirements are specified in this Section.

D. Installation of hardware shall comply with NFPA 80 and NFPA 101 requirements.

E. Set hardware plumb, level, and in exact alignment and location. Conceal and countersink fasteners wherever possible.

F. Set exterior thresholds in bed of sealant provided in accordance with Section 07 92 00 Joint Sealants.

3.03 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust hardware items to Work smoothly, easily, and correctly.

B. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of hardware being cleaned. Remove and replace Work which cannot be successfully cleaned, as judged solely by the Engineer.

C. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately prior to final acceptance.

D. Cover knobs, levers, pulls, and push plates with heavy cloth to protect against damage until Final Acceptance of the Project.

3.04 COMPLETION AND CONTINUED MAINTENANCE

A. Before completion of Work of this Section, inspect Work with Engineer and adjust and correct Work to leave operating parts in perfect operating condition, jointing to adjacent material tight, surfaces without blemishes or stains, Work properly executed and complete, and defects and damaged Work replaced or corrected.

B. Provide services of hardware Supplier's representative to inspect hardware six months after Final Acceptance of Project. Readjust and restore hardware.

END OF SECTION

SECTION 09 24 23

CEMENT STUCCO
(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide Cement Stucco System for exterior, vertical, above-grade precast concrete panels, brick masonry and CMU wall surfaces in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 07 19 00 – Water Repellents

2. Section 04 20 00 – Unit Masonry

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. ASTM International (ASTM)

a. ASTM B69 – Standard Specification Rolled Zinc

b. ASTM C 150 – Standard Specification for Portland Cement

c. ASTM C 926 – Standard Specification for Application of Portland Cement-Based Plaster

d. ASTM C 1063 – Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster

e. ASTM C 1328 – Standard Specification for Plastic (Stucco) Cement

2. Expanded Metal Lath Association (EMLA)

a. EMLA 920-09 – Guide Specifications for Metal Lathing and Furring

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Base Coat
2. Wood Molding and Trim
3. Adhesive
4. Anchors
5. Reinforcing Mesh
6. Corner Bead
7. Finish Coat

C. Certificates

1. Manufacturer Warranty
2. Material Safety Data Sheets

D. Manufacturer instructions including preparation, application, recommended equipment to be used, safety measures, and protection of completed application.

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Manufacturer requirements

1. System manufacturer for a minimum of twenty-five (25) years.
2. Manufacturing facilities ISO 9001:2000 Certified Quality System.

C. Contractor requirements

1. Engaged in application of cement stucco systems for a minimum of ten (10) years.

2. Employ skilled mechanics who are experienced, knowledgeable, and familiar with the requirements of the specified work.

3. Successful completion of minimum of ten (10) projects of similar size and complexity to the specified project.

4. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with manufacturer's published specifications and details and the project plans and specifications.

D. Mock-up Testing

1. Construct full-scale 10' x 10' mock-up of wall assembly with specified tools and materials. Mock-up shall comply with requirements of project specifications.

E. Inspections

1. Conduct inspections in accordance with code requirements and contract documents.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product.

C. Protect coatings from freezing and temperatures in excess of 90°F. Store away from direct sunlight.

D. Protect Portland cement-based materials from moisture and humidity. Store under cover off the ground in a dry location.

1.08 PROJECT CONDITIONS

A. Maintain ambient and surface temperatures above 40°F during application and drying period, minimum 24 hours after application of cement stucco system.

B. Application and protection shall be in strict accordance with manufacturer's recommendations.

C. Provide supplementary heat for installation in temperatures less than 40°F.

D. Provide protection of surrounding areas and adjacent surfaces from application of materials.

1.09 WARRANTY

A. Manufacturer's Warranty: Minimum five (5) year written warranty.

B. Contractor's Warranty: Minimum five (5) year written warranty.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Provide cement stucco system and accessories from single source manufacturer or approved supplier.

B. The following are acceptable manufacturers:

1. Sto Corp.

2. Amerimix Industries, Inc.

3. Approved Equal.

2.02 WOOD MOLDING AND TRIM

A. Per Specification Section 06 10 00, Rough Carpentry. Sizing shall be as specified on the Contract Drawings.

2.03 REINFORCING MESH

A. Galvanized diamond wire mesh with 3.4 pounds per square yard and minimum 27-inch by 97-inch sheet size. Mesh shall be manufactured by ClarkDietrich or approved equal.

2.04 BASE COAT

A. Top Grade Portland Cement: Type I, Type II or Type I-II, in conformance with ASTM C 150.

2.05 FINISH COAT

A. Acrylic-based textured wall coating with Lotus-Effect Technology, pronounced self-cleaning performance. Finish coat shall be Stolit® Lotusan® 1.5 with "medium" texture as manufactured by Sto Corp or approved equal. Finish coat color shall be selected by Owner.

2.06 ADHESIVE

A. Wood Molding and Trim Construction Adhesive: Construction adhesive shall be Loctite Proline Premium Polyurethane Construction Adhesive manufactured by Henkel or approved equal.

2.07 ANCHORS

A. Wood Molding and Trim Anchor: Galvanized steel masonry adhesive anchor with composite mesh sleeve. Adhesive anchor shall be HIT-HY 70 Masonry Adhesive Anchor manufactured by Hilti or approved equal.

B. Galvanized Wire Mesh Anchor: Zinc-coated powder-actuated fastener with 1.5-inch nail length. Fastener shall be X-SW Soft Washer Powder-Actuated Fasteners manufactured by Hilti or approved equal.

2.08 CORNER BEAD

A. Wood Galvanized steel expanded flange mesh corner bead for exterior corners equal to ClarkDietrich #1A Zinc Expanded Corner Bead with 2-7/8” wing flanges.

B. Corner bead shall comply with ASTM C1047, ASTM C1063, ASTM B69, and EMLA-920.

2.09 JOB MIXED INGREDIENTS

A. Water: Clean and potable.

PART 3 – EXECUTION

3.01 ACCEPTABLE INSTALLERS

A. Prequalify under Quality Assurance requirements of this specification (section 1.06 C).

3.02 SURFACE PREPARATION

A. Power wash total structure to remove all elements including, but not limited to, dirt, dust, efflorescence, form oil, mold, grease, laitance, mildew or other foreign substances

3.03 INSTALLATION

A. Surface preparation, application, and curing of cement stucco system shall be in strict accordance with manufacturer’s recommendations and all applicable ASTM and EMLA Standards.

B. Once dry, securely attach all wood molding and trim where designated on the Contract Drawings to create projected aesthetic features utilizing approved construction adhesive and adhesive anchors.

1. Provide two continuous minimum 1/4" wide beads of adhesive per wood member.

2. Provide two staggered rows of adhesive anchors spaced at 32-inches on center per wood member (16-inches on center for staggered rows).

3. Anchors shall be embedded 3-inches beyond face of brick or concrete substrate.

C. Fasten galvanized wire mesh to structure walls and wood molding and trim utilizing approved fasteners.

1. Frequency of fasteners shall be as required to ensure mesh can adequately support the cement stucco system, but in no case shall the spacing be greater than 24-inches on center horizontally and vertically.

2. Perimeter fasteners shall be no more than 2-inches from edge of mesh sheets.

D. Install corner beads at all windows, doors and edges.

E. Scratch coat complete structure with base coat.

F. Once base coat is dry, apply finish coat to walls, trim and projected aesthetic features.

G. Caulk all seams.

3.04 MANUFACTURER'S FIELD SERVICES

A. Furnish the services of a competent field representative of the manufacturer for a minimum of two days as required by the Engineer. Provide that the field representative is present at the Work Site prior to commencement of application to instruct the Contractor, to demonstrate proper application and inspection procedures, and to inspect the finish of the prepared surfaces prior to application.

3.05 CLEANING, REPAIR AND MAINTENANCE

A. Clean and maintain the cement stucco system for a fresh appearance. Repair cracks, impact damage, spalls or delamination promptly.

B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into the wall assembly.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING
(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide surface preparation and painting in accordance with this Section and applicable reference standards listed in Article 1.03.

2. Provide painting for the following types of painting Work and as included in this Section and as indicated on the Drawings.

B. Surface preparation, painting, and labeling for the following items at all Project locations. Items identified for individual Project locations are noted in paragraphs 1.01.C through 1.01E, below, and on the Drawings.

C. Raw Water Pump Station

1. Painting of new and existing metal doors, frames and coil doors as indicated

2. Painting of new and existing interior and exterior masonry and concrete surfaces as indicated.

3. Painting of existing steel columns and beams as indicated.

4. Painting of new interior miscellaneous metals as indicated.

5. Painting of new and existing steel bollards as indicated.

6. Painting of existing conduit, pipe, and miscellaneous materials as indicated.

D. Water Treatment Plant

1. Painting of new ductile iron pipe, valves, fittings, and appurtenances.

2. Labeling of PVC/CPVC pipes, and fittings.

3. Touch-up painting of factory-coated equipment as needed.

E. Stackpole Street Pump Station and Water Main Upgrades

1. Painting of existing steel bollards as indicated.

2. Touch-up painting of factory-coated equipment as needed.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.04 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Block Fillers

2. Primers

3. Manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.

4. Manufacturer's material data and certificates of performance for proposed substitutions.

5. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.

C. Samples and Mockups: as specified in Article 1.06.

1. Provide samples for initial color selection in the form of manufacturer's color charts.

a. After color selection, the Contractor will furnish color chips of selections made for surfaces to be coated.

D. Certificates

1. Provide certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

C. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

D. Field Samples: On wall surfaces and other exterior and interior components, duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface until required sheen, color, and texture are obtained; simulate finished lighting conditions for review of in-place Work.

1. Final acceptance of colors will be from job-applied samples.

2. The Engineer will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted. Apply coatings in this room or surface according to the schedule or as specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Deliver materials to the job Site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.

2. Product description (generic classification or binder type).

3. Manufacturer's stock number and date of manufacture.

4. Contents by volume, for pigment and vehicle constituents.

5. Thinning instructions.

6. Application instructions.

7. Color name and number.

C. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing: Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and Work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.07 SITE CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F and 90 degrees F.

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 95 degrees F.

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

1.08 MAINTENANCE

A. Extra Materials: Furnish as specified below. Make interchangeable with and same material and workmanship as corresponding original parts.

1. Paint: Furnish four gallons of each color and type.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products as specified in the painting schedule or approved equal by Tnemec, Sherwin Williams (S-W), and Devoe.

2.02 PAINT MATERIALS

A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

B. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1. Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers.

C. Colors: Provide color selections from the manufacturer's full range of standard colors.

2.03 PIPE IDENTIFICATION

A. Identify piping according to the fluid carried, with assistance by the Engineer, as needed.

1. For additional detail on HVAC pipe identification labels, refer to Section 23 05 53 Mechanical Identification.

B. Piping Color

1. Provide color selections from the manufacturer's full range of standard colors.

2. Band all new chemical pipes and containment pipes using the same color system. Color coding shall follow MassDEP Guidelines for Public Water Systems Chapter 6: Chemical Application and section 2.14: Piping Color Code of the "Ten State Standards – Recommended Standards for Water Works (2012 Edition)". For process fluids not listed in the referenced standards, a unique color scheme and labeling should be used as approved by the Engineer. In situations where two colors do not have sufficient contrast to easily differentiate between them, a six-inch band of contrasting color should be on one of the pipes at approximately 30 inch intervals as approved by the Engineer. Banding shall be at 30 inch intervals of continuous straight pipe, or at changes in direction of the pipe.

C. Pipe Labels

1. Pipe labeling shall include, but not be limited to, the following locations:

   a. New chemical pipes

   b. New insulated water pipes, including tempered water

   c. New and existing process piping, including insulation, where specified

2. Pipes shall be labeled on two sides with pipe markers and direction of flow labels at 30 inch intervals of continuous pipe according to the Ten State Standards. A flow direction arrow shall follow the label legend and be of the same color. The labels shall meet or exceed ASME A13.1 standards. The legend letters shall be CAPITALIZED and be black or white, depending on the background color. The labels shall be KWIK KOIL labels, with snap-around style for pipes under 6" outer diameter (O.D.) and spring fastened for pipes 6" O.D. and larger, or approved

   equal. The labels shall be suitable for a pipe temperature range of - 40 degrees F to 175 degrees

3. The labels shall meet or exceed ASME A13.1 and ANSI standards.

4. Pipes shall be labeled to match labeling of existing piping.

5. Pipe labels shall be installed on the exterior of all piping insulation/jacket.

6. Where pipe passes through a wall, use pipe markers and directional arrows on each side of the wall.

7. Use a pipe marker and directional arrow at each rise, "T" joint, and change in flow direction.

8. When using directional arrows, point arrowhead away from pipe markers and in direction of flow. If flow can be in both directions, use a double headed directional arrow.

9. The piping labels shall spell out the entire fluid designation, not the abbreviation. Confirm the naming convention with the Engineer prior to ordering the labels.

10. All pipe labels of the same type, style, and duty shall be supplied by a single Manufacturer. All Manufacturers' named or otherwise shall comply with the Contract Documents. All pipe labels shall be a product of the following Manufacturer:

    a. Marking Services Inc.

    b. Brimar Industries Inc.

    c. Engineer Approved Equal

PART 3 – EXECUTION

3.01 EXAMINATION

A. General: Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected

2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Engineer about anticipated problems using the materials specified over substrates primed by others.

3.02 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime. Notify Engineer in writing about anticipated problems using the specified finish-coat material with substrates primed by others.

2. Existing painted surfaces shall be structurally sound, dry, clean, and free of oil, grease, dirt, mildew, form release agents, curing compounds, efflorescence, loose and flaking paint, or other foreign material. Engineer shall approve condition of prepared substrate prior to application of coating system. Old coatings should be tested for lifting per coating manufacturer's recommendations.

3. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required, to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

   a. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.

   b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

4. Ferrous Metals: Clean ungalvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other

foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Carefully mix and prepare paint materials according to manufacturer's directions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3. Use only thinners approved by the paint manufacturer and only within recommended limits.

3.03 COLOR SELECTION

A. Colors of finish coats shall be as indicated or specified. Where not indicated or specified; colors shall be selected by the Owner.

3.04 APPLICATION

A. General: Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.

2. Provide finish coats that are compatible with primers used.

3. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.

4. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges,

corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.

5. The term exposed surfaces includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.

6. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.

8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

9. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.

10. Sand lightly between each succeeding enamel or varnish coat.

11. Omit primer on metal surfaces that have been shop-primed and touch-up painted.

12. Prime CMU walls and apply 1 finish coat prior to installation of any wall mounted equipment, piping, conduits, or fixed objects that would limit access for application of coating system and/or conceal portions of the wall surface. Apply second finish coat after all Work of other trades is completed.

C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

D. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.

1. Brushes: Use brushes best suited for the material applied.

2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

E. Minimum Coating Thickness: Apply materials no thinner than the manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

F. Mechanical and Electrical Work: Painting mechanical and electrical Work is limited to items exposed in mechanical equipment rooms and in occupied spaces.

G. Mechanical items to be painted include the following as specified:

1. Piping
2. Pumps
3. Heat exchangers
4. Tanks
5. HVAC ductwork
6. Insulation
7. Supports
8. Motors and mechanical equipment
9. Accessory items

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

3.05 PRIME COATS

A. Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing. Apply prime coat to all previously painted surfaces if finish coats are not compatible with existing coating.

3.06 PIGMENTED (OPAQUE) FINISHES

A. Completely cover to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

3.07 PIPE, VALVE/EQUIPMENT IDENTIFICATION AND COLOR CODING

A. Provide identification of pipes, valves and pumps by color as specified in the Section 22 00 00 Plumbing, 23 05 15 Mechanical Identification, and 40 05 13.01 Process Pipe and Fittings

3.08 COMPLETED WORK

A. Match approved samples for color, texture, and coverage. Remove, refinish, or repaint Work not complying with specified requirements.

3.09 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke the following test procedure up to four times during the period when paint is being applied:

1. The Contractor shall engage the services of an independent testing agency with five years of experience to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.

2. The testing agency shall perform appropriate tests at no additional cost to the Owner for the following characteristics as required by the Owner:

   a. Quantitative materials analysis.

   b. Abrasion resistance.

   c. Apparent reflectivity.

   d. Flexibility.

   e. Washability.

   f. Absorption.

   g. Accelerated weathering.

   h. Dry opacity.

   i. Accelerated yellowness.

   j. Recoating.

   k. Skinning.

   l. Color retention.

   m. Alkali and mildew resistance.

3. If test results show material being used does not comply with specified requirements, the Contractor shall be directed to stop painting, remove noncomplying paint, repaint surfaces coated with rejected paint, and remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are incompatible.

3.10 CLEANING

A. At the end of each Work day, remove empty cans, rags, rubbish, and other discarded paint materials from the Site.

B. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.11 PROTECTION

A. Protect Work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Engineer.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their Work after completing painting operations.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.12 ATTACHMENTS

A. Paint Schedule

END OF SECTION

PAINT SCHEDULE

Number of coats scheduled is as a minimum. Painting and finishing shall conform to applicable Laws and building code regarding fire hazard classifications and volatile organic content of finish materials. Provide products by the manufacturers named or approved equal.

Refer to "Room Finish Schedule" on the Drawings for building areas to be painted.

Provide paint and coating systems listed below where the Drawings refer to this Specification section or reference any item to be painted or coated, unless a specific paint or coating system is specified elsewhere.

This list is intended to cover all potential conditions that may require painting and not all paint and coating systems listed below may not be included in the Work.

Interior Galvanized Steel (where listed on Drawings to be field painted) for Epoxy Coating

Galvanizing Repair at Field Welds	1. Tnemec "Series 90-97 Tneme-Zinc" 2. S-W "Corothane I Galvapac Zinc Primer" 3. PPG "Amercoat 68HS" DFT 2-5 mils
Field Applied Prime Coat	1. Tnemec "Series N69 Hi-Build Epoxoline" DFT 2-3 mils 2. S-W "Macropoxy 646" DFT 3-5 mils 3. PPG "Amerlock 2" DFT 4-8 mils
Field Applied Finish Coat	1. Tnemec "Series N69 Hi-Build Epoxoline" DFT 2-3 mils 2. S-W "Macropoxy 646" DFT 3-5 mils 3. PPG "Amerlock 2" DFT 4-8 mils

Exterior Galvanized Steel (where listed on Drawings to be field painted) for Epoxy / Polyurethane Coating

Galvanizing Repair at Field Welds	1. Tnemec "Series 90-97 Tneme-zinc" 2. S-W "Corothane I Galvapac Zinc Primer" 3. PPG "Amercoat 68HS" DFT 2-5 mils
Field Applied Prime Coat	1. Tnemec "Series 27 Typoxy" DFT 2-3 mils 2. S-W "Macropoxy 646" DFT 3-5 mils 3. PPG "Amercoat 385" DFT 4-8 mils
Field Applied Two Finish Coats	1. Tnemec "Series 175 Endura-Shield" DFT 2-5 mils/ct 2. S-W "High-Solids Polyurethane" DFT 3-4 mils/ct 3. PPG "Amercoat 450" DFT 2-3 mils/ct

Factory/Shop Primed Steel, Previously Painted surfaces Interior Exposure for Epoxy Coating

Shop Applied Prime Coat	1. Manufacturer's Standard Primer
Field Applied Two Finish Coat	1. Tnemec "Series N69 Hi-Build Epoxoline" DFT 2-3 mils 2. S-W "Macropoxy 646" DFT 3-5 mils 3. PPG "Amerlock 2" DFT 4-8 mils/ct

Factory/Shop Primed Steel, Previously Painted Surfaces- Exterior Exposure for Epoxy / Polyurethane Coating

Shop Applied Prime Coat	1. Manufacturer's Standard Primer
Field Applied Intermediate Coat	1. Tnemec "Series N69 Hi-Build Epoxoline" DFT 2-3 mils 2. S-W "Macropoxy 646" DFT 3-5 mils 3. PPG "Amerlock 2" DFT 4-8 mils
Field Applied Two Finish Coats	1. Tnemec "Series 175 Endura-Shield" DFT 2-5 mils/coat 2. S-W "High Solids Polyurethane" DFT 3-4 mils/coat 3. PPG "Amercoat 450H" DFT 2-5 mils

Ferrous metals listed in Section 05 50 00 Metal Fabrications Interior Exposure for Epoxy Coating

Shop Applied Prime Coat	1. Tnemec "Series 27 Typoxy" DFT 2-3 mils 2. S-W "Recoatable Epoxy Primer" DFT 4-6 mils 3. PPG "Amerlock 370" DFT 4-6 mils
Field Applied Two Finish Coats	1. Tnemec "Series N69 Hi-Build Epoxoline" DFT 2-3 mils 2. S-W "Macropoxy 646" DFT 3-5 mils 3. PPG "Amerlock 2" DFT 4-8 mils/ct

Ferrous metals listed in Section 05 50 00 Metals Fabrication Exterior Exposure for Epoxy Coating

Shop Applied Prime Coat	1. Tnemec "Series N69 Hi-Build Epoxoline" DFT 2-3 mils 2. S-W "Macropoxy 646" DFT 4-6 mils 3. PPG "Amercoat 385" DFT 4-8 mils
Field Applied Two Finish Coats	1. Tnemec "Series 175 Endura-Shield" DFT 2-5 mils/ct 2. S-W "High Solids Polyurethane" DFT 3-4 mils/ct 3. PPG "Amercoat 450H" DFT 2-3 mils/ct

Ductile, Cast Iron, Copper, Aluminum or PVC - Interior or Exterior Exposure for Epoxy/Polyurethane Coating

PVC Surface Preparation	Scarify
Field Applied Prime Coat	1. Tnemec "Series N69 Hi-Build Epoxoline" DFT 2-3 mils 2. S-W "Macropoxy 646" DFT 3-5 mils 3. PPG "Amerlock 2" DFT 4-8 mils
Field Applied Intermediate Coat	1. Tnemec "Series N69 Hi-Build Epoxoline" DFT 4-6 mils 2. S-W "Macropoxy 646" DFT 3-5 mils 3. PPG "Amerlock 2" DFT 4-8 mils
Field Applied Finish Coat	1. Tnemec Series 175 Endura-Shield" @ DFT 2-5 mils 2. S-W "High Solids Polyurethane" DFT 4-5 mils 3. PPG "Amercoat 250H 2-3" DFT 4-6 mils

Insulated Pipe Interior or Exterior Exposure for Acrylic Coating

Field Applied	1. Tnemec "Series 151-1051 Elasto- Grip Primer" @ DFT 1.0-1.5 mils 2. S-W "DTM Acrylic/Primer" DFT 2.5-4.0 mils 3. PPG "Pitt Tech Plus Primer" DFT 2-4 mils
Field Applied Two Finish Coat	1. Tnemec "Series 1029 Enduratone" @ DFT 2.0-3.0 mils/ct 2. S-W "Sher-Cryl HPA" DFT 2.5-4.0 mils/ct 3. PPG "Pitt Tech Plus 90-131" DFT 2-4 mils/ct

Interior CMU walls for Waterborne Epoxy Coating

Field Applied Prime Coat	1. Tnemec "Series 130 Envirofill" 60-80 sf/gal 2. S-W "Cement-Plex 875" DFT 50-100 SF/GAL 3. PPG "Amerlock 400BF" DFT 10-20 mils
Field Applied Two Finish Coats	1. Tnemec "Series 113 Tufcoat" DFT 4-6 mils/ct 2. S-W "Waterbased Catalyzed Epoxy" DFT 2.5-3 mils/ct 3. PPG "Aquapon WB Water Base Epoxy" DFT 2-3 mils/ct

Exterior Concrete Columns, Beams, Foundations and Rook Planks for Epoxy Coating

Surface Preparation	1. Clean surfaces with high-pressure washer (5,000 psi minimum) and 15% bleach solution. Scrub surfaces to remove mold, mildew and other surface contamination. Rinse all cleaning residues from same surfaces.
Field Applied First Coat	1. Tnemec "Series 156 Enviro-Crete" DFT 6-8 mils 2. S-W "Loxon XP" 3. PPG "Perma-Crete 4-22" DFT 3.5-4 mils
Field Applied Finish Coat	1. Tnemec "Series 156 Enviro-Crete" DFT 6-8 mils 2. S-W "Loxon XP" 3. PPG "Perma-Crete 4-22" DFT 3.5-4 mils

SECTION 10 14 00

SIGNAGE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide exterior letters and hardware in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.04 SUBMITTALS

A. Submit in accordance with the Division 01 General Requirements.

1. Shop Drawings

a. Provide large-scale Shop Drawings for fabrication, installation, and erection of all parts of the work. Provide large-scale layout of letter wording, spacing, type size, and style. Provide Plans, elevations, and details of anchorages, connections, and accessory items. Provide installation templates for work installed but others. Provide full size spacing templates for individual letters and numbers.

2. Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used.

3. Samples

a. Submit Samples showing complete range of colors, textures, and finishes available for each material used.

4. Provide certification stating that materials comply with Regulations. Manufacturers shall have at least five years' experience in the manufacture of sign systems specified.

B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.06 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations and protect from damage. Sequence delivers to avoid delays, but minimize on-site storage.

1.07 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. For each type of material required for the work of this section, provide primary materials that are the products of one of the following manufacturers. Provide secondary materials that are acceptable to the manufacturers of the primary materials.

1. Gemini, Inc.
2. Mohawk Sign Systems
3. Approved Equal

2.02 MATERIAL

A. Letters shall be cast metal letters be Gemini, Inc., or approved equal.

1. Metal: Letters shall be made of aluminum
2. Font Style: To be selected by Owner.
3. Size:
    a. The top row of exterior letters shall be 12 inches high.
    b. The lower row of exterior letters shall be 9 inches high.
4. Finish: Painted. Color to be selected by Owner.

2.03 FABRICATION

A. Fabricate work to be straight, plumb, level, and square with smooth flat surfaces and sharp corners, except where indicated otherwise. Precisely form work to sizes, shapes, and profiles indicated on approved Shop Drawings. Fabricate metal work with uniform, invisible joints.

2.04 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 SEQUENCING AND SCHEDULING

A. Delay installation of work in this section until near time of Substantial Completion, as approved by the Engineer.

3.02 INSPECTION

A. The Installer shall examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means installer accepts substrates and conditions.

3.03 INSTALLATION

A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this section. Install work plumb, level, in true plane alignment. Provide lettering where shown using mounting manufacturer’s recommended mounting methods.

3.04 ADJUSTING, CLEANING AND PROTECTION

A. Adjust work to present the best possible appearance. Touch-up damaged finishes and repair damage to eliminate evidence of repair. Clean exposed surfaces using materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace work that cannot be successfully repaired or cleaned.

B. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.

3.05 SIGNAGE AND GRAPHICS SCHEDULE

A. Provide signage as follows:

1. Exterior Letters per Sheet S-101 of the Contract Drawings.

3.06 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.07 MANUFACTURER'S FIELD SERVICES

A. Furnish the services of a competent field representative of the manufacturer for a minimum of two days as required by the Engineer. Provide that the field representative is present at the Work Site prior to commencement of installation to instruct the Contractor, to demonstrate proper installation and inspection procedures, to inspect the finish of the prepared surfaces prior to installation, and to inspect installation of the specified products.

3.08 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 10 14 16

PLAQUE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all labor, materials, tools and equipment to furnish and install one plaque at the intake pump station in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 10 14 00 – Signage

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

B. Delay installation of work in this section until near time of Substantial Completion, as approved by the Engineer.

1.04 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Design Data/Submittals

1. Submit material shop drawings and camera ready artwork of plaque to the Engineer for approval.

C. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Packing, Shipping, Handling, and Unloading

1. Plaque shall be handled with care to prevent any damage prior to mounting.

C. Storage and Protection

1. Plaque shall be stored indoors in a secure location prior to mounting.

PART 2 – PRODUCTS

2.01 PLAQUE

A. Design Criteria

1. Quantity: One (1)

2. Recognition plaque shall be cast bronze 20" x 36" with studs for hidden mount, black leatherette background, and raised bronze copy/border. Fonts shall be Helvetica medium. Plaque shall be suitable for outdoor use.

3. Design shall match sample attached to this specification. Final text will be provided by Engineer. Composition shall be approved by the Engineer.

B. Source Quality Control

1. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 MOUNTING

A. Install plaque at location and at mounting height directed by the Engineer in the field.

B. Mounting shall be with stainless steel, oval headed, counter sunk expansion bolts. Location shall be as selected by the Engineer.

C. The plaque shall be covered from public view after installation until a selected time in the Fall of 2015. Selected time shall be coordinated with the Engineer.

3.02 REPAIR/RESTORATION

A. If the plaque, or the mounting of the plaque, is deemed unsatisfactory, the plaque or mounting shall be redone at no expense to the Owner.

3.03 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

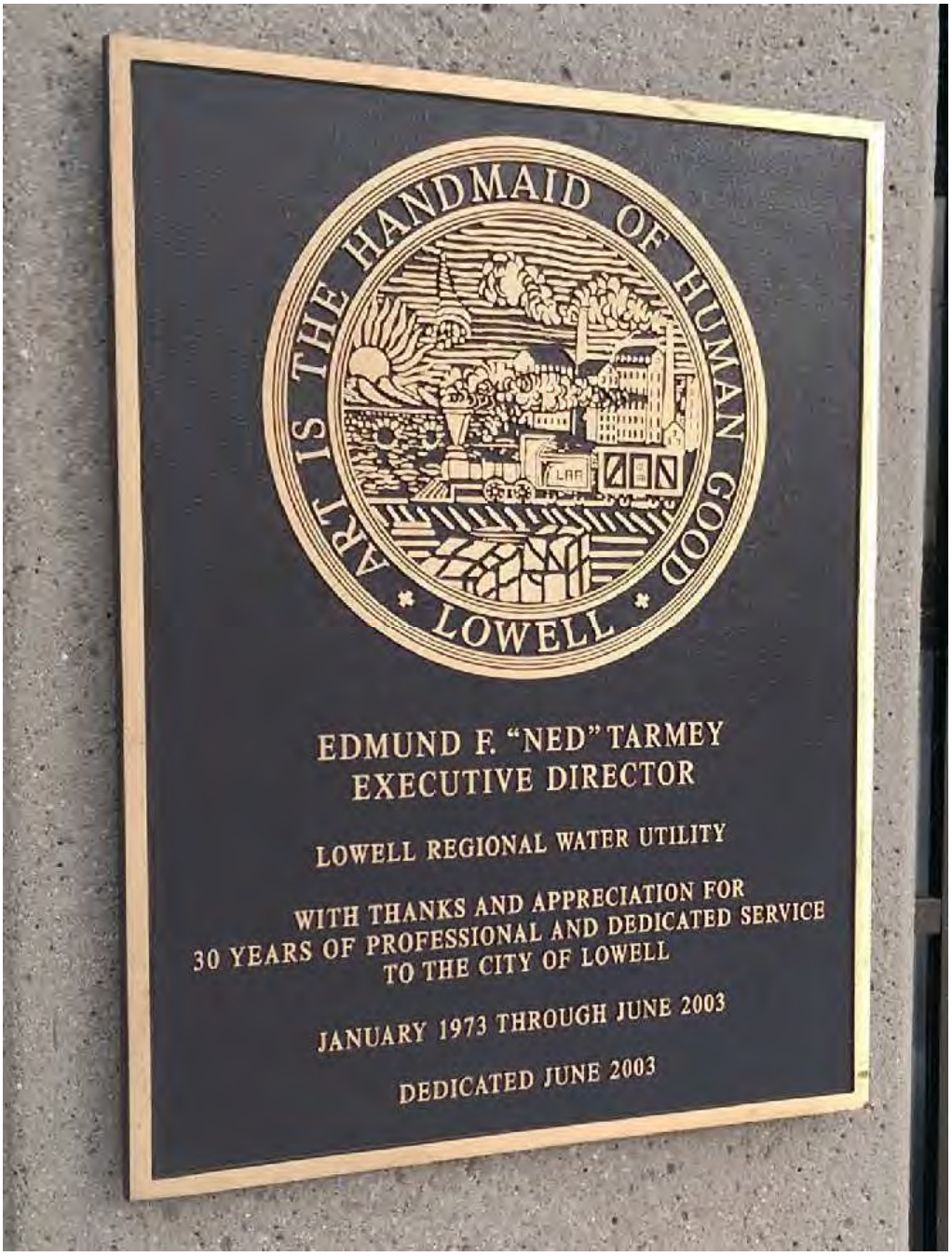
3.04 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

3.05 ATTACHMENTS

A. Sample Plaque

END OF SECTION


ART IS THE HANDMAID OF HUMAN GOOD
LOWELL
EDMUND F. "NED" TARMEY
EXECUTIVE DIRECTOR
LOWELL REGIONAL WATER UTILITY
WITH THANKS AND APPRECIATION FOR
30 YEARS OF PROFESSIONAL AND DEDICATED SERVICE
TO THE CITY OF LOWELL
JANUARY 1973 THROUGH JUNE 2003
DEDICATED JUNE 2003

SECTION 10 44 16

FIRE EXTINGUISHERS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide fire extinguishers in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. International Code Council (ICC)

2. National Fire Protection Association (NFPA)

3. U.S. National Archives and Records Administration (NARA)

4. Underwriters Laboratories (UL)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Fire Extinguisher

2. Accessories

3. Wall Brackets

4. Replacement Parts

C. Shop Drawings

1. Fire Extinguisher

2. Accessories

3. Wall Brackets

D. Certificates

1. Certification that Fire Extinguishers comply with local codes and regulations.

2. Certification that Fire Extinguishers comply with OSHA, NFPA, and UL requirements.

3. Submit Manufacturer's Warranty with Inspection Tag on each extinguisher.

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Protect materials from weather, soil, and damage during delivery, storage, and construction.

C. Deliver materials in their original packages, containers, or bundles bearing the brand name and the name and type of the material.

PART 2 – PRODUCTS

2.01 TYPE

A. Must conform to NFPA 10 Quantity and placement must comply with the applicable sections of IFC 1414, IFC 906, NFPA 1, NFPA 101, and 29 CFR 1910.157.

B. Provide dry chemical type fire extinguishers compliant with UL 299, rated A:B:C for all extinguishers, unless noted otherwise.

C. Provide carbon dioxide fire extinguishers compliant with UL 299, rated B:C, for extinguishers located within the electrical room.

D. Submit Manufacturer's Data for each type of Fire Extinguisher required, detailing all related wall mounting and accessories information, complete with Manufacturer's Warranty with Inspection Tag.

2.02 MATERIAL

A. Fire Extinguisher shall be red enameled steel.

2.03 SIZE

A. Fire Extinguisher shall be 10 pounds.

2.04 ACCESSORIES

A. Provide pressure gage on each Fire Extinguisher.

2.05 WALL BRACKETS

A. Provide wall-hook fire extinguisher wall brackets.

B. Wall bracket and accessories must be as approved.

C. Mounting Height: Top of Fire Extinguishers shall not be more than (5 feet) above the floor.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install Fire Extinguishers where indicated on the Drawings. Verify exact locations prior to installation.

B. Comply with the manufacturer's recommendations for all installations.

C. Provide Fire Extinguishers which are fully charged and ready for operation upon installation. Provide extinguishers complete with Manufacturer's Warranty with Inspection Tag attached.

3.02 ACCEPTANCE PROVISIONS

A. Repairing: Remove and replace damaged and unacceptable portions of completed Work at no additional cost to the Owner.

B. Provide Replacement Parts list indicating specified items replacement part, replacement cost, and name, address and contact for replacement parts distributor.

C. Cleaning: Clean all surfaces of the Work, and adjacent surfaces which are soiled as a result of the Work. Remove from the Site all construction equipment, tools, surplus materials and rubbish resulting from the Work.

END OF SECTION

SECTION 14 42 00

VERTICAL WHEELCHAIR LIFTS
(FILED SUB-BID REQUIRED)
(SRF INELIGIBLE)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide enclosed vertical wheelchair lift in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. ASME A17.1 - Safety Code for Elevators and Escalators
2. ASME A17.5 - Elevator and Escalator Electrical Equipment
3. ASME A18.1 - Safety Standard for Platform Lifts and Stairway Chairlifts
4. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities
5. NFPA 70 - National Electric Code

B. Related Requirements

1. Division 03 - Concrete
2. Division 26 - Electrical (Electrical Sub-Bid)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Manufacturer's installation instructions, including preparation, storage and handling requirements

2. Complete description of performance and operating characteristics

C. Shop Drawings

1. Typical details of assembly, erection and anchorage

2. Wiring diagrams for power, control, and signal systems

3. Complete layout and location of equipment, including required clearances and coordination with shaftway

D. Samples and Mockups: as specified in Article 1.06.

E. Qualification statements of manufacturer and installer

F. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Manufacturer qualifications: minimum 10 years experience in manufacturing of vertical platform lifts, with evidence of experience with similar installations of type specified.

C. Installer qualifications: licensed to install equipment specified, with evidence of experience with specified equipment.

D. Samples: 2 complete sets of color chips representing manufacturer's full range of available colors and patterns for each finished product specified.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Deliver materials in their original packages, containers, or bundles bearing the brand name and the name and type of the material.

C. Store products in manufacturer's unopened packaging until ready for installation.

1.08 PROJECT CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.09 MAINTENANCE

A. Provide a 2-year service contract by a certified manufacturer’s representative. Contract shall include two visits per year for preventative maintenance

inspections and cover 100% of costs associated with replacement parts under warranty.

B. Installer to maintain an adequate stock of replacement parts and have qualified people available to promptly provide maintenance and callback service.

1.10 WARRANTY

A. Special Warranty/Extended Correction Period

1. Provide a 2 year warranty for wheelchair lift materials and workmanship covering parts and labor.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Acceptable level of quality: equivalent to 1. Garaventa Lift; United States - P.O. Box 1769, Blaine, WA 98231-1769. Canada - 7505 134 A St., Surrey, BC V3W 7B3. ASD. Toll Free: (800) 663-6556. Tel: (604) 94-0422. Fax: (604) 594-9915. Email: productinfo@garaventalift.com. Web: www.garaventalift.com..

2.02 ENCLOSED VERTICAL WHEELCHAIR LIFT

A. Capacity: 750 pounds (340 kg) rated capacity.

B. Mast height: 75 inches maximum lifting height.

C. Nominal clear platform dimensions: 46 inches by 57 inches.

D. Platform Configuration: 90 degrees.

E. Entry/Exit: front and side openings.

F. Landing Openings

1. Lower landing: door.

2. Upper landing: door.

G. Doors and gates: self-closing type.

1. Door Height: flush mount, 80 inches (2,032 mm).

2. Door construction: aluminum frame with 3/16 inch bronze plexiglass panels with 16 gauge galvanized steel kick plate and 12 inch offset D-handle pull.

3. Power door/gate operator: to automatically open door/gate when platform arrives at a landing and open at landing by pressing call button or gently the pulling door.

    a. Location: upper landing, door.

H. Lift Components

1. Machine tower: custom aluminum extrusion.

2. Base frame: structural steel.

3. Platform side wall panels: 42-1/8 inches high, 16 gauge galvanized steel sheet with custom aluminum extrusion tubing frame.

4. Enclosure Panels: 3/16 inch bronze plexiglass. Enclosure shall be weather tight and suitable for an exterior application.

I. Enclosure height above upper landing: extending 83-3/4 inches above the upper landing level.

J. Base mounting and access to lift at lower landing: pit mounted with dimensions to meet manufacturer's requirements for the platform size specified. Pit construction: in accordance with Section 03 30 00.

K. Accessories

1. Enclosure Dome: plexiglass type to cover top of lift enclosure, weather tight and suitable for an exterior application.

2. Ventilation System: 2 exhaust fans, thermostatically controlled with a 12 VDC battery backup.

L. Hydraulic drive: chain hydraulic type.

1. Emergency Operation: Manual device to lower platform and use auxiliary battery power to raise or lower platform.

2. Safety devices:

    a. Slack chain safety device

    b. Shoring device

3. Travel speed: 17 fpm (5.2 m/minute).

4. Motor: 3.0 hp (2.2 kW); 24 VDC.

5. Power supply: 120 VAC single phase; 60 Hz on a dedicated 15 amp circuit.

a. Provide power converter within lift enclosure for converting building continuous mains power to 24 VDC.

b. Equip with auxiliary battery backup power system capable of running lift up and down for a minimum of 5 trips with rated load.

M. Platform controls: 24 VDC control circuit with the following features.

1. Direction control: illuminated tactile and constant pressure push buttons with dual platform courtesy lights and safety light.

2. Illuminated and audible emergency stop switch to shut off power to lift and activate audio alarm equipped with battery backup

3. Keyless operation

4. Arrival gong

N. Call station controls: 24 VDC control circuit with the following features.

1. Direction control: illuminated tactile and constant pressure push buttons with illuminated "In Use" indicator.

2. Keyless operation

3. Call station mounting

a. Lower: frame mounted.

b. Upper: wall mounted surface.

O. Safety devices and features:

1. Grounded electrical system with upper, lower, and final limit switches.

2. Tamper resistant interlock to electrically monitor that door is in closed position and lock is engaged before lift can move from landing.

P. Finishes

1. Aluminum extrusions: champagne anodized finish.

2. Lift finish: baked powder coat finish, color as selected by the Owner from manufacturer’s optional RAL color chart.

2.03 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates are properly prepared.

B. Verify required landings and openings are correct size and within tolerances.

C. Verify electrical rough-in is correctly located.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving best result for the substrate under the Project conditions.

3.03 INSTALLATION

A. Install lifts in accordance with applicable regulatory requirements including ASME A 17.1, ASME A 18.1 and the manufacturer's instructions.

B. Ventilation System: Electrical Subcontractor to provide continuous mains power for hydraulic drive.

C. Install system components and connect to building utilities.

D. Accommodate equipment in space indicated.

E. Startup equipment in accordance with manufacturer's instructions.

F. Adjust for smooth operation.

3.04 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Perform tests in compliance with ASME A 17.1 or A18.1 and as required by local authorities.

3.05 PROTECTION

A. Do not use wheelchair lift for hoisting materials or personnel during construction period.

B. Protect installed products until completion of Project.

C. Touch-up, repair or replace damaged products prior to Substantial Completion.

END OF SECTION

SECTION 23 05 00

COMMON WORK RESULTS FOR HVAC (FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.00 SUMMARY

A. Section Includes

1. Provide a complete HVAC system as shown on the contract drawings and specifications in accordance with this Section and applicable reference standards listed in Article 1.03.

2. Design Requirements for HVAC.

3. Performance Requirements for HVAC.

B. Related Requirements

1. Section 23 05 10 - HVAC Demolition
2. Section 23 05 15 - Mechanical Identification
3. Section 23 05 19 - Meters and Gauges for HVAC Piping
4. Section 23 05 23 - General-Duty Valves for HVAC Piping
5. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
6. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
7. Section 23 07 00 - HVAC Insulation
8. Section 23 09 00 - HVAC Control System
9. Section 23 09 93 - Control Sequences for Automatic Temperature Control
10. Section 23 21 13 - Hydronic Piping
11. Section 23 21 23 - Hydronic Pumps
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this section.

B. All Division 23 specification sections shall reference this section.

1.03 SUMMARY

A. This Section specifies the basic requirements for mechanical installations and includes requirements common to more than one section of Division 23. It expands and supplements the requirements Specified in sections of Division 01.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: All Work of Division 23 shall be performed by qualified journeymen of their respective trades who are employed by a firm that can demonstrate successful experience with Work similar in type, quality and extent to the Work required by this project.

1.05 DRAWINGS AND SPECIFICATIONS

A. The Drawings and specifications are complimentary. What is shown or noted on the Drawings, but not mentioned in the specifications, automatically becomes a part of the specifications. What is noted in the specifications, but not shown on the Drawings, automatically becomes a part of the Drawings. Conflicts between the requirements of the Drawings and the specifications must be brought to the immediate attention of the ENGINEER. The more stringent requirement will apply, unless ruled otherwise by the ENGINEER. When conflicts or discrepancies are noted, no Work shall proceed until the conflict or discrepancy has been resolved by the ENGINEER.

B. The listing of Drawings does not limit responsibility of determining full extent of Work required by contract Drawings. The CONTRACTOR shall refer to site, architectural, structural, electrical and other drawings and other specification sections that indicate types of construction with which Work of this section must be coordinated. If the Work is later found to include Work required to complete and coordinate the work or another trade, or to interfere with the work of another trade then the changes required to complete the work or to eliminate the interference shall be made without additional cost to the OWNER.

C. The Drawings show, schematically, the order of connection of the various terminal units, louvers, valves, etc. but can not show every detail of the piping and ductwork. Whether specifically shown or not, all fixtures shall be connected in

accordance with the standard details, accepted trade practice, and the intent of the contract documents. Coordinate with all other trades.

D. System components (Thermostats, sensors, volume dampers, access doors, etc.) System components are identified throughout the Drawings for proper system operation. If any component is inadvertently omitted from the Drawings, provide that component as per a similar location.

1.06 RESPONSIBILITY

A. It is the intent of these specifications that each mechanical trade be thoroughly familiar and responsible for the electrical operation of their entire mechanical system. This does not preclude the use of electrical tradesmen by each mechanical trade for their portion of the wiring but they must be sufficiently familiar with the electrical operations and wiring of their systems so that the OWNER can expect single source responsibility for the repair and maintenance of those systems

1.07 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing. Extend any grease fittings to an accessible location.

1.08 MECHANICAL INSTALLATIONS

A. Coordinate equipment and materials for installation with other building components.

B. Verify all dimensions by field measurements.

C. Sequence, coordinate and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

D. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.

E. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

F. Coordinate the installation of mechanical materials and equipment above ceilings with suspension system, lighting fixtures, and other installations.

G. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

H. Coordinate installation of identifying devices after completing coverage and painting where devices are applied to surfaces. Install identifying devices prior to installing acoustical ceilings and similar concealment.

1.09 SUBSTITUTIONS

A. Proposals for substitutions of mechanical materials or equipment shall be submitted in conformance with Division 1 requirements. No such substitute materials or equipment shall be incorporated in the work without the written approval of the ENGINEER.

B. All substitute materials and equipment submitted for approval must fit within the spaces available with neither substantial alteration to connected piping and ductwork as designed nor increased pressure drops or air friction losses.

C. Approval of substitute materials or equipment by the ENGINEER shall not relieve the CONTRACTOR from his responsibility to provide a complete and workable mechanical system.

D. The ENGINEER's decision as to the equality or acceptability of proposed substitutions for the materials and equipment Specified shall be final. Any additional costs incurred by such substitutions, including additional costs to other trades, or engineering design costs, shall be borne by the CONTRACTOR.

1.10 MECHANICAL SUBMITTALS

A. Refer to the Conditions of the Contract (General and Supplementary) and Division 01 Section 010010 SUBMITTALS for submittal definitions, requirements and procedures.

B. Submittals for each mechanical trade shall be complete, including all items for which submission and approval is required, and each sheet containing performance data shall be clearly highlighted and marked for the appropriate model or type of equipment to be reviewed. Intended use shall be written on each submittal sheet for each different type of equipment or material to be reviewed (i.e. valves for domestic water or heating hot water, etc.). Incomplete or unmarked submittals WILL BE RETURNED to the CONTRACTOR without action.

1.11 NAMEPLATE DATA

A. Provide permanent operational data nameplate on each item of power operated mechanical equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in accessible location.

1.12 RECORD DOCUMENTS

A. Refer to the Division 01 Section 01 70 00 PROJECT CLOSEOUT for requirements.

B. As Work progresses, mark Drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned for column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices.

C. Mark specifications to indicate approved substitutions; Change Orders; actual equipment and materials used.

D. At completion of Work and prior to final request for payment, the CONTRACTOR shall submit a complete set of reproducible record Drawings showing all systems as actually installed.

1.13 OPERATION AND MAINTENANCE DATA

A. Refer to the Division 01 Section 01 70 00 PROJECT CLOSEOUT or procedures and requirements for general project closeout, and individual Specifications Sections for preparation and submittal of Operation and Maintenance Manuals.

B. Provide description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.

C. Provide manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions.

D. Provide maintenance procedures for routine preventive maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

E. Provide servicing instructions and lubrication charts and schedules.

F. Provide copies of all approved submittals.

1.14 WARRANTIES

A. Warranties are required for each item of power driven or other mechanical equipment having moving parts, and wherever else Specified in Division 23 of these Specifications.

B. Compile and assemble the warranties Specified in Division 23, into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.

C. Provide complete warranty information for each item, to include date of commencement; duration; and the names, addresses, and telephone numbers and procedures for filing claims and obtaining warranty services.

D. Duration of warranties shall be not less than one year from the date of substantial completion of the facility unless prior approval has been granted in writing by the ENGINEER. If the manufacturer's warranty expires less than one year from the date of beneficial occupancy, that warranty service and replacement of parts shall be provided by the mechanical Subcontractor at no cost to the OWNER.

1.15 CLEANING

A. Refer to the Division 01 Section 01 70 00 PROJECT CLOSEOUT for general requirements for final cleaning.

B. Refer to Section 23 05 93 TESTING, ADJUSTING & BALANCING for HVAC for requirements for cleaning mechanical systems prior to final acceptance.

C. All ductwork and piping shall be capped during construction, dust and debris in ductwork and/or piping is not acceptable. Interior of ductwork and air systems must be completely cleaned.

1.16 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

1.17 ENERGY EFFICIENCY

A. All equipment shall meet the minimum energy efficient design standards as established in ASHRAE/IES standard 90.1-2007.

B. All equipment shall have minimum efficiency as described in Standard 90.1-2007 (including Addenda) requirements.

END OF SECTION

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SECTION 23 05 10

HVAC DEMOLITION
(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. The demolition and removal work of existing HVAC systems, including piping, ductwork and equipment.

B. Related Requirements

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 15 - Mechanical Identification
3. Section 23 05 19 - Meters and Gauges for HVAC Piping
4. Section 23 05 23 - General-Duty Valves for HVAC Piping
5. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
6. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
7. Section 23 07 00 - HVAC Insulation
8. Section 23 09 00 - HVAC Control System
9. Section 23 09 93 - Control Sequences for Automatic Temperature Control
10. Section 23 21 13 - Hydronic Piping
11. Section 23 21 23 - Hydronic Pumps
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 RELATED WORK

A. See Drawing H-02

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. The existing HVAC systems, including piping, ductwork and equipment, shall remain in operation until the new systems are placed in service. All systems shall be maintained without interruption. The demolition and removal work shall be

coordinated with the construction schedule for new work and the demolition work of other contracts.

B. In general, the work includes removal and disposal of:

1. Rooftop Units and associated ductwork distribution system.

2. All ductwork, controls and electrical connections that are to be removed shall be removed to a point below the roof and prepared for future fit-up whether or not indicated on the Drawings.

3.02 DEMOLITION AND REMOVAL

A. Disconnect all HVAC work associated with equipment scheduled for demolition except portions indicated to remain.

3.03 DISPOSITION OF MATERIALS AND EQUIPMENT

A. Except as indicated herein or otherwise directed by the OWNER, all material and equipment removed under this Section shall become the property of the CONTRACTOR and shall be removed from the site and disposed of by the CONTRACTOR. Provide the OWNER with receipts verifying acceptable disposal of any legally regulated materials and equipment.

END OF SECTION

SECTION 23 05 15

MECHANICAL IDENTIFICATION

(FILED SUB0BID REQUIRED)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Painted Identification Materials.
2. Plastic Pipe Markers.
3. Valve Tags.
4. Plastic Equipment Markers.
5. Plasticized Tags.

B. Related Requirements

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 19 - Meters and Gauges for HVAC Piping
4. Section 23 05 23 - General-Duty Valves for HVAC Piping
5. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
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11. Section 23 21 23 - Hydronic Pumps
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 REFERENCES

A. ANSI Standards - Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.03 SUBMITTALS

A. Manufacturer's technical product data and installation instructions for each identification material and device required.

B. Samples of each color, lettering style and other graphic representation required for each identification material or system.

C. Valve schedule for each piping system, typewritten and reproduced on 8½″ x 11″ bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves that are intended for emergency shut-off and similar special uses, by special “flags”, in margin of schedule.

1.04 QUALITY ASSURANCE

A. Mechanical identification materials shall be provided by firms regularly engaged in manufacture of identification devices of types and sizes required and whose products have been in satisfactory use in similar service for not less than 5 years.

1.05 MAINTENANCE

A. Extra materials

1. Furnish minimum of 5% extra stock of each mechanical identification material required, including additional numbered valve tags (not less than 3) for each piping system, additional piping system identification markers, and additional plastic laminate engraving blanks of assorted sizes.

2. Where stenciled markers are provided, clean and retain stencils after completion of stenciling and include used stencils in extra stock, along with required stock of stenciling paints and applicators.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide mechanical identification materials of one of the following or an approved equal:

1. Allen Systems, Inc.

2. Brady (W.H.) Co.; Signmark Div.

3. Seton Name Plate Corp.

2.02 MATERIALS

A. Mechanical Identification Materials

1. Provide manufacturer's standard products of categories and types required for each application as referenced in other Division 23 sections. Where more than single type is specified for application, selections is Installer's option, but provide single selection for each product category.

B. Painted Identification Materials

1. Provide standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications, but not less than 1-1/4 inch high letters for ductwork and not less than ¾ inch high letters for access door signs and similar operational instructions. Provide 1 inch high letters for labeling tanks between 0-20 gallons.

2. Utilize standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.

3. Utilize standard identification enamel of colors indicated or, if not otherwise indicated for piping systems, comply with ANSI A13.1 for colors.

C. Plastic Pipe Markers

1. Provide manufacturer's standard pre-printed, semi-rigid snap-on, color-coded pipe markers, complying with ANSI A13.1.

2. Furnish 1 inch thick molded fiberglass insulation with jacket for each plastic pipe marker to be installed on uninsulated pipes subjected to fluid temperatures of 125°F (52°C) or greater. Cut length to extend 2 inches beyond each end of plastic pipe marker.

3. For external diameters less than 6 inch (including insulation if any), provide full-band pipe markers, extending 360° around pipe at each location, fastened by one of the following methods:

   a. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.

4. For external diameters of 6 inch and larger (including insulation if any), provide either full-band or strip-type pipe markers, but not narrower than 3 times letter height (and of required length), fastened by one of the following methods:

   a. Strapped-to-pipe (or insulation) application of semi-rigid type, with manufacturer's standard stainless steel bands.

5. Manufacturer's standard pre-printed nomenclature that best describes piping system in each instance, as selected by the ENGINEER in cases of variance with names as shown or specified. Custom wording shall be provided when no standard nomenclature is available.

6. Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as a separate unit of plastic.

D. Valve Tags

1. Provide 19-gauge polished brass valve tags with stamp-engraved piping system abbreviation in ¼ inch high letters and sequenced valve numbers ½ inch high and with 5/32 inch hole for fastener.

   a. Provide 1-1/2 inch diameter tags, except as otherwise indicated.

   b. Provide size and shape as specified or scheduled for each piping system.

   c. Fill tag engraving with black enamel.

2. Provide manufacturer's standard solid brass chain (wire link or beaded type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves, and manufactured specifically for that purpose.

3. Provide manufacturer's standard 1/16-inch thick engraved plastic laminate access panel markers, with abbreviations and numbers corresponding to concealed valve. Include 1/8-inch center hole to allow attachment.

E. Plastic Equipment Markers

1. Provide manufacturer's standard laminated plastic, color coded equipment markers. Conform to the following color code:

   a. Yellow - Heating equipment and components.

   b. Blue - Equipment and components that do not meet any of the above criteria.

   c. For hazardous equipment, use colors and designs recommended by ANSI A13.1.

2. Include the following, matching terminology on schedules as closely as possible:

   a. Name and plan number.

   b. Equipment service.

   c. Design capacity.

d. Other design parameters such as pressure drop, entering and leaving conditions, rpm, etc.

3. Provide approximate 2-1/2 inch by 4 inch markers for control devices, dampers, and valves; and 4-1/2 inch by 6 inch for equipment.

F. Plasticized Tags

1. Manufacturer's standard pre-printed or partially pre-printed accident-prevention tags, of plasticized card stock with matt finish suitable for writing approximately 3-1/4 inch by 5-5/8 inch, with brass grommets and wire fasteners and with appropriate pre-printed wording including large-size primary wording (as examples; DANGER, CAUTION, DO NOT OPERATE).

G. Lettering and Graphics

1. Coordinate names, abbreviations and other designations used in mechanical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of mechanical systems and equipment.

2. Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service (as examples; Boiler No. 3, Air Supply No. 1H, Standpipe F12).

PART 3 EXECUTION

3.01 INSTALLATION

A. Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of removable concealment, if any.

B. Piping System Identification

1. Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:

a. Plastic pipe markers, with application system as indicated under "Materials" in this section. Install on pipe insulation segment where required for hot non-insulated pipes.

2. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible

maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

a. Near each valve and control device.

b. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.

c. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures.

d. At access doors, manholes and similar access points that permit view of concealed piping.

e. Near major equipment items and other points of origination and termination.

f. Spaced intermediately at maximum spacing of 50 feet along each piping run, except reduce spacing to 25 feet in congested areas of piping and equipment.

C. Valve Identification

1. Provide valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. List each tagged valve in valve schedule for each piping system.

D. Mechanical Equipment Identification

1. Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

a. Main control and operating valves, including safety devices and hazardous units.

b. Meters, gauges, thermometers and similar units.

c. Pumps, compressors, condensers and similar motor-driven units.

d. Fans, blowers, primary balancing dampers and mixing boxes.

e. Tanks and pressure vessels.

f. Strainers, filters, water treatment systems and similar equipment.

2. Where lettering larger than 1 inch height is needed for proper identification, because of distance from normal location of required identification, stenciled signs may be provided in lieu of engraved plastic, at Installer's option.

3. Minimum ¼ inch high lettering for name of unit where viewing distance is less than 2 feet, ½ inch high for distances up to 6 feet and proportionately larger lettering for greater distances. Provide secondary lettering of 67% to 75% of size of the principal lettering.

4. In addition to name of identified unit, provide lettering to distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

5. At Installer's option, where equipment to be identified is concealed, plasticized tags may be installed within concealed space to reduce amount of text in exposed sign (outside concealment).

    a. Operational valves and similar minor equipment items located in non-occupied spaces (including machine rooms) may, at Installer's option, be identified by installation of plasticized tags in lieu of engraved plastic signs.

3.02 ADJUSTING

A. Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.

3.03 CLEANING

A. Clean face of identification devices.

END OF SECTION

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SECTION 23 05 19

METERS AND GAUGES FOR HVAC PIPING (FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Pressure gauges and fittings
2. Thermometers

B. Related Sections

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 23 - General-Duty Valves for HVAC Piping
5. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
6. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
7. Section 23 07 00 - HVAC Insulation
8. Section 23 09 00 - HVAC Control System
9. Section 23 09 93 - Control Sequences for Automatic Temperature Control
10. Section 23 21 13 - Hydronic Piping
11. Section 23 21 23 - Hydronic Pumps
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 SUBMITTALS

A. Product data for each type of meter and gauge. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit meter and gauge schedule showing manufacturer's figure number, scale range, location, and accessories for each meter and gauge.

B. Product certificates signed by manufacturers of meters and gauges certifying accuracy’s under specified operating conditions and products' compliance with specific requirements.

C. Maintenance data for each type of meter and gauge for inclusion in Operation and Maintenance Manuals.

1.03 QUALITY ASSURANCE

A. UL Compliance - Comply with applicable UL standards pertaining to meters and gauges.

B. ASME and ISA Compliances - Comply with applicable portions of ASME and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers - Provide products by one of the following or an approved equal:

1. Pressure Gauges and Accessories

a. Ametek, U.S. Gauge Div.

b. Ashcroft Dresser Industries Instrument Div.

c. Trerice (H.O.) Co.

d. Weksler Instruments

e. Approved Equal

2.02 THERMOMETERS

A. Accuracy - ±1% of range span or ± scale division to maximum of 1.5% of range span.

1. Mercury-in-Glass Thermometers

a. Case – Die cast, aluminum finished, in baked epoxy enamel, glass front, spring secured, 9 inches long.

b. Adjustable Joint – Finished to match the case, 180 º adjustments in vertical plant, 360º adjustment in horizontal plane, with locking device.

c. Tube – Red reading, mercury filled, magnifying lens.

d. Scale – Satin-faced, non-reflective aluminum, with permanently etched markings.

e. Stem – Copper-plated steel, aluminum or brass, for separable socket, length to suit installation.

2. Direct-Mount Filled-System Dial Thermometers

a. Type – Vapor actuated, universal angle.

b. Case – Drawn steel or cast aluminum, glass lens, 4½ inch diameter.

c. Adjustable Joint – Finish to match case 180º adjustment in vertical plane, 360º adjustment in horizontal plane, with locking device.

d. Thermal Bulb – Copper with phosphor bronze bourdon pressure tube.

e. Movement – Brass, precision geared.

f. Scale – Progressive, satin faced, non-reflective aluminum, permanently etched markings.

g. Stem – Copper-plated steel, aluminum, or brass, for separable socket, length to suit installation.

B. Thermometer Wells – Brass or stainless steel, pressure rated to match piping system design pressure; with 2 inch extension for insulated piping and threaded cap nut with chain permanently fastened to well and cap.

C. Scale Range – Temperature ranges for services listed as follows:

1. Domestic Cold Water – 0°F to 100ºF with 2º scale divisions.

2. Hot Water – 30 F to 300ºF with 2º scale divisions.

2.03 PRESSURE GAUGES

A. Pressure gauges shall be provided where shown on the Drawings, specified in the detailed specifications or required for a complete installation.

B. The gauge tap shall be ½ inch NPT and shall be free from burrs or other irregularities.

C. Pressure gauges shall be a 4½ inch diameter minimum, black FRP (fiberglass reinforced polypropylene) case, glycerin filled, acrylic lens, screwed lens ring, solid front, blow-out back, bronze bourbon tube, ½ inch NPT brass socket, bottom connection, stainless steel brushed movement, 1% accuracy full scale ANSI B 40.1 grade 2A.

D. Select the proper vacuum, compound, or pressure range for the service intended. Pressure ranges shall be approximately twice the normal working pressure. Pressure ranges shall be graduated in PSI, vacuum ranges in inches of mercury; pressure gauges for all pumps shall be graduated in both PSI and feet of water.

E. Pressure gauges shall be provided with an external ½ inch NPT brass snubber to reduce the pressure pulsations to the gauge and a ½ inch NPT brass shut off ball valve.

PART 3 EXECUTION

3.01 INSTALLATION

A. Piping installation requirements are specified in other sections of Division 23. The drawings indicate the general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

3.02 ADJUSTING

A. Adjust faces of meters and gauges to proper angle for best visibility.

3.03 CLEANING

A. Clean windows of meters and gauges and factory finished surfaces. Replace cracked and broken windows, and repair scratched and marred surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 23 05 23
GENERAL-DUTY VALVES FOR HVAC PIPING
(FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Manual Operators
2. Gate Valves
3. Ball Valves
4. Dielectric Pipe Couplings

B. Related Sections

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
6. Section 23 05 90 - Testing, Adjusting and Balancing for HVAC
7. Section 23 07 00 - HVAC Insulation
8. Section 23 09 00 - HVAC Control System
9. Section 23 09 93 - Control Sequences for Automatic Temperature Control
10. Section 23 21 13 - Hydronic Piping
11. Section 23 21 23 - Hydronic Pumps
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 REFERENCES

A. ASTM A126 - Specifications for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

B. ASTM A307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi tensile

C. ASTM A563 - Specification for Carbon and Alloy Steel Nuts

D. ASTM B62 - Specification for Composition Bronze or Ounce Metal Castings

E. MSS SP45 - Standard for Bypass and Drain Connections

F. MSS SP80 - Standard for Bronze Gate, Globe, Angle and Check Valves

1.03 SUBMITTALS

A. Submit in accordance with Section 013300.

B. Product data including body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.

C. Performance and sizing data for air release valves including manufacturer's recommended sizing requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Ensure valves are dry and internally protected against rust and corrosion.

2. Protect valve ends against damage to threads, flange faces, and weld-end preps.

3. Set valves in best position for handling. Set globe and gate valves closed to prevent rattling; set ball valves open to minimize exposure of functional surfaces; set butterfly valves closed or slightly open: and block swing check valves in either closed or open position.

B. Use the following precautions during storage:

1. Do not remove valve end protectors unless necessary for inspection; then reinstall for storage.

2. Protect valves from weather. Store valves indoors. Maintain valve temperature higher than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement in watertight enclosures.

C. Use a sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels and stems as lifting or rigging points.

PART 2 PRODUCTS

2.01 GENERAL

A. Pressure and Temperature Ratings - As scheduled and required to suit.

B. Sizes - Same size as upstream pipe, unless otherwise indicated.

C. Extended Stems - Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

D. Bypass and Drain Connections - Comply with MSS SP-45 bypass and drain connections.

E. Valves shall have the same end connections and an equivalent or higher pressure rating as the pipeline in which it is installed.

2.02 MANUAL OPERATORS

A. Provide lever handles for quarter-turn valves 4 inches and smaller. Provide one lever handle for each valve supplied.

B. Provide manual actuator chain wheels on valves 2½ inches and larger located more than 6 feet above finished floor. Chainwheel actuators shall be furnished with a galvanized chainwheel, galvanized chain guide and galvanized chain extending to 5 feet above finished floor.

2.03 GATE VALVES

A. Gate Valves, 2 ½ -inch and Smaller - MSS SP-80; Class 125, body and bonnet of ASTM B62 cast bronze; with threaded or solder ends, solid disc, copper-silicon alloy stem, brass backing gland, “Teflon” impregnated packing, and malleable iron handwheel. Provide Class 150 valves meeting the above where system pressure requires.

B. Gate Valves, 3 inch and larger – MSS SP-70 and SP-25; Class 125 Outside Screw & Yoke, Rising Stem, Acme double thread, flanged; iron body with brass trim, non-asbestos packing, renewable bronze seat, body guide ribs, tapered solid wedge disc. Pressure rating 125 psi Steam Basic Rating, 200 psi cold working pressure. Provide chain operator. Valve shall meet ASME B16.10 and ASME 16.1.

2.04 BALL VALVES

A. Ball valves, 1½ inch and smaller - rated for 150 psi saturated steam pressure, 600 psi WOG pressure; two-piece adaptor load construction; with bronze body conforming to ASTM B 62, single reduced port, chrome-plated brass ball, glass reinforced "Teflon" or "TFE" seats and seals, blowout-proof stem, soldered, screwed or flanged ends, and vinyl-covered steel handle. For air service provide stainless steel ball and stem with screwed or flanged ends.

B. Ball Valves, 2 inch and larger - Rated for 150 psi saturated steam pressure, 600 psi WOG pressure; 3-piece construction; with bronze body conforming to ASTM B 62, single reduced port, chrome-plated brass ball, glass reinforced "Teflon" or "TFE" seats and seals blowout proof stem, soldered, screwed or flanged ends, and vinyl-covered steel handle.

2.05 CHECK VALVES

A. Swing Check Valves, 2 inches and smaller - MSS SP-80; Class 125, cast-bronze body and cap conforming to ASTM B 62; with horizontal swing, and bronze disc; and having threaded or solder ends. Provide Class 150 valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.

2.06 GLOBE VALVES

A. Globe Valves, 2-inch and Smaller - MSS SP-80; Class 125; body and screwed bonnet of ASTM B62 cast bronze; with threaded or solder ends, bronze or replaceable composition disc, copper-silicon alloy stem, bronze packing gland, non-asbestos packing, and malleable iron Handwheel. Provide Class 150 valves meeting the above where system pressure requires.

2.07 DIELECTRIC PIPE COUPLINGS

A. Dielectric couplings shall be installed where copper connects to steel or cast iron pipe appurtenances. Couplings shall have steel bodies with non-conducting bushing on each threaded end. Couplings shall be rated at 200 psi.

2.08 MANUFACTURERS

A. Valves and Dielectric couplings shall be Nibco, Apollo, Mueller or approved equivalent.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.

B. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.

C. Examine threads on both the valve and the mating pipe for form (i.e., out-or-round or local identification) and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

E. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.

F. Replace defective valves with new valves.

3.02 INSTALLATION

A. General Applications - Refer to the drawings and piping system specification sections for specific valve applications and arrangements.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Unions are not required on flanged devices.

D. Install three-valve bypass around each pressure reducing valve using throttling-type valves.

E. Install valves in horizontal piping with stem at or above the center of the pipe.

F. Install valves in a position to allow full stem movement.

G. Install swing check valves in a horizontal position with hinge pin level.

H. Valves and actuators shall be installed to be plumb in the vertical direction.

3.03 SOLDER CONNECTIONS

A. Cut tube square and to exact lengths.

B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or steel wire brush to a bright finish. Clean valve socket in same manner.

C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

D. Open gate valves to full open position.

E. Remove the cap and disc holder of swing check valves having composition discs.

F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.

G. Apply heat evenly to outside of valve around joint until solder will melt upon contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.04 THREADED CONNECTIONS

A. Note the internal length of threads in valve ends and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.

B. Align threads at point of assembly.

C. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).

D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.05 FLANGED CONNECTIONS

A. Align flange surfaces parallel.

B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

3.06 MECHANICAL CONNECTIONS

A. In lieu of solder connections per paragraph 3.03 above, the contractor may use press type fittings and connections.

B. All connections shall be Pro Press as manufactured by Viega, Nibco, Watts or approved equivalent.

C. All connections, to the extent possible shall be either solder type or press type but not a mix.

3.07 FIELD QUALITY CONTROL

A. After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leaks; replace valves if leak persists.

3.08 MANUFACTURER'S FIELD SERVICE

A. The CONTRACTOR shall provide the services of a qualified manufacturer's field service representative for a minimum of 4-hours on-site for the start-up of each of the following equipment:

1. Motorized Actuators

B. A manufacturer's field service representative shall be provided for a separate additional period of 8-hours on-site for each manufacturer to provide operator training in the calibration, use and maintenance of all equipment provided under this Section. The CONTRACTOR shall provide the OWNER with a minimum 7 days written notice of planned operator training. Training shall be conducted separate from the specified start-up.

3.09 CLEANING

A. Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

3.010 FINAL ACCEPTANCE AND WARRANTY

A. Final acceptance of all equipment furnished under these Specifications will be withheld until after the installation and field testing by the ENGINEER. The manufacturer and the CONTRACTOR shall guarantee the equipment against defects of any kind for a period of one year after final testing and acceptance.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

(FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Furnish all labor, materials, equipment and incidentals, and install a complete system of pipe hangers, supports, concrete inserts and anchor bolts including all metallic hanging and supporting devices for supporting non-buried piping as shown on the Drawings and as specified herein. All pipe hanger and support systems shall be designed and constructed to resist seismic forces as specified herein.

2. Pipe supports and details are generally not shown on the Drawings. The absence of pipe supports and details on the Drawings shall not relieve the CONTRACTOR of the responsibility for providing them. Pipe supports indicated on the Drawings are shown only to convey the intent of the design for a particular location and are not intended to represent a complete system.

B. Related Requirements

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 23 - General-Duty Valves for HVAC Piping
6. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
7. Section 23 07 00 - HVAC Insulation
8. Section 23 09 00 - HVAC Control System
9. Section 23 09 93 - Control Sequences for Automatic Temperature Control
10. Section 23 21 13 - Hydronic Piping
11. Section 23 21 23 - Hydronic Pumps
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 SUBMITTALS

A. Submit, in accordance with Section 013000, complete sets of shop drawings of all items to be furnished under this Section. Submittals shall include complete layouts, schedules, location plans and complete total bill of materials for all pipe support systems.

B. Submittals shall include a representative catalog cut for each different type of pipe hanger or support indicating the materials of construction, important dimensions and range of pipe sizes for which that hanger is suitable. Where standard hangers and/or supports are not suitable, submit detailed drawings showing materials and details of construction for each type of special hanger and/or support. Provide detailed information on anti-seize compound.

C. Submittals shall include complete piping layout drawings for each piping system specified in Division 23. The piping layouts shall indicate type of hanger and/or support, location, pipe support reactions transmitted to the structure and type of anchor, guide and other pipe supporting appurtenances including structural fasteners. Pipe loads supported by the pipe supports will not be accepted in lieu of pipe support reactions. Submittals shall be made for complete piping systems only. Submittals of partial piping systems will be considered as nonconformance with these specifications and will be returned.

D. Service conditions for each piping system, including service temperatures, and operating and test pressures, are tabulated in the piping sections.

E. Submit complete design data for pipe support systems to show conformance with this Section.

F. Description of surface preparation and shop painting including manufacture and dry film thicknesses.

1.03 REFERENCE STANDARDS

A. Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS)

1. MSS SP-58 - Pipe Hangers and Supports - Materials, Design and Manufacture.

2. MSS SP-69 - Pipe Hangers and Supports - Selection and Application.

B. American Society for Testing and Materials (ASTM)

1. ASTM A36 - Standard Specification for Carbon Structural Steel.

2. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

C. American National Standards Institute (ANSI)

1. ANSI B31.1 - Power Piping.

1.04 QUALITY ASSURANCE

A. The CONTRACTOR shall engage the services of an independent professional engineer (“Support Engineer”) registered in the state of Massachusetts, with specific experience

specified under paragraph below in the structural design and configuration of pipe supporting systems, including any non-standard supports that need to be designed and certified.

B. The "Support Engineer" shall have not less than 3 years of experience within the last 5 years in the analysis and design of pipe supports.

C. The "Support Engineer" shall be responsible for work within the design specifications and within the design configuration. Any construction-related deviations in criteria, materials or details within the design must be submitted to the ENGINEER. These submittals will be reviewed only for conformance to the specifications.

D. All hangers, supports and appurtenances shall conform to the latest applicable requirements of the Massachusetts State Building Code and ANSI B31.1, except as supplemented or modified by the requirements of this Section.

E. All hanger, supports and appurtenances shall be of approved standard design where possible and shall be adequate to maintain the supported load in proper position under all operating conditions. The minimum working factor of safety for all supporting equipment, with the exception of springs, shall be one fifth the ultimate tensile strength of the material, assuming a minimum 10-ft of water filled pipe being supported.

F. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, submit certification stating that such requirements have been complied with.

G. Support arrangements shall be coordinated to eliminate interference with similar support systems to be installed by Plumbing, HVAC, Electrical, and pipe support drawings; to account for structural expansion joints with co-located piping expansion joints; and to maintain unhindered access to all equipment for both operation and removal. No material handling equipment supports shall be used for piping supports under any circumstances. Do not support from structural struts, or braces.

1.05 SEISMIC RESTRAINTS

A. Provide seismic restraints for all piping systems including but not limited to free standing, suspended or wall mounted piping installed under this Section. Seismic restraints shall be sized for Seismic Hazard Exposure Group II and Seismic Performance Category C.

B. Use the restraints defined in the manual when the seismic criteria, and size of piping, are within the limits of the latest edition of the SMACNA Seismic Restraints Manual, at the time of bid opening. Select restraints from the Tables that represent the highest seismic hazard class or level possible within the state of Connecticut in which the project resides. Provide members of material of equal strength to those in the standards where materials other than carbon steel are specified.

C. Materials of construction for seismic restraints shall be same as those specified in PART 2 of this Section for the pipe hangers and supports. All nuts, bolts and washers shall be stainless steel regardless of locations.

1.06 DELIVERY, STORAGE AND HANDLING

A. All supports and hangers shall be crated, delivered and uncrated so as to protect against any damage.

B. All parts shall be properly protected so that no damage or deterioration shall occur during a prolonged delay from the time of shipment until installation is completed.

C. Finished metal surfaces not galvanized, that are not of stainless steel construction, or that are not coated, shall be grease coated, to prevent rust and corrosion.

PART 2 PRODUCTS

2.01 GENERAL

A. All of the equipment specified herein is intended to support the various types of pipe and piping systems shown on the Drawings. It shall be the responsibility of the CONTRACTOR to develop final details and any details associated with special conditions not already covered to meet the system conditions (in particular system temperatures and pressures) specified in the respective Division 23 Pipe Sections.

B. Support all pipe and tubing shall to prevent significant stresses in the pipe or tubing material, valves, fittings and other pipe appurtenances and to support and secure the pipe in the intended position and alignment. Design all supports to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, vibration due to fluid pulsation and/or equipment operation, internal flow forces and all probable external forces such as equipment, pipe and personnel contact and seismic forces. Any structural steel members required to brace any piping from excessive dislocation shall conform to the applicable requirements of Sections 055000 and shall be furnished and installed under this Section.

C. The CONTRACTOR may propose minor adjustments to the piping arrangements in order to simplify the supports, or in order to resolve minor conflicts in the work. Such an adjustment might involve minor change to a pipe centerline elevation so that a single trapeze support may be used.

D. Where flexible couplings are required at equipment, tanks, etc., the end opposite to the piece of equipment, tank, etc., shall be rigidly supported, to prevent transfer of force systems to the equipment. No fixed or restraining supports shall be installed between a flexible coupling and the piece of equipment.

E. Support all pipe and appurtenances connected to the equipment in a manner to prevent any strain from being imposed on the equipment or piping system.

F. Furnish all rods, clamps, hangers, inserts, anchor bolts, brackets and components for interior pipe supports per the schedule on the G-sheets and a minimum of 304L stainless steel Supports for copper pipe shall be copper plated or shall be 304L stainless steel. All rods, clamps, hangers, inserts, anchor bolts, brackets and components for exterior pipe, submerged pipe, Lime Slurry piping, Alum piping, Polymer piping, interior pipe within chemical containment areas, pipe within outdoor structures and tanks, and interior pipe within manholes, and exterior pipe within channels shall be of Type 316 stainless steel.

G. Supports shall be sufficiently close together such that the sag of the pipe is within limits that will permit drainage and avoid excessive bending stresses from concentrated loads between supports.

H. All uninsulated non-metallic piping such as PVC, CPVC, etc., shall be protected from local stress concentrations at each support point. Protection shall be provided by 304L stainless steel protection shields or other method as approved by the ENGINEER. Where pipes are bottom supported 180 degrees, arc shields shall be furnished. Where 360 degree arc support is required, such as U bolts, protection shields shall be provided for the entire pipe circumference. Protection shields shall have an 18 gauge minimum thickness, not be less than 12-in in length and be securely fastened to pipe with stainless steel straps not less than 1/2-in wide.

I. All insulated pipe shall be furnished with a rigid foam insulating saddle at each pipe support location as specified under respective pipe insulation. Provide protection shields as specified in at each support location.

J. Where pipe hangers and supports come in contact with copper piping provide protection from galvanic corrosion by; wrapping pipe with 1/16-in thick neoprene sheet material and stainless steel protection shield; isolators similar to Elcen, Figure No. 228; or copper plated or 304L stainless steel hangers and supports. All stainless steel piping shall be isolated from all ferrous materials, including galvanized steel by use of neoprene sheet material and protection shields, similar to above methods.

K. Pipe supports shall be provided as follows:

1. Cast iron and ductile iron, steel and stainless steel piping shall be supported at a maximum support spacing of 10-ft with a minimum of one support per pipe section at the joints.

2. All vertical pipes shall be supported at each floor or at intervals of not more than 6-ft by approved pipe collars, clamps, brackets, or wall rests and at all points necessary to insure rigid construction. All vertical pipes passing through pipe sleeves shall be secured using a pipe collar.

3. Pipe supports shall not induce point loadings but shall distribute pipe loads evenly along the pipe circumference.

4. Supports shall be provided at changes in direction and elsewhere as shown in the Drawings or as specified herein. No piping shall be supported from other piping or from metal stairs, ladders and walkways, unless specifically directed or authorized by the ENGINEER.

5. Pipe supports shall be provided to minimize lateral forces through valves, both sides of split type couplings and sleeve type couplings and to minimize all pipe forces on pump housings. Pump housings shall not be utilized to support connecting pipes.

6. Effects of thermal expansion and contraction of the pipe shall be accounted for in the pipe support selection and installation.

7. Sufficient lateral bracing shall be provided to minimize horizontal motion and vibration of piping due to fluid pulsation and/or equipment vibration to less than 1/8 inch peak-

to-peak throughout the range of routine operating conditions. Special attention shall be paid to lateral bracing on non-ridged piping systems such as grooved-end.

L. Unless otherwise specified herein, pipe hangers and supports shall be standard catalogued components, conforming to the requirements of MSS-SP-58 and -69; and shall be as manufactured by Grinnell Co., Inc., Providence, RI; Carpenter & Patterson, Inc., Woburn, MA; F&S Central, Brooklyn NY; PHD Manufacturing, Inc., Columbiana, OH or equal. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary.

M. Any required pipe supports for which the standard supports specified in this Section are not applicable shall be fabricated or constructed from standard structural steel shapes, concrete and anchor hardware similar to items previously specified herein and shall be subject to the approval of the ENGINEER.

N. Expansion anchors for wall and floor pipe supports and appurtenances shall be equal to Hilti Kwik-Bolt II; Simpson Strong-Tie Wedge-All; Powers Power-Stud, or equal. The length of expansion bolts shall be sufficient to place the wedge portion of the bolt a minimum of 1-in behind the steel reinforcement. Concrete anchors for ceiling mounted pipe support and appurtenances shall be adhesive type.

O. Hanger rods shall be hot rolled stainless steel, machine threaded. The strength of the rod shall be based on its root diameter. Hanger rods shall be attached to concrete structures using concrete inserts similar to F&S, Figures 180, 571 or 150; or continuous concrete inserts per F&S. Inserts shall be stainless steel. Beam clamps, C clamps or welded beam attachments shall be used for attaching hanger rods to structural steel members. Where necessary and as approved by the ENGINEER, expansion anchors may be used for attaching to concrete structures.

2.02 SINGLE PIPE HANGERS

A. Suspended multiple pipes, running parallel in the same horizontal plane, which are adjacent to each other shall be suspended by trapeze type hangers or wall brackets. Trapeze hangers shall consist of 304L or 316 stainless steel channel supported from stainless steel threaded rod or attached to concrete walls, columns or structural steel support members as required to meet the intent of this Section. Channel shall be similar to F&S, Figure 710, rods, concrete inserts, "C" clamps, beam clamps, welded beam attachments and expansion shields shall be as specified in Paragraph 2.02 above.

B. Except as otherwise specified herein pipe anchors used for attaching pipe to trapeze or multiple pipe wall brackets shall be anchor or pipe chairs similar to F&S, Figures 158, 419, 160A, 160B as required. Material of construction shall be stainless steel. Chair "U" bolts shall be tightened to allow freedom of movement for normal expansion and contraction except where pipe must be anchored to control direction of movement or act as a thrust anchor.

C. Pipes less than 3-in in diameter shall be held in position by supports fabricated from stainless steel "C" channel, welded post base similar to Unistrut, Figure P2072A and pipe clamps similar to Unistrut, Figures P1109 thru P1126. Where required to assure adequate support, fabricate supports using two vertical members and post bases connected together by horizontal member of sufficient load capacity to support pipe. Wherever possible supports shall be anchored to nearby walls or other structural member to provide horizontal rigidity. More than one pipe may be supported from a common fabricated support.

D. Where shown on the Drawings, pipe shall be anchored using concrete anchor posts or pedestals. Pipe shall be securely fastened to the posts or pedestals as indicated on the Drawings.

2.03 WALL SUPPORTED PIPES

A. Single or multiple pipes located adjacent to walls, columns or other structural members, whenever deemed necessary, shall be supported using welded stainless steel wall brackets similar to Carpenter and Patterson, Figure No. 69-78, 84, or 134; or "C" channel with steel brackets similar to Unistrut pipe clamps. All members shall be securely fastened to wall, column, etc., using double expansion shields or other method as approved by the ENGINEER. Additional wall bearing plates shall be provided where required.

B. Pipe shall be attached to supports using methods specified herein to meet the intent of this Section.

2.04 BASE ANCHOR SUPPORT

A. Where pipes change direction from horizontal to vertical via a bend, a welded or cast base bend support shall be installed at the bend to carry the load. The base bend shall be anchored to the floor, pipe stanchion, or concrete pedestal using expansion anchors or other method as approved by the ENGINEER.

B. Where shown on the Drawings, pipe bends shall be anchored using concrete anchor posts. Pipes shall be securely fastened to the concrete supports with suitable metal bands as required and approved by the ENGINEER. A felt insert shall be used to isolate the piping from the poured concrete.

2.05 VERTICAL PIPE SUPPORTS

A. Where vertical pipes are not supported by a Unistrut system as specified in Paragraph 2.06 below, they shall be supported in one of the following methods.

1. For pipes 1/4-in to 2-in in diameter, an extension hanger ring shall be provided with an extension rod and hanger flange. The rod diameter shall be as recommended by the manufacturer for the type of pipe to be supported. The hanger ring shall be stainless steel. The hanger ring shall be equal to Carpenter & Paterson, Figure No. 81 or 81CT. The anchor flange shall be stainless steel similar to Carpenter and Patterson, Figure No. 85.

2. For pipes equal to or greater than 2-in in diameter extended pipe clamps similar to Carpenter and Patterson, Figure No. 267 may be used. The hanger shall be attached to concrete structures using double expansion shields, or to stainless steel support members using welding lugs similar to Carpenter and Patterson, Figure No. 220.

3. Pipe riser clamps shall be used to support all vertical pipes extending through floor slabs. Riser clamps shall be stainless steel similar to Carpenter and Patterson, Figure No. 126. Copper clad or stainless steel clamps shall be used on copper pipes. Insulation shall be removed from insulated pipes prior to installing riser clamps. Insulation shall not be damaged by clamp installation.

4. Unless otherwise specified, shown, or specifically approved by the ENGINEER, vertical runs exceeding 6-ft shall be supported by base elbows/tees, clamps, brackets, wall rests and pipe collars, all located as required to ensure a rigid installation.

2.06 SURFACE PREPARATION AND SHOP PRIME PAINTING

A. All surfaces, except stainless steel surfaces, shall be prepared and shop prime painted as part of the work of this Section. Surface preparation and shop prime painting shall be as specified in Section 099000.

2.07 SEALS

A. Link-Seal by Thunderline Corporations or approved equal where a gas tight penetration is not required.

PART 3 EXECUTION

3.01 INSTALLATION

A. Proceed with the installation of piping and supports only after any building structural work has been completed and new concrete has reached its specified design strength.

B. The installation of pipe support systems shall in no way interfere with the operation of monorails, access hatches, etc.

C. The installed systems shall not interfere with maintenance and operational access to any equipment installed under this Section, or any other related Section.

D. All pipes, horizontal and vertical, requiring rigid support shall be supported from the building structure by methods specified under PART 2. Supports shall be provided at changes in direction and elsewhere as shown in the Drawings or as specified herein. No piping shall be supported from existing precast concrete tees, metal stairs, ladders and walkways unless specifically directed or authorized by the ENGINEER.

E. All pipe supports shall be designed with liberal strength and stiffness to support the respective pipes under the maximum combination of peak loading conditions to include pipe weight, liquid weight, liquid movement and pressure forces, thermal expansion and contraction, vibrations and all probable externally applied forces including seismic forces. Prior to installation, all pipe supports shall be approved by the ENGINEER.

F. Pipe supports shall be provided to minimize lateral forces through valves, both sides of split type couplings and sleeve type couplings (within four pipe diameters) and to minimize all pipe forces on pump housings and other equipment. Pump housings and other equipment shall not be utilized to support connecting pipes.

G. Inserts for pipe hangers and supports shall be installed on forms before concrete is placed. Before setting these items, all Drawings and figures shall be checked which have a direct bearing on the pipe location. Responsibility for the proper location of pipe supports is included under this Section.

H. Continuous metal inserts shall be embedded flush with the concrete surface.

I. Apply anti-seize compound to all nuts and bolts. Supports installed without the approved compound shall be dismantled and correctly installed, at no additional cost to the OWNER.

J. All sharp edges and corners within 7 feet of the floor or walking surface shall be ground down and/or protected with plastic protective covers.

K. After startup of equipment and piping systems, provide additional lateral bracing if horizontal vibration exceeds limits stated in Part 2.

3.02 TESTING

A. All pipe support systems shall be tested for compliance with this Section. After installation, each pipe support system shall be tested in conjunction with the respective piping pressure tests. If any part of the pipe support system proves to be defective or inadequate, it shall be repaired or augmented under this Section to the satisfaction of the ENGINEER.

END OF SECTION

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SECTION 23 05 93

TESTING, ADJUSTING AND BALANCING FOR HVAC (FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Furnish the necessary labor, materials, instruments, transportation and devices required and test, adjust and balance the total heating-ventilating-cooling system. Each as specified and detailed herein, or as required such that the systems perform in accordance with the intent of the Drawings, Specifications and this Section. Systems to be tested, adjusted, and balanced include air and water systems installed by the HVAC Contractor and Subcontractors.

2. Testing, balancing and operation of the systems shall be performed by competent and experienced personnel, having formerly done similar work and whose qualifications and performance shall be subject to the approval of the Engineer. Test and balance air and water systems and submit testing and balancing reports to the Engineer for review and approval. Re-balance when required by the Engineer, incorporating all changes and certify the systems have been tested and balanced to meet specified requirements.

3. The tests shall demonstrate the specified capacities and operation of equipment and materials comprising the systems. Such tests other than as described herein, which are deemed necessary by the Engineer to indicate the fulfillment of the Contract, shall be made.

4. Data required by this Section shall receive complete approval before final payment is made.

5. If, in the opinion of the Engineer, the Contractor has not, will not, or cannot comply with the testing, balancing and adjusting requirements of this Section, he may advise the Owner to employ a qualified firm to perform such work at Contractor's sole expense.

B. Related Requirements

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 23 - General-Duty Valves for HVAC Piping
6. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
7. Section 23 07 00 - HVAC Insulation
8. Section 23 09 00 - HVAC Control System
9. Section 23 09 93 - Control Sequences for Automatic Temperature Control

10. Section 23 21 13 - Hydronic Piping
11. Section 23 21 23 - Hydronic Pumps
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 SUBMITTALS

A. Submit, in accordance with Section 01 30 00, the following:

1. Qualifications and experience information and data as detailed under Paragraph 1.03 below.

2. Proposed testing schedules and procedures.

3. Results of periodic field inspections as specified under Paragraph 3.01 below.

4. Preliminary draft "system" balancing reports as systems are completed and tested.

5. Final systems and Project balancing reports as final system adjustments are made as systems are accepted by the OWNER.

6. All submittals shall contain a statement that Sections 23 05 00 and all other referenced Sections have been read and complied with. The certification statement shall be made by all of the following that are applicable; the CONTRACTOR, Subcontractor and the vendor. The statement shall be an individual statement for each party involved, and shall be included with every submittal and resubmittal.

B. In general, corrections, comments, or lack there of, made relative to submittals during review shall not relieve the CONTRACTOR from compliance with the requirements of the drawings and specifications. Submittals are for review of general conformance with the design concepts of the project and general compliance with the contract documents. The CONTRACTOR is responsible for the final design conforming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating the work of all trades, and performing the work in a safe and satisfactory manner.

1.03 QUALITY ASSURANCE

A. Qualifications standards for this work - Affiliation with manufacturers, installing contractors or engineering firms will not preclude acceptability. Submit qualifications within 60 days after Contract award. Membership in the AABC or NEBB for air testing is required. The testing balancing contractor shall not be affiliated with the on-site contractors.

B. The balancing contractor shall be prepared to submit credentials and other evidence of qualifications, and work experience.

C. To perform required professional services, the balancing agency shall have a minimum of two test-and-balance engineers certified by the AABC, TABB or NEBB.

D. This certified test-and-balance engineer shall be responsible for supervision and certification for the total work specified herein.

E. The balancing agency shall submit records of experience in the field of air system balancing or any other data as requested by the ENGINEER. The supervisory personnel for the firm shall have at least five years of experience and all the employees used in this project shall be qualified technicians in this specific field.

F. The balancing agency shall furnish all necessary calibrated instrumentation to adequately perform the specified services. An inventory of all instruments and devices in possession of the balancing agency may be required by the ENGINEER to determine the balancing agency's performance capability.

1.04 ENGINEERING SERVICES

A. When engineering services are specified to be provided by the CONTRACTOR, the CONTRACTOR shall retain a licensed professional engineer to perform the services. The ENGINEER shall be licensed at the time the work is done and in the State in which the project is located. If the State issues discipline specific licenses, the ENGINEER shall be licensed in the applicable discipline. In addition, the ENGINEER shall be experienced in the type of work being provided.

B. All work is to be done according to the applicable regulations for professional engineers, to include signing, sealing and dating documents. When submittals are required by a professional engineer, in addition to state required signing and sealing, a copy of the current wallet card or wall certificate indicating the date of expiration shall be included with the submittal.

1.05 SCHEDULE AND PROCEDURES

A. A complete schedule of balancing procedures for each of the buildings or systems shall be submitted in sufficient time in advance so that the ENGINEER might arrange to observe these procedures as they progress. Before commencing with the balancing of the systems, submit the methods and instruments proposed to be used to adjust and balance the air systems.

B. Submit proposed testing programs at least 2 weeks prior to the scheduled test to assure agreement as to personnel and instrumentation required and scope of each testing program.

1.06 DRAWING REVIEW

A. The balancing organization shall thoroughly review the location of all fresh air dampers, return dampers, spill dampers, quadrant dampers, splitter dampers, bypass dampers, face dampers, fire dampers, registers, grilles, diffusers, etc. The purpose of the review is to finalize the optimum locations for dampers, test ports, and balancing valves shown on the Drawings.

1.07 EQUIPMENT CURVES

A. Fan Characteristics Charts: The HVAC and General Contractors shall provide to the Balancing Organization any required characteristic curve charts for all fans to include air conditioning units and air handling units. Characteristic curve charts shall be not less than 8-1/2-in by 11-in and shall show the static pressure, capacity horsepower, and overall efficiency for operating conditions from no load to 130 percent of specified load. The minimum size of the actual fan curve shall be no less than 6-in by 8-in. The use of faxed copies of curves is not acceptable.

1.08 GUARANTEE

A. The balancing work shall be guaranteed to be accurate and factual data, based on readings in the field. All typewritten data shall be submitted within 14 working days of the performance of the test. Test data shall not be held until final completion, but shall be submitted on an interim basis as soon as the test or appropriate groups of tests are finished.

PART 2 PRODUCTS

2.01 MATERIALS

A. Furnish gaskets, lubricants and other expendable materials required to be replaced during the execution of this work.

B. Fixed-pitched pulleys required for fan adjustments shall be furnished on an exchange basis by the party responsible for the fan installation.

C. Where test results indicate that air quantities at any system fan are below or in excess of the specified amount, the HVAC and General Contractors, at their own expense, shall change driving pulley ratio or shall make approved changes to obtain the specified or scheduled air quantities.

D. Testing apparatus: Furnish plugs, caps, stops, valves, pumps, compressors, blowers, and similar devices required to perform this work.

1. Furnish anemometers, thermometers, gauges, voltmeters, ammeters, tachometers and similar instruments, not part of the permanent installation, but required to record the performance of the equipment and systems.

2. Testing apparatus, not part of the permanent installation, shall remain the property of the CONTRACTOR, but made available to the ENGINEER.

3. Instruments used for testing shall be certified accurate to within plus or minus 0.10 degrees F for temperature or plus or minus 0.10-in w.c. for pressure. Calibration of the instruments shall be done within 12 months of testing for this project.. Certification of calibration shall be submitted to the ENGINEER prior to starting the work.

2.02 TESTING REPORTS

A. Forms: Furnish test report data on 8-1/2-in by 11-in bond AABC or NEBB form paper in accordance with Section 013000. Submit format for recording data and receive approval prior to use.

B. Reports shall be excel spreadsheets format and shall be submitted in both hard copy and as a data file.

C. The report shall contain the following general data in a format selected by the balancing agency:

1. Project number
2. Contract number
3. Project title
4. Project location
5. Project Mechanical Engineer
6. Test and balance agency
7. Test and balance Engineer
8. General Contractor
9. Mechanical Subcontractor
10. Dates tests were performed
11. Certification

D. At a minimum, the report shall include:

1. Preface. A general discussion of the systems, any abnormalities, and problems encountered.
2. Instrumentation list. The list of instruments including type, model, manufacturer, serial number, and calibration dates.
3. System Identification. In each report, the VAV boxes, zones, supply, return and exhaust openings and traverse points shall be numbered and/or lettered to correspond to the numbers and letters used on the report data sheets and on the report diagrams.

E. Prepare 11-in by 17-in single line diagrams or 12-in by 18-in half size drawings showing all duct systems indicating all terminal air outlets including diffusers, grilles and registers, perforated plates, nozzles and other types of air supply, exhaust or return outlets. The minimum scale for diagrams showing the measurement points shall be 1/8-in=1-ft-0-in in the final form as submitted. The use of faxed copies of diagrams is not acceptable. Location of test points shown on the diagrams shall be clear and easy to locate on the diagram. The identification mark of the test points shall be the same as is shown on the test report showing the test data. The identification for test points shall include indication

of the units served, and shall not have a duplicate in the project. All supply outlets shall be adjusted so that there are no drafts. Grille and register readings may be made by a vane anemometer, but diffuser readings shall be made by a flow hood or a velometer, using the tip recommended by the diffuser manufacturer. Each test sheet shall include the following data:

1. Job name and address.
2. Name of HVAC Contractor.
3. Name of balancing organization.
4. Instruments used to perform the test.
5. Name of test technician or test engineer.
6. Fan system and/or zone number.
7. Room number or area name.
8. Size of outlet.
9. Type outlet.
10. Manufacturer of outlet.
11. The cfm at each outlet on system and corresponding cfm at each outlet as noted on the plans.
12. Percent deviation of the measured flow versus the design flow.
13. Indication of the branch and terminal that are the open/low that are the basis for balancing the remainder of the system.

PART 3 EXECUTION

3.01 INSPECTIONS

A. During construction, the balancing agency shall inspect the installation of pipe systems, sheet metal work, temperature controls, and other component parts of the heating, ventilating, and air conditioning systems. The inspections shall be performed periodically as the work progresses. A minimum of two inspections are required as follows: 1) when 60 percent of the ductwork is installed: 2) when 90 percent of the equipment is installed. The balancing agency shall submit a brief written report of each inspection to the ENGINEER.

3.02 START OF BALANCING

A. The General Contractor shall notify the Balancing Organization and ENGINEER when systems become operational and ready for preliminary and final testing, adjusting, and balancing.

B. Final balancing shall not begin until system has been installed complete and is capable of normal operation. Provide personnel to assist in rough balance and calibration.

C. All grilles, dampers, fans, coils, pumps, valves, and linkages shall be verified to be installed and operating.

D. System shall be capable of operating under control as specified on Drawings and/or contained herein.

E. Visually inspect all fire dampers on branch take-offs to each floor to ensure that they are fully open.

F. Verify with straight edge that fan/pump and motor shafts are parallel and that sheaves are in proper alignment.

G. Verify that belts are properly tensioned when unit is operating with no excessive squeal at startup. If not correct, adjust sheaves or motor base accordingly.

H. Start fans and pumps, verify that rotation is correct. If rotation is incorrect, coordinate with electrical contractor to switch power leads such that the motor rotates correctly.

I. Check nameplate voltage on motor, compare to scheduled voltage. Notify the ENGINEER immediately of any discrepancies. Measure and record actual voltage across all power leads. Notify the ENGINEER of discrepancies immediately.

J. Check motor nameplates full load amps, measure and record amperage across all power leads. If there are marked discrepancies in amperage draws between legs, notify the ENGINEER immediately.

K. Measure and record fan/pump and motor rpm. Check, that motor rpm agrees with nameplate and scheduled rpm.

L. If, upon commencing the work, the balancing contractor finds that the systems are not ready, or if a dispute occurs as to the readiness of the systems, the balancing agency shall request an inspection to be made by the ENGINEER. This inspection shall establish to the satisfaction of the represented parties whether or not the systems meet the basic requirements for testing and balancing. Should the inspection reveal the notification to have been premature, all costs for the inspection and work previously accomplished by the balancing agency shall be paid for by the General Contractor. Furthermore, such items that are not ready for testing and balancing shall be completed and placed in operational readiness before testing and balancing services shall be recommenced.

M. Leaks, damage and defects discovered or resulting from startup, testing and balancing shall be repaired or replaced to like-new condition with acceptable materials. Tests shall be continued until system operates without adjustments or repairs.

3.03 REQUIRED ACCURACY

A. Systems shall be balanced to be within the following limits of the capacity shown on the Drawings. Limits shall be applied to both individual components and to the system totals.

B. General Systems (plus/minus 10 percent)

3.04 TESTING

A. Air Testing & Balancing Procedure – Air Testing & Balancing Agency shall perform following tests and balance system in accordance with following requirements. Perform tests at high and low speeds of systems designed for two–speed operation.

1. Test and adjust blower rpm to design requirements. For direct drive equipment, set on proper speed tap or adjust speed control as listed in Drawings.

2. Test and record motor full load amperes.

3. Make Pitot tube traverse of main supply and obtain design cfm at fans and up-flow furnaces.

4. Test and record system static pressures, suction, and discharge.

5. Test and adjust system for design cfm air.

6. Test and adjust system for design cfm outside air.

7. Test and record entering air temperatures (db heating and cooling).

8. Test and record entering air temperatures (wb cooling).

9. Test and record leaving air temperatures (db heating and cooling).

10. Test and record leaving air temperatures (wb cooling).

11. Adjust main supply and return air ducts to proper design cfm.

12. Adjust zones to proper design cfm, supply and return.

13. Test and adjust each diffuser, grille, and register to within 10% of design requirements

14. Identify each diffuser, grille, and register to location and area.

15. Identify and list size, type, and Manufacturer of diffusers, grilles, registers, and testing equipment. Use Manufacturer's rating on equipment to make required calculations.

16. In readings and tests of diffusers, grilles, and registers, include required fpm velocity & test fpm velocity and required cfm & test cfm after adjustments.

17. Set adjustments of automatically operated dampers and valves to operate as specified, indicated, or noted.

18. Adjust diffusers, grilles, and registers to minimize drafts and set blades to proper angles to obtain spread and throw shown on the drawings or scheduled in the specifications.

B. Water Testing & Balancing Procedure

1. Open valves to full position including coil stop valves, close bypass valves, and return line balancing cocks.

2. Remove and clean strainers.

3. Examine water in system to determine if it has been treated and is clean.

4. Check pump rotation.

5. Check expansion tanks to make sure they are not air bound and system is full of water.

6. Check air vents at high points of water systems to make sure they are installed properly and are operating freely. Make certain air is removed from circulating system.

7. To balance flow though coils, set system to call for full flow. To balance coil bypass, set system to call for full bypass.

8. Check operating temperature of boilers and heat exchangers, and set to design requirements.

9. Perform air balance before beginning water balance.

C. Performance of Water Testing & Balancing (of applicable components)

1. Set water pumps to proper gpm delivery.

2. Adjust flow of hot water through boilers, heat exchangers, and condensers.

3. Check leaving water temperatures, return water temperatures, and pressure drop through boilers. Reset to correct design temperatures. Include heat exchangers and condensers.

4. Check water temperature at inlet side of cooling and heating coils. Note rise or drop of temperatures from source.

5. Upon completion of flow readings and coil adjustments, mark settings and record data.

D. Performance of Testing & Balancing

1. After making adjustments to coils, recheck settings at pumps, and boilers. Readjust if required.

2. Set pressure drop across bypass valve to match coil full flow pressure drop. This prevents unbalanced flow conditions when coils are on full bypass.

3. Check and record the following items at each cooling and heating element -

   a. Inlet water and air temperatures

   b. Leaving water and air temperatures

   c. Pressure drop of each coil

d. Pressure drop across bypass valve

e. Pump operating suction and discharge pressures and final TDH

f. Mechanical specifications of pumps

g. Rated and actual running amperage of pump motor

3.05 STANDBY EQUIPMENT

A. Where systems are provided with standby equipment, the system shall be balanced for operation in standby as well as normal operation.

3.06 FINAL ACCEPTANCE

A. At the time of final inspection, the balancing agency shall recheck, in the presence of the ENGINEER, specific and random selections of data recorded in the certified test-and-balance report.

B. Points and areas for recheck shall be selected by the ENGINEER.

C. Measurements and test procedures shall be the same as the original test and balance.

D. Selections for recheck, specific plus random, shall not normally exceed 15 percent of the total number tabulated in the report, except where special air systems require a complete recheck for safety reasons.

E. If the specific rechecks are more than 5 percent deviation from the report or specified flows, all of the systems, that require specific recheck, shall be rebalanced. If 5 percent or 5 of the random checks, whichever is less, exceed a 10 percent deviation from the specified flows, the report shall be rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, a new certified test-and-balance report submitted, and a new inspection test made, all at no additional cost to the OWNER.

3.07 OPPOSITE SEASON TEST

A. The balancing agency shall perform an inspection of the HVAC system during the opposite season from that in which the initial adjustments were made. The balancing agency shall make any necessary modifications to the initial adjustments to produce optimum system operation.

END OF SECTION

SECTION 23 07 00
HVAC INSULATION
(FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Ductwork Insulation:
    a. Fiberglass.
2. Duct Liner
3. Piping Systems Insulation:
    a. Fiberglass for all copper pipes.
4. Protective saddles, shields, and thermal hanger shields.

B. Related Sections

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 23 - General-Duty Valves for HVAC Piping
6. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
8. Section 23 09 00 - HVAC Control System
9. Section 23 09 93 - Control Sequences for Automatic Temperature Control
10. Section 23 21 13 - Hydronic Piping
11. Section 23 21 23 - Hydronic Pumps
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 REFERENCES

A. ASTM C 553 - Specification for Mineral Fiber Blanket and Felt Insulation (Industrial Type).

B. ASTM C 612 - Specification for Mineral Fiber Block and Board Thermal Insulation.

C. ASTM C 921 - Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

D. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.

E. ASTM C 547 - Specification for Mineral Fiber Preformed Pipe Insulation.

1.03 SUBMITTALS

A. Submit in accordance with Section 013300.

B. Manufacturer's technical product data and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, K-value, thickness, and furnished accessories for each mechanical system requiring insulation.

C. Manufacturer's sample of each piping insulation type required, and of each duct and equipment insulation type required. Affix label to sample completely describing product.

1.04 QUALITY ASSURANCE

A. Manufacturer's Qualifications - Firms regularly engaged in manufacture of mechanical insulation products, of types and sizes required, whose products have been in satisfactory use in similar services for not less than 3 years.

B. Installers' Qualifications - Firm with at least 5 years successful installation experience on projects with mechanical insulations similar to that required for the project.

C. Flame/Smoke Ratings - Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.

1. Exception - Industrial mechanical insulation that will not affect life safety egress of building may have flame spread index of 75 and smoke developed index of 150.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard indexes of products.

B. Protect insulation against dirt, water, chemical and mechanical damage. Do not install damaged or wet insulation; remove from project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer - Subject to compliance with requirements, provide products of one of the following or an approved equal:

1. Knauf Fiber Glass GmbH.
2. Manville Products Corp.
3. Owens-Corning Fiberglass Corp.
4. Childers Products Co.
5. Specialty Products and Insulation Co.

2.02 MATERIALS

A. HVAC Ductwork Insulation

1. Rigid Fiberglass Ductwork Insulation - ASTM C 612, Class 1.
2. Flexible Fiberglass Ductwork Insulation - ASTM C 553, Type I, Class B-4.
3. Jackets for Ductwork Insulation - ASTM C 921, Type I for ductwork with temperatures below ambient; Type II for ductwork with temperatures above ambient.
4. Ductwork Insulation Accessories - Provide staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.
5. Ductwork Insulation Compounds - Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.

B. Piping Insulation

1. Fiberglass Piping Insulation - ASTM C 547, Class 1 for all metallic piping.
2. Flexible elastomeric thermal insulation – ASTM C 534 Type I – Expanded closed cell type conforming to UL 94 5V0 for PEX tubing. Insulation shall be Armaflex or equal.
3. Jackets for Piping Insulation - ASTM C921, Type I for piping with temperatures below ambient, Type II for piping with temperatures above ambient. Type I may be used for all piping at Installers option.
    a. Encase pipe fittings insulation with one-piece premolded PVC fitting covers, fastened as per manufacturer's recommendations.
    b. Encase exterior piping insulation with aluminum jacket with weather-proof construction.
4. Piping Insulation Accessories - Provide staples, bands, wires, and cement as recommended by insulation manufacturer for applications indicated.
5. Piping Insulation Compounds - Provide adhesives, sealers, and protective finishes as recommended by insulation manufacturer for applications indicated.

2.03 DUCT LINER

A. Mechanical Liner and Fasteners

1. Liners: Internal duct liners shall be 1 inch thick fiberglass Type I or II per ASTM 1071 and have a thermal conductivity (k-value) of 0.26 at 75 deg. F. Liners shall comply with NFPA 90A and 90B and with NAIMA AH124 and have a maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E84. Liners shall be treated with an EPA approved biocide to resist bacterial and fungal growth. All surfaces exposed to the air stream shall be coated to prevent erosion of glass fibers.

2. Mechanical Fasteners: galvanized steel, suitable for adhesive, mechanical or welding attachment (self-stick adhesive fasteners are not permitted). Provide fasteners that will not damage the liner when applied as recommended by the manufacturer, that do not cause leakage within the duct and that will sustain a 50-pound tensile dead load perpendicular to duct wall.

3. Liner Adhesive: Non-oxidizing, vinyl acrylic, water-based adhesive used to bond insulation to sheet metal surfaces. Operational temperature range -20 to +160 F; curing time 24 hours. Manufactured by United McGill, type Uni-Tack. Comply with NFPA 90A and 90B and with ASTM C916

B. Performance

1. Fibrous glass duct liners are designed to meet or exceed the requirements of ASTM C 1071, Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material). This material standard establishes requirements for the following physical properties: Sound Absorption Characteristics; Thermal Conductivity; Surface Burning Characteristics; Erosion Resistance; Temperature Resistance; Corrosiveness; Odor Emission; Moisture Vapor Sorption; and Fungi Resistance.

2. Fibrous glass duct liners are designed to meet the requirements of the National Fire Protection Association (NFPA) Standard 90A for the installation of Air Conditioning and Ventilating Systems.

C. Specification, Fabrication, & Installation

1. Fibrous glass duct liner should be specified, fabricated and installed per project specifications in accordance with NAIMA Fibrous Glass Duct Liner Standard AHS-124-93 or SMACNA HVAC Duct Construction Standards. Care should be taken to keep the liner dry and clean during liner fabrication, duct transport, job site storage and system start-up and operation.

D. Liner

1. Provide duct liner in lieu of insulation for the following;

   a. Supply ductwork a minimum of 25’-0” downstream from rooftop units RTU-1 & RTU-2.

   b. Supply ductwork a minimum of 10’-0” downstream from VAV boxes where indicated.

c. RTU-1 & RTU-2 return ductwork connected to unit.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 APPLICATION

A. HVAC Ductwork

1. Insulation Omitted - Do not insulate fibrous glass ductwork, or lined ductwork.

2. Dual Temperature Ductwork

a. Application Requirements - Insulate the following dual temperature ductwork:

1) Hot/cold supply and return ductwork between fan discharge or HVAC unit discharge, and room terminal outlets; except omit insulation on return air ductwork located in return air ceiling plenums.

b. Insulate each ductwork system specified above with one of the following types and thicknesses of insulation:

1) Rigid Fiberglass – 2 inches thick.

2) Flexible Fiberglass – 2 inches thick, application limited to concealed locations.

B. HVAC Piping

1. Omit insulation on unions, strainers, check valves, balance cocks, flow regulators, and pre-insulated equipment.

2. Hot Piping

a. Application requirements - Insulate the following hot HVAC piping systems:

1) Hydronic piping

b. Insulate each piping system specified above with one of the following types and thicknesses of insulation:

1) Fiberglass – 1 inch thickness

C. Hydronic Piping

1. Insulate copper hydronic supply and return piping systems using 1 inch thick fiberglass insulation.

3.03 INSTALLATION

A. General

1. Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

B. Ductwork Insulation

1. Install insulation materials with smooth and even surfaces.

2. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

3. Maintain integrity of vapor-barrier on ductwork insulation, and protect it to prevent puncture and other damage.

4. Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations, except where otherwise indicated.

5. Lined Ductwork - Except as otherwise indicated, omit insulation on ductwork where internal insulation or sound absorbing linings have been installed.

6. Ductwork Exposed to Weather - Protect outdoor insulation from weather by installing outdoor protective finish or jacketing as recommended by manufacturer.

7. Corner Angles - Install corner angles on external corners of insulation on ductwork in exposed finished spaces before covering with jacketing.

C. Duct Liners

1. Install duct liners at locations as shown on the drawings and in accordance with NAIMA Fibrous Glass Duct Liner Standard. Apply with a single layer of 1” thickness.

2. Apply adhesive coating to all exposed edges of liner that do not receive nosing treatment.

3. Metal nosing shall be installed over exposed liner edges that face upstream of the airflow.

D. Piping Insulation

1. Install insulation on pipe systems subsequent to installation of heat tracing, painting, testing, and acceptance of tests.

2. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with a single cut piece to complete run. Do not use cut pieces or scraps abutting each other.

3. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure a complete and tight fit over surfaces to be covered.

4. Maintain integrity of vapor-barrier jackets on pipe insulation, and protect to prevent puncture or other damage.

5. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation applied to adjoining pipe run. Install factory molded,

precut or job fabricated units (at Installer's option) except where specific form or type is indicated.

6. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

7. Butt pipe insulation against pipe hanger insulation inserts. For hot pipes, apply 3 wide vapor barrier tape or bank over the butt joints. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3 inch wide vapor barrier tape or band.

3.04 REPAIR/RESTORATION

A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units, at no additional cost to the OWNER.

3.05 PROTECTION

A. The CONTRACTOR shall provide the required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION

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SECTION 23 09 00

HVAC CONTROL SYSTEM

(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for the automatic temperature control system including components, installation and commissioning.

2. All equipment, wiring, programming and commissioning required shall be by Taco, Johnson Controls, Honeywell or approved equal. Where this specification calls for electrical work, it shall be interpreted in this section to include all low voltage and 115 VAC control wiring. Power wiring to all equipment is by the electrical subcontractor.

B. Related Sections

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 23 - General-Duty Valves for HVAC Piping
6. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
8. Section 23 07 00 - HVAC Insulation
9. Section 23 09 93 - Control Sequences for Automatic Temperature Control
10. Section 23 21 13 - Hydronic Piping
11. Section 23 21 23 - Hydronic Pumps
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 QUALITY ASSURANCE

A. Installer and Manufacturer Qualifications

1. Installer shall have an established working relationship with Control System Manufacturer for a minimum of 5 years.

2. Installer shall have successfully completed Control System Manufacturer's control system training and shall be a Factory Authorized installing contractor. Upon request, Installer shall present record of completed training including course outlines.

3. The installer shall have a service office within 50 miles of the project.

1.03 SUBMITTALS

A. Submit in accordance with Section 013300.

B. Product Submittal Requirements: Provide four copies of shop drawings and other submittals on hardware, software, and equipment to be installed or furnished. Begin no work until submittals have been approved for conformity with design intent. When manufacturer's data sheets apply to a product series rather than a specific product, clearly indicate applicable data by highlighting or by other means. Clearly reference covered specification and drawing on each submittal. General catalogs shall not be accepted as data sheets to fulfill submittal requirements. Complete bill of materials indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.

1. Wiring diagrams and layouts for each control panel. Show termination numbers.

2. Floor plan schematic diagrams indicating field sensor and controller locations.

3. Controlled systems

a. Schematic diagram of each controlled system. Label control points with point names. Graphically show locations of control elements.

b. Instrumentation list (Bill of Materials) for each controlled system. List each control system element in a table. Show element name, type of device, manufacturer, model number, and product data sheet number.

4. Project Record Documents. Submit three copies of record (as-built) documents upon completion of installation for approval prior to final completion. Submittal shall consist of:

a. Project Record Drawings. As-built versions of submittal shop drawings provided as AutoCAD 2010 (or newer) compatible files

on magnetic or optical disk (file format: .DWG, .DXF, .VSD, or comparable) and 6 prints of each drawing on 11" x 17" paper.

b. Operation and Maintenance (O&M) Manual. Printed, electronic, or online help documentation of the following:

1) Training Materials: Provide course outline and materials for each class at least six weeks before first class. Training shall be furnished via instructor-led sessions, computer-based training, or web-based training. ENGINEER will modify course outlines and materials if necessary to meet OWNER'S needs. ENGINEER will review and approve course outlines and materials at least three weeks before first class.

1.04 STORAGE

A. Equipment shall not be stored out-of-doors. Equipment shall be stored in dry permanent shelters including in-line equipment, and shall be adequately protected against mechanical injury. If any apparatus has been damaged, the System Supplier at his own cost and expense shall repair such damage. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such tests as directed by the ENGINEER. This shall be at the cost and expense of the System Supplier or the System Supplier at his own expense shall replace the apparatus.

1.05 WARRANTY

A. Warrant work as follows:

1. Warrant labor and materials for specified control system free from defects for a period of 12 months after final acceptance. Control system failures during warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to OWNER. Respond during normal business hours within 24 hours of OWNER'S warranty service request.

2. Work shall have a single warranty date, even if OWNER receives beneficial use due to early system start-up. If specified work is split into multiple contracts or a multi-phase contract, each contract or phase shall have a separate warranty start date and period.

3. If ENGINEER determines that equipment and systems operate satisfactorily at the end of final start-up, testing, and commissioning phase, ENGINEER will certify in writing that control system operation has been tested and accepted in accordance with the terms of this specification. Date of acceptance shall begin warranty period.

4. Exception: CONTRACTOR shall not be required to warrant reused devices except those that have been rebuilt or repaired. Installation labor

and materials shall be warranted. Demonstrate operable condition of reused devices at time of ENGINEER'S acceptance.

1.06 OWNERSHIP OF PROPRIETARY MATERIAL

A. Project-specific software and documentation shall become OWNER'S property. This includes, but is not limited to:

1. Graphics
2. Record drawings
3. Database
4. Application programming code
5. Documentation

PART 2 – PRODUCTS

2.01 ACCEPTABLE SYSTEMS

A. Taco iWorx is the basis of design.

B. Mechanical contractor shall be responsible for furnishing work and material as described on contract drawings and herein after under paragraph 'WORK INCLUDED."

C. Coordinate all work associated with control installer.

2.02 MAN/MACHINE LOCAL CONTROL INTERFACE (LCI)

A. General

1. The LCI shall be a color touchscreen user interface and system configuration tool that communicates with device controllers over a Lon Works network. Its functions shall include a local touchscreen user interface, internet or dial-up connectivity for remote access, network configuration tools, database generation tool, automatic web page generation and global time of day scheduling. The LCI will provide supervisory HVAC control, lighting control, and access control integration.

B. Communications

1. The LCI2 shall incorporate Echelon Corporation Lon Works communications, utilizing Free Topology Transceivers (FTT-10) for communication to networked controllers.

C. Touch Screen

1. The LCI shall have a minimum useable touch screen areaof16.4square inches with 1/4 VGA 320x240 pixel resolution. TheLCI2 display shall consist of an analog resistance-based touchscreen over an LCD display with Cold-Cathode Fluorescent (CCFL) back lighting. The touch screen shall include contrast adjustment.

D. Automatic Configuration and Network Addressing

1. The LCI shall automatically self-configure for network addressing and communication for HVAC, access and lighting controllers upon initiation of the service pin push-button of a device controller added to the network. Systems that require PC based configuration software or portable system configuration hardware tools shall not be acceptable.

E. Programming

1. The LCI shall be preprogrammed and not require field programming of control proportional bands, control dead bands, reverse or direct acting control actions, control algorithms or any other programmable parameters.

2. Field programming shall only require input of set points, schedule and passwords.

F. Automatic WEB Page Creation

1. As the LCI automatically creates the database for HVAC, access and lighting controllers by the initiation of the service pin push-button, it shall create the database so that it is accessible from web-browsers. The LC I shall automatically generate webpages without administrator interaction, connection to a personal computer, or HTML programming shall not be required.

G. Web Content

1. All data that is accessible from the local touchscreen shall be accessible remotely except for the ability to calibrate the touchscreen, change usernames and enable and disable the key click.

H. E-mail Alarms

1. In the event of an alarm condition, the LCI shall generate an e-mail message to up to three predefined e-mail accounts. Thee-mail alarm message will provide the site name, device, alarm description, and the date and time the alarm event occurred.

I. Electrical Specifications

1. Power requirements 28-36 VAC or 24VAC (requires external power supply).

2. Power consumption 24 VA.

J. Battery and Real Time Clock

1. TheLCI2 shall include a Real Time Clock. A lithium battery shall maintain nonvolatile database memory.

2.03 APPLICATION SPECIFIC CONTROLLERS (ASC)

A. Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independent of other controllers in the network. Each ASC shall be a microprocessor based controller, multi-tasking real-time digital control processor and shall have sufficient memory to support its own operating system and databases including:

1. Controls processor

2. Monitoring functions

3. Energy management functions

4. I/O interface and conversions

B. Communications

1. ASC's shall incorporate Echelon Corporation Lon Works communications, utilizing Free Topology Transceivers (FTT-10) for communication to the LCI and the Web Data Server.

C. Automatic Configuration

1. The ASC's and LCI shall use a self-configuring control network management scheme requiring no external computers, tools, binding, or Lon Works knowledge. The LCI shall recognize and configure networked controllers when the controller's service pin is pressed. Once the service pin has been pressed, no further action shall be required by the installer, the controller will be fully accessible to the LCI.

D. ASC's may include a local iView LCD man/machine interface. The iView shall include, but not be limited, to the following:

1. Display operating conditions.

2. Display status.

3. Display set points.

4. Display control parameters

5. Override outputs

6. Change set points and operating parameters

E. Programming

1. The ASC's shall not require any special knowledge of programming. The ASC's shall be preprogrammed for control proportional bands, control dead bands, reverse or direct acting control actions, control algorithms or any other programmable parameters.

2. Field programming shall be limited to input of set points, schedules and passwords.

F. All system set points, proportional bands, control dead bands, reverse or direct acting control actions, control algorithms and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate there programming of the controller.

G. ASCs shall be provided for control of HVAC fan coils, heat pumps, VAV units, air handling units, AC units, boilers, chillers, cooling towers, pumps, and energy (BTU) metering.

H. ASCs shall be provided for lighting and access control.

2.04 SENSORS

A. Sensor shall be RTD type, nickel silicon, platinum, or thermistor type to best meet the application. Complete with all necessary mounting hardware.

B. Room Sensors: Plastic or metallic casing with occupant readjustment feature as required by description in sequence of control. When required by sequence description, an occupied/unoccupied override switch will be resident with the sensor to allow occupant override of system mode. Each sensor shall have provisions for set point adjustment.

C. Duct Sensors: Sensor completely cased in metallic case with handi-box for electrical wiring connections.

D. Fluid Sensors: Mount inseparable well or equivalent strap-on. Sensor cased in metal casing with handi-box for electric wire connections.

E. Low limit sensor or thermostat. Unitwith20ft.averaging element and manual or automatic reset as indicated on the sequence description. (Low limit sensors which provide system freeze-up protection will be manual reset type.).

F. Differential static pressure sensors (duct and building): Transmitter measures differential status of pressure with a stainless steel displayer that converts the differential static pressure toa0-10VDC ora4to20MAproportional output. Range as required by applications.

2.05 CONTROL VALVES

A. Brass body with stainless steel stem and modulated plug. Replaceable seat sand stem. Replaceable packing with adjustable packing unit.

B. Two-way or three-way mixing application as indicated.

C. Valves lessthan2"tobescrewed connection, over 2"to be flanged.

2.06 PUMPS

A. Wet rotor pumps shall be repairable in-line without removal of the circulator from the piping using a stainless steel replaceable cartridge. Pump shall be provided with a 3 year warranty.

1. Circulator shall bear UL label.

2. An integral variable speed drive (VSD) shall accept a0-10Vdcor4-20mA modulating control signal to control the speed of the circulator motor.

2.07 DAMPERS

A. Dampers

1. Airfoil, low leakage rated. Size as indicated on the drawings.

2. Control dampers will be opposed blade type .Mixing dampers shall be parallel blade with blade attitude for converging airstreams.

B. Actuators

1. Electric/Electronic Actuators: Provide with all necessary mounting hardware and linkage to meet application. Size to provide control sequence as indicated for application.

2. Magnetic or synchronous motors for full modulation with appropriate linkage to provide linear actuation.

3. Controls of system components which require action after power failure (such as freeze protection) require spring return devices.

2.08 SMOKE DETECTORS

A. Self-contained, stand along, ionized type duct detector with sampling tubes to sample full width of the duct.

2.09 MANUFACTURER

A. Taco iWorx controls are the basis of design. Provide Taco, Johnson Controls, Honeywell or approved equal.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Thoroughly examine project plans for control device and equipment locations. Report discrepancies, conflicts, or omissions to the ENGINEER for resolution before starting rough-in work.

B. Inspect site to verify that equipment can be installed as shown. Report discrepancies, conflicts, or omissions to ENGINEER for resolution before starting rough-in work.

C. Examine drawings and specifications for work of others. Report inadequate headroom or space conditions or other discrepancies to the ENGINEER and obtain written instructions for changes necessary to accommodate work of this section with work of others. Controls CONTRACTOR shall perform at his expense necessary changes in specified work caused by failure or neglect to report discrepancies.

D. Verify that abandoned wiring and equipment serve only abandoned facilities.

E. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to ENGINEER before disturbing existing installation.

F. Beginning of demolition means installer accepts existing conditions.

G. Remove inoperative or abandoned controls, tubing, wiring, pneumatic piping as necessary for a clean renovated installation.

3.02 PROTECTION

A. Controls Contractor shall protect against and be liable for damage to work and to material caused by Contractor's work or employees.

B. Controls Contractor shall be responsible for work and equipment until inspected, tested, and accepted. Protect material not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.03 COORDINATION

A. Site

1. Assist in coordinating space conditions to accommodate the work of each trade where work will be installed near or will interfere with work of other trades. If installation without coordination causes interference with work of other trades, CONTRACTOR shall correct conditions without extra charge.

2. Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.

B. Test and Balance

1. Provide Test and Balance Contractor a single set of necessary tools to interface to control system for testing and balancing.

2. Train Test and Balance Contractor to use control system interface tools.

3. Provide a qualified technician to assist with testing and balancing the terminal units.

4. Test and Balance Contractor shall return tools undamaged and in working condition at completion of testing and balancing.

C. Coordination with Other Controls. Integrate with and coordinate controls and control devices furnished or installed by others as follows.

1. Coordinate and resolve incompatibility issues that arise between control products provided under this section and those provided under other sections or divisions of this specification.

2. Controls Contractor shall be responsible for integration of control products provided by multiple suppliers regardless of where integration is described within the contract documents.

3.04 GENERAL WORKMANSHIP

A. Install equipment, piping, and wiring or raceway horizontally, vertically, and parallel to walls wherever possible.

B. Provide sufficient slack and flexible connections to allow for piping and equipment vibration isolation.

3.05 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

B. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

C. Existing Electrical Service: Disable system only to make switchovers and connections. Obtain permission from OWNER at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.06 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Demolish and extend existing electrical work under provisions of Section 022250, and this Section.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

G. Repair adjacent construction and finishes damaged during demolition and extension work.

H. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

I. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

J. Wiring. Interconnecting control wiring shall be removed and shall become OWNER'S property unless specifically noted or shown to be reused.

3.07 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

3.08 INSTALLATION

A. Install relocated materials and equipment as indicated.

3.09 WIRING

A. Control and interlock wiring and installation shall comply with national and local electrical codes, Division 16, and manufacturer's recommendations

B. Maintain minimum clearance of 6 in. between raceway and high-temperature equipment such as hot water pipes and flues.

3.10 INSTALLATION OF SENSORS

A. Install sensors according to manufacturer's recommendations.

B. Mount sensors rigidly and adequately for operating environment.

C. Install pipe-mounted temperature sensors in wells. Install liquid temperature sensors with heat-conducting fluid in thermal wells.

D. Install outdoor air temperature sensors on North wall at designated location with sun shield.

E. Smoke detectors, freezestats, high-pressure cut-offs, and other safety switches shall be hard-wired to de-energize equipment as described in the sequence of operation. Switches shall require manual reset. Provide contacts that allow DDC software to monitor safety switch status.

3.11 CONTROL SYSTEM CHECKOUT AND TESTING

A. Startup Testing. Complete startup testing to verify operational control system before notifying OWNER of system demonstration. Provide OWNER with schedule for startup testing. OWNER may have representative present during any or all startup testing.

1. Calibrate and prepare for service each instrument, control, and accessory equipment furnished.

2. Verify that control wiring is properly connected and free of shorts and ground faults. Verify that terminations are tight.

3. Enable control systems and verify each input device's calibration. Calibrate each device according to manufacturer's recommendations.

4. Verify that binary output devices such as relays, solenoid valves, two-position actuators and control valves, and magnetic starters, operate properly and that normal positions are correct.

5. Verify that analog output devices and actuators are functional, that start and span are correct, and that direction and normal positions are correct. Check control valves and automatic dampers to ensure proper action and closure. Make necessary adjustments to valve stem and damper blade travel.

6. Prepare a log documenting startup testing of each input and output device, with technician's initials certifying each device has been tested and calibrated.

7. Verify that system operates according to sequences of operation. Simulate and observe each operational mode by overriding and varying inputs and schedules. Tune PID loops and each control routine that requires tuning.

8. Alarms and Interlocks.

   a. Check each alarm with an appropriate signal at a value that will trip the alarm.

   b. Trip interlocks using field contacts to check logic and to ensure that actuators fail in the proper direction.

   c. Test interlock actions by simulating alarm conditions to check initiating value of variable and interlock action.

3.12 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

A. Demonstration. Prior to acceptance, perform the following performance tests to demonstrate system operation. Provide ENGINEER with log documenting completion of startup tests.

1. ENGINEER will be present to observe and review system demonstration. Notify ENGINEER at least 10 days before system demonstration begins.

2. Demonstration shall follow process submitted and approved. Complete approved checklists and forms for each system as part of system demonstration.

3. Demonstrate actual field operation of each sequence of operation. Provide at least two persons equipped with two-way communication. Demonstrate calibration and response of any input and output points requested by ENGINEER. Provide and operate test equipment required to prove proper system operation.

4. Demonstrate compliance with sequences of operation through each operational mode.

5. Demonstrate complete operation of operator interface.

6. Tests that fail to demonstrate proper system operation shall be repeated after CONTRACTOR makes necessary repairs or revisions to hardware or software to successfully complete each test.

B. Acceptance

1. After tests described in this specification are performed to the satisfaction of both ENGINEER and OWNER, ENGINEER will accept control system as meeting completion requirements. ENGINEER may exempt tests from completion requirements that cannot be performed due to circumstances beyond CONTRACTOR'S control. ENGINEER will provide written statement of each exempted test. Exempted tests shall be performed as part of warranty.

2. System shall not be accepted until completed demonstration forms and checklists are submitted and approved.

3.13 CLEANING

A. Each day clean up debris resulting from work. Remove packaging material as soon as its contents have been removed. Collect waste and place in designated location.

B. On completion of work in each area, clean work debris and equipment. Keep areas free from dust, dirt, and debris.

C. On completion of work, check equipment furnished under this section for paint damage. Repair damaged factory-finished paint to match adjacent areas. Replace deformed cabinets and enclosures with new material and repaint to match adjacent areas.

3.14 TRAINING

A. Provide up to 8 hours of training on site for a designated staff of OWNER'S representatives. Training shall cover the changes to the system provided under this contract.

END OF SECTION

SECTION 23 09 93

CONTROL SEQUENCES FOR AUTOMATIC TEMPERATURE CONTROL SYSTEMS (FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. The automatic temperature control (ATC) shall be as specified in Section 23 09 00 and shall perform the functions specified and as described in this section.

2. This section shall comply with all requirements of Section 23 09 00 and is incomplete without Section 23 05 00.

B. Related Requirements

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 23 - General-Duty Valves for HVAC Piping
6. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
8. Section 23 07 00 - HVAC Insulation
9. Section 23 09 00 - HVAC Control System
10. Section 23 21 13 - Hydronic Piping
11. Section 23 21 23 - Hydronic Pumps
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 SUBMITTALS

A. Submit, in accordance with Section 01 30 00 and Section 23 05 00, the following:

1. A complete description of the operation of the control system, including sequences of operation.

2. The description shall include and reference a schematic diagram of the controlled system.

PART 2 – PRODUCTS - NOT USED

PART 3 – EXECUTION

3.01 CONTROL SEQUENCES

A. Variable Air Volumes Boxes (VAV)

1. Primary airflow is maintained within minimum and maximum limits based upon the reading of an airflow sensor to give pressure independent control of the VAV terminal unit. The Building Automation System (BAS) determines the control mode (heating, cooling, or deadband) by comparing the zone temperature to the Active Heating Temperature Setpoint and Active Cooling Temperature Setpoint. The cooling and heating requirements are determined using a Proportional plus Integral (PI) control algorithm.

2. In the Cooling Mode, the primary airflow modulates between the active cooling minimum and maximum airflow setpoints as the cooling requirement goes from 0 to 100%. In the Deadband Mode, the primary airflow is at the active cooling minimum airflow setpoint. In the heating Mode, the primary airflow is at the active heating minimum airflow setpoint and the hot water reheat coil control valve is modulated (0-10VDC) to maintain the active heating temperature setpoint.

3. The roof-top unit (RTU) shall be shut down during the unoccupied mode. Zone temperatures shall be sampled throughout the unoccupied period. If any of the rooms fall below the night setback temperature setpoint (60º F adj.) or above the night setup temperature setpoint (85º F, adj.), the roof top unit will be duty cycled (as described in the RTU sequence of operation) until the night setback or setup temperature setpoint is satisfied. The VAV air damper shall be driven full open during the unoccupied mode.

4. During the morning warm-up mode, the terminal units shall modulate to their maximum CFM position.

B. Roof Top Units (RTU)

The RTU shall operate to maintain a constant discharge temperature and utilize the economizer section to optimize the energy usage of the unit. As programmed by the BAS, the unit shall operate on a 7 day Occupied/Unoccupied cycle

The RTU shall operate in one of 3 modes, Heating, Cooling or Ventilation. The mode of operation shall be determined by majority vote of the zone temperature sensors attached to the RTU. If the majority calls for heat, the RTU shall be placed in heating mode. A similar logic shall apply to the remaining modes of operation.

1. Occupied Mode (Heating, Cooling or Ventilation)

   During occupied mode, the air handling unit shall maintain a constant discharge air temperature (55º F adjustable by the BAS). The fans shall run continuously, and the outside air damper shall modulate to its minimum position. The Supply fan speed shall be varied to maintain a suitable duct static pressure, and exhaust/return fan speed shall vary to maintain a suitable space static pressure.

2. Cooling Mode

   If the outside air is suitable for free cooling, then the outside air damper shall modulate open as the first means of cooling (economizer operation). If discharge air temperature setpoint cannot be attained by economizer operation alone, then the compressors shall be staged to provide cooling to maintain the space temperature. The hot water valve shall be modulated open to "heat" the discharge air up to the temperature setpoint, if conditions are such that an extensive amount of cold outside air is being brought in via the outside air damper. Otherwise, hot water valve is closed during occupied modes. VAV boxes perform individual zone comfort control, by receiving cool air, and varying the rate at which it is delivered into the zones in order to maintain zone setpoints. During transitional seasons, if the boilers are in operation, zones shall be maintained at the setpoint using reheat from the duct coils.

   If the outside air is not suitable for free cooling, (based on both wet and dry bulb conditions) then the compressor(s) shall be staged on to maintain the discharge air temperature setpoint.

3. Heating Mode

   Outdoor Air Damper is modulated closed to the minimum position. Minimum position shall be adjustable through the BAS. Hot water valve is modulated open to heat the discharge air temperature up to the setpoint.

   Provide a morning warm-up cycle upon transition from unoccupied to occupied mode. Fans shall turn on, outside air damper remains closed, and hot water valve is driven fully open. Unit remains in this mode until the

space or return air temperature reaches the morning warm-up mode termination setpoint. Upon reaching this setpoint, the air handling unit enters its normal occupied mode of operation (discharge air temperature control

C. Unoccupied Modes (Heating and Cooling)

During unoccupied modes, the air handling unit shall remain off unless called to run in order to maintain the space temperature between unoccupied heating and cooling setpoints (typically 60 and 80 degrees, respectively). If the temperature in any single zone served by the air handling unit calls for heating or cooling, depending on the mode of operation, then the fans turn on, and the unit heats or cools as necessary in order to bring the space temperature back into the range defined by the unoccupied mode setpoints. Outside air damper remains closed during unoccupied mode operation.

END OF SECTION

SECTION 23 11 23

FACILITY NATURAL GAS PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Gas piping for Rooftop units including

a. Pipes, fittings, and specialties

b. Special duty valves

c. Gas vents to atmosphere

B. Related Sections

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 15 - Mechanical Identification
3. Section 23 05 23 - General-Duty Valves for HVAC Piping
4. Section 23 05 29 - Hangers and Supports for HVAC Piping
5. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 DEFINITIONS

A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).

B. Gas Distribution Piping - A pipe within the building that conveys gas from the point of delivery to the points of usage.

C. Gas Service Piping - The pipe from the gas main or other source of supply including the meter, regulating valve, or service valve to the gas distribution system of the building served.

1.03 SUBMITTALS

A. Product data for each gas piping specialty and special duty valves. Include rated capacities of selected models, furnished specialties and accessories, and installation instructions.

B. Shop drawings detailing dimensions, required clearances, for connections to gas meter.

C. Coordination drawings for gas distribution piping systems.

D. Maintenance data for gas specialties and special duty valves for inclusion in operating and maintenance manual.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements - Comply with the requirements of the following codes:

1. NFPA 54 - National Fuel Gas Code, for gas piping materials and components, gas piping installations, and inspection, testing, and purging of gas piping systems as amended by the Commonwealth of Massachusetts. Version of NFPA 54 shall correspond to the version in use by the Commonwealth at the time of installation.

2. ASME Code for Pressure Piping B31.3, Normal Fluid Service.

B. Product Qualifications - All products (piping, valves, and equipment) for use on gas system shall be Underwriters Laboratory listed for its actual installation in this project.

1.05 SEQUENCING AND SCHEDULING

A. Notification of Interruption of Service - Except in the case of an emergency, notify all affected users when the gas supply is to be turned off.

B. Work Interruptions - When interruptions in work occur while repairs or alterations are being made to an existing piping system, leave the system in safe condition.

C. Coordinate the installation of pipe sleeves for foundation wall penetrations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer - Provide gas piping system products from one of the following or an approved equal:

1. Gas Cocks:

a. Jenkins Bros.

b. Lunkenheimer Co.

c. NIBCO, Inc.

d. Powell Co.

e. Stockham

f. Watts

2. Gas Check Valves:

a. Eclipse

b. Spencer

c. Air Power of New England

2.02 PIPE AND TUBING MATERIALS

A. Above ground, inside the building,

1. Steel Pipe - ASTM A-106, Grade B, seamless, Schedule 40

½ inch to 2 ½ inch - Screwed Fittings

2.03 FITTINGS

A. Screwed Fittings - 3000#, ASTM A-105, dimensional standards in accordance with ANSI B16.11.

B. Socketweld Fittings - 3000#, ASTM A-105, dimensional standards in accordance with ANSI B16.11.

C. Buttweld Fittings - ASTM A-234 WPB, seamless, dimensional standards in accordance with ANSI B16.9.

D. Flanges - 150# RF, ASTM A-105, screwed or weldneck, dimensional standards in accordance with ANSI B16.5.

E. Unions - ½ inch to ¾ inch 6000#, 1 inch to 1½ inch 3000#, ASTM A-105, socketweld or screwed.

F. Bolting - Stud bolts with two heavy hex nuts, ASTM A-193, Grade B7 continuously threaded stud bolt, ASTM A-194 Grade 2H nuts, dimensional standards in accordance with ANSI B16.5.

G. Gaskets - 1/8 inch thick, 150# spiral wound 304SS with asbestos filler.

2.04 JOINING MATERIALS

A. Joint Compound - suitable for natural gas.

B. Gasket Material - thickness, material, and type suitable for gas to be handled, and for design temperatures and pressures.

2.05 PIPING SPECIALTIES

A. Dielectric Unions - ANSI B16.39, Class 250; malleable iron and cast bronze; with threaded or soldered end connections suitable for pipe to be joined; designed to isolate galvanic and stray current corrosion.

B. Protective Coating - When piping will be in contact with material or atmosphere exerting a corrosive action and for buried pipe, pipe and fittings shall be factory-coated with polyethylene tape, having the following properties:

1. overall thickness; 20 mils;

2. synthetic adhesive;

3. Water vapor transmission rate, gallons per 100 square inch - 0.10 or less.

4. Water absorption, percent – 0.02 or less.

Prime pipe and fittings with a compatible primer prior to application of tape.

2.06 VALVES

A. General duty valves (i.e., gate, globe, check, and ball valves) are specified in Section 230523. Special duty valves are specified in this Article by their generic name. Refer to Part 3 below, Article "VALVE APPLICATION" for specific uses and applications for each valve specified.

B. Gas Cocks less than 2 inch - 150 psi WOG, bronze body, straightaway pattern, square head, threaded ends.

C. Gas Cocks – 2 inch and Larger - MSS SP-78; 175 psi, lubricated plug type, semi-steel body, single gland, wrench operated, flanged ends.

D. Gas Line Pressure Regulators - single stage, steel jacketed, corrosion-resistant gas pressure regulators; with atmospheric vent, elevation compensator; with threaded ends for 1½ inch and smaller, flanged ends for 2 inch and larger; for inlet and outlet gas pressures, specific gravity, and volume flow indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Precautions - Before turning off the gas to the premises, or section of piping, turn off all equipment valves. Perform a leakage test as specified in "FIELD QUALITY CONTROL" below, to determine that all equipment is turned off in the piping section to be affected.

B. Conform to the requirements in NFPA 54, for the prevention of accidental ignition.

3.02 PIPE APPLICATIONS

A. Install steel pipe with threaded joints and fittings for 1½ inch and smaller, and with welded joints for 2 inch and larger, for gas lines operating less than or equal to 3 psig. All steel pipe operating greater than 3 psig shall be installed with buttweld and socketweld connections.

3.03 PIPING INSTALLATION

A. General - Conform to the requirements of NFPA 54 - National Fuel Gas Code.

B. Use fittings for all changes in direction and all branch connections.

C. Tubing shall contain no joints underground.

D. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted.

E. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

F. Locate groups of pipes parallel to each other, spaced to permit servicing of valves.

G. Install gas piping at a uniform grade of ¼ inch in 15 feet, upward to risers, and from the risers to the meter, or service regulator when meter is not provided, or the equipment.

H. Adapt HDPE to steel pipe using adapters specifically designed for that purpose and approved for use by the local gas supplier.

I. Connect branch outlet pipes from the top or sides of horizontal lines, not from the bottom.

J. Supports and hangers are specified in Section 230529. Conform to the table below for maximum spacing of supports:

1. Steel Pipe:

Size (NPS)	Spacing In Feet	Min. Rod Size-Inches
½	5	_
¾ - 1¼	6	_
1½ - 3 (horizontal)	12	½
all sizes (vertical)	10′ or every floor level, whichever is less	

K. Install unions in pipes 2 inches and smaller, at final connections for each piece of equipment. Unions are not required on flanged devices.

L. Anchor piping to ensure proper direction of expansion and contraction.

3.04 PIPE JOINT CONSTRUCTION

A. Threaded Joints - Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:

1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint. Refer to NFPA 54, for guide for number and length of threads for field threading steel pipe.

2. Align threads at point of assembly.

3. Apply appropriate tape or thread compound to the external pipe threads.

4. Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.

5. Damaged Threads - Do not use pipe with threads which are corroded, or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

3.05 VALVE APPLICATION

A. General - The Drawings indicate valve types, locations, and arrangements.

B. Shut-off duty - Use gas cocks specified in Part 2 above.

3.06 VALVE INSTALLATIONS

A. Install valves in accessible locations, protected from physical damage. Tag valves with a metal tag attached with a metal chain indicating the piping systems supplied.

B. Install a gas cock upstream of each gas pressure regulator. Where two gas pressure regulators are installed in series in a single gas line, a manual valve is not required at the second regulator.

C. Install pressure relief or pressure limiting devices so they can be readily operated to determine if the valve is free; so they can be tested to determine the pressure at which they will operate; and examined for leakage when in the closed position.

3.07 ELECTRICAL BONDING AND GROUND

A. Install above ground portions of gas piping systems, upstream from equipment shutoff valves electrically continuous and bonded to a grounding electrode in accordance with NFPA 70 - "National Electrical Code."

B. Do not use gas piping as a grounding electrode.

C. Conform to NFPA 70 - "National Electrical Code," for electrical connections between wiring and electrically operated control devices.

3.08 FIELD QUALITY CONTROL

A. Piping Tests - Inspect, test, and purge natural gas systems in accordance with NFPA 54, and local utility requirements.

3.09 PIPE MARKING AND VALVE IDENTIFICATION

A. Pipe marking and valve identification is included in the work of this Section. All identification systems applied to the work of this Section shall comply with the requirements of Section 230515.

END OF SECTION

SECTION 23 21 13

HYDRONIC PIPING

(FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Piping systems for hot water heating including
    a. Pipes, fittings, and specialties
    b. Special duty valves
    c. Hydronic specialties

B. Related Sections

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 23 - General-Duty Valves for HVAC Piping
6. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
8. Section 23 07 00 - HVAC Insulation
9. Section 23 09 00 - HVAC Control System
10. Section 23 09 93 - Control Sequences for Automatic Temperature Control
11. Section 23 21 23 - Hydronic Pumps
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 DEFINITIONS AND ABBREVIATIONS

A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).

B. i.a.w. – In accordance with

1.03 SYSTEM DESCRIPTION

A. General - The hydronic piping systems are the "water-side" of an air-and-water or all-water heating and air conditioning system. Hydronic piping systems specified in this Section include hot water piping system. These systems are classified by ASHRAE as Low Water Temperature, Forced, Recirculating systems.

1.04 SUBMITTALS

A. Product data, including rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties and accessories, and installation instructions for each hydronic specialty and special duty valve specified.

1. Furnish flow and pressure drop curves for diverting fittings and calibrated plug valves, based on manufacturer's testing.

B. Maintenance data for hydronic specialties and special duty valves.

C. Welding procedures, procedure qualification records and certified welder certificates that comply with the quality requirements specified in Quality Assurance below.

D. Certification of compliance with ASTM and ANSI manufacturing requirements for pipe, fittings, and specialties.

E. Reports specified in Part 3 of this Section.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements - comply with the provisions of the following:

1. ASME B 31.9 "Building Services Piping" for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.

2. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

3. ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualification" for qualifications for welding processes and operators.

1.06 EXTRA MATERIAL

A. Maintenance Stock - Furnish a sufficient quantity of chemical for initial system start-up and for preventive maintenance for one year from Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers - Subject to compliance with requirements, manufacturers offering hydronic piping system products which may be incorporated in the work include, but are not limited to, the following:

1. Triple Duty Valves
    a. Amtrol, Inc.
    b. Bell & Gossett ITT; Fluid Handling Div.
    c. Taco, Inc.
2. Safety Relief Valves
    a. Amtrol, Inc.
    b. Bell & Gossett ITT; Fluid Handling Div.
    c. Spirax Sarco.
3. Pressure Reducing Valves
    a. Amtrol, Inc.
    b. Bell & Gossett ITT; Fluid Handling Div.
    c. Taco, Inc.
4. Air Vents (manual and automatic)
    a. Bell & Gossett ITT; Fluid Handling Div.
    b. Hoffman Specialty ITT; Fluid Handling Div.
    c. Spirax Sarco.
5. Diverting Fittings
    a. Amtrol, Inc.
    b. Bell & Gossett ITT; Fluid Handling Div.
    c. Taco, Inc.
6. Dielectric Unions
    a. Perfection Corp.
    b. Watts Regulator Co.
    c. Grinnell Corp.

7. Y-Pattern Strainers
    a. Hoffman Specialty ITT; Fluid Handling Div.
    b. Spirax Sarco
    c. Victualic Co. of America

2.02 PIPE MATERIALS

A. Drawn Temper Copper Tubing - ASTM B88, Type L

B. Steel Pipe - ASTM A-53. Schedule 40

2.03 FITTINGS

A. Copper Fittings
    1. Wrought-Copper Fittings - ANSI B16.22, streamlined pattern.
    2. Cast Bronze Flanges - ANSI B16.24, Class 150; raised ground face, bolt holes spot faced.
    3. Unions – Wrought copper per ASME/ANSI B16.22, or cast per MSS SP-123.

B. Steel Fittings
    1. ½ inch to 2½ inch - Screwed Fittings
       3 inch and larger - Buttweld Fittings
    2. Screwed Fittings - 300#, ASTM A-47 or A-197.
    3. Welded Fittings - ASTM A-234 WPB, Seamless.
    4. Flanges - 150# FF, ASTM A-105, Screwed or Weldneck.
    5. Unions - ASTM A-105, 3000#.
    6. Bolting - ASTM A-307, Grade B with X-Heavy Nuts.
    7. Gaskets - 1/8 inch thick, 150#, spiral wound, 304SS with graphite filler, Flexitaulic Type Co. or 1/16 inch thick composition type.

C. Dielectric Unions - Threaded or soldered end connections for the pipe materials in which installed; constructed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion. Dielectric nipples may be used in lieu of unions on pipe 2” dia and smaller.

2.04 JOINING MATERIALS

A. Solder Filler Metals - ASTM B 32, 50-50, Tin-Lead, for drain piping and non-potable water applications.

B. Solder Filler Metals - ASTM B 32, 95-5 Tin-Antimony, for heating hot water

C. Solder Fluxes – All fluxes shall be lead free per the Massachusetts Plumbing Code.

D. Gasket Material - thickness, material, and type suitable for fluid to be handled, and design temperatures and pressures.

2.05 GENERAL DUTY VALVES

A. General duty valves (i.e., gate, globe, check, and ball valves) are specified in Section 23 05 23. Special duty valves are specified below by their generic name.

2.06 SPECIAL DUTY VALVES

A. Calibrated Control (Balancing) Valves - 125 psig water working pressure, 250 degrees F. maximum operating temperature, bronze body, valve with calibrated orifice. Provide with connections for portable differential pressure meter with integral check valves and seals. Valve shall have integral pointer and calibrated scale to register degree of valve opening. Valves 2 inch and smaller shall have threaded connections, and 2½ inch and larger valves shall have flanged connections.

B. Pressure Reducing Valves - diaphragm operated, cast-iron or brass body valve, with low inlet pressure check valve, inlet strainer removable without system shut-down, and non-corrosive valve seat and stem. Select valve size, capacity, and operating pressure to suit system. Valve shall be factory-set at operating pressure and have the capability for field adjustment.

C. Safety Relief Valves - 125 psig working pressure and 250 degrees F. maximum operating temperature; designed, manufactured, tested, and labeled in accordance with the requirements of Section IV of the ASME Boiler and Pressure Vessel Code. Valve body shall be cast-iron, with all wetted internal working parts made of brass and rubber. Select valve to suit actual system pressure and BTU capacity.

D. Combined Pressure/Temperature Relief Valves - diaphragm operated, cast-iron or brass body valve, with low inlet pressure check valve, inlet strainer removable without system shut-down, and non-corrosive valve seat and stem. Select valve size, capacity, and operating pressure to suit system. Valve shall be factory-set at operating pressure and have the capability for field adjustment. Safety relief valve designed, manufactured, tested, and labeled in accordance with the requirements of Section IV of the ASME Boiler and Pressure Vessel Code. Valve body shall be cast-iron, with all wetted internal working parts made of brass and rubber; 125 psig working pressure and 250 degrees F. maximum operating temperature. Select valve to suit actual system pressure and BTU capacity. Provide with fast fill feature for filling hydronic system.

2.07 HYDRONIC SPECIALTIES

A. Manual Air Vent - bronze body and nonferrous internal parts; 150 psig working pressure, 225 degrees F. operating temperature; manually operated with screwdriver or thumbscrew; and having 1/8 inch discharge connection and 1/2 inch inlet connection.

B. Automatic Air Vent - designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150 psig working pressure, 240 degrees F. operating temperature; and having 1/4 inch discharge connection and 1/2 inch inlet connection.

C. Y-Pattern Strainers - 125 psig working pressure cast iron body (ASTM A126, Class B), flanged ends for 2-1/2 inch and larger, threaded connections for 2 inch and smaller, bolted cover, perforated Type 304 stainless steel basket, and bottom drain connection.

PART 3 EXECUTION

3.01 PIPE APPLICATIONS

A. Install Type L Hard Copper pipe for main supply and return lines in the circulating hot water heating system.

3.02 PIPING INSTALLATIONS

A. Locations and Arrangements - Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. Locations and arrangements of piping take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.

B. Use fittings for all changes in direction and all branch connections.

C. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

D. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1 inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

E. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

F. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4 inch ball valve, and short 3/4 inch threaded nipple and cap.

G. Install piping at a uniform grade of 1 inch in 40 feet upward in the direction of flow.

H. Make reductions in pipe sizes using eccentric reducer fitting installed with the level side up.

I. Install branch connections to mains using Tee fittings in main with take-off out the bottom of the main, except for up-feed risers which shall have take-off out the top of the main line.

J. Install unions in pipes 2 1/2 inches and smaller at final connections to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

K. Install dielectric unions to joint dissimilar metals.

L. Install flexible connectors at inlet and discharge connections to pumps (except inline pumps) and other vibration producing equipment.

M. Install Y-strainers on the supply side of each control valve, solenoid valve, and elsewhere as indicated. Install nipple and ball valve in blow down connection of strainers.

3.03 HANGERS AND SUPPORTS

A. General - Hanger, supports, and anchors devices are part of the work of this section and shall be provided in accordance with the requirements of Section 23 05 29.

3.04 ANCHOR BOLTS

A. Anchor bolts, nuts, washers, and bolt sleeves shall be hot dipped galvanized. Expansion bolts shall be "Thunderstuds", as manufactured by Unifast Industries, Inc., Hauppauge, NY, Redhead "Wedge Anchors" as manufactured by ITT Phillips; Michigan City, Indiana, Molly Parabolt or approved equal.

3.05 PIPE JOINT CONSTRUCTION

A. Soldered Joints - Comply with the procedures contained in the AWS "Soldering Manual".

B. Threaded Joints - Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe fittings and valves as follows:

1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.

2. Align threads at point of assembly.

3. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).

4. Assemble joint wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

a. Damaged Threads - Do not use pipe with threads that are corroded or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

C. Flanged Joints - Align flanges surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

3.06 VALVE APPLICATIONS

A. General Duty Valve Applications - The Drawings indicate valve types to be used. Where specific valve types are not indicated the following requirements apply:

1. Shut-off duty – Type as shown on the drawings.

2. Throttling duty - use globe or ball valves.

3. Install shut-off duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, and elsewhere as indicated.

4. Install throttling duty valves as each branch connection to return mains, at return connections to each piece of equipment, elsewhere as indicated.

B. Install calibrated control (balancing) valves on the outlet of each heating or cooling element except radiators and elsewhere as required to facilitate system balancing.

C. Install drain valves at low points in mains, risers, branch lines, and elsewhere as required for system drainage.

D. Install check valves on each pump discharge and elsewhere as required to control flow direction.

E. Install pump discharge valves with stem in upward direction; allow clearance above stem for check mechanism removal.

F. Install safety relief valves on the boiler, and elsewhere as required by ASME Boiler and Pressure Vessel Code. Pipe discharge to floor without valves. Comply with ASME Boiler and Pressure Vessel Code Section VIII, Division 1 for installation requirements.

3.07 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in the system, at heat transfer coils, and elsewhere as required for system air venting.

3.08 FIELD QUALITY CONTROL

A. Preparation for testing - Prepare hydronic piping in accordance with ASME B31.9 and as follows:

1. Leave joints un-insulated and exposed for examination during the test.

2. Provide temporary restraints for expansion joints that cannot sustain the reactions due to test pressure. If temporary restraints are not practical, isolate expansion joints from testing.

3. Flush system with clean water. Clean strainers.

4. Isolate equipment that is not to be subjected to the test pressure from the piping. If a valve is used to isolate the equipment, its closure shall be capable of

sealing against the test pressure without damage to the valve. Flanged joints at which blinds are inserted to isolate equipment need not be tested.

5. Install relief valve set at a pressure no more than 5 psi higher than the test pressure, to protect against damage by expansion of liquid or other source of over pressure during the test.

B. Testing - Test hydronic piping as follows:

1. Use ambient temperature water as the testing medium, except where there is a risk of damage due to freezing. Another liquid may be used if it is safe for workmen and compatible with the piping system components.

2. Use vents installed at high points in the system to release trapped air while filling the system. Use drains installed at low points for complete removal of the liquid.

3. Examine system to see that equipment and parts that cannot withstand test pressure are properly isolated. Examine test equipment to ensure that it is tight and that low pressure filling lines are disconnected.

4. Subject piping system to a hydrostatic test pressure which at every point in the system is not less than 1.5 times the design pressure. The test pressure shall not exceed the maximum pressure for any vessel, pump, valve, or other component in the system under test. Make a check to verify that the stress due to pressure at the bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength, or 1.7 times the "SE" value in Appendix A of ASME B31.9, Code for Pressure Piping, Building Services Piping.

5. After the hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage while maintaining the test pressure. Eliminate leaks by tightening, repairing, or replacing components as appropriate, and repeat hydrostatic test until there are no leaks.

3.09 ADJUSTING AND CLEANING

A. Clean and flush hydronic piping systems. Remove, clean, and replace strainer screens. After cleaning and flushing hydronic piping system, but before balancing, remove disposable fine mesh strainers in pump suction diffusers.

B. Mark calibrated name plates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.

C. Chemical Treatment - Provide a water analysis prepared by the chemical treatment supplier to determine the type and level of chemicals required for maintenance of proper pH and prevention of scale and corrosion. Perform initial treatment after completion of system testing.

3.010 COMMISSIONING

A. Fill system and perform initial chemical treatment.

B. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.

C. Before operating the system perform these steps:

1. Open valves to full open position. Close coil bypass valves.
2. Remove and clean strainers.
3. Check pump for proper rotation. Correct improper wiring.
4. Set automatic fill valves for required system pressure.
5. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
6. Set temperature controls so all coils are calling for full flow.
7. Check operation of automatic bypass valves.
8. Check and set operating temperatures of boilers to design requirements.
9. Lubricate motors and bearings if required by the manufacturer.

END OF SECTION

SECTION 23 21 23

HYDRONIC PUMPS

(FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. In-Line Centrifugal Pumps.
2. Interlock wiring specified as factory-installed

B. Related Sections

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 23 - General-Duty Valves for HVAC Piping
6. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
8. Section 23 07 00 - HVAC Insulation
9. Section 23 09 00 - HVAC Control System
10. Section 23 09 93 - Control Sequences for Automatic Temperature Control
11. Section 23 21 13 - Hydronic Piping
12. Section 23 30 00 - HVAC Air Distribution
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 QUALITY ASSURANCE

A. Manufacturer's Qualifications - Firms regularly engaged in manufacture of general-use centrifugal pumps with characteristics, sizes and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards

1. HI Compliance - Design, manufacture, and install hydronic pumps in accordance with HI "Hydraulic Institute Standards".

2. UL Compliance - Design, manufacture, and install hydronic pumps in accordance with UL 778 "Motor Operated Water Pumps".

3. UL and NEMA Compliance - Provide electric motors and components which are listed and labeled by Underwriters Laboratories and comply with NEMA standards.

C. Certification, Pump Performance - Provide pumps whose performances, under specified operating conditions, are certified by manufacturer.

1.03 SUBMITTALS

A. Manufacturer's pump specifications, installation and start-up instructions, and current accurate pump characteristic performance curves with selection points clearly indicated.

B. Manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.

C. Manufacturer's electrical requirements for power supply wiring to hydronic pumps. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

D. Maintenance data and parts lists for each type of pump, control, and accessory; including "trouble-shooting" maintenance guide. Include this data, product data, shop drawings, and wiring diagrams in maintenance manual.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Handle hydronic pumps and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged hydronic pumps or components; replace with new.

B. Store hydronic pumps and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

C. Comply with Manufacturer's rigging and installation instructions for unloading hydronic pumps, and moving them to final location.

PART 2 PRODUCTS

2.01 PUMPS

A. Provide factory-tested pumps, thoroughly cleaned, and painted with one coat of machinery enamel prior to shipment. Type, size, and capacity of each pump is shown on the drawings and listed on the pump schedule. Provide pumps of same type by same manufacturer.

2.02 HYDRONIC CIRCULATING PUMPS

A. Provide in-line centrifugal pumps where indicated, and of capacities and having characteristics as scheduled and shown on the drawings.

B. The closed coupled circulator shall be permanently lubricated, sealed for life bearings, Nu-Tride coated solid steel shaft, Noryl impeller, and durable carbon/silicon-carbide mechanical seal.

C. The circulator shall be repairable in-line without removal of the circulator from the piping. The circulator shall be provided with a high performance motor with superior efficiency and starting torque. Motor to be precision balanced for quiet operation and include cooling fins for longer motor life.

D. Circulator shall be rated for 150 psi working pressure at 225˚F fluid temperature.

E. Circulator shall bear UL label.

F. Electrical characteristics and flows shall be as scheduled on the drawings.

G. Manufacturer - Subject to compliance with requirements, provide in-line circulating pumps of one of the following, or an approved equal:

1. Bell & Gossett ITT; Fluid Handling Div.
2. Taco
3. Grundfos
4. Or approved equal.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which hydronic pumps are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to the Engineer.

3.02 INSTALLATION OF PUMPS

A. Install hydronic pumps where indicated, in accordance with manufacturer's published installation instructions, complying with recognized industry practices to ensure that hydronic pumps comply with requirements and serve intended purposes.

B. Provide access space around hydronic pumps for service as indicated, but in no case less than that recommended.

C. Install electrical devices furnished by manufacturer but not specified to be factory-mounted.

1. Electrical wiring installation shall be in accordance with manufacturer's submittal and installation requirements of Division 26 sections.

2. Power wiring of the pumps is by the Electrical Subcontractor.

D. Coordinate installation with all other trades and subcontractors.

E. Provide piping, wiring, valves, accessories, gauges, supports, and flexible connections as indicated on the drawings and in the manufacturer’s installation manual.

3.03 ADJUSTING AND CLEANING

A. Alignment - Check alignment, and where necessary, realign shafts of motors and pumps within recommended tolerances by manufacturer, and in presence of manufacturer's service representative.

B. Start-Up - Start-up in accordance with manufacturer's instructions.

C. Cleaning - Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 23 30 00
HVAC AIR DISTRIBUTION
(FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Ceiling Air Diffusers and Grilles.
2. Wall Registers and Grilles.
3. Other air devices indicated on drawings and schedules.

B. Related Requirements

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 23 - General-Duty Valves for HVAC Piping
6. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
8. Section 23 07 00 - HVAC Insulation
9. Section 23 09 00 - HVAC Control System
10. Section 23 09 93 - Control Sequences for Automatic Temperature Control
11. Section 23 21 13 - Hydronic Piping
12. Section 23 21 23 - Hydronic Pumps
13. Section 23 31 13 - Metal Ducts
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 QUALITY ASSURANCE

A. Manufacturer's Qualifications - Firms regularly engaged in manufacture of air outlets and inlets of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards

1. ARI Compliance - Test and rate air outlets and inlets in accordance with ARI 650 "Standard for Air Outlets and Inlets".

2. ASHRAE Compliance - Test and rate air outlets and inlets in accordance with ASHRAE 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".

3. ADC Compliance - Test and rate air outlets and inlets in certified laboratories under requirements of ADC 1062 "Certification, Rating and Test Manual".

4. ADC Seal - Provide air outlets and inlets bearing ADC Certified Rating Seal.

5. AMCA Compliance - Test and rate louvers in accordance with AMCA 500 "Test Method for Louvers, Dampers and Shutters".

6. AMCA Seal - Provide louvers bearing AMCA Certified Rating Seal.

7. NDPA Compliance - Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.03 SUBMITTALS

A. Schedule of air outlets and inlets indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.

B. Data sheets for each type of air outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details.

C. Performance data for each type of air outlet and inlet furnished, including aspiration ability, temperature and velocity traverses; throw and drop; and noise criteria ratings. Indicate selections on data.

D. Manufacturer's assembly-type shop drawing for each type of air outlet and inlet, indicating materials and methods of assembly of components.

E. Maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver air outlets and inlets wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.

B. Store air outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURER'S

A. Titus Company

B. MetalAire Industries, Inc.

C. Nailor Industries

D. Krueger

E. Price

F. Substitutions under provisions of Division One.

2.02 GENERAL DESCRIPTION

A. Unless otherwise indicated, provide manufacturer's standard air devices of size, shape, capacity, type and accessories as indicated on drawings and schedules, constructed of materials and components as indicated and as required for complete installation and proper air distribution.

B. Provide air devices that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer's current data.

C. Unless noted otherwise on drawings, the finish shall be #26 white. The finish shall be an anodic acrylic paint, baked at 315˚F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100 hour ASTM D117 Corrosive Environments Salt Spray Test without creepage, blistering, or deterioration of film. The paint must pass a 250 hour ASTM-870 Water Immersion Test. The paint must also pass the ASTM D-2794 Reverse Impact Cracking Test with a 50 inch pound force applied.

D. Provide air device with border styles that are compatible with adjacent ceiling or wall system, and that are specially manufactured to fit into the wall construction or ceiling module with accurate fit and adequate support. Refer to architectural construction drawings and specifications for types of wall construction and ceiling systems.

E. Provide integral volume damper with roll formed steel blades where indicated on the drawings or schedules. Dampers shall be opposed blade design with a screw driver slot or a concealed lever operator for adjustment through the face of the air device.

F. Air devices designated for fire rated systems shall be pre-assembled with UL classified radiation damper and thermal blanket. Fire rated air devices shall be shipped completely assembled; one assembly per carton. Each assembly shall be enclosed in plastic shrink wrap with installation instructions.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General - Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to ensure that products serve intended function.

B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.

END OF SECTION

SECTION 23 31 13

METAL DUCTS
(FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Furnish, fabricate and install all ductwork, including fittings, accessories, dampers, hangers and any incidental work or components required to provide complete air supply, return and exhaust ductwork systems as shown on the Drawings and as specified herein.
2. Where required by the applicable building code, design, furnish and install seismic restraints and braces for all ductwork and accessories.
3. In general, ductwork shall consist of any passageway made of sheet metal or other material substantially air-tight, used for the conveying of air, gas or materials. Included are fittings, transitions, bracing, fasteners, sealers, supports and accessories such as access panels, access doors, turning vanes and manual air balancing dampers. All ductwork shall be of size and material as specified herein and as shown on the Drawings. All duct sizes indicated on the Drawings are clear, inside dimensions. Where ductwork is lined with fiberglass, duct sizes shown on the Drawings are clear, inside dimensions to the duct liner material.
4. Any change in duct sizes, offsets, transitions and fittings required to accommodate job conditions shall be submitted to the Engineer for approval.
5. The following work descriptions are not intended to in any way limit the above broad statement, but are intended as a more specific mention of the most important items included therein.
6. All ductwork, piping, and equipment shown on the drawings is intended to be approximately correct to scale, but figured dimensions and detailed drawings of the actual equipment furnished shall be followed in every case. The drawings shall be taken in a sense as diagrammatic. Size of ductwork and piping are shown, but it is not the intent to show every offset or fitting, nor every hanger or support, or structural difficulty that may be encountered. To carry out the intent and purpose of the drawings all necessary parts to make a complete working system ready for use shall be furnished without extra charge. The Contractor shall be responsible to coordinate the system installation and routing with the work of all trades.

B. Related Requirements

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 23 - General-Duty Valves for HVAC Piping
6. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
8. Section 23 07 00 - HVAC Insulation
9. Section 23 09 00 - HVAC Control System
10. Section 23 09 93 - Control Sequences for Automatic Temperature Control
11. Section 23 21 13 - Hydronic Piping
12. Section 23 21 23 - Hydronic Pumps
13. Section 23 30 00 - HVAC Air Distribution
14. Section 23 36 00 - Air Terminal Units
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.02 RELATED WORK

A. Coordinate all cutting, coring and patching for all HVAC work in accordance with Section 23 05 00. Cutting and patching is by Others.

B. Concrete work is included in Division 03 except for required HVAC anchor bolts, sleeves and templates, which shall be furnished under this Section.

C. Structural steel and miscellaneous metal is included in Division 05 except for supplementary steel required for HVAC hangers, equipment supports, anchors and guides, which shall be furnished under this Section.

D. Flashing and counter flashing is included in Division 07 except for items specified herein.

E. Painting is included in Division 09 except for factory finished HVAC equipment, HVAC shop painting and HVAC identification labeling and as required in Paragraph 3.14 below.

1.03 SUBMITTALS

A. Submit, in accordance with Section 01 30 00, the following Drawings and data.

1. Detailed equipment and ductwork drawings at a minimum scale of 1/4-in = 1-ft-0-in. Site layout drawings and roof plans may be submitted at scales smaller than 1/4-in = 1-ft-0-in, subject to ENGINEER'S prior approval. Drawings shall locate ductwork accessories including manual, automatic and fire dampers. Ratings of fire dampers shall be shown. Drawings shall also show and dimension maintenance clear spaces for motors, drives, coils, filters and access doors or panels. Indicate ductwork pressure class used for fabrication.

2. Standard shop and field installation details for transitions, elbows, takeoffs, discharge nozzles, turning vanes, access panels and doors, volume control and splitter dampers, hangers and volume extractors. When SMACNA references are used, the specific methods for the project shall be clearly defined. Where SMACNA has more than one option, the option to be used shall be indicated.

3. Ductwork materials, joining methods, reinforcing and material gauges. Where options are allowed by SMACNA, the proposed option shall be clearly defined. Indicate proposed materials and methods for ductwork and equipment hangers.

4. For units that will be shipped exposed, provide a description of the protective packaging that will be used during transit.

5. All submittals shall contain a statement that Sections 23 05 00 and all other referenced Sections have been read and complied with. The certification statement shall be made by all of the following that are applicable; the CONTRACTOR, Subcontractor and the vendor. The statement shall be an individual statement for each party involved, and shall be included with every submittal and resubmittal.

B. In general, corrections or comments or lack there of, made relative to submittals during review shall not relieve the CONTRACTOR from compliance with the requirements of the drawings and specifications. Submittals are for review of general conformance with the design concepts of the project and general compliance with the contract documents. The CONTRACTOR is responsible for the final design conforming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating the work of all trades, and performing the work in a safe and satisfactory manner.

1.04 REFERENCE STANDARDS

A. These standards shall be considered as minimum requirements. This is a general list and not all standards listed are necessarily referenced elsewhere in this Section. Specific

requirements of this Section and/or Drawings shall have precedence. The ENGINEER shall resolve conflicts between published requirements.

B. Titles and abbreviations of Federal, State and industry standards, technical societies, associations and institutes and other organizations which may be used are as follows:

1. American Conference of Governmental Industrial Hygienists (ACGIH)

2. Air Movement and Control Association (AMCA)

3. American National Standards Institute (ANSI)

4. Air-conditioning and Refrigeration Institute (ARI)

5. Air Diffusion Council (ADC)

    a. ADC 1062-R4 - Certification, Rating and Testing Manual.

6. American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE)

    a. ASHRAE 68 - Laboratory Method of Testing In-Duct Sound Power Measurement Procedure for Fans.

7. American Society of Mechanical Engineers (ASME)

8. American Society for Testing and Materials (ASTM)

    a. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron, Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    b. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
    c. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

9. Factory Mutual (FM)

10. National Institute of Standards and Technology (NBS)

11. National Fire Protection Association (NFPA)

    a. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
    b. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

12. Occupational Safety and Health Administration (OSHA)

13. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

14. Underwriters Laboratories (UL)

    a. UL 723 - UL Standard for Safety Test for Surface Burning Characteristics of Building Materials.

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. Inspection by the ENGINEER'S representative or failure to inspect shall not relieve the CONTRACTOR of responsibility to provide materials and perform the work in accordance with the documents.

B. The OWNER and ENGINEER reserve the right to sample and test any materials after delivery and to reject all components represented by a sample that fails to comply with the specified requirements.

1.06 DELIVERY, STORAGE AND HANDLING

A. All materials shall be inspected for size, quality and quantity against approved shop drawings upon delivery.

B. Delivery schedule of all equipment shall be coordinated with the CONTRACTOR. Equipment ready for shipment prior to the agreed on shipping date shall be stored without cost to the OWNER by the manufacturer.

C. All materials shall be suitably packed for shipment and long term storage. Each package shall be labeled to indicate the project and the contents of each package. Where applicable, equipment numbers shall be marked on the container.

D. All equipment shipped that is exposed such as on a flat bed truck shall be protected during transit. The equipment shall be protected from moisture, road salt, dirt and stones or other materials thrown up from other vehicles. Electrical components shall be protected as above, but with special attention to moisture. The method of shipment protection shall be defined in the submittals.

E. All materials shall be stored in a covered dry location off of the ground. When required to protect the materials they shall be stored in a temperature-controlled location.

1.07 SPARE PARTS

A. Spare parts shall include all special items on the manufacturer's standard list of spare parts

B. In addition to special items, the following spare parts shall be provided:

1. Furnish all special tools required for normal operation and proper servicing of the equipment.

2. Provide a minimum of 1 or 5 percent of the total units rounded to the next full unit whichever is greater for each size and rating of the following components.

a. Thermostats

b. Thermometers

c. Pressure gauges

d. Control relays

e. Damper operators

f. Control transmitters

g. Control transformers

C. Pack spare parts in containers suitable for extended storage without deterioration of the parts. Containers shall be clearly labeled designating contents, pieces of equipment for which intended and equipment identification numbers.

1.08 DEFINITIONS

A. Particular terminology used under this Section is defined as follows:

1. Traffic Level and Personnel Level - Areas, including process areas, equipment rooms, boiler rooms and other areas where insulation may be damaged by normal activity and local personnel traffic. Area extends vertically to 8-ft above floor, walkways, platforms and stairs, and horizontally 3-ft beyond the edge of walkways, platforms, and stairs.

2. Exposed Piping and Ductwork - Piping and ductwork visible from the floor level and includes all piping and ductwork in equipment rooms, boiler rooms, etc.

3. Supply Air Ductwork - Ductwork carrying air from a fan or air handling unit to the space or spaces to which it will be introduced. This air may have been heated or cooled or in the case of ventilation system the air would be neither heated nor cooled. Supply air ductwork extends from the fan or air handling unit to the registers, grills or diffusers at the end of the ductwork.

4. Exhaust Air Ductwork - Ductwork carrying air from a space to a fan and then to be discharged to the outdoors. Exhaust air ductwork extends from the registers or grills at the end of the ductwork to the fan. From the fan the exhaust ductwork extends to the discharge point, exhaust air damper, or exhaust air plenum, whichever comes first.

5. Outdoor Air Ductwork - Ductwork carrying untreated air from the outside to a fan or air handling unit. Outdoor air ductwork starts at the intake point, outdoor air damper, or outdoor air plenum, whichever comes last. The outdoor air ductwork extends to the fan, air handling unit, or connection with a return air duct, whichever comes first.

6. Outdoor Air Plenum - A plenum that extends from the opening in the skin of the structure to the outdoor air duct. If the outdoor air damper is directly at the intake or there is no outdoor air damper, the plenum will extend to the first size reduction. If the outdoor air damper is not at the intake, the plenum will extend to the outdoor air damper.

7. Ventilated Spaces - Areas supplied with outdoor air on a continuous or intermittent basis. The outdoor air may be heated and/or cooled or untreated.

8. Heated Spaces - Areas where heat is supplied to maintain a minimum temperature during the heating season.

9. Non-Conditioned Spaces - Areas that are not provided with mechanical cooling.

10. Thermal Conductivity - the rate of heat flow through unit area of a homogeneous substance under the influence of unit temperature gradient in the direction perpendicular to the area. Units-BTU per (hour)(sq ft)(degrees F temperature difference)(per inch thickness).

11. Indoor Ductwork - Ductwork within a building that is not exposed to the weather.

12. Outdoor Ductwork - Ductwork that is not within a building and is exposed to the weather.

13. Flues/Stacks/Breeching - Ductwork carrying products of combustion to atmosphere.

1.09 COORDINATION

A. The Drawings indicate the extent and general arrangement of the systems. If any departures from the drawings or specifications are deemed necessary, details of such departures and the reasons therefore shall be submitted as soon as practical for review. No such departures shall be made without the prior written concurrence of the ENGINEER.

B. The CONTRACTOR shall coordinate the location and placement of all concrete inserts and welding attachments with the structural engineer.

C. The CONTRACTOR shall assume full responsibility for coordination of the HVAC systems, including; scheduling, and verification that all structures, ducts, piping and the mounting of equipment are compatible.

D. The CONTRACTOR shall not install any equipment or materials until the OWNER and ENGINEER have approved all submittals. If any equipment or materials are installed prior to approval of the submittals, it shall be at the CONTRACTOR'S risk.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION FOR DUCTWORK

A. Flexible fabric connectors for vibration isolation shall be airtight, watertight, fire retardant, 6-in wide with 3-in metal edges. Metal edges and fasteners shall be the same material or greater corrosion resistance as the duct.

1. Flexible connections for conventional indoor HVAC systems shall be glass fabric coated with polychloroprene. Fabric must comply with Underwriters Laboratories Standard UL214 and NFPA Bulletin 90A. Connections shall be Ventglas by Ventfabrics or equal.

2. Flexible connection for outdoor conventional HVAC systems ductwork shall be glass fabric coated with DuPont Hypalon Fabric and must be resistant to sunlight, ozone and weather. Fabric must comply with Underwriters Laboratories Standard UL214 and NFPA Bulletin 90A. Connection shall be Ventlon by Ventfabric or equal.

B. Connections in PVC ductwork shall be 3/16-in thick Neoprene with Type 304 worm drive band clamp for round ducts and bar stock type battens with stainless steel fasteners for rectangular PVC ductwork.

C. Furnish flexible connectors at each inlet and outlet of fan where called for on the Drawings. Flexible connections shall be integrally flange molded arch type units constructed of EPDM rubber 1/4-in thick, reinforced with a strong synthetic asbestos-free fabric suitable for corrosive service. The flexible connections shall be designed to minimize the transmission of vibration from the fans to the ductwork at the suction and discharge connections. Expansion or contractor flexible connections shall be designed to allow 1-in movement. Working length or “live” length shall be as designed by the manufacturer to allow up to 1-in of movement. Ends shall be flanged, with flanges matching duct connection flanges. Corners on rectangular expansion joints shall be molded and free of patches or splices. The flexible connections shall be suitable for outdoor service and temperature ranges from minus 10 up to 125 degrees F, and pressure to 5 psig. Specially fabricated split Type 316 stainless steel retaining back-up bars shall be supplied to prevent damage to the EPDM rubber flanged with Type 316 stainless steel bolts are tightened.

D. Manufacturer

1. Holz Rubber Company.

2. Mercer Rubber Company.

3. Proco Products Incorporated.

4. Or equal.

2.02 FLAME AND SMOKE RATINGS

A. All materials, including adhesives, surface coatings, sealers, assemblies of several materials, insulation, jacketing, finish, etc, shall have flame spread ratings not over 25 (fire resistive) and smoke development ratings not over 50 and fuel contributed rating not over 50, as established by tests conducted in accordance with the Federal Standard 00136B, National Bureau of Standards Radiant Energy Fire Test and the National Fire Code of the NFPA.

B. These requirements apply to all circumstances whether the materials are field applied or applied by a manufacturer in his/her shop, or elsewhere, prior to delivery to the project.

2.03 SOUND CONTROL

A. The selection of ductwork and accessories shall be such as not to create noise that will exceed the levels of permissible noise exposures for occupational areas as established by the OSHA and other Federal, State and local safety and health standards, codes and ordinances.

2.04 HANGERS, SUPPORTS AND ANCHORS

A. Furnish supports, hangers and other devices necessary to support firmly and substantially the equipment and ductwork described in this Section. Ductwork support systems shall include restrains as required by the applicable building codes to withstand seismic loading. All equipment, ductwork, and supports that are installed outdoors shall be designed and installed to meet wind loadings as required as required by the International Mechanical Code, the Massachusetts Building Code, all other applicable codes, and the requirements specified herein.

B. Rectangular, Round and Flat-Oval Ductwork - Spacing and size of hangers shall be as called for in the SMACNA standards, except as limited below.

1. Rectangular ductwork 48-in wide and larger shall be supported by adjustable threaded rod hangers.

2. Round ductwork 37-in and larger shall be supported by two adjustable threaded rods at each support.

C. All hangers shall be of same material as ductwork which they serve, e.g., galvanized, aluminum, black steel, etc, except for PVC ductwork which shall be aluminum.

D. All hanger hardware and fasteners shall be of the same material as the duct they serve or shall be of a material with equal or greater corrosion resistance. Where materials other than the duct material are used, they must be approved by the ENGINEER before installation.

E. Perforated band iron or wire for supporting ducts shall not be permitted.

F. Where C-clamp type hangers are used, furnish with a retainer strap.

G. The following methods of hanger attachment to the building structure are NOT allowed. The numbers and letters refer to hanger methods shown in Figure 4-1, 4-2 and 4-3 of the 1985 edition of the HVAC Duct Construction Standards Metal and Flexible as published by SMACNA.

"T"- wrap around strap on open web joist.
"W" - bent over band on open web joist.
"14" - friction clamps.
"17" - bent wire in metal deck.

H. Design of hangers shall include the effect of all loads applied to the duct as well as the load of the duct. These loads include, but are not limited to wind, snow and internal dirt or liquid buildup.

I. Hangers shall not be supported from roof decking or bulb tees. Where required, provide supplemental steel to span between the building structures.

2.05 DUCTWORK MATERIAL

A. Ductwork shall be constructed of the materials specified using the gauges or thicknesses, reinforcing and construction methods in accordance with SMACNA standards. Unless otherwise specified, all components of the duct systems shall be constructed of the same material as the ductwork. This is to include braces and turning vanes.

1. Galvanized steel ductwork shall be constructed of hot-dip galvanized sheet steel, per ASTM A653.

2.06 DUCTWORK CONSTRUCTION

A. All ductwork shall be substantially built with joints and seams smooth on the inside and given a neat appearance on the outside. Inside surfaces and joints shall be smooth and free from pockets, burrs and projections. All joints shall be substantially airtight with laps made in the direction of air flow and no flanges projecting into the air stream.

B. Pressure Classes

1. Pressure classes for determination of sheet metal gauge and reinforcing shall be as defined by the latest issue of the SMACNA - Industrial Duct Construction Standards.

2. For systems with fans with a shut off static pressure higher than 2-in w.g., design pressure shall be as listed in Paragraph 2.06 above. For systems with fans a shut off static pressure 2-in w.g. or less design pressure shall be equal to the maximum pressure indicated for the fans or air handling units on the Schedules and the pressure class shall be the same for the entire length, including branches, of the specific duct system.

C. Rectangular Ductwork (Sheet Metal)

1. Ductwork shall be constructed as shown on the Drawings in accordance with the specified SMACNA - Construction Standard.

2. Cross-breaking shall conform to SMACNA standard. Cross-breaking shall be applied to the sheet metal between the standing seams or reinforcing angles. The center of the cross-break shall be of the required height to assure rigidity for each panel.

3. Alternate Construction - Factory fabricated joint systems may be offered as an alternate form of construction. The system offered shall meet all requirements of SMACNA. Alternate joint systems shall be "Ductmate System" as manufactured by Ductmate Industries, Inc., installed in accordance with the manufacturer's recommendations. The system shall be sealed for zero leakage and angle attachment to the main duct section shall be by tack welding. The use of screws is not allowed.

D. Round Ductwork (Sheet Metal)

1. Ductwork shall be constructed as shown on the Drawings in accordance with the specified SMACNA - Construction Standard.

2. Round ductwork longitudinal seams shall be either lock type or continuous welded construction.

3. Slip joints shall be used on ductwork and fittings up to 36-in in diameter and Vanstone flanges shall be used on ducts over 36-in in diameter.

4. Fittings shall be fabricated with continuous welds. 90 degree elbows shall have a turning radius of 1.5 times the fitting diameter. 90 degree elbows shall be mitered construction with five segments.

5. All fittings in the round duct system shall be of the male and female type. Mechanically fasten the conduits together using sheet metal screws not less than four per fitting 6-in on centers maximum and equally spaced around the circumference of fitting.

6. Round ductwork and fittings shall be manufactured by United Sheet Metal; SEMCO or equal.

2.07 DAMPERS

A. DAMPERS - MANUAL

1. Manual Volume Dampers - Provide dampers with parallel blades for 2 position controls, or opposed blades for modulating control. Construct blades of 16 gauge steel; provide heavy-duty molded self-lubricating nylon bearings, ½ inch diameter steel axles spaced on 9 inch centers. Construct frame of 2 inches by ½ inch by 1 inch steel channel for face areas 25 sq. ft. and under; 4 inches by 1-¼ inches by 16-gauge channel for face areas over 25 sq. ft. Provide galvanized steel finish with aluminum touch-up.

2. Backdraft Dampers - Provide gravity backdraft dampers with extruded aluminum, 6063-T52 alloy, 0.081-inch thick 1 inch by 4 inches by 1 inch channel frame on all sides. Blades shall be extruded aluminum of same material and thickness. Seals shall be extruded silicone rubber leg at blade edges and expanded polyurethane on jambs. Shafts shall be ½ inch diameter extruded aluminum, pin-lock design. Bearings shall be oilite bronze with linkage installed in jamb out of the airstream. Counterbalance shall be mounted externally on extended shaft and assist opening.

3. Manufacturer - Subject to compliance with requirements, provide dampers of one of the following or an approved equal:

   a. Ruskin Mfg. Co.

   b. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.

   c. Louvers & Dampers, Inc.

   d. Or approved equal.

B. DAMPERS – AUTOMATIC

1. Rectangular Automatic Control Dampers

   a. Provide control dampers that meet the following minimum construction standards: Frame shall be 16 gauge galvanized steel structural hat channel with tabbed corners for reinforcement. The blades shall be single skin, 16 gage galvanized steel with three longitudinal grooves for reinforcement. Blade edge seals shall be PVC coated polyester fabric suitable for -25^{o}F to +180^{o}F (-32^{o}C to +83^{o}C) mechanically locked into the blade edge. Adhesive or clip-on type seals are unacceptable. Jamb seals shall be flexible metal, compression type to prevent leakage between blade end and damper frame. Blade end overlapping frame is unacceptable. Bearings

shall be corrosion resistant, molded synthetic sleeve type turning in an extruded hole in the damper frame. Axles shall be hexagonal positively locked into the damper blade. Linkage shall be concealed out of airstream, within the damper frame to reduce pressure drop and noise. Submittal must include leakage, pressure drop, maximum velocity and maximum pressure data based on AMCA Publication 500. Dampers shall be equipped with factory installed damper position indication switch package. The switch package shall include two position indication switches linked directly to the damper blade to provide full open and full closed damper blade position. The switch package shall provide the capability to interface with the HVAC control system and provide remote damper blade position status.

b. Dampers shall have 120VAC direct coupled, spring return damper actuators, manufactured by the same manufacturer as the dampers. Control shall be fully open/fully closed from an auxiliary contact. The actuators shall have true spring return operation for reliable fail-safe operation and positive close off. Actuator shall be spring close, power open.

c. Manufacturer – Subject to compliance with requirements, provide Model CD36 dampers by Ruskin Mfg. Co. or an approved equal by:

i. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.

ii. Louvers & Dampers, Inc.

iii. Or approved equal.

2. Round Automatic Control Dampers

a. Provide dampers meeting the following specifications: Dampers shall be of the butterfly type consisting of circular blade mounted to a shaft. Inside frame surface shall be clean and smooth with no blade stops or similar inward projections.

Frames shall include rolled stiffener beads to allow easy sealing of spiral ductwork joints. Dampers shall include a firm, fine cell foam seal sandwiched between two blades. Leakage through the damper in the closed position shall not exceed .15 scfm per inch of blade circumference at a pressure differential of 4 inch w.g. Leakage through the bearings shall be less than ¼ CFM at 4 inches static pressure. Damper frame and blade shall be fabricated from galvanized steel. Frame shall be 20 gauge. Blade shall be constructed of two layers of galvanized steel, 14 gage equivalent thickness.

b. Dampers shall have 120 VAC direct coupled, spring return damper actuators, manufactured by the same manufacturer as the dampers. Control shall be fully open/fully closed from an auxiliary contact. The actuators shall have true spring return operation for reliable fail-safe operation and positive close-off. Actuator shall be spring close, power open.

3. Manufacturer – Subject to compliance with requirements, provide Model CDRS25 by Ruskin Mfg. Co. or an approved equal by:

a. Air Balance, Inc.

b. Airguide Corp.

c. American Warming & Ventilating, Inc.

d. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.

e. Louvers & Dampers, Inc.

f. Penn Ventilator Co.

2.08 ACCESS DOORS

A. Access doors shall be minimum 24-in by 24-in in ducts 26-in and larger. Where the duct size is less than 26-in, the largest door that can be accommodated shall be used. Access doors shall be of the same material as the duct, pan type construction for metal ductwork, with smooth edges and fitted seals, constructed and installed for air-tight fit with ease of opening and closing. Doors shall be substantially butt hinged, with heavy sash locks and substantial door pulls. Door openings and door frames shall be reinforced with bar stock or angle. Where ductwork is installed with duct liner or exterior duct insulation, the access door shall be of the insulated type. Access doors shall be factory fabricated. Where ductwork is constructed of stainless steel, access door and hardware shall be of similar material.

B. Hand hole access panels shall be 12-in by 12-in, constructed of the same material as the ductwork, with peripheral gaskets and sash locks. Provide hinges or chain for attachment to duct.

2.09 FASTENERS

A. Sheet metal screws, drive cleats, cinch bands and other fasteners shall be fabricated from materials with an equal or greater corrosion resistance than the ductwork in which they are installed. Where a material other than the duct material is used, it shall be approved by the ENGINEER before installation

2.10 LABELS

A. The service of each duct along with and arrow indicating direction of flow shall be provided on each duct system. Labels shall be located not more than 26 linear feet apart and shall also be provided at both sides of wall penetrations, at each damper, and each equipment connection.

B. Labels shall contain the service spelled out, the duct size, and the equipment number of the equipment served. Label locations shall have unobstructed view from normal viewing locations.

C. Numbers and letters shall be die-cut from 3.5 mil vinyl film and pre-spaced on carrier film.

Adhesive and finish shall be protected with one-piece removable liners. Colors shall be white letters on black backgrounds.

D. The system for preparation and application of letters shall be Type B a.s.i./2 by ASI Sign Systems; Architectural Graphics Inc. or equal. Letters shall be 3-in high Optima Bold, upper case using Grid 2 spacing. Direction arrows are to match. The instructions of the manufacturer shall be followed in respect to storage, surface preparation and application of letters.

E. Each piece of equipment is to be provided with an identification label listing the unit number and the areas served. Labels shall be as specified above.

2.11 TURNING VANES

A. Turning vanes shall be shop fabricated and installed in all abrupt rectangular elbows. Single thickness or airfoil type double thickness blades shall be chosen based on SMACNA recommendations.

B. Vanes shall be fabricated from the same material as the ductwork and manufactured by Elgen; Duro-Dyne; Aero/Dyne or equal.

PART 3 EXECUTION

3.01 INSTALLATION OF DUCTWORK

A. Fabricate and erect all ductwork where shown on the Drawings, as specified herein, and in accordance with SMACNA standards. Rigidly support and secure ductwork.

B. The CONTRACTOR shall not install any equipment or materials until the OWNER and ENGINEER have approved all submittals. If any equipment or materials are installed prior to approval of the submittals, it shall be at the CONTRACTOR'S risk.

C. Wherever ducts are divided, maintain the cross-sectional area. All such changes must be approved and installed as directed by the ENGINEER or as approved on shop or erection drawings.

D. During installation, temporarily close the open ends of ducts to prevent debris and dirt from entering. Install work in accordance with the overall approved progress schedule and in cooperation with all other trades so there will be no delay to other trades.

E. Cross-break sheet metal in accordance with SMACNA duct construction standard. Apply cross-breaking to the sheet metal between the standing seams or reinforcing angles. The center of the cross-break shall be of the required height to assure each panel section being rigid.

F. Beading as specified in SMACNA will be acceptable in lieu of cross-breaking.

G. The Drawings of the air ducts and air risers show the general location for installation of the ducts and risers. Should additional offsets or changes in direction be made, these changes must be considered in the original bid and shall be installed at no additional cost to the OWNER.

H. All necessary allowances and provisions shall be made in the installation of the ducts for the structural conditions of the building. Ducts shall be transformed or divided as may be required. Wherever this is necessary, maintain the cross-sectional area. All of these changes, however, must be approved and ducts installed as directed by the ENGINEER or as approved on shop or erection drawings.

I. The taper of all transformations shall be not more than 15 degrees.

J. Secure casing to curbs according to SMACNA "Duct Construction Standards."

K. Where ducts are constructed of materials other than galvanized steel the reinforcing members shall be of the same material as the ductwork.

L. For PVC ductwork where reinforcing members of material other than PVC are required, totally encase the reinforcing member in PVC.

M. The use of button punching or snap locks on ductwork constructed of aluminum shall not be permitted.

N. Ducts carrying moist air that pass through areas that could cause condensation shall be pitched to facilitate condensate removal. Low points of such ducts shall be provided with drains.

O. Ductwork connections to units that require corrosion resistant coatings shall be made with flanges. Flanges shall be factory drilled before coating. Resilient washers suitable for the environment shall be used to protect the coating from the bolts in the flange. The use of self tapping screws or other fastening methods that will damage the coating are not acceptable.

3.02 HANGERS

A. Rectangular, Round and Flat-Oval Ductwork - Spacing and size of hangers shall be as recommended in the SMACNA standards except as noted in PART 2.

B. Install hangers plumb and securely suspended from supplementary steel or inserts in concrete slabs. Sufficiently thread lower ends of hanger rods to allow adequate vertical adjustment. Do not use building siding or metal decking to hang ductwork.

C. Ducts shall not be supported from furring, hung ceilings or from another duct or pipe.

D. C-clamp type hangers shall be supplied with a retainer strap.

E. Ductwork shall not come in contact with any of the ceiling construction or any other equipment in the ceiling cavity.

F. Duct support at flexible connections shall be adjustable for ease of aligning the duct to the piece of equipment.

3.03 SEALING OF DUCTWORK

A. General - unless otherwise indicated, seal all ductwork joints and seams using sealant in accordance with the instructions of the sealant manufacturer and this Section. All transverse seams, joints and fitting connections, both shop and field assembled, shall be sealed in accordance with this Section. Longitudinal seams shall be sealed on all duct systems with a design operating pressure greater than 2-in w.g.

B. Application of Sealant - Thoroughly clean all seams, joints, etc, of dirt, oil, grease, or other coatings which might interfere with the adhesion of the duct sealant before the sealant is applied.

C. Uncured sealant may be forced into the slotted side of the seam or joint before shop or field assembly and the joint or seam completed while the sealant is still uncured. Excess sealant shall be removed from both the inside and outside of the duct before it sets.

D. Duct Tape - the use of duct tape alone for sealing ductwork is prohibited. Duct tape may be used primarily for the purpose of retaining the uncured duct sealant in seams and joints until it has cured. Duct tape shall not be applied to the inside of any duct nor shall it be applied to standing type joints at any time. All duct tape used shall be compatible with the sealant. The use of sealant saturated tape is acceptable when part of an integrated sealing system.

E. Sealant shall be either in liquid form or a mastic with a maximum flame spread of 25 and a maximum rate of fuel contributed and smoke developed of 50 when tested in accordance with ASTM E84, NFPA 255 and UL 723.

F. Sealing systems shall be suitable for the environment. The following schedule is to be used to select the sealant.

1. Indoor, dry galvanized round and rectangular duct is to be sealed with Iron Grip 601 or equal.

2. Indoor, dry, stainless steel, aluminum and PVC coated is to be sealed with FTA 20 adhesive and DT-Tape gypsum or equal.

3. All other areas unless otherwise noted are to be sealed with FTA 50 adhesive and DT-Tape gypsum or equal.

4. All sealers listed are manufactured by Hardcast Inc and are to define the type of sealer. Other equal sealants are acceptable.

G. Installed duct systems shall be tested in accordance with the SMACNA - HVAC Air Duct Leakage Test Manual. Leakage rates shall not exceed those predicted for ASHRAE - Leakage Class 6 at the system design pressure. For flexible ducts and ducts with design pressures less than 2-in w.g., ASHRAE - Leakage Class 12 shall be used. Duct systems that fail to pass the test standards shall be repaired and tested again until standards are attained.

3.04 DUCTWORK FITTINGS AND ACCESSORY ITEMS

A. Duct Elbows - Changes in direction and offsets shall be made in a gradual manner to facilitate streamline flow of air. All elbows shall have a centerline radius of not less than 1-1/2 times the width of the duct in the plane of the elbow. For rectangular ductwork where full radius elbows cannot be installed, provide abrupt elbows equipped with shop-installed turning vanes unless noted otherwise on the Drawings.

B. Flexible Fabric Connectors

1. Install flexible connectors for vibration isolation at all duct connections to fans, fan units or blowers, air handling units and air conditioning units. Make connections substantially airtight at all seams and joints.

2. Where the construction of the flexible connection or vibration isolator results in a cross sectional area of the connection which is less than 90 percent of the adjacent ductwork, the size of the connection shall be increased to provide a cross sectional area equal to or greater than 90 percent of the adjacent duct.

3. Provide flexible duct connections at both the intake and discharge connections for all fans and air handling units except as noted below.

   a. Wall and roof fans that have integral motor/fan wheel isolation.

   b. Air handling units where the fan is isolated from the intake and discharge connections by internal flexible connections or separations, and the unit is mounted without vibration isolators between the unit and the support structure.

4. Ductwork spacing and alignment for flexible connections shall be aligned to the tolerances of the flexible connection manufacturer, or plus/minus 1/4-in whichever is less. Bolts shall be torqued to the manufacturer's recommendations. Do not over tighten.

5. Where flexible connections are used as expansion joints, the manufacturer's pre-compression recommendations must be followed. When the temperature at installation differs from the temperature in the pre-compression recommendation, a correction shall be made.

C. Dampers

1. Install manual volume control dampers wherever it may be necessary to regulate air volume for system air balancing and where shown on the Drawings.

2. Install splitter dampers wherever it may be necessary to regulate air volume for system air balancing.

3. Install motorized dampers when supplied by other trades.

D. Access Doors

1. Hinged access doors shall be installed where listed below, wherever shown on the Drawings and wherever access may be required for service, maintenance and adjustment.

2. Provide access doors at the following locations (minimum requirements):

a. Motorized dampers - linkage side.
b. Duct mounted temperature controllers.
c. Smoke detectors.
d. Plenums.
e. Fire dampers.
f. Manual dampers and splitters.
g. Inlet side of centrifugal fans.
h. Inlet and outlet ducts to fans and air handlers.

3. Where access doors are required in ductwork located above ceilings, coordinate the location of the access doors to clear the ceiling support system and to be accessible through the ceiling grid.

4. 12-in by 12-in handhole access panels may be substituted for access doors when ductwork dimensions are less than 14-in by 14-in

3.05 FILLING IN SPACE AROUND DUCTWORK

A. To prevent sound passing through the area between the duct and the framed or cut opening in the floors, walls or partitions, pack mineral wool to completely fill the space the full depth of the opening. Whenever a fire-rated wall or floor is penetrated and a fire damper is not required, fill the space around the duct with a locally approved fireproof rope.

B. At penetration, apply escutcheon plates on both faces of the wall to close the gap between the structure and the sides of the insulated or bare duct. Escutcheon plates shall be the same material as the duct for metal ducts and stainless steel for PVC ducts.

3.06 DUCTWORK GENERATED NOISE

A. All ductwork shall be free from pulsation, chatter, vibration or objectionable noise. After system is in operation, should these defects appear, correct by removing, replacing or reinforcing the work. No discreet tones will be allowed.

3.07 PLENUMS

A. Seal fresh air inlet and exhaust air plenums watertight at louvers or otherwise subject to water entrainment at all bottom joints and seams and up all vertical seams for a minimum of 12-in. Remove excess sealant before it sets hard. Where possible, pitch fresh air inlet and exhaust air plenums down towards the louver. Where it is not possible to pitch the plenum, provide a 1-in capped drain connection at the low point of the plenum.

3.08 TEST PORTS

A. Where shown on the Drawings and where required for testing and balancing, provide instrument insertion ports. Size and location of ports shall be coordinated with the CONTRACTOR performing air balancing. Seal ports with plastic snap lock plugs. When the ductwork will be insulated, extend the port to the face of the insulation and seal the vapor barrier to the port. When the ductwork is lined, extend the port into the duct to the inner surface of the duct liner.

B. In round ductwork provide 2 ports 90 degrees on centers. In rectangular ductwork provide ports as required by AABC or NEBB for a full traverse measurement.

C. As a minimum, ports shall be provided in the following connections:

1. All duct mains.

2. All duct branches unless all connections are diffusers, registers, or grilles and the total can be calculated by summing the readings for all of the connections.

3. All connections to tanks or hoods where there is no other access for taking a measurement.

D. A main duct is defined as one of the following:

1. A duct emanating from a fan or plenum.

2. All other ducts are considered branch ducts.

3.09 PAINTING

A. Paint the outside face of all louver blank off panels and the interiors of unlined plenums and ductwork where connected to louvers. Prime and paint with two coats of flat black exterior paint. Painting shall be performed under this Section and shall be as specified in Division 09.

3.10 CLEANING OF DUCTWORK

A. Maintain all ductwork, fans, coils, air filters, outlets and other parts of the ductwork systems in a clean condition during installation.

B. Clean complete ductwork systems prior to testing and air balancing. Secure cheese cloth over all openings of the ductwork system for entrapment of dirt during the cleaning operation.

END OF SECTION

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SECTION 23 36 00

AIR TERMINAL UNITS

(FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.1 SUMMARY

A. Section includes

1. Single duct, Variable Volume, Terminal Box, UL listed, ARI certified, NFPA 90A compliant, ASHRAE 62.1 compliant.

B. Related Requirements

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 23 - General-Duty Valves for HVAC Piping
6. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
8. Section 23 07 00 - HVAC Insulation
9. Section 23 09 00 - HVAC Control System
10. Section 23 09 93 - Control Sequences for Automatic Temperature Control
11. Section 23 21 13 - Hydronic Piping
12. Section 23 21 23 - Hydronic Pumps
13. Section 23 30 00 - HVAC Air Distribution
14. Section 23 31 13 - Metal Ducts
15. Section 23 74 00 - Packaged Outdoor HVAC Equipment

1.2 SUBMITTALS

A. Comply with the provisions of Section 230500.

1.3 QUALITY ASSURANCE

A. Comply with the provisions of Section 230500.

1.4 DELIVERY, STORAGE AND HANDLING

A. Comply with the provisions of Section 230500.

PART 2 PRODUCTS

2.1 UNIT CONSTRUCTION:

A. The unit casing shall be 22 gauge galvanized steel. Outlet connection shall be slip and drive type connection. The interior surface of the unit casing shall be acoustically and thermally lined with 1/2" 2.0 lb./cu. ft. density glass fiber with foil facing. The insulation shall be UL listed and conform to NFPA-90A, UL 181 standards, and bacteriological standard ASTM C 665. The insulation R-value minimum of 2.2. All cut edges of insulation shall be completely encapsulated in metal to prevent erosion.

B. Air Valve: Air inlet connection shall be minimum of 18 gauge galvanized steel cylinder sized to fit standard round duct. A multiple point, averaging flow sensing ring shall be provided with balancing taps for measuring within +/- 5% of unit cataloged airflow. An airflow versus pressure differential calibration chart shall be provided. The damper blade shall be constructed of a closed cell foam seal mechanically locked between two 22 gauge galvanized steel disks. The damper blade assembly shall be connected to a cast zinc shaft supported by self lubricating bearings. The shaft shall be cast with a damper position indicator. The valve assembly to include a mechanical stop to prevent over stroking. At 4.0" w.g. air valve leakage shall not exceed 1% of cataloged airflow.

C. Connection: Slip and drive connection shall have two straight flanges on the top and bottom, and two drive connections on the left and right sides.

D. Controls: Controls shall be field mounted for 24 volt actuator and controls on units external shaft. See HVAC Sequence of Operations, coordinate with others.

E. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch (2.5 mm), and rated for a minimum working pressure of 200 psig (1380 kPa) and a maximum entering-water temperature of 220 deg F (104 deg C). Include manual air vent and drain valve.

1. Coil shall be mounted in a minimum 20 gage galvanized steel casing with slip and drive discharge connections, and factory mounted on the base unit as shown on the equipment drawings.

2. Aluminum fins bonded to the copper tubes by mechanical expansion.

3. Number of coil rows and circuits shall be selected to provide performance as required by the plans.

4. Right or left-hand fittings with sweat connection sizes as indicated on equipment drawings.

F. Unit Service. Clearance: Provide adequate clearance to meet NEC on control box side of unit to meet NEC requirements. Provide a minimum of 3 duct diameters of straight duct work, upstream of the air inlet connection for optimum airflow measurement performance. Upstream duct work to be the same diameter as the primary inlet connection.

G. Manufacturers:

1. Nailor

2. Titus

3. Enviro-Tec

4. Or approved equal

PART 3 EXECUTION

3.1 INSTALLATION

A. Comply with the provisions of Section 230500.

B. Work shall be installed as shown and according to the manufacturer's diagrams and recommendations.

C. Handle and install units in accordance with manufacturer's written instructions.

D. Support units rigidly so they remain stationary at all times. Cross bracing or other means of stiffening shall be provided as necessary. Method of support shall be such that distortion and malfunction of units cannot occur.

E. Locate air terminal units to provide a straight section of inlet duct for proper functioning of volume controls.

3.2 FIELD QUALITY CONTROL

A. Comply with the provisions of Section 230500.

END OF SECTION

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SECTION 23 74 00
PACKAGED OUTDOOR HVAC EQUIPMENT
(FILED SUB BID-REQUIRED)

PART I GENERAL

1.01 SUMMARY

A. Section Includes

1. Furnish and install Rooftop Units RTU-1 and RTU-2 as shown and scheduled on the Drawings, and as specified herein.

B. Related Requirements

1. Section 23 05 00 - Common Work Results for HVAC
2. Section 23 05 10 - HVAC Demolition
3. Section 23 05 15 - Mechanical Identification
4. Section 23 05 19 - Meters and Gauges for HVAC Piping
5. Section 23 05 23 - General-Duty Valves for HVAC Piping
6. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
8. Section 23 07 00 - HVAC Insulation
9. Section 23 09 00 - HVAC Control System
10. Section 23 09 93 - Control Sequences for Automatic Temperature Control
11. Section 23 21 13 - Hydronic Piping
12. Section 23 21 23 - Hydronic Pumps
13. Section 23 30 00 - HVAC Air Distribution
14. Section 23 31 13 - Metal Ducts
15. Section 23 36 00 - Air Terminal Units

1.02 SCHEDULES

A. This Section is incomplete without the information contained in the schedules. Rooftop units shall be of the type, capacity and arrangement as listed on the schedules. Units shall consist of the components listed in the schedule and those components obviously required for the type of unit. The order of component assembly will be as called for on the schedule. Particular attention must be paid to the remarks and notes in these schedules.

1.03 SUBMITTALS

A. Submit, in accordance with Section 013000 and 230500, the following:

1. Unit data sheets; to include catalog data, a description of the proposed unit, size, type, arrangement, and materials of construction.
2. For belt drive equipment, provide drive data indicating sheave sizes, belt size, number and length.
3. Each submittal shall include pertinent equipment dimensional data, cooling coil operating data. Submit, in accordance with Sections 013000 and 230500, all data and the fan schedules. The submittal shall include fan data sheets with a description of the proposed fan, fan size, type, arrangement, materials of construction, weight, motor horsepower, motor type, power supply, and

frame size. Provide catalog data and selections for vibration isolators, include materials of construction. For belt drive equipment; provide drive data indicating the sheave sizes, belts size, number and length. Each submittal shall include pertinent equipment dimensional data, fan performance (operating data information, and a performance curve showing the fan operating point and range. Copies of operating and maintenance manuals shall be submitted. Significant dimensional differences between the specified equipment and the proposed equipment shall be noted on the equipment submittal. The Contractor shall provide data to show the dimensionally different equipment will fit within the space and still provide suitable clearance. Where corrosion resistance is required, provide conformation of material suitability for the specified service.

4. For cooling sections, provide information on type of cooling, air entering and leaving conditions, air pressure drop, cooling media entering and leaving conditions, flow, and pressure drop. Provide size, type, arrangement, materials of construction, and operating weight.
5. For condensing sections provide information on number and type of compressors, type of refrigerant and refrigerant charge, and controls provided and operating weight. Provide electrical data for power and controls. For condensing coils, provide air entering and leaving conditions, air pressure drop, size, type, arrangement, and materials of construction.
6. List of accessories to be furnished shall be included on each submittal.
7. Provide a recommended list of spare parts to be provided.
8. Significant dimensional differences between the specified equipment versus the proposed equipment shall be noted on the equipment submitted.
9. For units that will be shipped exposed, provide a description of the protective packaging that will be used during transit.
10. All submittals shall contain a statement that Sections 230500, 237400 and all other referenced Sections have been read and complied with. The certification statement shall be made by all of the following that are applicable; the Contractor, sub-contractor and the vendor. The statement shall be an individual statement for each party involved, and shall be included with every submittal and re-submittal.
11. Submit to the Engineer as provided in Section 018000, Operating and Maintenance Manuals. The following information shall be considered a minimum. Where applicable, provide information required for specific pieces of equipment.
    a. Personnel familiar with the operation and maintenance of the specific information shall prepare manuals.
    b. Equipment shall be identified with the Engineers Equipment Numbers and Identification as shown in the Schedules and on the Drawings.
    c. Provide information in three ring binders. All sheets shall have reinforced punches. Tabbed dividers shall separate all sections. Drawings will be bound in the manual or contained in envelopes bound into the manual.
    d. Contents – Each volume shall contain the following minimum contents:
        i. Installation including instructions for unpacking, installing, aligning, checking and testing. Foundation data, allowable piping loads, and electrical design shall be included.
        ii. Operating Instructions to provide pre-operational checks, start up and shut down and description of all control modes. Include emergency procedures for all fault conditions and actions to be taken for all alarms. Procedures for long term storage shall be included.

iii. Maintenance shall include preventive, and corrective. Schedules for test of other functions are to be included. Provide a list of tools required to service the equipment. Trouble shooting instructions to include a trouble-shooting guide shall be included.

e. Spare Parts List
f. Shop Drawing Data to include performance curves, data sheets, flow diagrams, wiring diagrams, and descriptive drawings.

B. In general, corrections or comments or lack there of, made relative to submittals during review shall not relieve the Contractor from compliance with the requirements of the drawings and specifications. Submittals are for review of general conformance with the design concepts of the project and general compliance with the contract documents. The Contractor is responsible for the final design conforming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating the work of all trades, and performing the work in a safe and satisfactory manner.

1.04 REFERENCE STANDARDS

A. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

1. ASHRAE 52 - Method of Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter.

B. Air Movement and Control Association (AMCA)

C. National Fire Protection Association (NFPA)

1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems

2. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems.

D. American Society for Testing and Materials (ASTM)

1. ASTM C581 - Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass- Fiber- Reinforced Structures Intended for Liquid Service.

2. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Materials).

E. Air-conditioning and Refrigeration Institute (ARI)

F. American Society of Mechanical Engineers (ASME)

G. National Electrical Code (NEC)

H. National Electrical Manufacturers Association (NEMA)

I. Association of Home Appliance Manufacturers (AHAM)

J. Factory Mutual (FM)

K. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. All equipment of a given type included in this section shall be furnished by or through a single manufacturer or as specified on the schedules

B. Inspection by the Engineer's representative or failure to inspect shall not relieve the Contractor of responsibility to provide materials and perform the work in accordance with the documents.

C. The Owner and Engineer reserve the right to sample and test any materials after delivery and to reject all components represented by a sample that fails to comply with the specified requirements.

D. An authorized representative of the manufacturer shall perform the initial startup of the equipment. The Owner and Engineer shall witness startup. The use of local sales representatives to perform this work is not acceptable, unless the manufacturer provides documented evidence that the sales representative has been specifically trained for this work.

E. All rotating parts of equipment shall be dynamically balanced at the factory.

1.06 DELIVERY, STORAGE AND HANDLING

A. All materials shall be inspected for size, quality and quantity against approved shop drawings upon delivery.

B. Delivery schedule of all equipment shall be coordinated with the Contractor. Equipment ready for shipment prior to the agreed on shipping date shall be stored without cost to the Owner by the manufacturer.

C. All materials shall be suitably packed for shipment and long term storage. Each package shall be labeled to indicate the project and the contents of each package. Where applicable, equipment numbers shall be marked on the container.

D. All equipment shipped that is exposed such as on a flat bed truck shall be protected during transit. The equipment shall be protected from moisture, road salt, dirt and stones or other materials thrown up from other vehicles. Electrical components shall be protected as above, but with special attention to moisture. The method of shipment protection shall be defined in the submittals.

E. Instructions for the servicing and startup of equipment in long term prolonged storage shall accompany each item.

F. All materials shall be stored in a covered dry location off of the ground. When required to protect the materials they shall be stored in a temperature-controlled location.

1.07 SPARE PARTS

A. Spare parts shall include all special items on the manufacturer's standard list of spare parts

B. In addition to special items, the following spare parts shall be provided:

1. Furnish all special tools required for normal operation and proper servicing of the equipment.

2. Spare parts shall include all items on the manufacturer's standard list of spare parts and the following for each unit:

a. One complete set of drive belts for each piece of belt driven equipment
b. One complete set of gaskets for each unit.
c. Three full sets of air filters if not otherwise specified

C. Pack spare parts in containers suitable for extended storage without deterioration of the parts. Containers shall be clearly labeled designating contents, pieces of equipment for which intended and equipment identification numbers.

PART 2 PRODUCTS

2.01 GENERAL

A. Units shall be specifically designed for outdoor rooftop installation on a roof curb and be completely factory assembled and tested, piped, internally wired, and shipped in one piece. Units with direct expansion cooling coils shall ship with a nitrogen holding charge. Units shall be available for direct expansion cooling only. Filters, outside air system, exhaust air system, optional non-fused disconnect switches and all operating and safety controls shall be furnished factory installed. All units shall be factory run tested. All units shall have decals and tags to aid in service and indicate caution areas. Electrical diagrams shall be printed on long life water resistant material and shall ship attached to control panel doors.

B. Manufacturer shall be Trane, Carrier, McQuay or equal.

2.02 CASING

A. Exterior panels shall be zinc coated galvanized steel, phosphatized and painted with a slate grey air-dry finish durable enough to withstand a minimum of 500 hours consecutive salt spray application in accordance with standard ASTM B117. Screws shall be coated with zinc-plus-zinc chromate. Heavy gauge steel hinged access panels with tiebacks to secure door in open position shall provide access to filters and heating sections. Refrigeration components, supply air fan and compressor shall be accessible through removable panels as standard. Unit control panel and filter section shall be accessible through hinged access panels as standard. All access doors and panels shall have neoprene gaskets. Interior surfaces or exterior casing members shall have 1/2" Tuf-Skin® fiberglass insulation. Unit base shall be watertight with heavy gauge formed load bearing members, formed recess and curb overhang. Unit lifting lugs shall accept chains or cables for rigging. Lifting lugs shall also serve as unit tiedown points.

DX Cooling Coil - R410A
Internally enhanced copper tubing of 3/8" or 1/2" O.D. shall be mechanically bonded to heavy-duty aluminum fins of configured design.

2.03 COOLING COIL AND REFRIGERANT

2.03 CONTROL SYSTEM

A. Provide a thermostat ready control system suitable for CV and VAV applications. Provide terminal blocks for field power wiring connections and a location for a non-fused disconnect switch with an external handle. Unit mounted microprocessor controls shall provide compressor anti-short cycle protection. The unit controls can be used as a stand-alone controller or as part of a building management system.

2.04 FANS

A. Fans shall be two double inlet, forward-curved fans mounted on common shaft with fixed sheave drive and will be dynamically balanced and tested in factory. Supply fan shall be test run in unit as part of unit test and unit will reach rated rpm before the fan shaft passes through first critical speed. Fan shaft will be mounted on two grease lubricated ball bearings designed for 200,000 hours average life. Mount fan motor and fan assembly on a common base to allow consistent belt tension with no relative motion between fan and motor shafts. Supply and exhaust fan assemblies will be isolated with 2" [50.8mm] nominal deflection spring isolation. All supply fan motors shall meet the U.S. Energy Policy Act of 1992 (EPACT).

2.05 VARIABLE FREQUENCY DRIVES

A. The AC Drive and all associated optional equipment shall be UL listed according to Power Conversation Equipment cULus. The AC Drive shall be designed, constructed and tested in accordance with NEMA ICS, NFPA, and IEC standards. Provide a metal NEMA 1 enclosure. All standard and optional features are included within the Drive enclosure, unless otherwise specified. The Drive converts incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC motors. Provide DC link reactors on both the positive and negative rails of the DC bus equal to 3% impedance to minimize power line harmonics. Full load amp ratings shall meet or exceed NEC Table 430-150. The Drive provides full rated output current continuously, 110% of rated current for 60 seconds and 160% of rated current for up to 0.5 seconds while starting. Provide isolation between the Drive's power circuitry and control circuitry. Carrier frequency shall be adjustable. Automatically adjusted Carrier Frequency to optimize motor and AC Drive efficiencies while reducing motor noise. Operating range, ambient temperature, -10 to 50C (14 to 104F), 0 to 95% relative humidity, non-condensing, AC line voltage variation, -10 to +10% of nominal with full output.

B. Provide Class 10 I2t electronic motor overload protection. Protection against input transients, loss of AC line phase, output short circuit, output ground fault, over-voltage, under voltage, AC Drive over-temperature and motor over-temperature. All faults are displayed in plain English. Protection from AC Drive sustained power or phase loss. A "signal loss detection" circuit senses the loss of an analog input signal such as 4 to 20 mA or 0 to 10 V DC, and is programmable to react as desired in such an instance. Default: After 10-second time out the Drive will shut off. The drive will function normally when the keypad is removed while the AC Drive is running and continue to follow remote commands. AC Drive catches rotating motor operating forward or reverse up to full speed. The AC Drive is rated for 100,000 amperes interrupting capacity (AIC). Includes current sensors on three output phases to detect and report phase loss to the motor. Identifies which of the output phases is low or lost.

C. Provide Off/Stop and Auto/Start selector switches to start and stop the AC Drive and to determine the speed reference. In DRIVE mode speed reference shall be a 0 to 10 V DC analog input. The display has four lines, with 20 characters on three lines and eight large characters on one line. The following points shall be controlled and/or accessible: AC Drive Start/Stop. Speed reference, Fault diagnostics, Meter points to include - Motor power in HP, Motor power in kW, Motor kW-hr, Motor current, motor voltage, Hours run, DC link voltage, Thermal load on motor, Thermal load on AC Drive and Heatsink temperature. The AC Drive stores in memory the last 10 faults and related operational data. Provide four simultaneous displays, frequency or speed, run time, output amps and output power. The Reference Signal Value, Output Frequency in Hz or percent, Output Amps, Motor HP, Motor kW, kW hour, Output Voltage, DC Bus Voltage, AC Drive Temperature in degrees, and Motor Speed in RPM shall be accessible from the keypad.

2.06 FILTERS

A. Provide two-inch high efficiency media filters with average dust spot efficiency of 30-35 percent and an average arrestance in excess of 90 percent when tested in accordance with ASHRAE 52-76. Filters shall meet MERV 8 standards as a minimum.

2.07 CENTRIFUGAL PROPELLER POWER EXHAUST

A. Power exhaust shall be used in conjunction with an integrated economizer. Power exhaust shall be controlled by economizer controller operation. Exhaust fans shall be energized when dampers open past the 0-100% adjustable setpoint on the economizer control. The fan is factory dynamically balanced and tested. Shaft bearings are grease lubricated ball type designed for 200,000 hours average life. Fan motor and fan assembly are mounted on common base. Entire assembly is isolated from the unit by double deflection rubber in shear isolators (or spring isolation with motor sizes larger than five horsepower). For both CV and VAV applications, a differential pressure control system, compares the indoor building pressure to the atmospheric pressure. The exhaust fan is turned on and the discharge dampers at the fan outlet modulate when the building pressure exceeds the specified deadband configured in the Rooftop Human Interface Control. All exhaust fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

2.08 0-100 PERCENT ECONOMIZER

A. Provide an automatic modulating return and outside air dampers assist in maintaining the control temperature setpoint to allow "free" cooling. The economizer shall be equipped with an automatic lockout when the outdoor enthalpy/temperature is not suitable for space temperature control. Minimum position shall be standard and adjustable through the building management system. A spring return actuator insures closure of the outside air dampers during shutdown or power interruption. Mechanical cooling is available to assist the economizing mode. Provide Low leak dampers with a leakage rate of 2.5 percent of nominal airflow of 400 Cfm per ton at a static pressure of 1" w.c.

B. Provide an outdoor air and return air enthalpy sensors to enable differential enthalpy control. The sensors allow the unit to determine if outdoor air is suitable for free cooling.

2.09 SMOKE DETECTORS

A. Provide factory installed return air smoke detectors. Detector shall be a Four-Wire Controller and Detector. Detector shall be environmental compensated with differential sensing for reliable, stable, and drift-free sensitivity. Detector shall use magnet-activated test/reset sensor switches. Detector shall have tool-less connection terminal access. Detector shall have a recessed momentary switch for testing and resetting the detector.

2.10 UNIT NON-FUSED DISCONNECT

A. This switch is non-fused and is located inside the unit control box. An external handle allows for power disconnection without having to open the control box door.

2.11 HOT GAS BYPASS

A. Valve, piping and controls are all included on circuit 2 to allow operation at low airflow, avoiding coil frosting and damage to compressor. When suction pressure falls below valve adjustable setpoint, the valve modulates hot gas to the inlet of the evaporator.

2.12 ACCESS DOORS

A. Provide hinged access doors provide to service areas. These access doors shall have double wall construction with dual density insulation sandwiched between 18- gauge and 20-gauge galvanized steel panels for strength and durability.

2.13 GFI CONVENIENCE OUTLET (FACTORY POWERED)

A Provide a 15A, 115V Ground Fault Interrupter convenience outlet, factory installed. It shall be wired and powered from a factory mounted transformer. Provide a Unit mounted non-fused disconnect switch with external handle.

2.14 PROGRAMMABLE ZONE TEMPERATURE SENSOR

A. The electronic programmable sensor is Auto or Manual changeover with seven day programming. Programmable sensor has System Off, Auto and Service LCD indicators as standard. Night setback sensor has up to four programs per day which can be individually configured to occupied or unoccupied.

2.15 PREFABRICATED ADAPTER CURB

A. Provide a prefabricated, self-contained RETROMATE™ unit designed to mount on top of an existing rooftop's curb and is the basis of design for this specification. The adapter curb shall be constructed of prime galvalume steel. The construction's minimum gauge shall be 14 ga. The galvalume must meet ASTM-446, 525 & 527. There shall be continuous welded corners and seams for a water and airtight self-contained unit. All exposed welds shall be coated with one coat of aluminum urethane sealer. Provide neoprene gaskets to allow the for an air and watertight seal.

B. The adapter curb shall be insulated. The curb wall shall be insulated with 1.4" 6# density rigid R-6.5 insulation and shall be insulated on the floor with 1" duct liner, secured with glue and weld pins. The curb shall be insulated on the counter flashing deck with 2" duct liner, also secured with glue and weld pins. All supply and return transitions and plenums shall be insulated. All insulation shall be capped with metal to prevent being blown into the existing ductwork. All insulation shall meet and be tested under one of the following methods: ASTM C1338, ASTM G 21, UL 181, or ASTM G22. All insulations must be documented to be mold and fungi resistant by allowing (0%) growth. The water vapor absorption shall be <3% by weight.

C. The curb shall be structurally reinforced and include necessary block-offs to allow the use of the existing

ductwork. All air flow turns that are 90 degrees or higher shall incorporate turning vanes. The maximum static pressure loss shall be .35”wg.

D. The shall provide full continuous support of the new rooftop. The adapter curb s Thycurb model RETROMATE™ as manufactured by Thybar Corporation and ESOP Company or approved equivalent.

PART 3 EXECUTION

3.01 INSTALLATION

A. Equipment shall be installed in accordance with manufacturer's recommendation. Provide piping and ductwork connections in accordance with the requirements of the other related Sections.

B. The Contractor shall not install any equipment or materials until the Owner and Engineer have approved all submittals. If any equipment or materials are installed prior to approval of the submittals, it shall be at the Contractor's risk.

C. When units are shipped disassembled, field connect all sections together as shown on the Drawings to form single air handling unit. Seal all joints with gaskets and/or sealants.

D. Do not operate equipment without filters. Do not run equipment with dirty filter pressure drop more than twice clean filter pressure drop. A total of three complete sets of filters shall be provided. The first set is to be installed for start-up, test and balancing. The second set shall be installed after final cleanup and acceptance by the Owner. The third set shall be turned over to the Owner as a spare.

E. The Contractor shall start up each piece of equipment and system and shall make all adjustments so that the system is placed in proper operating condition.

END OF SECTION

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SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL (FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Sections Includes

1. Provide electrical work in accordance with this section and applicable reference standards listed in Article 1.03.

2. Examine all Drawings and Specifications for requirements that affect the Work of this section.

3. Coordinate the Work of this section with related Work of other trades and cooperate with such trades to assure the steady progress of the Work.

4. The term "Contractor" in this Section(s) and all referenced Drawings and Specifications shall mean the ELECTRICAL Subcontractor except where "General Contractor" is specified.

5. Electrical Work includes, but is not limited to, the following.

   a. Motor wiring, safety disconnects, and motor starters unless integral with equipment

   b. Temporary construction power and Contractor Trailer Power.

   c. Power distribution equipment

   d. Power outlets and equipment connections

   e. Wiring devices

   f. Motor controls and control wiring not provided under other Specifications (other than Division 26 sections of the Specifications)

   g. Complete grounding system

   h. Motor control center

   i. Service entrance work

   j. Building interior and exterior lighting

   k. Raceways.

   l. Support material and hardware for raceway and electrical equipment

   m. Branch circuit wiring

n. Electrical Contractor shall furnish and install manholes, handholes, conduit, and conduit spacers/supports for underground electrical systems; trenching, concrete ductwork and backfill provided by the General Contractor.

o. Installation and termination of control and signal wiring for instrumentation and process control equipment. Installation and mounting of new control panel hardware and mounting and connection of panels and instruments furnished under Division 40 sections of the Specifications

p. Sealing of all conduit that enters the building wall, floor and roof penetrations for raceways

q. Start up, acceptance testing, test reports and instruction of electrical systems equipment.

r. Core drilling all electrical conduit penetrations.

B. Related Requirements

1. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
2. Section 26 05 26 - Grounding and Bonding for Electrical Systems
3. Section 26 05 34 - Raceways, Boxes and Supporting Devices
4. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems
5. Section 26 21 00 - Low-Voltage Electrical Service Entrance
6. Section 26 27 00 - Low-Voltage distribution Equipment
7. Section 26 27 26 - Wiring Devices
8. Section 26 28 16 - Enclosed Switches & Circuit Breakers
9. Section 26 29 13 - Enclosed Controllers
10. Section 26 29 23 - Variable Frequency Motor Controllers
11. Section 26 32 13.13 - Automatic Transfer Switch
12. Section 26 33 63 - Uninterruptible Power Supply
13. Section 26 50 00 - Lighting

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. National Electrical Code (NEC)
2. Massachusetts Electrical Code (MEC)
3. Underwriters' Laboratories (UL)
4. Institute of Electrical and Electronics Engineers (IEEE C2)
5. American National Standards Institute, Inc. (ANSI)
6. National Fire Protection Association (NFPA)
7. National Electrical Manufacturers Association (NEMA)
8. Insulated Power Cable Engineers Association (IPCEA)
9. Association of Edison Illuminating Companies (AEIC)
10. Occupational Safety Health Act (OSHA)
11. Americans with Disabilities Act (ADA)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

1. Shop Drawings: submit to General Contractor for review and approval prior to submittal to the Engineer.
    a. Specific equipment and material being supplied
    b. Quantity being supplied
    c. List of accessories, dimensions, and descriptions
    d. Mounting and connection details, wiring diagrams, elementary control diagrams, equipment interface diagrams
2. Manufacturer's product data, test reports, and materials certifications
3. Reports, permits, and easements necessary for installation, use, and operation

4. Test reports, inspections, and meter readings

B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1. Prior to performing electrical Work, carefully inspect the installed Work of other trades and verify that Work of other trades is complete to allow electrical Work to properly commence.

2. Verify that electrical Work may be performed in accordance with pertinent codes and Regulations and the original design.

B. Coordination

1. Coordinate electrical Work with schedules for Work of other trades to prevent unnecessary delays in the total Work.

2. Coordinate with local utility companies and ensure installations for utility services are in accordance with utility company requirements.

3. Provide required supports and wiring to clear encroachments for a complete installation where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment.

C. Accuracy of Data

1. The Drawings are diagrammatic and functional only, and are not intended to show exact circuit layouts, number of fittings and components Install additional circuits, components and material where needed to support the specific requirements of the equipment of the Work, whether or not indicated or specified.

2. Check with Engineer before installation of Work for outlets not specified as to location or for Work that interferes with other trades.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Protect the Work of other trades. Restore any damage caused to Work of other trades to the condition existing prior to damage at no additional cost to the Owner.

C. Investigate locations in the building through which equipment must pass to reach its final location to identify space limitations. Require manufacturers to ship

equipment and material in sections sized to accommodate space limitations in the building.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Materials and equipment: listed by UL unless it can be demonstrated that no UL standards exist for a specific item or class of equipment.

B. Provide material and equipment not specified but required for a complete installation.

2.02 INTERCHANGEABILITY

A. Provide for interchangeability of items of equipment, subassemblies, parts, motors, starters, relays and other items. Furnish similar items of the same manufacturer, type, model and dimensions.

B. Furnish equipment of a single manufacturer for ease of maintenance and parts replacement to the maximum extent possible..

2.03 MANUFACTURER'S NAMEPLATE

A. Provide manufacturer's nameplate for each item of equipment bearing manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place. Do not provide nameplate of distributing agent.

2.04 FIELD FABRICATED NAMEPLATES

A. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device, inscribed to identify the name of the equipment, function and, when applicable, the position.

1. Type: melamine plastic, 0.125 inch thick, black with white letters, matte finish surface, square corners.

2. Minimum size: 1 by 2.5 inches.

3. Lettering: minimum 0.25 inch high normal block style. Accurately align lettering and engrave into the core.

B. Label electrical equipment with the following:

1. Panel Name
2. Fed from "Panel Name" & "CKT #"
3. Amps

4. Volts

5. Phase

2.05 ARC FLASH LABEL

A. Provide arc flash labels for electrical equipment with operating voltages greater than 50 Volts per NEC 110.16.

2.06 WARNING SIGNS

A. Colors, legend, and size: appropriate for location.

1. Exterior warning and caution signs: weather resistant, nonfading, preprinted cellulose acetate butyrate signs with 20 gauge, galvanized steel backing.

2. Interior warning and caution signs: aluminum signs with preprinted baked enamel finish and punched for fasteners.

2.07 WIRE AND CABLE MARKERS

A. Underground line marking tape: permanent, bright colored, continuous printed, metal backed, plastic tape, not less than 6 inches wide, compounded for direct burial service. Printed legend: indicative of general type of underground line below.

B. Wire labels for wires smaller than No. 4: vinyl or vinyl cloth, self-adhesive, wraparound, wire markers with preprinted numbers and letters.

C. Wire labels for No. 4 and larger and multi conductor cables: marked with one-piece, nylon locking marker ties.

D. Acceptable level of quality: equivalent to Panduit PLM Series.

2.08 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 WORK BY OTHER TRADES

A. Flashing around electrical items penetrating roof or exterior walls.

B. Patching walls, floors or ceilings for conduit entry or exit into the buildings.

C. Fireproofing, waterproofing and sealing of openings in slabs and walls for electrical conduits.

3.02 WORK PERFORMANCE

A. Perform electrical Work with affected circuits or equipment de-energized.

B. Comply with the following if an electrical outage cannot be scheduled for the required Work.

1. Before initiating Work, develop a Work plan with the Owner which includes procedures to be used on and near live electrical equipment, barriers to be installed, safety equipment to be used and exit pathways. Do not begin Work on energized circuits or equipment until written approval is obtained from the Owner.

2. Ensure electricians wear personal protective equipment and use full protective equipment while working on energized systems in accordance with NFPA 70E including certified and tested insulating material to cover exposed energized electrical components and certified and tested insulated tools.

3.03 INSTALLATION

A. Verify and properly coordinate placement of outlets and review Shop Drawings for equipment and apparatus that must be roughed-in and to which connections must be made.

B. Provide for accessibility of electrical equipment such as junction and pull boxes, panelboards, switches, controls and such other equipment and apparatus that may require periodic maintenance and operation and properly label.

C. Install equipment and fixtures in accordance with manufacturers' recommendations and instructions, and pertinent codes and Regulations.

D. Inspect equipment and repair and paint items dented, scratched, or otherwise damaged to match original finish or replace item as necessary.

E. Coordinate installation of required supporting devices and sleeves to be set in poured-in-place concrete or supported from or on other structural components as they are constructed.

F. Sequence, coordinate, and integrate installation of electrical material and equipment to prevent delay of the Work, especially large equipment requiring positioning prior to closing in the building and equipment which must be placed in service before further construction can be performed.

G. Install systems, materials, and equipment to provide the maximum headroom possible where mounting heights are not detailed or dimensioned.

H. Determine final routing of raceways based on structural conditions, interferences with other trades, and terminal locations on apparatus. Allow for a reasonable amount of shifting at no extra cost up until time of roughing-in the Work.

I. Provide necessary fittings and boxes for a complete raceway installation where circuits are shown as “home-runs”.

J. Furnish and install wiring and raceway systems for security alarm, fire alarm, telephone and intercommunications systems as necessary.

K. Provide a neutral, dedicated to that circuit for each lighting and each receptacle circuit. Do not provide a common neutral for more than one signal phase circuit.

L. Support surface mounted panels, junction boxes, and conduits by spacers to provide a clearance between wall and equipment.

M. Thoroughly inspect exposed portions of the electrical Work and completely remove exposed labels, soils, markings and foreign material upon completion of installation, lamping, and testing.

3.04 MARKING AND LABELING

A. Label panelboards, indoor transformers, cabinets, control panels and other specified equipment with engraved laminated plastic plates with engraved lettering. Do not use punch tapes with mastic backings.

B. Label starters, disconnect switches, and other specified equipment with engraved laminated plastic plates with engraved lettering. Mark with 1/2-inch high labels where individual switches are circuit breakers in power or distribution panelboards that do not have cardholders.

C. Label empty conduits tied to the pull string at each end of each empty conduit, marked identify each end. Label junction boxes with circuits provided for future use with appropriate circuit designation.

D. Fill out panelboard directories with typewritten identification of each circuit.

3.05 WIRE AND CABLE MARKERS

A. Tag control circuit conductors at both ends and at junction box splices using wire and cable markers with identification numbers as designated on equipment wiring diagrams. Provide typed listing to identify conductors by number and use.

B. Identify spare conductors, individually, at both ends and at junction box splices with number between 1 and 999. Do not duplicate numbers.

C. Identify wire numbers on terminal block marking strips.

D. Provide permanent plastic name tag indicating load for each feeder for junction boxes, handholes and manholes. Label process motor wires to yard equipment in handholes and manholes.

3.06 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Site/Field Tests and Inspections

1. Provide the services of an independent testing agency in accordance with Division 01 to perform the specified tests for the following systems.

   a. Ground resistance testing: in accordance with National Electrical Testing Association (NETA) standards and procedures. Submit test results on NETA forms, list recommended test values that should be obtained for new installation and the provide that testing data is certified by the respective testing agency, and indicate recommended action for a sub-par test results.

   b. Provide necessary material, equipment, labor and technical supervision to perform and complete the electrical acceptance tests required and specified including tests and inspections required to determine that the equipment is acceptable as delivered to the Site, that equipment may be energized for final operational tests, and equipment complies with the Specifications.

2. Final acceptance of the equipment and/or Work is subject to performance characteristics as determined by the subject tests, in addition to complete operation tests on electrical equipment to demonstrate it will perform the functions for which it was designed.

3. Promptly implement necessary adjustments, corrections, modifications and/or replacements to be made to meet the specified requirements if test and inspection data indicate deficiencies in the operation of the electrical apparatus or in the manufacture thereof.

4. Upon completion of remedial Work, provide that the testing agency repeats tests on components previously found deficient on the first test or on any additional test.

3.07 CLEANING

A. Clean light fixtures, equipment, and exposed surfaces that have been directly affected by electrical Work.

3.08 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. The Contractor shall provide the labor, tools, equipment, and materials to install wires, cables, and connectors in accordance with the plans and as specified herein.

2. This section includes wires, cables, and connectors for power, lighting, signal, control, communications and related systems rated 600 volts and less.

B. Related Requirements

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 26 - Grounding and Bonding for Electrical Systems
3. Section 26 05 34 - Raceways, Boxes and Supporting Devices
4. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems
5. Section 26 21 00 - Low-Voltage Electrical Service Entrance
6. Section 26 27 00 - Low-Voltage distribution Equipment
7. Section 26 27 26 - Wiring Devices
8. Section 26 28 16 - Enclosed Switches & Circuit Breakers
9. Section 26 29 13 - Enclosed Controllers
10. Section 26 29 23 - Variable Frequency Motor Controllers
11. Section 26 32 13.13 - Automatic Transfer Switch
12. Section 26 33 63 - Uninterruptible Power Supply
13. Section 26 50 00 - Lighting

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

B. Related Sections:

1. Division 26: Section, “Common Work Results for Electrical”.

1.03 QUALITY ASSURANCE

A. Reference Standards:

1. National Fire Protection Association (NFPA) 70 "National Electrical Code (NEC), and Massachusetts Electrical Code".

2. Underwriter's Laboratories, Inc. (UL) Compliance.

a. UL Standard 83 Thermoplastic Insulated Wires and Cables.

b. UL Standard 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors.

c. UL Standard 854 Service Entrance Cable.

3. National Electrical Manufacturers Association (NEMA) Compliance.

a. WC-5 Thermoplastic Insulated Wire and Cable for the

b. Transmission and Distribution of Electrical Energy.

c. WC-7 Cross Linked Thermosetting Polyethylene Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

d. WC-8 Ethylene Propylene Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

4. Institute of Electrical and Electronic Engineers (IEEE) Compliance.

a. Standard 82 Test Procedure for Impulse Voltage Tests on Insulated Conductors.

1.04 SUBMITTALS

A. Furnish manufacturer's product data, test reports, and materials certifications as required.

B. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:

1. Product data for electrical wires, cables, and connectors.

2. Product data for Megger insulation testing instrument.

3. Report sheets for Megger testing.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire and cable properly packaged in factory fabricated type containers, or wound on NEMA specified type wire and cable reels.

B. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.

PART 2 – PRODUCTS

2.00 MATERIALS

A. General:

1. Provide factory-fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by contractor to comply with project's installation requirements, NEC and NEMA standards. Select from the following UL types those wires with construction features which fulfill project requirements:

2. Provide color-coding for phase identification as specified herein.

3. Provide factory applied nylon or polyvinyl chloride (PVC) external jackets on wires and cables for pulls in raceways over 100 feet in length, for pulls in raceways with more than three equivalent 90 degree bends, for pulls in conduits underground or under slabs on grade, and where indicated.

B. Service & Distribution Wiring:

1. 98 percent conductivity copper.

2. 600 volt insulation, type XHHW.

3. U.L. listed for underground use in wet locations at 75° C.

4. Use XHHW Insulation.

C. Building Wiring:

1. 98 percent conductivity copper.

2. 600 volt insulation, type, THWN/THHN, or XHHW.

3. Stranded conductor: #14 AWG and larger.

4. Minimum branch circuit: #12 AWG.

5. Minimum #10 AWG for 120 volt circuits more than 100 feet long.

6. Minimum #10 AWG for 277 volt circuits more than 230 feet long.

D. Control Wiring:

1. Control wiring for digital/discrete signal wiring, shall be 600V, minimum #14AWG, THHN/THWN, copper stranded, unless specifically indicated otherwise.

2. Instrument cable for analog signal wiring (4-20mA DC) shall be shielded, 2-conductor, 300 volt rated, minimum #18 AWG, Belden No. 8760, Alpha Wire, or approved equal. Provide 600 volt rated cable where cable occupies the same enclosure and/or raceway with voltages greater than 300 volt as specified below.

3. Single Shielded Pair Instrument Cable.

   a. Tinned copper, XLPE insulated stranded conductors, No. 18 AWG minimum, twisted pair with overall shield, stranded tinned No. 18 AWG copper drain wire and overall PVC jacket. Rated for 600 volts minimum and conforming to UL 1581. Cables shall be rated for tray cable "TC" use where installed within a cable tray.

      1) Beldon Company.

      2) Okonite Company.

      3) Dekoron Wire and Cable Company.

4. Multi-paired Shielded Instrument Cable.

   a. Tinned copper, XLPE insulated stranded conductors, No. 16 AWG minimum, twisted pairs with shield over each pair, stranded tinned No. 18 AWG copper drain wire, and overall PVC outer jacket. Rated for 600 volts minimum and conforming to UL 1581 or UL 13. Cables shall be rated for tray cable "TC" use where installed within a cable tray.

      1) Beldon Company.

      2) Okonite Company.

      3) Dekoron Wire and Cable Company.

E. VFD Cable:

1. VFD load-side power cable shall be shielded type specifically listed for use with Variable Frequency Drives.

2. VFD cable shall be UL listed with 600V black XLPE insulation.

3. Cable shall be equipped with 100% foil shield.

4. Cables shall be stranded type with number and sizes of conductors as indicated on the Drawings.

5. Cable shall be equal to Belden Series 295XX, or Engineer approved equal.

F. Ethernet Cable:

1. Cabling shall be UL listed for the application and shall comply with EIA TIA/EIA-568-B and NFPA 70. Provide a labeling system for cabling as required by EIA TIA/EIA-606-A and UL 969.

2. When running cables in ceiling return air plenums, use Teflon Air Plenum cable, unless used inside conduit or tubing sleeve.

3. Provide conduit or tubing sleeves when passing through walls and floors.

4. Provide bushings at each end of conduit runs.

5. Cables shall be derated appropriately in accordance with NEC when combined in a common conduit run.

6. Areas used as air plenums: run fire-resistant teflon cable approved for use in air plenums.

7. Ethernet cable shall be CAT6 four pair, 24 AWG annealed copper, UTP cables with PVC jackets at all locations indicated on the Drawings.

8. All cables shall be "BLUE" in color.

9. All cables shall be homerun from to locations indicated in minimum 3/4"C.

10. All cables shall be terminated and tested at both ends of the cable run.

G. Splices:

1. No. 10 and smaller with 600-volt pressure type insulated connector of wire-nut type, or equal; soldered and crimped type not allowed. Ideal type “wire nut” Buchanan type “B-Cap” and Minnesota Mining (3M) type “Scotchlok”.

2. No. 8 and larger with solderless lugs or solderless connectors of Lock-tite or similar type properly taped with plastic insulating tape, Minnesota Mining Co. #33, or equal, then two half-lap servings of friction tape, Manson, or equal.’

3. Wire connector systems for use with underground conductors shall be UL listed specifically for such use.

4. Service entrance conductors shall be installed without splices. Electrical equipment feeders shall be spliced only where shown or specifically approved. Control and metering conductors shall be installed without splices.

5. All splices shall be made only by specific permission of the Engineer and then only in manholes or pull boxes and shall be sealed watertight with a heat-shrunk insulation.

6. Tighten electrical connectors and terminals in accordance with manufacturer's published torque tightening values. Where manufacture's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and 486B.

7. Use UL listed splice for all underground wires, ducts buried, in conduit and in ducts. Connectors and splices shall be waterproof.

PART 3 – EXECUTION

3.00 WIRE AND CABLE INSTALLATION

A. All wire and cables shall be installed in conduit of size and type indicated on the drawing and specifications.

B. Install electrical cables, wires, and connectors in compliance with NEC.

C. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.

D. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.

E. Conceal all cable in finished spaces.

F. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible.

G. Contractor shall provide conductors such that voltage drop does not exceed 3 percent for branch circuits or 5 percent for feeder/branch circuit combinations. Verify voltage drop does not exceed the limitations after installation.

H. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with

conductors larger than No. 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.

I. All feeder and branch circuit wiring shall be color coded at all termination and splice locations. System neutrals shall be designated in addition to phase conductors. Equipment grounds shall be green.

J. The number of conductors shown on the Drawings is not necessarily the correct number required. As many conductors as are required in each case shall be installed. In general, grounding conductors are not scheduled.

K. In general, wiring for the following systems shall be installed in separate conduits. Do not mix categories in a single raceway.

1. 120 volt power wiring.

2. 120 volt control wiring, including, digital input and output signals.

3. 24 volt DC control wiring, including, digital input and output signals.

4. 24 volt DC analog control wiring (4-20mA).

5. Communications wiring.

6. Special & Emergency Systems

L. Conductors 600 volts and below shall be color coded in accordance with the following:

	120/208	480/277
CONDUCTOR	COLOR	COLOR
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	White/Gray
Equipment Grounds	Green	Green

3.01 FIELD QUALITY CONTROL

A. The Contractor shall test each electrical circuit after permanent cables are in place with terminators installed, but before cable or wire is connected to equipment or devices to demonstrate that each circuit is free from improper grounds and short circuits.

B. The Contractor shall Megger Test, the insulation resistance between phases and from each phase to ground for each of the following feeder and motor branch circuits:

1. Secondary Service Entrance

2. Distribution Equipment

3. Generator and ATS

4. Transformers

5. Variable Frequency Drives.

6. Motors.

C. The Megger Testing shall be witnessed by the Engineer/Architect. The Engineer/Architect shall be notified at least 48 hours in advance of testing.

D. Measure the insulation resistance with a digital "Megger" insulation testing instrument in accordance with manufacturer's recommendations. All test instruments are to be provided by the Contractor.

E. If any insulation resistance measures less than 50 megohms, the cable shall be considered faulty with the cable failing the insulation test. In moist environments, bag the ends of the cable to prevent a faulty Megger test.

F. Any cable which fails the insulation tests or which fails when tested under full load conditions shall be replaced with new cable for the full length and retested at no additional cost to Owner.

G. The below grade service or feeder splice shall be water immersion Megger tested in the presence of the Engineer. Each splice shall be immersed in a grounded water immersion bath for 24 continuous hours prior to and during the test. Criteria for failure shall be as described for cable above.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS (FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

B. Related Sections:

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
3. Section 26 05 34 - Raceways, Boxes and Supporting Devices
4. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems
5. Section 26 21 00 - Low-Voltage Electrical Service Entrance
6. Section 26 27 00 - Low-Voltage distribution Equipment
7. Section 26 27 26 - Wiring Devices
8. Section 26 28 16 - Enclosed Switches & Circuit Breakers
9. Section 26 29 13 - Enclosed Controllers
10. Section 26 29 23 - Variable Frequency Motor Controllers
11. Section 26 32 13.13 - Automatic Transfer Switch
12. Section 26 33 63 - Uninterruptible Power Supply
13. Section 26 50 00 – Lighting

1.02 QUALITY ASSURANCE

A. Reference Standards.

1. "National Electrical Code" (NEC), as applicable to electrical grounding and bonding, Art. 250. Use of conduit system for ground conductor shall not be allowed.

2. “Massachusetts Electrical Code” (MEC).

3. Underwriters' Laboratories, Inc. (UL). UL 467 "Electrical Grounding and Bonding Equipment."

4. Institute of Electrical and Electronic Engineers (IEEE) IEEE 81 and 142.

a. 1-1983, "IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounded System (Part 1)."

b. 141-1993, "IEEE Recommended Practice for Electric Power Distribution for Industrial Plants."

c. 142-1991, "IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems."

1.03 SUBMITTALS:

A. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:

1. Product data for each type of product specified.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Provide each electrical grounding system with assembly of materials required for complete installation including wires/cables, connectors, lugs, clamps, ground rods, bonding jumpers and accessories.

B. Provide electrical grounding conductors for grounding connections matched to power supply wiring materials and sized according to NEC.

C. Provide electrical connectors, lugs, clamps, boding jumpers and accessories as recommended by the respective manufacturer for the particular application, unless other indicated.

D. Ground rods; Solid copper clad, 3/4-inch diameter by 10 feet long.

E. Insulated conductors: Green in color.

F. Ground Bus. Bare annealed copper bars of rectangular cross section, ¼-inch x 3-inch x length as required, with 98 percent conductivity, rigidly attached to structure.

G. Bonding Strap Conductor/Connectors. Soft copper, 0.05 inch thick and 2-inches wide, except as indicated.

H. Pressure Connectors. High conductivity plated units.

I. Bolted Clamps. Heavy-duty units listed for the application.

J. Exothermic Welded Connections. Provided in kit form and selected for the specific types, sizes, and combinations of conductors and other items to be connected.

PART 3 – EXECUTION

3.01 GROUNDING AND BONDING

A. Ground main service entrance ground bus or lug to neutral of incoming service, to enclosure, to building steel, to ground rods/grounding ring, to rebar in concrete footing, and to main cold water pipe. Install grounding bushings on service conduits. Use exothermic style ground connections to the ground rods and building steel.

B. Provide and install 600 volt insulated bonding conductors throughout the distribution system with connection to bonding (or grounding) terminal on each panel and panelboard with connections to other equipment where specifically indicated and noted.

C. Bonding conductors shall be continuous where possible. Where splices are required, provide T & B, or equal, compression connectors of approved pattern. Insulate connectors to equivalent thickness of conductors.

D. Provide grounding system for grounded circuit conductors of dry type transformer secondaries as indicated and required. Use exothermic style ground connections to building steel. Enclose grounding conductors in schedule 40 PVC conduit.

E. Provide equipment grounding conductors in all conduits containing power, control, or instrumentation conductors on the load side of the service equipment or on the load side of a separately derived system.

F. Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except that larger sizes indicated or shown on the Contract Documents shall take precedence. Use of metallic conduit systems for equipment grounding as recognized by the NEC shall not be permitted under this specification.

G. Install grounding bushings on conduits at both primary and secondary entrances to transformers. Ground transformer enclosures to bushings.

H. Install bonding jumper for flexible metal conduit unless fittings are approved for grounding or otherwise comply with NEC.

1. Size jumper to match over-current device.

2. Green insulation.

3. Connect to grounding bushing at each end.

I. Ensure that entire electrical system is electrically continuous and permanently and effectively grounded, including all electrical equipment and motors.

1. Locate ground rods with a minimum of two rod length from each other and at least the same distance from any other grounding electrode. Connect ground conductors to ground rods by means of exothermic welds except at test wells and as otherwise indicated. Drive rods until tops are 24 inches below finished floor or final grade except as otherwise indicated.

J. Route grounding electrode conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.

K. Ensure that grounding electrode conductor connections to interior piping, structural members, and the like are accessible for periodic inspection during the life of the structure.

3.02 BONDING FOR OTHER TRADES

A. Signal raceways, water piping, heating piping and metallic air ducts shall be bonded together and to the grounding conductor with No. 8 soft drawn bare solid conductors. Connections to pipes shall be made with cast clamps of like material as the pipes to which attached, to ducting terminated in a secure manner by best practical means, bonding across any flexible or insulated connections.

B. All bonding conductors shall be installed in a neat and workmanlike manner properly shaped for contour of surface involved and properly supported. At locations remote from the main service entrance panelboards, bond to the largest raceway nearby.

3.03 FIELD QUALITY CONTROL

A. Independent Testing Organization. Arrange and pay for the services of a qualified independent electrical testing organization to perform tests described below.

B. Measure ground resistance without the soil being moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the three-point fall of potential method in accordance with Section 9.03 of IEEE 81. Simple moisture addition is not acceptable.

C. Ground/resistance maximum values shall be as follows:

1. Equipment rated 500 kva and less. 10 ohms.

2. Equipment rated 500 kVA to 1000 kVA. 5 ohms.

3. Equipment rated over 1000 kVA. 3 ohms.

4. Unfenced substations and pad mounted equipment. 5 ohms.

5. Fence Grounds. 10 ohms.

D. The grounding tests results shall be submitted to the Engineer for review and approval. Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values. Where measures are directed that exceed those indicated under the provisions of the Contract, covering change orders will be provided.

END OF SECTION

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SECTION 26 05 34

RACEWAYS, BOXES AND SUPPORTING DEVICES (FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

B. Related Sections

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
3. Section 26 05 26 - Grounding and Bonding for Electrical Systems
4. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems
5. Section 26 21 00 - Low-Voltage Electrical Service Entrance
6. Section 26 27 00 - Low-Voltage distribution Equipment
7. Section 26 27 26 - Wiring Devices
8. Section 26 28 16 - Enclosed Switches & Circuit Breakers
9. Section 26 29 13 - Enclosed Controllers
10. Section 26 29 23 - Variable Frequency Motor Controllers
11. Section 26 32 13.13 - Automatic Transfer Switch
12. Section 26 33 63 - Uninterruptible Power Supply
13. Section 26 50 00 – Lighting

1.02 QUALITY ASSURANCE

A. Reference Standards.

1. Underwriter's Laboratories, Inc. (UL) Listing and Labeling. Items provided under this section shall be listed and labeled by UL.
2. National Electrical Code (NEC).
3. Massachusetts Electrical Code (MEC).
4. National Electrical Manufacturers Association (NEMA).

1.03 SUBMITTALS

A. Furnish manufacturer's product data, test reports, and material certifications as required.

B. In accordance with Conditions of Contract and Division 1 specification sections:

1. Product data for cabinets and enclosures with classification higher than NEMA 1.
2. Shop drawings for floor boxes and boxes, enclosures and cabinets that are to be shop fabricated (non-stock items).

PART 2 – PRODUCTS

2.01 CONDUIT, RACEWAYS & FITTINGS

A. Provide conduit with ¾-inch diameter minimum, except where specifically shown smaller on the Contract Drawings.

B. Conduit, connectors, and fittings shall be approved for the installation of electrical conductors.

C. Refer to Conduit Table in Section 3.01.A8 for approved conduit installation guidelines.

1. Electrical Metallic Tubing (EMT):
2. EMT shall be rigid metallic conduit of the thinwall type in straight lengths, elbows, or bends and must conform to NEMA C80.3 and the requirements of UL 797.
3. Couplings and connectors shall be steel compression fittings. Where EMT enters outlet boxes, cabinets, or other enclosures, connectors must be the insulated-throat type, with a locknut. Fittings must meet the requirements of NEMA FB 1.

4. Rigid Galvanized Steel Conduit:

   a. Rigid steel conduit (RGS), including couplings, elbows, bends, and nipples, shall conform to the requirements of UL 6 and NEMA C80.1 Steel fittings shall be galvanized by the hot-dip process.

   b. Fittings for rigid steel conduit shall be threaded and shall conform to NEMA FB 1.

   c. Gaskets shall be solid for fittings sized 1-1/2 inches and less. Conduit fittings with blank covers shall have gaskets except in clean, dry areas or at the lowest point of a conduit run where drainage is required.

   d. Covers shall have captive screws and be accessible after the Work has been completed.

5. PVC-Coated Rigid Metal Conduit:

   a. Rigid galvanized metal conduit coated with 40 mils thick polyvinylchloride coating.

   b. Fittings, elbows, supporting devices and accessories shall include factory applied 20 mils thick polyvinylchloride coating and be manufactured by the same as that of the conduit.

   c. Use tools as recommended by the manufacturer so as not to damage PVC coating. Where coating is damaged, touch-up with PVC paint in the field after installation.

6. Rigid Plastic Conduit:

   a. PVC Schedule 40: Conduit shall be made of polyvinyl chloride compound that shall be homogeneous plastic material free from cracks, holes or foreign inclusions. Conduit shall be rated for use with 90 degree C conductors, UL Listed. Use solvent cement to join conduits as manufactured the same as the conduit manufacturer.

   b. PVC Schedule 80: Heavy wall PVC conduit that shall be made of polyvinyl chloride compound that shall be homogeneous plastic material free from cracks, holes or foreign inclusions. Conduit shall be rated for use with 90 degree C conductors, UL Listed. Use solvent cement to join conduits as manufactured the same as the conduit manufacturer.

7. Flexible Metallic Conduit:

   a. Flexible metallic (FM) conduit shall meet the requirements of UL 1.

   b. Liquid tight flexible metallic conduit shall be provided with a protective jacket of PVC extruded over a flexible interlocked galvanized steel core to protect wiring against moisture, oil, chemicals, and corrosive fumes.

   c. Fittings for flexible metallic conduit shall meet the requirements of UL 514B, Type I box connector, electrical, Type III coupling, electrical conduit, flexible steel, or Type IV adapter, electrical conduit.

8. Wireways:

   a. Wireways and auxiliary gutters for use in exposed, dry locations shall be a prefabricated channel-shaped sheet metal trough with hinged or removable covers, associated fittings, and supports for housing, and protecting electrical wires and cables in accordance with UL 870.

   b. Straight sections of trough, elbows, tees, crosses, closing plates, connectors, and hanging brackets shall be constructed from sheet steel of commercial quality not less than 16-gage. Sheet metal component parts shall be cleaned, phosphatized, and coated with a corrosion-resistant gray paint.

   c. Straight sections of wireways and auxiliary gutters shall be solid or have knockouts as indicated in both sides and bottom, 3 inches on center.

   d. Straight sections shall be not more than 5-feet long, with covers held closed with screws.

9. Conduit Seals:

   a. Provide factory fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Provide a cast in place water stop wall sleeve with a mechanical pipe seal between the conduit and the sleeve. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

   b. Provide E.Y.S. seal fittings with appropriate potting material where conduits enter or leave a Class 1, Division 1 or 2

environments or a Class 2, Division 1 or 2 environment, and chemical rooms.

2.02 SUPPORTING DEVICES

A. Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot dip galvanized unless material is inherently corrosion resistant.

B. Refer to Supporting Devices Table in Section 2.02.B3 for approved supporting device installation guidelines.

1. Conduit Supports:

a. Single run hangers: Galvanized steel conduit straps or clamps, or cast metal beam clamps. Perforated straps and spring steel clips and clamps will not be permitted.

b. Group run hangers: Minimum 12-gauge galvanized performed U-channel rack with conduit fittings; 25 percent spare capacity.

c. Hanger rods: Threaded steel, 3/8-inch diameter, or as identified on the Drawings.

d. Vertical run supports: Minimum 12-gauge galvanized performed U-channel struts with conduit fittings.

2. Equipment and Lighting Supports:

a. U-channel: 12-gauge galvanized performed U-channel struts with fixture and conduit fittings, as applicable, unless indicated otherwise on the Drawings.

3. Corrosive Area Supports:

a. Clamp Hangers, Pipe Straps, and Clamp Back Spacers for use with PVC-coated rigid metal conduit shall have 40mil gray PVC exterior coating.

b. Clamp Hangers, Pipe Straps, etc. for use with PVC nonmetallic conduit shall be of nonmetallic PVC material.

c. Hanger Rods: 20mil gray PVC exterior coated rod with threaded ends only 3/8” and 1/2” sizes as required.

d. Strut Support: 20mil gray PVC exterior coating strut. Standard channel, slotted channel, and back to back channel are acceptable.

Location/Equipment	Acceptable Support Type
Electrical & Control Rooms	Galvanized Steel U-Channel
Utility & Mechanical Rooms	Galvanized Steel U-Channel
Exterior	Galvanized Steel U-Channel
Raw Water Flow Vault	Galvanized Steel U-Channel
Flow Control Vault	Galvanized Steel U-Channel
GAC Filter Room	PVC Coated Steel U-Channel
Sand Filter Room	PVC Coated Steel U-Channel
Dual Media Room	PVC Coated Steel U-Channel
Chemical Feed Room	PVC Coated Steel U-Channel

TABLE 2.02A – Supporting Devices

2.03 BOXES AND FITTINGS

A. Boxes must have sufficient volume to accommodate the number of conductors entering the box in accordance with the requirements of NFPA 70 and UL 514A.

B. In general, boxes that are exposed to weather, process areas, normally wet locations, and locations exposed in mechanical spaces shall be cast-metal. Boxes in all other finished areas shall be sheet metal. Boxes installed in corrosive areas, such as the chemical feed room, shall be nonmetallic.

C. Refer to Boxes and Fittings Table in Section 2.03.C4 for approved enclosure types.

1. Sheet Metal Outlet Boxes:

a. Sheet Metal Outlet Boxes: Standard type galvanized steel, minimum four inch square or octagon by 1-1/2 inch deep.

b. Luminaire and Equipment Supporting boxes: Rated for weight of equipment supported; include 2 inch male fixture studs where required.

c. Single Wall Type: Minimum size, four inch square by 1-1/2 inch or 2-1/8 inch deep, except as noted. Provide dry wall device covers raised 3/4 inch minimum to insure flush finish mounting.

d. Ganged Wall Type: Minimum depth three inches except as noted, ganged as required under common plate to contain devices shown. On 277 volt circuits ganged boxes for switches shall contain only one circuit or equipment box with permanent barriers per NEC Art 404-8.

2. Cast Outlet Boxes:

a. Type FS shallow and type FD deep, cast feralloy.

b. Provide number of threaded hubs as required.

c. Use in all exterior, damp and locations exposed in mechanical spaces.

d. Provide gasketed cover and accessories by box manufacturer for complete weatherproofing. Provide correct box to accept weatherproof covers as specified.

3. Sheet Metal Pull & Junction Boxes:

a. Sheet metal boxes shall be standard type galvanized steel and must conform to UL 50.

b. Box dimensions shall be minimum four inch square or octagon by 2/1/2 inch deep.

c. Sizes up to 12x12x6 inch: Provide screw-type or hinged covers.

d. Sizes greater than 12x12x6 inch: Provide hinged covers.

e. Boxes shall be sized to accommodate all incoming raceways.

4. Nonmetallic Outlet, Device, and Wiring Boxes:

a. Conform to NEMA OS 2, "Nonmetallic Outlet Boxes, Device Boxes, Covers, and box Supports," and UL 514C, "Nonmetallic Outlet Boxes, Flush Device Boxes and Covers." Boxes shall be molded polyvinyl chloride (PVC), or fiberglass units of type, shape, size, and depth to suit location and application.

b. Boxes shall be equipped with threaded screw holes for device and cover plate mounting. Each box shall have a molded cover of matching material suitable for the application and location installed.

Location/Equipment	Acceptable Enclosure Type
Electrical & Control Rooms	NEMA 1G
Utility & Mechanical Rooms	NEMA 12
Exterior	NEMA 4X
Raw Water Vault	NEMA 12
Flow Control Vault	NEMA 12
GAC Filter Room	NEMA 4X
Sand Filter Room	NEMA 4X
Dual Media Room	NEMA 4X
Chemical Feed Room	NEMA 4X

TABLE 2.03A – Electrical Enclosure Types

PART 3 – EXECUTION

3.01 CONDUIT

A. Uses Permitted:

1. Use liquid tight flexible metal conduit for the final 24 inches of connections to motors or control items subject to movement or vibration.

2. Use RGS for all exterior aboveground installations unless otherwise noted.

3. Use PVC coated rigid steel conduit, or as scheduled below, for installation in corrosive areas, and other areas as identified on the Contract Drawings.

4. Conduit and raceway runs in finished areas concealed in or behind walls, above ceilings, or exposed on walls and ceilings 15 feet or more above finished floors and not subject to mechanical damage may be electrical metallic tubing (EMT).

5. Use Schedule 40 PVC conduit for exterior direct buried installations. Use Schedule 40 PVC conduit for exterior concrete encased installations. Use Schedule 80 PVC conduit for underground installations under driveways. The transition from underground and from concrete encasement to riser shall be PVC coated rigid steel conduit to a minimum of 12" above finished floor and/or finished grade elevation. All elbows shall be prefabricated Rigid Steel to prevent wire burn through. Reference specification 26 05 43 "Underground Ducts and Raceways for Electrical Systems" for further requirements.

6. Install conduit seals for conduit penetrations of slabs on grade and exterior walls below grade and where indicated. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal. Provide seals for the interior of conduits that penetrate exterior or water bearing walls, consisting of gland type sealing bushings or RTV closed cell silicone foam.

7. Refer to Table 3.01A below for approved conduit types:

Location/Equipment	Approved Conduit Type
Electrical & Control Rooms	Electrical Metallic Tubing
Utility & Mechanical Rooms	Electrical Metallic Tubing
Exterior	Rigid Galvanized Steel
Raw Water Flow Vault	Rigid Galvanized Steel
Flow Control Vault	Rigid Galvanized Steel
GAC Filter Room	Schedule 40 PVC
Sand Filter Room	Schedule 40 PVC
Dual Filter Room	Schedule 40 PVC
Chemical Feed Room	Schedule 40 PVC

TABLE 3.01A – Conduit Types

B. Power, lighting, control, emergency light and power, and special-service systems and all related components shall be installed in accordance with NFPA 70, and shall be enclosed in separate conduit or separate conduit systems as indicated on the Contract Drawings and as specified herein.

C. Any run of conduit between outlet and outlet, between fitting and fitting, or between outlet and fitting shall contain not more than the equivalent of three 90-degree bends, including those bends located immediately at the outlet or fitting. Field bends shall be made in accordance with the manufacturer's recommendations, which normally require use of a one-size-larger bender than would be required for uncoated conduit. Installed conduit and fittings shall be free of dirt and trash and shall not be deformed or crushed. Empty conduit shall have a pull rope stalled.

D. Conduit shall be installed with a minimum of 3 inches of free air space separation from mechanical piping.

E. Conduit in finished areas shall be installed concealed. Conduit passing through masonry or concrete walls shall be installed in sleeves. Conduit shall be securely clamped and supported at least every 10 feet vertically and 8 feet horizontally. Galvanized pipe straps shall be fastened to structure with bolts, screws, and anchors. Wooden masonry plugs shall not be used.

F. Install exposed conduits, parallel or perpendicular to walls, ceilings, or structural members. Do not run through structural members. Avoid horizontal runs within partitions or sidewalls. Avoid ceiling inserts, lights, or ventilation ducts or outlets. Do not run conduits across pipe shafts or ventilation duct openings and keep conduits a minimum of 6 inches from parallel runs of flues, hot water pipes, or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.

G. Do not run conduits exposed on the exterior surface of buildings. Conduits penetrating exterior walls below grade, at grade floors, or below grade floors shall be sealed to prevent moisture migration. The exterior of the conduit shall be sealed with a mechanical pipe seal. The interior conduit seal shall be a gland type sealing bushing or RTV closed cell silicone foam. Ensure that conduits do not retain water against these seals.

H. Raceways penetrating fire rated walls, floors, and partitions shall be sealed with a fire rated sealant.

I. All conduits shall be supported with materials specifically made for this purpose. Do not use wire hangers. Do not attach any parts of the raceway system to ventilation ducts. Conduit supports shall be attached to the building. Support conduits on each side of bends and on a spacing not to exceed the following: 6 feet for conduits smaller than 1 1/4 inches and 8 feet for conduits 1 1/4 inches and larger. Support riser conduits at each floor level with clamp hangers. All underground conduits shall be securely anchored to prevent movement during placement of concrete or backfill. Use precast separators and heavy gauge wire ties or other approved fasteners.

J. Provide E.Y.S. seal fittings with appropriate potting material where conduits enter or leave a Class 1, Division 1 or 2 environments or a Class 2, Division 1 or 2 environment, and chemical rooms.

K. Conduit connections to boxes and fittings shall be supported not more than 36 inches from the connection point. Conduit bends shall be supported not more than 36 inches from each change in direction. Conduit shall be installed in neat symmetrical lines parallel to the centerlines of the building construction and the building outline. Multiple runs shall be parallel and grouped whenever possible on common supports. Exposed ends of conduit without conductors shall be sealed with watertight caps or plugs.

L. Bonding wires shall be used in flexible conduit for all circuits. Flexible conduit shall not be considered a ground conductor.

M. Liquid tight flexible metallic conduits shall be used in wet and oily locations and to complete the connection to motor-driven equipment.

N. Electrical connections to vibration-isolated equipment shall be made with flexible metallic conduit in a manner that will not impair the function of the equipment.

O. A polypropylene pull rope with a tensile strength not less than 130 pounds shall be installed in empty conduit.

P. Electrical conduit may be embedded in concrete according to the provisions of Article 6.3 of ACI 318 "Building Code Requirements for Reinforced Concrete", provided the following conditions are met:

1. Outside diameter of conduit shall not exceed 1/3 of concrete thickness. Maximum conduit outside diameter shall not exceed 3 inches when embedded in slab.

2. Conduit shall not be placed closer than three diameters on center. Route conduit to minimize crossing of different conduit runs.

3. Conduit shall not be embedded in structural concrete slabs less than four inches thick.

4. A 1 1/2 inch minimum concrete cover shall be provided for conduits in structural concrete slabs.

Q. Installation of Underground Conduit:

1. Minimum of 3/4 inch conduit in or under concrete slab on grade.

2. Where conduits are installed in concrete slabs, on the ground, underground, or exposed to the weather, make all joints liquid tight and gas tight.

3. Bury all underground conduit, except under concrete slabs placed on fill, to a depth of at least 30 inches below finished grade unless otherwise indicated on the Drawings.

4. Slope ducts to drain away from buildings into manholes and/or handholes. Adjust final slopes to coordinate with existing site utilities.

5. Install on undisturbed soil where possible. Concrete encase conduits as shown on Drawings. Use pit run gravel and sand, placed 8 inch lifts and compacted for backfill.

6. Reference Specification 26 05 43 “Underground Ducts and Raceways for Electrical Systems” for further requirements.

R. Installation of Rigid Metal Conduit:

1. Ends of conduit shall be cut square, reamed and threaded, and joints shall be brought butt-to-butt in the couplings. Joints shall be mechanically tight. Conduit shall be protected against damage and the entrance of water or foreign material during construction.

2. Ninety-degree bends of conduit with a diameter larger than 1 inch shall be made with factory-made elbows. Conduit elbows larger than 2 ½ inches

shall be long radius. Field-made bends and offsets shall be made with an approved hickey or conduit-bending machine. Changes in directions of runs shall be made with symmetrical bends or cast-metal fittings.

3. At connections to sheet metal enclosures and boxes, a sufficient number of threads shall project through to permit the bushing to be drawn tight against the end of the conduit, after which the locknut shall be pulled up sufficiently tight to draw the bushing into firm electrical contact with the box. Conduit shall be fastened to sheet metal boxes and cabinets with two locknuts where required by NFPA 70 where insulating bushings are used, where bushings cannot be brought into firm contact with the box, and where indicated.

4. Conduit joints shall be made with tapered threads set firmly. Each length of conduit cut in the field shall be reamed before installation. Where conduit is threaded in the field, each threaded end shall consist of at least five full threads. Corrosion-inhibitive compound (cold galvanizing paint) shall be used on all conduit threads or any locations where the original hot galvanized surface has been compromised.

5. Conduit stubbed-up through concrete floors for connections to free-standing equipment except motor-control centers, cubicles, and other such items of equipment shall be provided with a minimum of a 12” riser above the floor slab is of sufficient thickness; if not, a floor box shall be provided and set flush with the finished floor. Conduits installed for future use shall be terminated with a coupling and plug set flush with the floor.

3.02 SUPPORTING DEVICES

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.

B. Coordinate with the building structural system and with other electrical installations.

C. Conform to manufacturer's recommendations for selection and installation of supports.

D. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.

E. Support parallel runs of horizontal raceways together on trapeze type hangers.

F. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1 1/2 inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For

hanger rods with spring steel fasteners, use 1/4 inch diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.

G. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

H. Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

I. Install sleeves in concrete slabs and walls and all other fire rated floors and walls for raceways and cable installations. For sleeves through fire rated wall or floor construction, apply UL listed fire-stopping sealant in gaps between sleeves and enclosed conduits and cables.

3.03 BOXES AND FITTINGS

A. Pullboxes shall be furnished and installed where necessary in the conduit system to facilitate conductor installation. Conduit runs longer than 100 feet or with more than three right-angle bends shall have a pull box installed at a convenient intermediate location.

B. Boxes and enclosures shall be securely mounted to the building structure with supporting facilities independent of the conduit entering or leaving the boxes.

C. Bonding jumpers shall be used around concentric or eccentric knockouts.

D. Installation of Outlet Boxes:

1. Use nonmetallic boxes in corrosive areas such as chemical feed area and as designated on the plans.

2. Use explosion proof boxes in Hazardous areas as identified on the Drawings.

3. Use cast metal boxes in all other locations. Each box with associated covers and fittings shall have a NEMA rating for each location installed.

4. , such as the chemical feed area, and as identified on the Drawings.

END OF SECTION

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SECTION 26 05 43

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS (FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install underground duct banks, manholes and handholes excluding trenching, concrete fill and backfill.

2. Provide underground conduit duct banks with manholes and pullboxes for power, and lighting circuits as shown on the Drawings.

3. Coordination: Duct bank routing when shown on the Drawings is diagrammatic. Coordinate installation with piping and other underground systems and structures and locate clear of interferences. Coordinate manhole and handhole installation with piping, sheet piling and other underground systems and structures and locate clear of interferences.

B. Related Requirements

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
3. Section 26 05 26 - Grounding and Bonding for Electrical Systems
4. Section 26 05 34 - Raceways, Boxes and Supporting Devices
5. Section 26 21 00 - Low-Voltage Electrical Service Entrance
6. Section 26 27 00 - Low-Voltage distribution Equipment
7. Section 26 27 26 - Wiring Devices
8. Section 26 28 16 - Enclosed Switches & Circuit Breakers
9. Section 26 29 13 - Enclosed Controllers
10. Section 26 29 23 - Variable Frequency Motor Controllers
11. Section 26 32 13.13 - Automatic Transfer Switch
12. Section 26 33 63 - Uninterruptible Power Supply
13. Section 26 50 00 - Lighting

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.03 QUALITY ASSURANCE

A. Reference Standards: Electrical material and equipment shall conform in all respects to the latest approved standards of the following:

1. National Electrical Manufacturers Association (NEMA).
2. The American National Standards Institute (ANSI).
3. The Institute of Electrical and Electronic Engineers (IEEE).
4. Insulated Cable Engineers Association (ICEA).
5. National Electrical Code (NEC).
6. National Electrical Safety Code (NESC).
7. ASTM A 48, Gray Iron Castings.
8. ANSI A14.3, Safety Requirements for Fixed Ladders.
9. OSHA.

1.04 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Layouts showing the proposed routing of duct banks and the locations of manholes, handholes and areas of reinforcement.
2. Profiles of duct banks showing crossings with piping and other underground systems.
3. Typical cross sections.
4. Installation procedures.
5. Manufacturer's technical information for manholes, handholes and accessories proposed for use.
6. Drawings showing interior and exterior manhole and handhole dimensions and details of openings, jointing, inserts, reinforcing, size and locations of openings, and accessory locations.

7. Product Data for nonmetallic conduit and manhole accessories.

B. Record Drawings:

1. Layouts showing the actual routing of duct banks including the dimensions and depth of the top of duct bank below grade. Record drawings for duct banks should also include cross sections of the duct bank indicating the circuit, use, conduit size, orientation and number of conduits.

2. Locations of manholes, handholes and areas of reinforcement.

1.05 DEFINITIONS

A. Duct: Electrical conduit and other raceway, either metallic or nonmetallic, used underground, embedded in earth or concrete.

B. Duct bank: 2 or more conduits or other raceway installed underground in the same trench or concrete envelope.

C. Handhole: An underground junction box in a duct or duct bank with cover accessible from grade.

D. Manhole: an underground utility structure, large enough for a person to enter, with facilities for installing and maintaining cables. Where required manholes shall comply with the Utility Companies requirements.

1.06 PROJECT CONDITIONS AND COORDINATION

A. Coordination with other Underground Utilities:

1. Locate all existing underground utilities through the use of an underground utility piping location services company. Locate the existing underground utilities and piping before any excavation is to begin.

2. Coordinate conduit routing, duct bank and manholes with other new and existing underground utilities. Revise locations and elevations as required to suit field conditions and ensure that conduits, duct runs, manholes and handholes do not interfere with existing and new underground utilities and piping.

PART 2 – PRODUCTS

2.01 DUCT BANK CONDUIT

A. Duct: Schedule 40 and Schedule 80 PVC conduit and fittings in accordance with Division 26 Section “Raceways, Boxes and Supporting Devices”.

B. Rigid Steel Conduit: Rigid steel conduit and fittings in accordance with Division 26 Section “Raceways, Boxes and Supporting Devices”.

C. All shielded instrumentation and communications cable shall be installed in ferrous metal, steel conduit throughout the entire run of conduit from end to end.

2.02 HANDHOLES

A. The pull/splice box underground enclosures shall be constructed of polymer concrete consisting of sand and aggregate bound together with a polymer resin. Internal reinforcement may be provided by means of steel, fiberglass, or a combination of the two. Handholes for installation in roadways shall concrete reinforced H20 traffic rated.

B. Enclosure:

1. The enclosure must be manufactured with an open or closed bottom and a removable cover. The enclosures shall be green or concrete gray in color.

2. The enclosures shall be designed to be installed flush to grade with the cover fitting flush to the box.

3. The enclosures shall be suitable for installation in either direct or buried native soil, embedded in concrete, or embedded in asphalt surfacing. (A concrete collar is required for installation in asphalt).

4. The enclosures shall be of a stackable design for greater installation flexibility.

5. All covers are to be equipped with a minimum of two stainless steel lockdown mechanisms. All covers shall have a logo recessed into the cover and it shall read electric.

6. All enclosure covers will have some type of recessed access point to allow removal of the cover with a hook. The access points will be placed in such a location to allow for the greatest amount of leverage and safety possible.

7. Enclosures shall be designed and suitable for installation and use through a temperature range of -40ºC (-40ºF) to 60ºC (140ºF).

8. A certified copy of all test reports must be signed and stamped by a registered professional engineer and submitted prior to shipment of products.

C. Material Requirements:

1. Permanent deflection of any surface shall not exceed 10 percent of the maximum allowable static design load deflection.

2. The covers shall be skid resistant and have a maximum coefficient of friction of 0.50 on the top surface of the cover. Coatings will not be allowed.

3. Any point on the covers must be able to withstand a 70 foot-pound impact administered with a 12 pound weight having a "C" tup (ASTM D-2444) without puncturing or splitting. The test shall be performed with the cover resting on a flat, rigid surface such as concrete or a 1" steel plate.

4. Covers shall have molded lettering, ELECTRIC or COMM as applicable.

5. Fastening devices used to secure the cover to the box shall be capable of withstanding a minimum torque of 15 foot-pounds and a minimum straight pullout strength of 750 pounds.

6. The material is tested according to the requirements of ASTM D543, Section 7, Procedure 1, for chemical resistance. The manufacturer is responsible for proof of compliance with the latest version of the ASTM standards.

7. Other required acceptance standards are:

a. ASTM D756, Procedure E: Accelerated Service Exposure.

b. ASTM G53: Recommended Practice for Operating Light and Water Exposure on Nonmetallic Materials (with a U.V.A. 340 bulb).

c. ASTM D570, Section 5, 6.1, 6.5: Water Absorption.

d. ASTM D790: Flexural Properties

e. ASTM D635: Flammability Test.

D. Manufacturers: Provide handholes as manufactured by

1. Strongwell Quazite or approved equal.

PART 3 – EXECUTION

3.01 GENERAL

A. All duct line concrete pours shall be continuous between manholes or handholes and between manholes or handholes and structures.

B. Where duct lines pass through concrete walls, concrete envelopes shall be extended through the finished flush with inside surfaces. Watertight construction joints of an approved type shall be provided.

C. Duct banks shall be reinforced when laid on backfill covering new pipelines, roads, parking lots or any are subject to vehicular traffic. Beneath these areas, install reinforcing bars as shown on the Drawings, extending 10 ft beyond area needing protection.

D. Duct lines shall be laid in trenches on mats of gravel not less than 6 inches thick and well graded.

E. All electrical duct banks shall be colored red for safety purposes.

F. Install raceways to drain away from buildings. Raceways between manholes or handholes shall drain toward handholes. Raceway slopes shall not be less than 3 in per 100 ft.

3.02 INSTALLATION

A. Excavation, backfilling and concrete installation for conduit ductbanks and handhole installations provided by the General Contractor. Electrical Contractor to furnish and install all handholes, conduit, spacers, supports and wiring for ductbanks and handholes.

B. Assemble duct banks using non-magnetic saddles, spacers and separators. Position separators to provide 3-inch minimum separation between the outer surfaces of the ducts.

C. Firmly fix ducts in place during pouring of concrete.

D. Make bends with sweeps of not less than 48-inch radius or 5 degree angle couplings.

E. Make a transition from non-metallic to PVC coated rigid steel conduit where duct banks enter structures or turn upward for continuation above grade. Terminate the ducts in insulated grounding bushings. Continue ducts inside buildings with steel, metallic conduit.

F. Where ducts enter handholes, terminate the ducts in suitable end bells.

G. Provide expansion/deflection fittings in accordance with the requirements specified in Division 26, Section “Raceways, Boxes and Supporting Devices”.

H. Do not backfill with material containing large rock, paving materials, cinders, large or sharply angular substances, corrosive material or other materials which can damage or contribute to corrosion of ducts or cables or prevent adequate compaction of fill.

I. Slope duct runs for drainage toward manholes and away from buildings with a slope of approximately 3 inches per 100 feet.

J. After completion of the duct bank and prior to pulling cable, pull a mandrel, not less than 12 inches long and with a cross section approximately one-fourth inch less than the inside cross section of the duct, through each duct. Then pull a rag swab or sponge through to make certain that no particles of earth, sand or gravel have been left in the duct.

K. Install a bare stranded copper duct bank ground cable in each duct bank envelope. Make ground electrically continuous throughout the entire duct bank system. Connect ground cable to building and station ground grid or to equipment ground buses. In addition, connect ground cable to steel conduit extensions of the underground duct system. Provide ground clamp and bonding of each steel conduit extension, where necessary to maintain continuity of the ground system. Terminate ground conductor at last manhole or handhole for outlying structures.

L. Install a warning ribbon approximately 12 inches below finished grade over all underground duct banks. The identifying ribbon shall be a PVC tape, 3-inches wide, yellow color, permanently imprinted with "CAUTION BURIED ELECTRIC LINE BELOW" in black letters.

M. Plug and seal all empty spare ducts entering buildings and structures. Seal all ducts in use entering buildings and structures. Seal shall be watertight, O-Z/Gedney Type Dux Duct Sealing Compound or equal.

N. Install duct banks in conformance with National Electrical Code and National Electrical Safety Code.

O. Install handholes where shown on Drawings. Verify final locations in field.

P. Complete installation of handholes so that structures are watertight. Provide expansion/deflection fitting for each conduit entry into the manholes.

Q. .

R. Conduits shall extend 3 inches above concrete slab surface, unless otherwise indicated. All conduits shall be bushed to protect cables and provide means for grounding.

S. Duct Bank Conduit Spacers: Non-metallic, snap together intermediate and bottom pieces, sized for conduit diameter and code spacing. Carlon “Span-Loc” or approved. Separators shall be compatible with the conduit utilized. The joints of the conduits shall be staggered by rows and layers so as to provide a duct line having the maximum strength. During construction, partially completed duct lines, shall be protected form the entrance of debris such as mud, sand, and dirt by means of suitable conduits plugs. As each section of a duct line is completed, a testing mandrel not less than 12 inches long with a diameter ¼ inch less than the

size of the conduit, shall be drawn through each conduit, after which a brush having the diameter of the duct, and having stiff bristles shall be drawn through until the conduit is clear of all particles of earth, sand and/or gravel; conduit plugs shall then be immediately installed. Provide a plastic pull rope, having a minimum of 3 additional feet at each end, in all spare ducts.

3.03 DUCT BANK INSTALLATION

A. All bends shall have a radius grater than 36 inches or 12 times conduit inside diameter whichever is greater.

B. Install duct with minimum slope of 4 inches per 100 feet. Slope duct away from building entrances.

C. Install no more than equivalent of three 90-degree bends between pull points.

D. Provide suitable fittings to accommodate expansion and deflection where required.

E. Use suitable separators and chairs installed not greater than 4 feet on centers. Conduit separation shall be per code, and not less than 3 inches.

F. Securely anchor duct to prevent movement during concrete placement. Use re-bar holders at spacers and secure with #4 re-bar driven into earth minimum of 1 foot.

G. Connect to manhole wall using No. 6 re-bar dowels. Dowels shall be located at each corner, and 12 inches on center. Insert dowels minimum 3 inches into manhole and 3 feet into duct bank.

3.04 CABLE PULLING

A. The inspection, handling, storage, temperature conditioning prior to installation, bending and training limits, pulling limits, and calculation parameters for installation of all cables must comply with the manufacturer’s recommendations. For ease of installation and prevention of cable damage, the Contractor shall utilize quadrant blocks located properly along the cable run. Failure to comply with any of the above shall make this Contractor responsible for any cable failures that occur within the manufacturer’s warranty period.

B. Cable lubricant shall be soapstone, graphite or talc for rubber or plastic jacketed cables.

C. Lubricants for assisting in the pulling or jacketed cables shall be those specifically recommended by the cable manufacturer.

D. Cable pulling tensions shall not exceed the maximum pulling tensions recommended by the cable manufacturer.

E. All medium voltage cables shall be individually fire/arc proofed.

3.05 CABLE TERMINATING

A. Terminations of insulated power and lighting cables shall be protected from accidental contact, deterioration of coverings and moisture by the use of terminating devices and materials. Terminations shall be made using materials and method as indicated or specified herein or as designed by the written instruction of the cable manufacturer and termination kit manufacturer.

3.06 GROUNDING

A. Duct banks shall be grounded with a bare stranded copper ground wire that is run within the duct bank and is bonded and grounded at both ends. Conduit shall not be used as the ground conductor.

B. Manholes shall be grounded with ground rods. A bare stranded copper ground wire from the ground wire loop shall be used to bond together and ground the manhole cover frame, ladder support bracket, concrete inserts, cable racks, duct bank ground conductors, and the shields of any medium voltage cables that are spliced in the manhole.

C. Grounding: Install a ground rod for each manhole. Bond all exposed metal manhole accessories and the concrete reinforcing rods with bare copper wire and connect to the ground rod and to the ductbank ground cable. Provide foam sealant for rod penetration in manhole floor for water tight seal.

D. Install a bare stranded copper duct bank ground cable in each duct bank envelope. Make ground electrically continuous throughout the entire duct bank system. Connect ground cable to building and station ground grid or to equipment ground buses. In addition, connect ground cable to steel conduit extensions of the underground duct system, manholes and handholes. Provide ground clamp and bonding of each steel conduit extension, where necessary to maintain continuity of the ground system.

END OF SECTION

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SECTION 26 21 00

LOW-VOLTAGE ELECTICAL SERVICE ENTRANCE (FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

B. Related Requirements:

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
3. Section 26 05 26 - Grounding and Bonding for Electrical Systems
4. Section 26 05 34 - Raceways, Boxes and Supporting Devices
5. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems
6. Section 26 27 00 - Low-Voltage distribution Equipment
7. Section 26 27 26 - Wiring Devices
8. Section 26 28 16 - Enclosed Switches & Circuit Breakers
9. Section 26 29 13 - Enclosed Controllers
10. Section 26 29 23 - Variable Frequency Motor Controllers
11. Section 26 32 13.13 - Automatic Transfer Switch
12. Section 26 33 63 - Uninterruptible Power Supply
13. Section 26 50 00 - Lighting

1.02 QUALITY ASSURANCE

A. Electric Utility Company: National Grid.

B. Install work in accordance with Utility Company's rules and regulations.

C. Reference Standards.

1. National Electrical Code (NEC), including Articles 230, 250, and 338.

2. Massachusetts Electrical Code (MEC).

3. National Electrical Manufacturers Association (NEMA) Compliance.

4. Underwriters' Laboratories, Inc. (UL) Compliance.

   a. UL 50 Electrical Cabinets and Boxes.

   b. UL 854 Service Entrance Cables.

   c. UL 869 Electrical Service Equipment.

5. Institute of Electrical and Electronic Engineers (IEEE) Compliance.

6. American National Standards Institute (ANSI) Compliance.

1.03 SUBMITTALS

A. Furnish manufacturer's product data, test reports, and materials certification as required.

B. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:

1. Product Data: Submit manufacturer's data on service entrance equipment and accessories.

1.04 PROJECT CONDITIONS

A. The Contractor shall be responsible for providing and installing the secondary service entrance conduit and conductors for all associated service work as indicated on the Contract Drawings.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General: Provide service entrance equipment and accessories; of types, sizes, ratings and electrical characteristics indicated, which comply with utility and manufacturer's standard materials, design and construction.

B. Conductors

1. Copper conductors with XHHW insulation, 600 volt rated.

2. Cable identifications shall indicate the manufacturer's name, wire size, insulation type, voltage, etc.

3. Spade connectors and lug extensions shall be provided as required to accommodate all service conductors at transformer.

C. Metering

1. Provide utility meter and meter enclosure for the building service as required by the local utility company.

2. Coordinate all metering requirements with utility company for a complete installation in accordance with the utility company's specifications.

D. Manholes, Handholes and Pullboxes

1. Provide in accordance with Division 26 05 43 "Underground Ducts and Raceways for Electrical Systems".

PART 3 – EXECUTION

3.01 INSTALLATION

A. Provide and install required conduit wire, pullboxes, and accessory items to accomplish the Work involved in providing the electrical service as shown on the Drawings.

B. Coordinate service work with the Owner and utility company to insure proper timing of installation and connection of equipment.

C. Obtain all permits, pay all fees and provide all materials and labor necessary for interfacing with utility equipment to install electric service.

D. Furnish and install all electrical conduits for low voltage cables and low voltage wire and accessory items necessary to accomplish the Work detailed herein or in the Drawings.

E. Furnish and install utility meter, meter enclosure, and all associated metering conduits in accordance with the utility company's requirements.

F. All conductors shall be terminated at the pad-mounted transformer secondary by the contractor per local utility company requirements.

END OF SECTION

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SECTION 26 27 00

LOW-VOLTAGE DISTRIBUTION EQUIPMENT (FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. The Contractor shall provide the labor, tools, equipment, and materials necessary to install Distribution Equipment in accordance with the plans and as specified herein.

2. This section includes lighting and power panelboards, transformers and associated auxiliary equipment rated 600 volts or less.

B. Related Requirements

1. Section 26 05 00 - Common Work Results for Electrical

2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables

3. Section 26 05 26 - Grounding and Bonding for Electrical Systems

4. Section 26 05 34 - Raceways, Boxes and Supporting Devices

5. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems

6. Section 26 21 00 - Low-Voltage Electrical Service Entrance

7. Section 26 27 26 - Wiring Devices

8. Section 26 28 16 - Enclosed Switches & Circuit Breakers

9. Section 26 29 13 - Enclosed Controllers

10. Section 26 29 23 - Variable Frequency Motor Controllers

11. Section 26 32 13.13 - Automatic Transfer Switch

12. Section 26 33 63 - Uninterruptible Power Supply

13. Section 26 50 00 - Lighting

1.02 QUALITY ASSURANCE

A. Reference Standards.

1. National Electrical Code (NEC).

2. Massachusetts Electrical Code (MEC).

3. Underwriters' Laboratories, Inc. (UL) Compliance. UL 50 - Enclosures for Electrical Equipment, UL 67 – Panelboards, UL 48 – MCCB's and CB Enclosures.

1.03 SUBMITTALS

A. Furnish manufacturer's product data, test reports, and materials certifications as required.

B. Submit the following in accordance with Conditions of Contract and Division 1 specification sections.

1. Product data for each type panelboard, accessory item, component, and transformer specified.

2. Shop drawings from manufacturers of panelboards and transformers including dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features, voltage rating and AIC ratings.

3. Panel schedules for installation in panelboards. Submit final versions after load balancing.

PART 2 – PRODUCTS

2.01 PANELBOARDS

A. Panelboards shall have mains and circuits as indicated on the Drawings and designed for three phase, four wire, solid neutral, 60-hertz service rated for 480/277 volt, or three phase, four wire rated for 120/208V service as indicated. Where main circuit breakers are indicated on the Drawings, provide main circuit breaker type interiors. Back-fed branch circuit breakers shall not be utilized for main circuit breakers.

B. Panelboards shall be flush or surface mounted, etc., as indicated by panel schedule; code gauge galvanized steel boxes and enameled steel fronts sized for minimum 6" minimum side, top and bottom gutters, or greater as required by NEC.

C. Each panel shall have door in door trim with full length piano hinge to allow for easy access to wireways.

D. Each panel shall have door provided with cylinder lock and latch allowing for common key access to each panel. Each panel shall have fully typed out directory indicating outlets, fixtures, devices and locations served by the intended circuit. Panelboards for use as service disconnecting means shall additionally conform to UL 869.

E. Mechanical lugs furnished with panelboards shall be cast copper or copper alloys of sizes suitable for the conductors indicated to be connected thereto. Panelboards shall have fully capacity neutral bus, ground bus and bolt-on circuit breakers.

F. Circuit breakers shall be molded-case, thermal-magnetic, quick-make, quick-break, bolt-in type. Interrupting rating of circuit breakers shall be as indicated. Provide with suitable handle locks where indicated. Where interrupting rating is not indicated, panels for 120/208 volts service shall have breakers with 10,000 ampere RMS minimum interrupting rating at 240 volts, main circuit breakers where indicated shall have 25,000 ampere RMS minimum interrupting rating at 240 volts. Panels for 480/277 volt service shall have breakers with 14,000 ampere RMS minimum interrupting rating at 480 volts.

G. Distribution panelboards shall be circuit breaker type and shall have mains and circuits as indicated on the Drawings and all designed for three phase, four wire, solid neutral with bonding bar, 60-hertz service rated for 120/208 volt or 480/277 volt service as indicated. Circuit breaker interrupting ratings shall be a minimum of 25,000 amperes, RMS or as indicated on the Contract Drawings. Distribution panelboards shall be of same manufacturer as breaker panelboards and shall have UL label.

H. Acceptable Manufacturers:

1. Square D. Co.

2. General Electric Co.

3. Cutler-Hammer Products.

4. Siemens Energy and Automation, Inc.

2.02 DRY TYPE TRANSFORMERS

A. Transformers with steel enclosures ventilated as required and provided with suitable terminal compartments and terminals designed to receive copper conductors. Ventilated transformers located against walls shall be located sufficient distance from wall for proper ventilation. Coordinate with manufacturers recommendations.

B. Sound levels for transformers shall not exceed NEMA established sound levels for specialty dry type transformers.

C. Insulation shall be rated not to exceed 115 C rise over 40 degrees ambient. Transformer insulation system shall be in accordance with ANSI/NEMA Standard St-20.

D. Transformers for three phase circuits shall be three phase type rated for 480 volts delta primary and 208/120 volt, three phase, four wire wye secondary, except as noted.

E. Transformers shall have 2-1/2% taps for above and below voltage on primary side.

PART 3 – EXECUTION

3.01 PANELBOARDS

A. Install panelboards and accessory items in accordance with NEMA PB 1.1,"General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less" and manufacturers' written installation instructions.

B. Mounting Heights. Top of trim 6'-2" above finished floor, except as indicated.

C. Circuit Directory: Typed and reflective of final circuit changes required to balance panel loads. Obtain approval before installing. Number branch circuit devices accordingly to correspond to circuit directory.

D. After substantial completion, conduct load balancing measurements and circuit changes. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.

E. Make equipment grounding connections for panelboards as indicated.

F. Provide ground continuity to main electrical ground bus indicated.

G. Electrical Tests: Include the following items performed in accordance with manufacturer's instructions:

1. Ground resistance test on system and equipment ground connections.

2. Test main and subfeed overcurrent protective devices.

3.02 TRANSFORMERS

A. Transformers shall be suitable for wall and platform mounting for ratings 45kVA and below. Provide mounting supports and platforms as required and indicated. Submit detailed shop drawings of supports on all transformers.

B. Provide isolation mounts for all transformers to minimize noise transmission. Transformer connections shall have a minimum of eighteen (18) inches of flexible conduit.

C. Secondary midpoint of wye connected transformers shall be grounded as required by NEC for separately derived source.

3.03 CLEANING

A. Upon completion of installation, inspect all panelboards and transformers. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

END OF SECTION

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SECTION 26 27 26

WIRING DEVICES
(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Section Includes

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 specification sections, apply to this section.

B. Related Requirements:

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
3. Section 26 05 26 - Grounding and Bonding for Electrical Systems
4. Section 26 05 34 - Raceways, Boxes and Supporting Devices
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10. Section 26 29 23 - Variable Frequency Motor Controllers
11. Section 26 32 13.13 - Automatic Transfer Switch
12. Section 26 33 63 - Uninterruptible Power Supply
13. Section 26 50 00 - Lighting

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. National Electrical Code (NEC)

2. Massachusetts Electrical Code (MEC)

3. Underwriter's Laboratories, Inc. (UL)

4. National Electrical Manufacturers Association (NEMA) Compliance.

1.03 SUBMITTALS

A. Furnish manufacture’s product data, test reports, and materials certifications in accordance with Division 1, Submittals.

PART 2 – PRODUCTS

2.01 FLUSH OR SURFACE MOUNTED WIRING DEVICES

A. Wall Switches:

1. Wall Switches shall be specifications grade, toggle operated, quiet type alternating current (ac) switches, NEMA heavy duty class, rated at 20 ampere, 120/277 v. Provide matching two pole, 3-way or 4-way switches as indicated. Comply with UL 20 and NEMA Standards.

2. Where two or more switches are to be installed at the same location, they must be mounted in one-piece ganged switch boxes, with appropriate gang cover plate.

3. Provide waterproof switches where indicated. All switches installed in the Chemical Feed Room, Sand/GAC Filter Rooms and Dual Media Filter Room shall be waterproof tumbler operated switches.

4. Explosion Proof Switches: Explosion Proof/Dust-Ignition Proof Wall Switches shall be specifically approved by Underwriters' Laboratories, Inc., or Factory Mutual for particular "Class," "Division," and "Group" of hazardous locations involved. Switches shall be tumbler operated equal to Appleton EDS Series, Crouse Hinds, or approved equal. Switches shall be factory sealed specifically designed to a U.L. standard so that any arcing devices are within a chamber which contains any explosions. Switches shall be approved for installation without any additional external sealing fittings. Switches shall be specifically designed to accept conduit sizes indicated on the Contract Drawings.

B. Receptacles:

1. Convenience receptacles for interior use shall be specification grade, industrial heavy duty type, 20-ampere, 125-volt ac, 2-pole, 3-wire, back wiring, metal plaster ears, single, duplex (as indicated) grounded, conforming to NEMA FB 11, NEMA WD 1 and to the 5-20R configuration in NEMA WD 6. Provide waterproof in-use covers where indicated and required.

2. Ground Fault Interrupter (GFI) Receptacles shall be specification grade. Provide 20 ampere, "feed through" type ground fault circuit interrupter, with integral heavy duty NEMA 5 20R duplex receptacles arranged to protect connected downstream receptacles on same circuit. Provide unit designed for installation in a 2 3/4 inch deep outlet box without adapter, grounding type, Class A, Group 1. Provide waterproof in-use covers where indicated and required.

3. Locking receptacles shall conform to NEMA WD 6. One (1) plug shall be furnished with each locking receptacle.

4. Receptacles shall meet the requirements for retention of plugs, overload, temperature, and assembly security in accordance with NEMA WD 1.

5. Special purpose outlets: NEMA heavy duty class, grounding type with matching plug. Coordinate NEMA type with equipment manufacturer.

6. Explosion Proof Receptacles: Explosion Proof/Dust-Ignition Proof Receptacles shall be specifically approved by Underwriters' Laboratories, Inc., or Factory Mutual for particular "Class," "Division," and "Group" of hazardous locations involved. Receptacles installed in hazardous locations shall be factory sealed as provide by Appleton Contendor U-Line Series, Crouse Hinds, or approved equal. Receptacles shall be 20 amp rated designed with dead front construction. To operate, a matching plug shall be utilized. When the plug is inserted and rotated, the receptacle shall be activated. Receptacles shall be approved for installation without any additional external sealing fittings. Receptacle enclosures shall be constructed of copper-free aluminum and malleable iron. Provide each receptacle with matching 20 amp plug. Plugs shall be constructed of thermoplastic polyester specifically designed for use where moisture and corrosion may be present. Plugs shall be designed for use with general purpose receptacles in non-classified locations. Provide each receptacle with two (2) spare matching plugs.

C. Device Plates:

1. Wall plates for flush wall switches and receptacles shall be the appropriate type and size and shall match the wiring devices for which they are

intended. Dimensions for openings in wall plates shall be in accordance with NEMA WD 1.

2. Process area: Plates in process areas for receptacles, telephone, etc., shall Galvanized steel, smooth rolled outer edge sized to fit box.

3. Plates in general areas for receptacles, telephone, etc., shall be stainless steel.

D. Weatherproof Device Plates:

1. Provide weatherproof device plates where indicated and required.

2. Interior and Exterior Wet Locations: Device plates for interior and exterior wet locations shall be die-cast aluminum, gasket, with corrosion resistant screws to match plate cover finish. Provide weatherproof receptacles with vertical “in-use” covers for complete weatherproofing when plug is inserted.

3. Chemical Feed Room: Device plates for installation in the Chemical Feed Room shall be gasket nonmetallic polyvinyl chloride (PVC), or fiberglass units, for complete weatherproofing and protection against corrosive chemicals. Provide receptacles with vertical “in-use” covers for complete weatherproofing when plug is inserted.

2.02 CONTROL RELAYS

A. Control Relays: Allen Bradley Bulletin 700-H Series, Square D or equal.

B. 120V coil as required or as indicated.

C. Number of poles as indicated or required.

D. Electrically Held, except as noted.

E. Enclosure shall be NEMA-1, except as noted.

2.03 MOTOR CONTROL RELAYS/CONTACTORS

A. 120V and 277V coils as required or as indicated

B. Number of poles as indicated or required.

C. Horsepower rated for connected motor.

D. Electrically Held, except as noted.

E. Enclosure shall be NEMA-1, except as noted.

F. 600V Rated.

2.04 CONTROL STATIONS

A. All control stations shall be industrial, heavy duty type, with oil-tight construction and clearly marked legend plates. Enclosures shall be provided based upon location in accordance with NEMA requirements and as required for the area classifications as indicated and NEMA rating to meet environmental conditions of installed location.

B. Enclosures shall be common or grouped mounted for devices in the same location. Devices shall include front mounted nameplates identifying function.

C. Subject to compliance with requirements, provide control stations by one of the following:

1. Allen Bradley Company.

2. Appleton Electric Company.

3. Crouse-Hinds Company.

4. Approved equal.

D. Selector Switches:

1. Selector Switches shall be non-illuminated, standard knob operated rated for use at 120VAC. The knob operator insert shall be white in color. Units shall be rotary type with round or oval handles and positioning device to securely hold switch in selected position. Where shown on the Drawings selector switches shall be key type.

2. Provide compatible nameplate for each selector switch identifying intendedfunctions: (I.E. "HAND/OFF/AUTO", "LOCAL/OFF/REMOTE", “JOG/OFF/AUTO”, ETC.) as indicated on the Contract Drawings.

3. Units shall be 30.5mm selector switches.

E. Pushbuttons:

1. Switches shall be non-illuminated momentary or maintained type rated for use at 120 VAC. Switches shall green in color for "START" pushbuttons, and shall be red in color for "STOP" pushbuttons.

2. Provide compatible nameplate for each pushbutton identifying intended functions (I.E. "STOP", "START", ETC.).

3. Emergency stop operators shall be mushroom style, 2-position push-pull type, with number of contacts as indicated on the Contract Drawings.

Stations shall be provided with push-pull padlocking attachment and legend plate reading: "Push to Stop, Pull to Start."

4. Units shall be 30.5mm pushbuttons.

2.05 STAND ALONE SMOKE DETECTORS

A. Stand Alone Smoke Detectors shall be powered by 120vac with available battery backup. An LED power on indicator shall be provided for verification that the unit is active.

B. Unit shall be provided with test switch which shall electronically activate the chamber to simulate smoke and check for proper operation. Unit shall be provided with electronic horn with a level of 85 decibels at 10 feet. Unit shall meet the requirements of U.L Standard 217.

C. Unit shall be provided with Form C dry-contact for alarming to the facility SCADA system.

2.06 STAND ALONE HEAT DETECTORS

A. Stand Alone Heat Detectors shall be powered by 120vac with available battery backup. An LED power on indicator shall be provided for verification that the unit is active.

B. Unit shall be provided with test switch which shall electronically activate the detector and check for proper operation. Unit shall be provided with electronic horn with a level of 85 decibels at 10 feet. Unit shall meet the requirements of U.L Standard 217.

C. Unit shall be provided with Form C dry-contact for alarming to the facility SCADA system.

PART 3 – PART 3 - EXECUTION

3.01 WIRING DEVICES

A. Wall Switches and Receptacles:

1. Wall switches and receptacles shall be so installed that when device plates are applied, the plates will be aligned vertically to within 1/16-inch.

2. Ground terminal of each flush-mounted receptacle shall be bonded to the outlet box with an approved green bonding jumper.

B. Device Plates:

1. Device plates for switches that are not within sight of the loads controlled shall be suitably engraved with a description of the loads.

2. Device plates and receptacle cover plates for receptacles other than 15-ampere, 125-volt, single-phase, duplex, convenience outlets shall be suitably engraved, showing the circuit number, voltage, frequency, phasing, and amperage available at the receptacle; for example: RP1-12, 208 VOLTS, 60 HERTZ, 3-PHASE, 30 AMPERES. If engraving is not practical, an engraved laminated phenolic identification plate may be applied.

3. Device plates shall be identified on the inside by circuit number and panelboard.

C. Control Stations:

1. Mount equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

2. Securely fasten equipment to walls or other surfaces on which they are mounted. Provide independent galvanized steel supports where no wall or other surface exists.

3. Install in conformance with National Electrical Code.

END OF SECTION

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SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS (FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. This Section includes individually mounted enclosed switches and circuit breakers used for the following:

   a. Service disconnecting means.

   b. Feeder and branch-circuit protection.

   c. Motor and equipment disconnecting means.

B. Related Requirements

1. Section 26 05 00 - Common Work Results for Electrical

2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables

3. Section 26 05 26 - Grounding and Bonding for Electrical Systems

4. Section 26 05 34 - Raceways, Boxes and Supporting Devices

5. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems

6. Section 26 21 00 - Low-Voltage Electrical Service Entrance

7. Section 26 27 00 - Low-Voltage distribution Equipment

8. Section 26 27 26 - Wiring Devices

9. Section 26 29 13 - Enclosed Controllers

10. Section 26 29 23 - Variable Frequency Motor Controllers

11. Section 26 32 13.13 - Automatic Transfer Switch

12. Section 26 33 63 - Uninterruptible Power Supply

13. Section 26 50 00 - Lighting

1.02 SUBMITTALS

A. Product Data: For each type of switch, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each switch and circuit breaker.

1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details.

b. Current and voltage ratings.

c. Short-circuit current rating.

d. UL listing for series rating of installed devices.

e. Features, characteristics, ratings, and factory settings of individual over-current protective devices and auxiliary components.

f. Time-current curves, including selectable ranges for each type of circuit breaker.

2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.

C. Field Test Reports: Submit written test reports and include the following:

1. Test procedures used.

2. Test results that comply with requirements.

3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Manufacturer's field service report.

E. Maintenance Data: For enclosed switches and circuit breakers and for components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Closeout Procedures," include the following:

1. Routine maintenance requirements for components.

2. Manufacturer's written instructions for testing and adjusting switches and circuit breakers.

3. Time-current curves, including selectable ranges for each type of circuit breaker.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NEMA AB 1 and NEMA KS 1.

C. Comply with UL #98, Enclosed Switches and UL #508, Industrial Control Equipment.

D. Federal Specification W-S-865- Heavy Duty Switches.

E. Comply with NFPA 70.

F. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.04 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).

2. Altitude: Not exceeding 3000 feet (2000 m).

1.05 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Square D Co.

2. Eaton Corp.; Cutler-Hammer Products.

3. General Electric Co.; Electrical Distribution & Control Division.

2.02 ENCLOSED SWITCHES

A. Enclosed, Non-fusible Switch: NEMA KS 1, heavy duty type with lockable handle.

B. Rating: Voltage and number of poles as required for motor or equipment circuits being disconnected. Switches used for service entrance equipment shall bear a UL label and be rated for service entrance equipment.

C. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, heavy duty type with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position. Provide auxiliary contacts in switch for VFD controlled motors.

D. Double Throw Safety Switches shall be unfused double throw with center OFF position, quick-make, quick-break mechanism, visible blades in the OFF position and safety handle. Rating, voltage and number of poles as required for the circuits being disconnected

2.03 ENCLOSED CIRCUIT BREAKERS

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable instantaneous, magnetic trip setting for circuit-breaker frame sizes 150 Amp through 400 Amp.

B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles. Lugs shall be mechanical style suitable for number, size, trip ratings, and material of conductors.

C. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

D. Electronic Trip Unit Circuit Breakers (Frame sizes 400 Amp and larger): RMS sensing, interchangeable harmonic trip unit, LED trip indicators with the following field-adjustable settings:

1. Long-time pickup levels and adjustments (L).

2. Short-time pickup levels adjustments (S).

3. Instantaneous trip adjustments (I).

4. Ground fault pickup level, time delay, I2t response and adjustments (G).

5. Remote trip indication and control.

6. Modbus communication Capability; Integral communication module with functions and features compatible with power monitoring, harmonic monitoring, and control system.

2.04 SURGE PROTECTION DEVICE (SPD)

A. Main Circuit Breaker SPD

1. SPD shall be Listed in accordance with UL 1449 Second Edition 2005 and UL 1283, Electromagnetic Interference Filters.

2. Integrated surge protective devices (SPD) shall be Component Recognized in accordance with UL 1449 Second Edition, Revision 2/9/2005 Section 37.3 and 37.4 at the standard's highest short-circuit current rating (SCCR) of 200 kA, including intermediate level of fault current testing that will be effective 2/9/2007.

3. SPD shall be tested with the ANSI/IEEE Category C High exposure waveform (20kV-1.2/50μs, 10kA-8/20μs).

4. SPD shall provide suppression for all modes of protection: L-N, L-G, and N-G in WYE systems.

5. The manufacturer of the SPD shall be the same as the manufacturer of the service entrance and distribution equipment in which the devices are installed and shipped. Also, this distribution equipment shall be fully tested and certified to the following UL standards:

   a. UL 67 - Panelboards

   b. UL 845 - Motor Control Centers

   c. UL 857 - Busway

   d. UL 891 - Switchboards

   e. UL 1558 - Low Voltage Switchgear

6. Recommended SPD ratings

   a. Minimum surge current ratings per phase of equipment shall be as follows:

EQUIPMENT	SURGE RATING
SWITCHGEAR	200kA
SWITCHBOARDS	160kA
POWER PANELS	160kA
LIGHTING PANELS	160kA
RECEPTACLE PANELS	120kA

TABLE 2.4A – MINIMUM SURGE CURRENT RATINGS

   b. UL 1449 clamping voltage must not exceed the following:

VOLTAGE	L-N	L-G	N-G
240/120	800/400V	800/400V	400V
208/120	400V	400V	400V
480/277	800V	800V	800V
600/347	1200V	1200V	1200V

TABLE 2.4B – MAXIMUM CLAMPING VOLTAGE LIMITS

   c. Pulse life test: Capable of protecting against and surviving 5000 ANSI/IEEE Category C High transients without failure or degradation of clamping voltage by more than 10%.

7. SPD shall be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115% of nominal RMS voltage.

8. SPD shall be constructed of one self-contained suppression module per phase.

9. Visible indication of proper SPD connection and operation shall be provided. The indicator lights shall indicate which phase as well as which module is fully operable. The status of each SPD module shall be monitored on the front cover of the enclosure as well as on the module. A push-to-test button shall be provided to test each phase indicator. Push-to-test button shall activate a state change of dry contacts for testing purposes.

10. SPD shall be equipped with an audible alarm which shall activate when any one of the surge current modules has reached an end-of-life condition. An alarm on/off switch shall be provided to silence the alarm. The switches and alarm shall be located on the front cover of the enclosure.

11. A connector shall be provided along with dry contacts (normally open or normally closed) to allow connection to a remote monitor or other system. The output of the dry contacts shall indicate an end-of-life condition for the complete SPD or module.

12. Terminals shall be provided for necessary power and ground connections.

13. The SPD shall be equipped with the following items:

    a. A transient voltage surge counter shall be located on the diagnostic panel on the front cover of the enclosure. The counter shall be equipped with a manual reset and battery backup to retain memory upon loss of AC power.

    b. A remote monitoring device shall be provided to directly connect to the TVSS with a dry contact connector for simple installation. The device will have indicator lights and an audible alarm to monitor for normal and fault conditions.

14. TVSS shall have a warranty for a period of ten (10) years from date of invoice. Warranty shall be the responsibility of the electrical distribution equipment manufacturer and shall be supported by their respective field service division.

2.05 DOUBLE THROW SAFETY SWITCHES

A. Unfused, double throw with center OFF position, quick- make, quick-break mechanism, visible blades in the OFF position and safety handle. Rating, voltage and number of poles as required for the circuits being disconnected.

2.06 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA Type 4.

2. Corrosive Locations: NEMA Type 4X, stainless steel.

3. Wet or Damp Locations: NEMA Type 4.

4. Indoor Dry Locations: NEMA Type 1.

5. Indoor Dusty Locations: NEMA Type 12.

6. Reference Specification 26 05 34 “Raceways, Boxes and Supporting Devices” for approved enclosure types.

2.07 FACTORY FINISHES

A. Manufacturer's standard prime-coat finish ready for field painting.

B. Finish: Manufacturer's standard grey paint applied to factory-assembled and -tested enclosures before shipping.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Mount equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

B. Securely fasten equipment to walls or other structural surfaces on which they are mounted. Provide independent galvanized steel supports where no wall or other structural surface exists

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install in conformance with National Electrical Code.

3.03 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26.

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

C. For double throw switches identify source of each service identify source of each service.

3.04 CONNECTIONS

A. Install equipment grounding connections for switches and circuit breakers with ground continuity to main electrical ground bus.

B. Install power wiring. Install wiring between switches and circuit breakers, and control and indication devices.

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.05 FIELD QUALITY CONTROL

A. Testing: After installing enclosed switches and circuit breakers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.06 CLEANING

A. On completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION

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SECTION 26 29 13

ENCLOSED MOTOR CONTROLLERS
(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. This Section includes ac general-purpose manual motor starters and magnetic motor starters rated 600 V and less that are supplied as enclosed units.

B. Related Requirements

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
3. Section 26 05 26 - Grounding and Bonding for Electrical Systems
4. Section 26 05 34 - Raceways, Boxes and Supporting Devices
5. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems
6. Section 26 21 00 - Low-Voltage Electrical Service Entrance
7. Section 26 27 00 - Low-Voltage distribution Equipment
8. Section 26 27 26 - Wiring Devices
9. Section 26 28 16 - Enclosed Switches & Circuit Breakers
10. Section 26 29 23 - Variable Frequency Motor Controllers
11. Section 26 32 13.13 - Automatic Transfer Switch
12. Section 26 33 63 - Uninterruptible Power Supply
13. Section 26 50 00 - Lighting

1.02 SUBMITTALS

A. Product Data: For each type of enclosed controller. Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each enclosed controller.

1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:

    a. Enclosure types and details.

    b. Nameplate legends.

    c. Short-circuit current rating of integrated unit.

    d. UL listing for series rating of over-current protective devices in combination controllers.

    e. Features, characteristics, ratings, and factory settings of individual over-current protective devices in combination controllers.

    f. Listing of the motor starters to be furnished with their location and equipment to be controlled and identified

2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.

C. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain, within 100 miles (160 km) of Project Site, a service center capable of providing training, parts, and emergency maintenance and repairs.

B. Source Limitations: Obtain enclosed controllers of a single type through one source from a single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NEMA Standard ICS2-110, General Standards for Manual and Magnetic Controllers.

E. Comply with NEMA Standard ICS2-321 AC General Purpose Class A Controller for Squirrel Cage Induction Motors, 600 volts and less.

F. UL #508, Industrial Control Equipment.

G. Comply with NFPA 70 and the Massachusetts Electrical Code.

H. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed controllers, including clearances between enclosed controllers, and

for adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

B. If stored in areas subjected to weather, cover enclosed controllers to protect from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers; install electric heating of sufficient wattage to prevent condensation.

1.05 COORDINATION

A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

C. Coordinate features of enclosed controllers and accessory devices with pilot devices and control circuits to which they connect.

D. Coordinate features, accessories, and functions of each enclosed controller with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

1.06 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Spare Fuses: Furnish one spare for every five installed, but not less than one set of three of each type and rating.

2. Indicating Lights: Two of each type installed.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Manual and Magnetic Enclosed Controllers:

a. Square D Co

b. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary.

c. Eaton Corp.; Cutler-Hammer Products.

d. General Electrical Distribution & Control.

e. Rockwell Automation Allen-Bradley Co.; Industrial Control Group.

2.02 ENCLOSED MANUAL MOTOR STARTERS

A. Description: NEMA ICS 2, general purpose, Class A, with toggle action operated, horsepower rated with thermal and overload element.

B. Provide in enclosure suitable for use with the manual motor starter.

C. Enclosure cover shall include a white ON indicating light.

D. Where indicated on the Drawings manual motor starters rated 600 volt, 3 pole and 240 volt, 2 pole, 20 amp without overload protection shall be provided to be used as disconnects.

2.03 ENCLOSED MAGNETIC MOTOR STARTERS

A. Description: NEMA ICS 2, Class A, full voltage, across the line, non-reversing, magnetic coil operated, horsepower rated, NEMA sized, with thermal overload bimetallic protection, unless otherwise indicated. Starter shall consist of one contactor, one overload relay, and a magnetic only circuit breaker.

B. Control Circuit: 120 V; obtained from integral control power transformer of sufficient capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity. Include two primary fuses for 480-volt systems, one secondary fuse and the other secondary leg grounded. For other voltage systems include one secondary fuse and the other secondary leg grounded.

C. Combination Controller: Factory-assembled combination controller and disconnect switch.

1. Circuit-Breaker Disconnecting Means: NEMA AB 1, motor-circuit protector with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.

2. Disconnecting means shall be provided with an external operating handle mounted in the flange of the enclosure which has a means to lock the handle in the off position. Mechanism shall prevent enclosure door from opening when handle is in the on position.

D. Overload Relay: Ambient-compensated melting alloy, bimetallic type, interchangeable heaters with inverse-time-current characteristic and NEMA ICS 2, Class 20 tripping characteristic. Manually reset from outside the enclosure by means of an insulated button with normally open auxiliary contact for remote alarm purposes and separate heater elements sized for the full load ampere and service factor of the actual motors furnished. They shall have a visible trip indicator, a reset mechanism that resets on the upstroke only and a manual weld check which checks the overload contacts for welding. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.

E. Contactor contacts shall be silver alloy, double break, and shall be inspectable on NEMA Sizes 00 through 4 without the use of tools. Size 5 and larger shall be inspectable with standard tools. They shall be replaceable without removing the line, load, or control wiring from the starter, and replaceable without removing the starter from the enclosure.

F. Contactor coils shall be the encapsulated type, and shall be replaceable on NEMA Sizes 00 through 4 without the use of tools. Size 5 and larger shall be replaceable with standard tools. They shall be replaceable without removing the line, load, or control wiring from the starter, and replaceable without removing the starter from the enclosure.

G. Controls: Combination starters shall be provided with hand-off-auto selector switch, start push button, stop push button, red on indicating light (across coil) and green off indicating light. Operating controls, pilot and control devices shall be provided for each starter for proper operation. Pilot and control devices shall be mounted on the enclosure door. The auto position shall enable the motor to perform start/stop operations from remote dry contact from external control panel. Auxiliary contacts to remotely signal temperature control panel run and overload conditions. Provisions to accept remote dry contact from stop station for shutdown of the motor.

H. The short circuit withstand rating of the combination starter is to be 65K RMS amperes symmetrical.

2.04 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Reference Specification 26 05 34 “Raceways, Boxes and Supporting Devices” for approved enclosure types.

2.05 ACCESSORIES

A. Devices shall be factory installed in controller enclosure, unless otherwise indicated.

B. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.

C. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.

D. Hand-Off –Automatic three position selector switch.

E. Control Relays: Auxiliary and adjustable time-delay relays.

2.06 FACTORY FINISHES

A. Manufacturer's standard prime-coat finish ready for field painting.

B. Finish: Manufacturer's standard grey paint applied to factory-assembled and -tested enclosed controllers before shipping.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine areas and surfaces to receive enclosed controllers for compliance with requirements, installation tolerances, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLICATIONS

A. Select features of each enclosed controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, drive, and load; and configuration of pilot device and control circuit affecting controller functions.

B. Select horsepower rating of controllers to suit motor controlled.

3.03 INSTALLATION

A. For control equipment at walls, bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks as required.

B. Mount equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

C. Securely fasten equipment to walls or other surfaces on which they are mounted. Provide independent galvanized steel supports reasonably close to motor where no wall or other surface exists.

D. Certified factory start-up shall be provided for each solid state reduced voltage soft starter provided. Service engineers shall be employed by the manufacturer or be certified by the manufacturer and provide start-up services including physical inspection of drive and connected wiring and final adjustments to meet specified performance requirements.

3.04 IDENTIFICATION

A. Identify enclosed controller components and control wiring according to Division 26 Section “Basic Electrical Requirements”.

3.05 CONTROL WIRING INSTALLATION

A. Install wiring between enclosed controllers according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables"

B. Bundle, train, and support wiring in enclosures.

C. Connect hand-off-automatic switch and other automatic-control devices where applicable.

1. Connect selector switches to bypass only manual- and automatic-control devices that have no safety functions when switch is in hand position.

2. Connect selector switches with enclosed controller circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.06 CONNECTIONS

A. Conduit installation requirements are specified in other Division 26 Sections. Drawings indicate general arrangement of conduit, fittings, and specialties.

B. Ground equipment.

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.07 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. Perform each electrical test and visual and mechanical inspection indicated in NETA ATS, Sections 7.5, 7.6, and 7.16.

2. Certify compliance with test parameters.

3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.

2. Test results that comply with requirements.

3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

3.08 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.09 CLEANING

A. Clean enclosed controllers internally, on completion of installation, according to manufacturer's written instructions. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

3.10 STARTUP SERVICE

A. Verify that enclosed controllers are installed and connected according to the Contract Documents.

B. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 26 Sections.

C. Complete installation and startup checks according to manufacturer's written instructions.

END OF SECTION

SECTION 26 29 23

VARIABLE FREQUENCY MOTOR CONTROLLERS (FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install variable frequency drives in accordance with Section 01 Submittal Procedures.

2. Section includes Variable Frequency Drives for the following equipment:

   a. Booster Pump 1.

   b. Booster Pump 2.

   c. Booster Pump 3.

B. Related Requirements

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
3. Section 26 05 26 - Grounding and Bonding for Electrical Systems
4. Section 26 05 34 - Raceways, Boxes and Supporting Devices
5. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems
6. Section 26 21 00 - Low-Voltage Electrical Service Entrance
7. Section 26 27 00 - Low-Voltage distribution Equipment
8. Section 26 27 26 - Wiring Devices
9. Section 26 28 16 - Enclosed Switches & Circuit Breakers
10. Section 26 29 13 - Enclosed Controllers
11. Section 26 32 13.13 - Automatic Transfer Switch
12. Section 26 33 63 - Uninterruptible Power Supply
13. Section 26 50 00 - Lighting

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. National Electrical Code(NEC).

2. Massachusetts Electrical Code (MEC).

3. UL® 198C - High-Interrupting Capacity Fuses; Current Limiting Type.

4. UL 198E - Class R Fuses.

5. NECA, "Standard of Installation" - published by National Electrical Contractors Association.

6. NEMA AB 1 - Molded Case Circuit Breakers.

7. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.

8. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

9. NEMA KS 1 - Enclosed Switches.

B. Qualifications:

1. Firms regularly engaged in manufacture of variable frequency drives of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years, or as indicated.

1.03 SUBMITTALS

A. Furnish manufacturer's product data, test reports, and materials certifications as required.

B. Submit the following in accordance with conditions of contract and Division 1 specification sections:

1. Product Data: Submit manufacturer's data and installation instructions.

2. Wiring Diagrams: Submit power and control wiring diagrams for connections to electrical power panels, feeders, and equipment. Differentiate between portions of wiring which are manufacturer installed and portions, which are field installed.

3. Motor Overloads: Submit for approval motor overload sizes for each new VFD furnished. Overload size shall be based on actual motor nameplate data and power factor correction size; where applicable. Include thermal

overload compensation sizing information where motor(s) are operated at temperatures different than the motor controller.

PART 2 – PRODUCTS

2.01 VARIABLE FREQUENCY DRIVES (VFD)

A. Variable Frequency Drives shall be equal to Allen Bradley Powerflex 700 or 70 Series (as required), or approved equal.

B. The VFD shall convert the input AC main power to an adjustable frequency and voltage as defined in the following sections. The VFD shall be UL Listed and labeled as a complete unit, and shall include all accessories and requirements as described in this section and as identified on the Drawings.

C. Each drive shall have a rating in horsepower (HP) equal to or greater than the motor name plate horsepower and each drive shall have a continuous output current rating equal to or greater than the motor full load amperes (FLA).

D. Input Power:

1. The drive is available in two ranges and is self-adjustable to accept an input voltage range between; 380-500 VAC, three phase +/-10%, 525-690 VAC, three phase +/-10%.

2. Displacement power factor 0.98, lagging, over the entire speed range. The efficiency of the drive is a minimum of 97.5% at full load and speed.

E. Environment:

1. Storage ambient temperature range: -40º C to 60º C (-40º to 140ºF).

2. Operating ambient temperature range without derating: IP21 / Type 10º C to 40º C (0º to 104º F).

3. The relative humidity range is 5% to 95% non-condensing.

4. Operating elevation: up to 1000 Meters (3,300ft) without derating.

5. Shock: 15G peak for 11ms duration

6. Vibration: 2.0 mm (0.0787 inches) displacement, 1G peak, EN50178 / EN60068-2-6

F. Output Power:

1. The output voltage is adjustable from 0 to rated motor voltage (400 V, 460 V, 575 V or 690 V). The output frequency range is adjustable from 0 to

320Hz. The inverter section will produce a pulse width modulated (PWM) waveform using latest generation IGBTs.

G. Motor and Application Data:

1. The AC drives shall have the ability to operate variable or constant torque loads. The speed range shall be from a minimum speed of 1.0 Hz to a maximum speed of 60 Hz. The normal duty drive overload current shall be 100% continuous, 110% for 1 minute, and 150% for 3 seconds. The heavy duty drive overload current shall be 100% continuous, 150% for 1 minute, and 200% for 3 seconds.

Equipment	HP	Voltage	Application	Duty Type
Booster Pump #1	150	480	Variable Torque	Normal
Booster Pump #2	150	480	Variable Torque	Normal
Booster Pump #3	40	480	Variable Torque	Normal

2. Horsepower ratings, application, and duty types listed above are subject to change based on final equipment selected and/or recommended by equipment supplier. Coordinate final motor horsepower ratings, application type, and duty types as required with equipment vendors.

H. Hardware:

1. The drive hardware employs the following power components:

a. Diode or fully gated bridge on the input.

b. AC line reactor on input for all ratings.

c. Switching logic power supply operating from the DC bus.

d. MOV protection available on Frame 9 only - phase to phase and phase to ground with ability to remove the phase to ground unit when applicable.

e. Common Mode Capacitors available on all units. For use on ungrounded systems Frame 9 is orderable without and Frame 10 and higher removable by jumper.

f. Gold plated plug-in connections on printed circuit boards.

g. Microprocessor based inverter logic isolated from power circuits.

h. Latest generation IGBT inverter section.

i. Customer Interface common for all horsepower ratings. LCD digital display standard with choices for programming keypad and operator keys options.

j. The Main Control Board is the same for all ratings to optimize spare parts stocking and exchange.

k. Common control connection for all ratings.

l. Optimized for 2kHz carrier frequency.

m. Device Peripheral Interface (DPI) for connection to common options.

n. Power LED viewable through the control box cover.

o. Status LEDs for communications status, including embedded DPI status, adapter health and communications network status, viewable at HIM mounting plate.

I. Control Logic:

1. The drive is programmable or self-adjusting for the following:

a. Operating the drive with motor disconnected.

b. Controlled shut down, when properly fused, with no component failure in the event of an output phase to phase or phase to ground short circuit and annunciation of the fault condition.

c. Adjustable PWM carrier frequency within a range of 1-6 kHz.

d. Selectable Sensorless Vector or V/Hz mode.

e. Suitable for use on both Normal Duty and Heavy Duty loads.

f. Multiple programmable stop modes including - Ramp, Coast, DC-Brake, Ramp-to-Hold and S-curve.

g. Multiple acceleration and deceleration rates.

h. All adjustments to be made with the door closed.

i. Adjustable output frequency up to 320Hz.

J. Terminal Blocks:

1. Separate terminal blocks are provided for control and power wiring. Power terminal blocks are rated a minimum of 90 ºC and marked for both inputs and outputs (L1, L2, L3 and U/T1, V/T2, W/T3).

K. Power Conditioning:

1. The drive is designed to operate on an AC supply source that may contain line notching and up to 10% harmonic distortion. An input isolation transformer is not required for protection from normal line transients. If line conditions dictate the use of a transformer, the K factor should be 4.0 or less.

L. Operator Interface:

1. Interface to the drive is provided via a removable Human Interface Module (HIM) with integral display. This unit is a 7 line by 21-character backlit LCD display with graphics capability. It is used to display drive operating conditions, fault / alarm indications and programming information with full text support in multiple languages, including but not limited to English, German, French, Italian, Spanish, Portuguese and Dutch.

2. The keypads for these include programming keys, drive operating keys (Start, Stop, Direction, Jog and Speed Control), numeric keys for direct entry and an ALT (alternate function) key to allow some of the more common drive programming or operating functions to be accessed directly without knowledge of programming structure. These ALT functions include S.M.A.R.T. Start for fast and easy commissioning, View selection, Auto Manual operation, HIM removal under power, and device selection for programming.

M. Input/Output Capabilities (Control Interface):

1. Analog Inputs/Outputs:

   a. Two (2) differential, +/-10V (bi-polar) / 20mA analog inputs, 11 bit plus sign, 160V common mode noise rejection. Both inputs shall be fully user programmable for a variety of uses including frequency command, process loop inputs, and others. Inputs are programmable for function, scaling, offset, signal loss detect and square root.

   b. Two (2) single-ended +/-10V (bi-polar) / 20mA analog output, 11 bit plus sign. Both shall be fully user programmable to be proportional to one of 25 process parameters including output frequency, output current, encoder feedback, output power, and others. Programming is available to select either absolute or signed values of these parameters.

   c. Input for motor protection thermistor (1.8k Ohm PTC). Drive will provide fault protection if temperature exceeds protection value

2. Digital Inputs/Outputs:

   a. Six (6) digital inputs 24Vdc or 120Vac as shown. Inputs shall be configurable as sink or source. All inputs are individually programmable for functions from a list of 57 that include Start (3-wire control, Run(2-wire control), Stop, External fault, Speed select, Jog, Process PU functions, Level-sensitive Run, and others. 24V inputs draw 10mA each and require a 20V minimum for "ON" state and a maximum for 5V "OFF" state. 115Vac inputs

draw 5mA each and require a 100V minimum for "ON" state and a maximum of 30V for "OFF" state.

b. One input shall able to be set by a jumper to be a Hardware Enable. In this state, no microprocessor control is involved with disabling the drive outputs.

c. Three (3) relay outputs, (1 form-C, 1 form-B, 1 form-A). Contact output ratings 240Vac/30Vdc, and require a 10mA minimum clearing current. Relays are programmable to 57 different conditions. All outputs shall have timers that control the amount of time before an output changes state. All outputs shall have an on-delay and off-delay timers relative to the function assigned to the input.

N. Features:

1. Acceleration/Deceleration: Accel/Decel settings provide separate adjustments to allow either setting to be adjusted from 0.0 seconds to 3276.7 seconds. A second set of remotely selectable Accel/Decel settings is accessible through digital inputs. Programming capability allows the user to produce acc/dec profiles with linear or "S-Curve" characteristics that provide changing accel/decel rates. S-Curve profiles are adjustable.

2. Adjustments: The digital interface is used for all set-up, operation and adjustment settings. All adjustments are stored in nonvolatile memory (EEPROM). No potentiometer adjustments are used. The drive provides EEPROM memory for factory default values and user stored drive configurations.

3. Auto Economizer: This feature automatically reduces the output voltage when the drive is operating in an idle mode (drive output current less than programmed motor FLA). The voltage is reduced to minimize flux current in a lightly loaded motor thus reducing kW usage. If the load increases, the drive will automatically return to normal operation.

4. Auto / Manual Mode: The HIM can utilize the ALT function key to transfer the drive from Automatic mode to Manual mode and back. When in Auto mode, the drive receives its frequency command from the programmed source. When in Manual mode, control of the frequency command is transferred to the HIM speed control keys (or potentiometer). The user has the choice of preloading the HIM with the current “auto” frequency reference before transferring control to allow for smooth transitions without speed “jumps”.

5. Auto Restart: The drive provides up to nine automatic fault reset and restarts following a fault condition before locking out and requiring manual restart. The automatic mode is not applicable to a ground fault,

shorted output faults and other internal microprocessor faults. The time between restarts is adjustable from 0.5 seconds to 30.0 seconds.

6. Bus Regulation: DC Bus regulation is available to reduce the possibility of drive overvoltage trips due to regenerative conditions. The drive's reaction to a Bus voltage increase is programmable to one of 4 options.

7. Communications Interface: The drive has the capability for either internally mounted or externally mounted communications interface cards. Internal cards use drive power and can operate at higher speeds. Externally mounted cards are separately powered and connected to the drive via a cable.

8. Control Mode: Programming provides the ability to select either Sensorless Vector or V / Hz mode. The sensorless vector mode uses motor nameplate data plus motor operating data such as IR drop, nominal flux current and flux up time to tune the motor / drive for optimum torque performance. The volts per hertz mode can be programmed straight line, pre programmed fan curve or full custom patterns.

9. Current Limit: Programmable current limit from .1 amps to 150% of drive rated amps. Current limit is active for all drive states; accelerating, constant speed and decelerating. Both the source of the current limit value and the gain for responsiveness adjustment are programmable. The drive employs PI regulation with an adjustable gain for smooth transition in and out of current limit.

10. Fault Memory: The last eight fault codes with respective times are stored in the fault buffer. In addition, information about the drive's condition at the time of the last fault such as operating frequency, output current, dc bus voltage and 28 other status conditions are stored at the time of fault. Information is maintained in the event of a power loss. A power up marker is also provided at each power up time to aid in analyzing fault data. The last eight alarm codes are also stored, without time stamp for additional troubleshooting reference.

11. Flying Start: The drive is capable of determining the speed and direction of a spinning motor and adjusts its output to "pick-up" the motor at the rotating speed.

12. Inertia Ride Through: The drive can respond to a loss of AC input power by adjusting the output frequency to create a regenerative situation in the motor. This regenerated energy recaptures the mechanical energy and converts it to electrical energy to power the drive logic during the power outage. This allows the drive to retain control of the motor during the power outage. Performance is based on the amount of system inertia and the length of the outage. The bus voltage level required to trigger inertia

ride through is adjustable. Inertia Ride Through can be enabled or disable via programming.

13. Memory Storage: The drive stores the factory default settings in non-volatile memory (EEPROM) so that the user can return the drive to a known state. Additional memory storage locations in the drive, known as User Sets can also be stored in the drive's non-volatile memory. Three User Set locations are offered. The user can name the sets per the process / application and recall the configuration to active drive memory as needed.

14. Motor Overload Protection: The drive will provide Class 10 motor overload protection investigated by UL to comply with N.E.C. Article 430. Overload protection is speed sensitive and adjustable. To accommodate a variety of motors with different speed range capabilities, the frequency at which the overload begins to derate is programmable. A parameter is available to directly read the level of accumulated overload.

15. Process PI Control: The internal process PI regulator has proportional and integral gain adjustments as well as error inversion and output clamping functions. The feedback can be configured for normal or square root functions. If the feedback indicates that the process is moving away from the setpoint, the regulator will adjust the drive output until the feedback equals the reference. Process control can be enabled or disabled with a hardwired input. Transitioning in and out of process control can be tuned for faster response by preloading the integrator. Protection is provided for a loss of feedback or reference signal. A signal can also be provided to indicate that excess error exists.

16. Ride Through: The control logic is capable of "riding through" a power outage of at least 2 seconds in duration. The inverter section is shut off after a 28% drop in bus voltage to conserve power for the drive logic. The ride through method and trigger point are adjustable by the user.

O. VFD Enclosures:

1. VFDs shall be provided as Packaged/Configured Drives.

2. Unit shall be wall or floor mountable and be NEMA type 12 rated.

3. Unit shall be provided with lockable Main Input Fused Disconnect.

4. The enclosures shall be provided with an input Line Reactor with an Impedance rating of 3% for voltage transient protection, and for a degree of protection from harmonic distortion.

5. The VFD enclosures for the larger 110hp drives shall be provided with an integral Harmonic Filter in lieu of a line reactor as specified below.

6. Units shall be provided with door mounted HAND/OFF/AUTO selector switch. The HAND Mode shall provide a local start control. In the AUTO Mode, the start control shall be provided via a remote contact in the SCADA control panel. Provide an extra set of contacts on the selector switch to monitor the switch position via the facilities SCADA control panel.

7. Enclosure shall be provided with a door mounted Operator Interface as follows:

   a. Interface to the drive is provided via a removable Human Interface Module (HIM) with integral display. This unit is a 7 line by 21-character backlit LCD display with graphics capability. It is used to display drive operating conditions, fault / alarm indications and programming information with full text support in multiple languages, including but not limited to English, German, French, Italian, Spanish, Portuguese and Dutch.

   b. The keypads for these include programming keys, drive operating keys (Start, Stop, Direction, Jog and Speed Control), numeric keys for direct entry and an ALT (alternate function) key to allow some of the more common drive programming or operating functions to be accessed directly without knowledge of programming structure. These ALT functions include S.M.A.R.T. Start for fast and easy commissioning, View selection, Auto Manual operation, HIM removal under power, and device selection for programming.

P. Harmonic Filters:

1. Provide Harmonic Filters integral to the drives packages as specified herein.

2. The harmonic filter shall be a Matrix Filter as manufactured by MTE Corporation, General Electric, or approved equal. The filter shall be physically sized to meet all requirements as shown on the Contract Drawings, and be furnished within a panel rated appropriately for the environment being installed.

3. The harmonic filter shall treat all characteristic low frequency harmonics generated by a three phase full wave converter load (5^{th}, 7^{th}, 11^{th}, 13^{th}, etc.).

4. The characteristic harmonics shall be suppressed without need for individual tuning or the requirement to phase shift against other harmonic sources.

5. The harmonic filter shall be a passive series connected low pass filter consisting of an inductor capacitor network. Active electronic components shall not be used.

6. The harmonic filter model supplied shall be capable of feeding a three phase input rectifier with or without line reactors, with or without a DC link choke, with or without a combination line reactor and DC link choke.

7. The harmonic filter shall not resonate with the power distribution system, nor attract harmonics from other sources.

8. The filter shall be suitable for use with either a single nonlinear load or multiple nonlinear loads.

9. The filter shall be listed per UL-508.

10. In the operating range from full load to half load the power factor shall be .98 lagging to .95 leading.

11. The harmonic filter in combination with the variable frequency drive shall meet all requirements specified in IEEE 519 for individual and total harmonic voltage and current distortion. The PCC for all voltage and current harmonic calculations and measurements shall be the input terminals of the harmonic filter.

12. Total Demand Distortion (TDD) of the current at the input terminals of the harmonic filter shall not exceed the limits defined in Table 10-3 of IEEE 519.

13. Total Harmonic Voltage Distortion (THVD) shall meet the requirements of Table 10-2 of IEEE-519. The harmonic filter supplier shall not be responsible for pre-existing voltage distortion caused by other harmonic sources.

14. The harmonic filter shall suppress the characteristic harmonics to the levels specified in paragraph " K" provided that the line voltage unbalance is between 0% and 1%. If the line voltage unbalance is between 1% and 3% per ANSI C84.1-1995 the total harmonic input current distortion at any reduced load or speed condition shall not exceed the full load THID by more than 50% (i.e. if 5% THID required at full load, then not more than 7.5% THID at reduced load when voltage unbalance is more than or equal to 1% and less than or equal to 3%)

15. The full load efficiency of the harmonic filter shall be greater than 98%.

16. When fed from a power distribution system operating at the nominal distribution voltage, the harmonic filter output voltage at no load shall not be more than 4.6% of the nominal RMS and peak distribution voltage.

17. When fed from a power distribution system operating at the nominal distribution voltage, the harmonic filter output voltage at full load shall not be less than the nominal RMS utilization voltage.

18. All wiring shall be copper.

19. At no load the harmonic filter shall not cause the voltage at the PCC to rise by more than 2%.

20. To assure that the voltage source PWM inverters do not experience over voltage trips, the harmonic filter shall not cause the inverter bus voltage to increase by more than 5% when the filter is operating from the nominal distribution voltage.

21. To assure that the filter will not reduce the life of a voltage source inverters bus capacitor, the output current waveform of the harmonic filter and the input current waveform of the inverter shall be consistent with the input waveform of an inverter fed from a drive equipped with a 3% minimum impedance line reactor.

22. The harmonic filter shall be furnished will an integral output contactor. The output contactor shall have a 120Vac coil, and be energized upon the startup of the associated VFD.

23. The harmonic filter shall be handled, stored, and installed in accordance with the manufacturer's recommended installation practices as found in the manufacturer's User Manual. Installation shall comply with all applicable local codes.

24. To assure quality control and proper performance, the filter shall be manufactured by an ISO9001:2000 supplier in the supplier's own manufacturing facility, and not by a contract manufacturer. Filters shall be fully tested prior to shipment.

25. The harmonic filter shall be warranted to be free of defects in materials and workmanship for a period of one year from the date of shipment when applied in accordance with the manufacturer's recommended installation procedures.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Examine areas and conditions under which VFDs are to be installed, and notify the Engineer in writing of conditions detrimental to proper completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

B. Per NEMA ICS 3.1, install equipment in accordance with the approved manufacturer's printed installation drawings, instructions, wiring diagrams, and as indicated on project drawings and the approved shop drawings. A field representative of the VFD manufacturer shall supervise the installation of all equipment, and wiring.

C. Certified factory start-up shall be provided for each VFD provided. Service engineers shall be employed by the manufacturer or be certified by the manufacturer and provide start-up services including physical inspection of drive and connected wiring and final adjustments to meet specified performance requirements.

D. Make equipment grounding connections for each VFD in accordance with all applicable codes and as recommended by the manufacturer.

E. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and B, and the MEC.

F. Wall-mount the enclosures using spacers or standoffs (1/4 inch minimum).

G. The VFD’s shall be warranted by the manufacturer for a period of one year, or the contracted period of any extended warrantee agreed upon by the Owner, after successful completion of the acceptance test. Any component failing to perform its function as specified and documented shall be repaired or replaced by the Contractor at no additional cost to the Owner.

3.02 FIELD QUALITY CONTROL

A. Prior to energizing motor controller equipment, check with ground resistance tester, phase-to-phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.

B. Prior to energizing, check circuitry for electrical continuity, and for short circuits.

END OF SECTION

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SECTION 26 32 13.13

AUTOMATIC TRANSFER SWITCH
(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. The Work included under this section shall include the installation of one automatic transfer switch for the existing Olympian generator.

2. The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install an automatic transfer switch in accordance with the plans and as specified herein. The Work shall include but not be limited to the following:

   a. Automatic Transfer switch.

B. Related Requirements

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
3. Section 26 05 26 - Grounding and Bonding for Electrical Systems
4. Section 26 05 34 - Raceways, Boxes and Supporting Devices
5. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems
6. Section 26 21 00 - Low-Voltage Electrical Service Entrance
7. Section 26 27 00 - Low-Voltage distribution Equipment
8. Section 26 27 26 - Wiring Devices
9. Section 26 28 16 - Enclosed Switches & Circuit Breakers
10. Section 26 29 13 - Enclosed Controllers
11. Section 26 29 23 - Variable Frequency Motor Controllers
12. Section 26 33 63 - Uninterruptible Power Supply
13. Section 26 50 00 - Lighting

1.02 QUALITY ASSURANCE

A. Reference Standards

1. National Electrical Code (NEC) Compliance. NEC Article 700.

2. American National Standards Institute National Electrical Manufacturers Association (ANSI/NEMA) Compliance. ANSI/NEMA MG 1.

3. Institute of Electrical and Electronic Engineers (IEEE) Compliance. IEEE Standard.

4. State and Local Code Compliance. All applications, permits, fees, and licenses for the installation shall be submitted, secured, and paid for by the Contractor.

5. UL 2200 requirements.

6. NFPA 110 Compliant.

B. Qualifications

1. Firms regularly engaged in manufacture of automatic transfer switches with types, ratings, and characteristics indicated herein and on the Drawings.

C. General Requirements

1. It is the intent of this specification to secure an automatic transfer switch that has been tested during design verification, production and at the final job Site. All finished equipment shall be of the latest commercial design and shall be complete with all of the necessary accessories for complete installation as shown on the plans, Drawings, and as specified herein. The equipment supplied and installed shall meet the requirements of the National Electrical Code, along with all applicable local code and state regulations. All equipment shall be new and of current production of a national firm that manufactures automatic transfer switches with controls, and assembles them as a complete and coordinated system. There shall be only one source responsibility for the warranty, parts, and service through a local representative with factory-trained servicemen.

PART 2 – PRODUCTS

2.01 AUTOMATIC TRANSFER SWITCH

A. An automatic transfer switch with number of poles, voltage and current ratings as shown on the plans and specified herein shall be provided for the existing generator. The ATS shall consist of a power transfer switch unit and a control module interconnected to provide complete automatic operation. All equipment shall be new and of current production by an international firm which manufactures the generator, controls, and transfer switch. The company selected will assemble the standby generator set and transfer switch as a matched unit so

that there is one-source responsibility for warranty, parts and service through a local representative with factory-trained personnel.

B. Electrical Requirements:

1. Automatic transfer switches shall be designed for continuous duty.

2. The automatic transfer switch shall be rated in amperes for total system transfer including control of motors, electric-discharge lamps, electric heating, and tungsten-filament lamp load. Switches rated 400 amperes and below shall be suitable for 100% tungsten-filament lamp load. Switches rated above 400 amperes shall be suitable for 30% tungsten-filament load.

3. The automatic transfer switch shall be rated to withstand the rms symmetrical short circuit current available at the automatic transfer switch terminals, with the type of overcurrent protection shown on the plans.

C. The transfer switch shall have the following characteristics:

1. Voltage and Current rating as indicated on the Drawings.
2. 3 Pole.
3. 4 wire, 3 phase.
4. Solid Neutral.
5. The withstand and closing ratings with a current-limiting fuse shall be 200,000 Amps.
6. The withstand and closing ratings with any overcurrent protective device shall be 10,000 Amps.
7. NEMA 1 Gasketed Enclosure.
8. The switch shall be a 600 volt class.

D. Mechanical Requirements:

1. All main contacts shall be of silver composition. The main contacts shall be protected by arcing contacts in sizes 400 amperes and above. The main contacts shall be of the blow-on configuration and of segmented construction in ratings 600 amperes and above.

2. All contacts, coils, springs, and control elements shall be conveniently removable from the front of the transfer switch without major disassembly or disconnection of power conductors.

3. The contact transfer time shall not exceed one-sixth of a second.

4. All moveable parts of the operating mechanism shall remain in positive mechanical contact with the main contacts during the transfer operation without the use of separate mechanical interlocks.

5. All contacts, coils, springs, and control elements shall be conveniently removable from the front of the transfer switch without major disassembly or disconnection of power conductors.

6. The neutral conductor shall be solidly connected as shown on the plans, a neutral conductor terminal plate with fully rated AL-CU pressure connectors shall be provided.

E. Transfer Switch Control System:

1. The control module shall direct the operation of the transfer switch. The module's sensing and logic shall be a built-in microprocessor-based system for maximum reliability, minimum maintenance, and inherent digital communications capability. The control settings shall be stored in nonvolatile EEPROM. The module shall contain an integral programmable clock and calendar. The control module shall have a keyed disconnect plug to enable the control module to be disconnected from the transfer mechanism for routine maintenance. The control module shall be mounted separately from the transfer mechanism unit for safety and ease of maintenance. Interfacing relays shall be industrial control grade plug-in type with dust cover.

2. The control module shall include programming keypad, alphanumeric display for monitoring settings and diagnostic values, key-lockable program selector switch, light-emitting diode status indication, and user instructions. These features shall be user accessible when the enclosure door is closed.

3. The control module shall be capable of storing the following records in memory for access either locally (at the control module) or remotely (at a computer):

   a. Number of hours transfer switch is in the emergency position (total and since record reset)

   b. Number of hours the emergency is available (total and since record reset)

   c. Total days that control has been energized (total and since record reset)

   d. Total transfers in either direction (total and since record reset)

   e. Date of record reset

   f. Date of last exercise period

g. Date, time, and description of the last four source failures

h. Elapsed time during the most recent source outage

F. Transfer Switch Operation & Accessories

1. The voltage of each phase of the normal source and a single phase of the emergency source shall be monitored with pickup adjustable from 75% to 100% and dropout adjustable from 70% to 95% of nominal. Adjustment must be digital. An automatic minimum differential of 2% shall be maintained between pickup and dropout settings. Repetitive accuracy of the setting shall be ±2% or better over an operating temperature range of -20oF to 150oF (-29oC to 65.5oC). The settings shall be fully field-adjustable by keypad or keyboard (local or remote) in increments of 1 Volt without opening the enclosure door and without the use of special tools or separate meters. Factory settings shall be pickup at 90% and dropout at 85%. A light-emitting diode shall indicate that normal and/or emergency voltage is within the set point parameter. The indication shall be viewable when the enclosure door is closed.

2. The control module shall include four time delays that are fully field-adjustable by keypad or keyboard in increments of 1 second over the entire range. Adjustments and viewing of the time delay values shall be accessible when the enclosure door is closed. Light emitting diodes shall indicate when the timing feature is running and when the time delay has ended. Required time delays shall be as follows: Input values outside the allowable parameters shall cause a "range error" message to be displayed.

   a. Time delay for engine start to delay initiation of transfer for momentary source outages: Range 0-6 seconds. Factory set at 5 seconds.

   b. Time delay for transfer to emergency: Range 0-5 minutes. Factory set at 5 seconds.

   c. Time delay for transfer back to normal: Range 0-30 minutes. Factory set at 5 seconds.

   d. Time delay for engine cool-down: Range 0-30 minutes. Factory set at 5 seconds.

3. The user shall have the ability to manually program an engine start and run for a period of up to 72 hours in the loaded or unloaded mode of operation. The time delay transfer to emergency and/or normal may be bypassed during the run period. A numeric indication shall be displayed of the run time remaining in hours and minutes. The run period may be stopped at any time with a single keystroke. After the run period has stopped, the engine shall run unloaded for the cool-down time.

4. User terminals shall be available to connect a normally closed contact that, when opened, signals the control module to start and transfer load to the

engine-generator. Closing these contacts shall initiate a retransfer and engine cool-down sequence. The load shall be transferred to an available utility source immediately if the generator source should fail.

5. The following features shall be built into the control module logic. These features shall be enabled at the factory or in the field by installing an insulated program jumper provided by the vendor as standard.

   a. Anti-single phasing protection shall detect regenerative voltage as a failed source condition.

   b. In-phase monitoring shall continuously monitor the contactor transfer times, source voltage, frequency and phase angle to provide a self-adjusting, zero crossing contactor transfer signal.

   c. Manual operation override shall function to bypass any manual switch accessories if the source to which the transfer switch is positioned fails. This program jumper shall be factory installed.

   d. Plant Exerciser: Programmable seven-day, fourteen-day or calendar exerciser. Each exerciser mode shall be capable of performing up to two exercise runs in up to five exercise event periods. The exerciser period shall be programmed with the enclosure door closed. The exercise time may be reset at any time with a single keystroke. The engine shall be allowed to run when the exercise period is terminated.

   e. All phases of normal and all or single phases of emergency shall be monitored for overvoltage and single phase of normal and emergency for over- and under-frequency. The values shall be programmed with the enclosure door closed.

   f. Extended Time Delay: Allows the time delay settings to be extended to 99 minutes.

6. Light emitting diodes shall indicated the following:

   a. Contactor Position

   b. Transfer Switch Position Sensing Fault

   c. Transfer Switch Fail to Transfer

   d. Internal Control Module Fault

   e. Manual Transfer Operation

   f. External Fault Condition (two inputs)

   g. ATS in Normal

   h. ATS in Emergency

i. Generator Running

j. Generator Fault

k. Programming Switch Not In Off

l. The system status messages shall also be shown on the alphanumeric display.

m. A lamp test push button shall light all light-emitting diodes.

7. The control module shall have a three-position, key-operated, programming control switch. The key shall be removable in any position. The positions shall be:

a. Off--Allows all enabled accessories to be monitored only. Settings cannot be changed while in this position.

b. Local--Allows all enabled accessory settings to be changed by local keypad entry.

c. Remote--Allows all enabled accessories to be altered via the remote communications port.

8. A momentary-type test switch shall be provided to simulate a normal source failure.

9. The transfer switch shall be able to control up to 12 isolated form C auxiliary contacts rated 5A, 120/240VAC resistive and shall have the following user programmable functions:

a. Utility available (within voltage, frequency & phase balance limits)

b. Generator source available (within voltage, frequency & phase balance limits)

c. Second engine start contact

d. Utility and Generator sources available

e. Transfer Fail

f. Load on Generator

g. Load on Utility

h. Load Shed

i. Generator Failure

j. Generator Running

k. ATS in normal

l. ATS in emergency

10. A set of gold-flashed contacts rated 10 amps, 28VDC shall be provided for a low-voltage engine start signal when the normal source fails.

2.02 ACCEPTABLE MANUFACTURERS

A. Caterpillar Transfer Switch - Model CTG

B. Russ Electric

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install transfer switch, including associated control devices as indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that transfer switch comply with requirements. Comply with applicable requirements of NEC and NFPA pertaining to wiring practices and installation of transfer switch.

B. Provide and install housekeeping pads for all floor mounted transfer switches.

C. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and 486B.

3.02 GROUNDING

A. Provide equipment grounding connections for transfer switch units as indicated. Tighten connectors to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounding.

3.03 FIELD QUALITY CONTROL

A. Test transfer switch, by means of simulated power outage; automatic start-up by remote automatic starting, transfer of load and automatic shutdown. Prior to these tests, adjust transfer switch timers for proper system coordination.

3.04 TRAINING

A. Train Owner's personnel in procedures for starting up, testing, and operating transfer switches and auxiliary equipment and required NFPA documentation.

END OF SECTION

SECTION 26 33 63

UNINTERRUPTIBLE POWER SUPPLY (UPS) SYSTEM (FILED SUB BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Furnish, install and test the Uninterruptible Power Supply (UPS) systems as shown on the Drawings and as specified herein.

B. Related Requirements

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
3. Section 26 05 26 - Grounding and Bonding for Electrical Systems
4. Section 26 05 34 - Raceways, Boxes and Supporting Devices
5. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems
6. Section 26 21 00 - Low-Voltage Electrical Service Entrance
7. Section 26 27 00 - Low-Voltage distribution Equipment
8. Section 26 27 26 - Wiring Devices
9. Section 26 28 16 - Enclosed Switches & Circuit Breakers
10. Section 26 29 13 - Enclosed Controllers
11. Section 26 29 23 - Variable Frequency Motor Controllers
12. Section 26 32 13.13 - Automatic Transfer Switch
13. Section 26 50 00 - Lighting

1.02 SUBMITTALS

A. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:

1. Equipment outline drawings showing elevation and plan views, dimensions and weight. Indicate all options, special features, ratings and deviations from this Section.

2. Conduit entrance drawings.

3. Product data sheets.

4. Wiring Diagrams.

5. Local sources for service and supply.

6. System Description.

7. Instructions and renewal parts books.

8. Itemized list of spare parts tailored specifically for this project, including quantities, description, part numbers, cost and lead time.

9. Test and inspection reports.

10. Complete bill of materials list.

11. The equipment drawings, wiring diagrams, spare parts list and bill of materials list shall be computer generated (i.e. no hand drawings, sketches, or lists will be acceptable).

12. Factory representative's certification of proper installation and operation of equipment.

B. REFERENCE STANDARDS

1. Uninterruptible Power Supply systems shall be designed, built and tested in accordance with the following;

   a. Institute of Electrical and Electronics Engineers, Inc.

   b. (IEEE): ANSI/IEEE 519, "Guide for Harmonic Control and Reactive Compensation of Static Power Converters" (copyrighted by IEEE, ANSI approved).

   c. International Organization for Standardization (ISO): ISO 9001, "Quality Management Systems Requirements."ISO 14001,“Environmental Management Systems Requirements With Guidance for Use.”

   d. Underwriters Laboratories, Inc. (UL): UL 1778, "Standard for Uninterruptible Power Supply Equipment" (copyrighted by UL, ANSI approved).

2. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

C. SPARE PARTS

1. Provide the following spare parts in the quantities specified:

   a. 100 percent replacement fuses, all types and sizes.

2. Spare parts shall be boxed or packaged for long term storage. Identify each item with manufacturers name, description and part number on the exterior of the package.

D. ENVIRONMENTAL RATINGS

1. The UPS shall be capable of withstanding any combination of the following environmental conditions in which it must operate without mechanical or electrical damage, or degradation of operating characteristics.

a. Storage Ambient Temperature: 30°C (22°F) to 70°C (158°F) without internal battery; 15°C (5°F) to 40°C (113°F) with internal batteries.

b. Operating Ambient Temperature: 0°C (32°F) to 40°C (104°F) (25°C [77°F] is ideal for most battery types).

c. Relative Humidity: 0% to 95% non condensing.

d. Altitude: Maximum installation with no derating of the UPS output shall be 1000 m (3281 ft) above sea level.

e. Audible Noise: The UPS shall not produce audible noise at a distance of 1 m (39 in) in excess of the following: 15 kVA: 51.3 dBA.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Acceptable Manufacturers:

1. Eaton Electrical Inc.

2. APC (MGE Galaxy 3500)

3. Or equal.

B. System Description

1. The UPS shall be sized for 20 kVA and 16 kW load.

2. The UPS battery shall be sized for 16 kW at a power factor of 60 minutes.

C. System Characteristics:

1. System Capacity: The system shall be rated in the following size:20kVA/16 kW.

2. AC Input Nominal Voltage: 208 volts, three phase, 4 wires plus ground, 60 Hz.

3. AC Input Voltage Window: +15%, 20% of nominal (while providing nominal charging to the battery system).

4. Short Circuit Withstand Rating: 30,000 symmetrical amperes.

5. Maximum Frequency Range: 40 to 70 Hz.

6. Input Power Factor: 0.98 for loads greater than 50%, 0.95 for loads greater than 15%.

7. Input Current Distortion With No Additional Filters: Less than 5% at 100% load.

8. Soft-Start: Shall be linear from 0% to 100% input current and shall not exhibit inrush. This shall take place over a 15 second time period when transferring from battery operation to mains operation.

9. AC Output Nominal Output: 208/120 volts, three phase, 4 wires plus ground, 60 Hz.

10. AC Output Voltage Regulation: ±1% for 100% linear or non linear load.

11. Voltage Transient Response: ±5% maximum for 100% linear load step.

12. Voltage Transient Recovery: Within less than 60 milliseconds.

13. Output Voltage Harmonic Distortion: Less than 1.5% THDU maximum for a 100% linear load, Less than 3.5% THDU maximum for a 100% non linear load.

14. Phase Angle Displacement:

    a. 120 degrees ±0.1 degree for balanced load.

    b. 120 degrees ±0.1 degree for 50% imbalanced load.

    c. 120 degrees ±0.3 degrees for 100% imbalanced load.

15. Phase Angle Displacement:

    a. 120 degrees ±0.1 degree for balanced load.

    b. 120 degrees ±0.1 degree for 50% imbalanced load

    c. 120 degrees ±0.3 degrees for 100% imbalanced load.

16. Overload Rating:

17. Normal Operation:

    a. 150% for 1 minute.

    b. 125% for 10 minutes.

    c. 100% continuous.

18. Bypass Operation:

    a. 110% continuous.

    b. 800% for 500 milliseconds.

19. System AC AC Efficiency: Greater than 93% at full load with 208 volt supply.

20. Output Power Factor Rating: 0.8 at full load.

21. Slew Rate: 0.25 to 1 Hz/second.

2.02 MODES OF OPERATION

A. Normal: The input converter and output inverter shall operate in an on line manner to continuously regulate power to the critical load. The input and output converters shall be capable of full battery recharge while simultaneously providing regulated power to the load for all line and load conditions within the range of the UPS specifications.

B. Battery: Upon failure of the AC input source, the critical load shall continue being supplied by the output inverter, which shall derive its power from the battery system. There shall be no interruption in power to the critical load during both transfers to battery operation and retransfers from battery to normal operation.

C. Recharge: Upon restoration of the AC input source, the UPS shall simultaneously recharge the battery and provide regulated power to the critical load.

D. Static Bypass: The static bypass shall be used to provide transfer of critical load from the inverter output to the bypass source. This transfer, along with its retransfer, shall take place with no power interruption to the critical load. In the event of an emergency, this transfer shall be an automatic function. The UPS shall be able to recharge the batteries while supplying full power to the load via the static bypass switch.

E. Internal Mechanical Bypass: As a standard feature, the UPS shall be equipped with an internal, make before break, bypass switch. This switch shall mechanically bypass the UPS for times where maintenance is required.

F. External Maintenance (Wrap Around) Bypass: As an option for a single UPS unit, the system may be equipped with an external MBC to electrically isolate the UPS during routine maintenance and service of the UPS. The MBC shall completely isolate both the UPS input and output connections. The MBC shall be used for paralleling of multiple UPS units.

2.03 INPUT POWER CONVERTER

A. General: The input power converters of the system shall constantly control the power imported from the mains input of the system, to provide the necessary UPS power for precise regulation of the DC bus voltage, battery charging, and main inverter regulated output power.

B. Input Current Total Harmonic Distortion: The input current THDI shall be held to 5% or less at full system load, while providing conditioned power to the critical load bus, and charging the batteries under steady state operating conditions. This shall be true while supporting loads of both a linear or non linear type. This shall be accomplished with no additional filters, magnetic devices, or other components.

C. Soft Start Operation: As a standard feature, the UPS shall contain soft start functionality, capable of limiting the input current from 0% to 100% of the nominal input over a default 15 second period, when returning to the AC utility source from battery operation. The change in current over the change in time shall take place in a linear manner throughout the entire operation (di/dt = constant).

D. Magnetization Inrush Current: The UPS shall exhibit 0 inrush current as a standard product. If provided with an optional isolation transformer, inrush shall be limited to six times the nominal input current of the transformer.

E. Input Current Limit: The system input current limit, shall be designed to provide 100% load while fully charging the batteries at 10% of the system rating. The system shall be capable of this with up to a +15%, 20% variation of the nominal input voltage.

F. Charging:

1. The battery charging shall keep the DC bus float voltage of ±220 volts, ±1%.

2. The battery charging circuit shall contain a temperature compensation circuit, which shall regulate the battery charging to optimize battery life.

3. The battery charging circuit shall remain active when in static bypass and in normal operation.

4. The UPS shall be capable of limiting the energy sourced from the mains for purposes of battery charging. As a default setting, the battery charge

energy shall be set to 100% of its nominal value. When signaled by a dry contact, (such as from an emergency generator) the UPS shall be capable of limiting the battery charge energy taken from the mains. This shall take place in Owner selectable increments of 75%, 50%, 25%, 10% and 0% of the nominal charge power. The selection shall be made from the UPS front panel display/control unit.

G. Back Feed Protection: The logic controlled input contactor shall provide the back feed protection required by UL 1778.

2.04 OUTPUT INVERTER

A. General: The UPS output inverter shall constantly recreate the UPS output voltage waveform by converting the DC bus voltage to AC voltage through a set of IGBT driven power converters. In both normal operation and battery operation, the output inverters shall create an output voltage independent of the mains input voltage. Input voltage anomalies such as brown outs, spikes, surges, sags, and outages, shall not affect the amplitude or sinusoidal nature of the recreated output voltage sine wave of the output inverters.

B. Overload Capability: Steady state overload conditions, of up to 150% of system capacity, shall be sustained by the inverter for 60 seconds in normal and battery operation. Overloads of 125% shall be sustainable by the inverter for up to 10 minutes. Should overloads persist past the outlined time limitation; the critical load shall be switched to the automatic static bypass output of the UPS.

C. Output Contactor: The output inverter shall be provided with an output mechanical contactor to provide physical isolation of the inverter from the critical bus. With this feature a failed inverter shall be removed from the critical bus.

D. Battery Protection: The inverter shall be provided with monitoring and control circuits to limit the level of discharge on the battery system.

2.05 STATIC BYPASS

A. General: As part of the UPS, a system static bypass switch shall be provided. The system static bypass shall provide no break transfer of the critical load from the inverter output to the static bypass input source during times where maintenance is required, or the inverter can not support the critical bus. Such times may be due to prolonged or severe overloads, or UPS failure.

B. Design: The design of the static switch power path shall consist of silicon controlled rectifiers (SCR) with a continuous duty rating of 110% of the UPS output rating.

C. Automatic Transfers: An automatic transfer of load to static bypass shall take place whenever the load on the critical bus exceeds the overload rating of the UPS. Automatic transfers of the critical load from static bypass back to normal

operation shall take place when the overload condition is removed from the critical bus output of the system. Automatic transfers of load to static bypass shall also take place if for any reason the UPS cannot support the critical bus.

D. Manual Transfers: Manually initiated transfers to and from static bypass shall be initiated through the UPS display interface.

E. Overloads: The static bypass shall be rated and capable of handling overloads equal to or less than 110% of the rated system output continuously. For instantaneous overloads caused by inrush current from magnetic devices, or short circuit conditions, the static bypass shall be capable of sustaining overloads of 800% of system capacity for periods of up to 500 milliseconds.

F. System Protection: As a requirement of UL 1778, back feed protection in the static bypass circuit shall also be incorporated in the system design. To achieve back feed protection, a mechanical contactor in series with the bypass SCR(s) shall be controlled by the UPS/static switch, to open immediately upon sensing a condition where back feeding of the static switch by any source connected to the critical output bus of the system is occurring. One such condition could be a result of a shorted SCR.

2.06 INTERNAL MECHANICAL BYPASS

A. The UPS shall be equipped with an internal make before break bypass switch to isolate the UPS during times where maintenance is required.

2.07 DISPLAY AND CONTROLS

A. Display Unit: A microprocessor controlled display unit shall be located on the front of the system. The display shall consist of an alphanumeric display with backlight, an alarm LED, and a keypad consisting of pushbutton switches.

B. Metered Data: The following metered data shall be available on the alphanumeric display:

1. Year, month, day, hour, minute, second of occurring events.

2. Source input voltage.

3. Output AC voltage.

4. Output AC current.

5. Input frequency.

6. Battery voltage.

7. Highest internal battery temperature.

C. Event Log: The display unit shall allow the Owner to display a time and date stamped log for the 64 most recent status and alarm events.

D. Alarms: The display unit shall allow the Owner to display a log of all active alarms. The following minimum set of alarm conditions shall be available:

1. Static bypass switch on.
2. EPO active.
3. Mechanical bypass activated.
4. External bypass switch (Q3) activated.
5. Battery discharged.
6. Return from low battery.
7. Low battery.
8. Load not powered from UPS.
9. UPS in bypass.
10. Runtime calibration aborted.
11. Runtime calibration started.
12. Runtime calibration complete.
13. Battery self test aborted.
14. Battery self test started.
15. Battery self test completed.
16. Number of battery modules decreased.
17. Number of battery modules increased.
18. Fan fault.
19. SBS fault.
20. System not in sync.
21. Bypass not available, frequency/voltage out of range.
22. Mains voltage/frequency out of range.

23. Site wiring fault.

24. Low battery voltage shut down.

25. XR battery breaker or fuse open.

26. Defective battery detected.

27. Runtime is below alarm threshold.

28. Load is above alarm threshold.

29. Battery over voltage warning.

30. Battery over temperature warning.

31. Emergency power supply fault.

32. Output overloaded.

E. Controls: The following controls or programming functions shall be accomplished by use of the display unit. Pushbutton membrane switches shall facilitate these operations.

1. Silence audible alarm.

2. Set the alphanumeric display language.

3. Display or set the date and time.

4. Enable or disable the automatic restart feature.

5. Transfer critical load to and from static bypass.

6. Test battery condition on demand.

7. Set intervals for automatic battery tests.

8. Adjust set points for different alarms.

9. Program the parameters for remote shutdown.

F. Front Panel Interface: The following shall make up the UPS front panel user interface.

1. Indicating LED's:

a. Load On: When green, this LED shall indicate the load is being supported by the UPS output.

b. On Battery: When yellow, this LED shall indicate the UPS is running from battery power.

c. Bypass: When yellow, this LED shall indicate the load is being supported by static bypass/mechanical bypass.

d. Fault: When red, this LED shall indicate there is a fault condition present in the UPS.

2. Pushbutton User Controls:

a. Up arrow.

b. Down arrow.

c. Help key.

d. Escape key.

e. Enter key.

G. Communication Interface: For purposes of remote communications with the UPS the following shall be available and contained within the UPS on a removable, hot swappable smart slot Web/SNMP Network interface card:

1. RJ 45 interface port for remote communications with a network via web browser or SNMP, or APC StruXureware management platform.

2. Environmental monitoring feature, capable of locally monitoring temperature and humidity as well as one additional generic set of Owner determined dry contacts capable of taking an input signal from any APC or third party on/off signal, such as water detection, smoke detection, motion, or fire detection.

3. Two dry alarm contacts for monitoring UPS fault and Low Battery through the facility Scada system.

2.08 BATTERY

A. The UPS battery shall be of modular construction made up of Owner replaceable, hot swappable, fused, battery modules. Each battery module shall be monitored to determine the highest battery unit temperature for use by the UPS battery diagnostic, and temperature compensated charger circuitry.

B. The battery jars housed within each removable battery module shall be of the valve regulated lead acid (VRLA) type.

2.09 ACCESSORIES

A. Extended Runtime (XR) Option:

1. For purposes of extending the UPS battery runtime, external extended runtime options shall be available. The extended runtime option shall be housed in line up and match type enclosures and shall contain necessary hardware and cables to connect to the UPS, or between XR enclosures. Each XR enclosure shall be equipped with removable, hot swappable, battery units housed in draw out cartridges.

2. The extended runtime system shall have a 250 volts DC rated, thermal magnetic trip molded case circuit breaker. Each circuit breaker shall be equipped with shunt trip mechanisms and 1A/1B auxiliary contacts. The circuit breakers shall be equipped as part of a line up and match type battery enclosure.

B. Maintenance Bypass Cabinet (MBC):

1. The MBC shall provide power to the critical load bus from the bypass source, during times where maintenance or service of the UPS is required. The MBC shall provide a mechanical means of complete isolation of the UPS from the electrical wiring of the installation. The MBC shall be constructed in a freestanding or wall mounted NEMA 1 enclosure unless otherwise stated in this Section.

2. As a minimum, the MBC shall contain the following features and accessories:

a. Circuit breakers of the appropriate size and withstand rating (maximum 25 kAIC rating), for the system.

b. Minimum 1A/1B auxiliary contacts for the purpose of relaying status information of the maintenance bypass circuit switch to the UPS.

c. The MBC shall be available in a minimum of two distinct types:

d. Wall mount, three breaker, NEMA 1 enclosure.

3. The MBC shall carry a UL 1778 agency listing.

C. Software and Connectivity:

1. Network Adaptor: The ethernet web/SNMP adaptor shall allow one or more network management systems (NMS) to monitor and manage the UPS in TCP/IP network environments. The management information base (MIB) shall be provided in DOS and UNIX "tar" formats. The SNMP

interface adaptor shall be connected to the UPS via the RS 232 serial port on the standard communication interface board.

2. Unattended Shutdown: The UPS, in conjunction with a network interface card, shall be capable of gracefully shutting down one or more operating systems during when the UPS is on reserve mode. The UPS shall also be capable of using an RS 232 port to communicate by means of serial communications to gracefully shut down one or more operating systems during an on battery situation.

D. Remote UPS Monitoring: The following three methods of remote UPS monitoring shall be available:

1. Web Monitoring: Remote monitoring shall be available via a web browser such as Internet Explorer.

2. RS 232 Monitoring: Remote UPS monitoring shall be possible via either RS 232 or contact closure signals from the UPS.

3. Simple Network Management Protocol (SNMP): Remote UPS monitoring shall be possible through a standard MIB II compliant platform.

E. Software Compatibility: The UPS manufacturer shall have available software to support graceful shutdown and or remote monitoring for the following systems:

1. Microsoft Windows 95/98/XP.

2. Microsoft Windows NT 4.0 SP6/2000.

3. OS/2.

4. Netware 3.2 – 5.1.

5. MAC OS 9.04, 9.22, 10.

6. Digital Unix/True 64.

7. SGI 6.0-6.5.

8. SCO UNIX.

9. SVR4 2.3, 2.41.

10. SCO Unix Ware 7.0 - 7.11.

11. SUN Solaris 2.6-2.8.

12. SUN OS 4.13, 4.14.

13. IBM AIX 4.3x-4.33g, 5.1.

14. HP-UX 9.x-11.i.

PART 3 – EXECUTION

3.01 INSTALLATION

A. General: Preparation and installation shall be in accordance with reviewed product data, final shop drawings, manufacturer's written recommendations, and as indicated on the Drawings.

B. Factory Assisted Start Up:, Before energizing UPS, a factory trained service personnel shall perform the following inspections, test procedures, and on site training:

1. Visual Inspection:

   a. Inspect equipment for signs of damage.

   b. Verify installation per manufacturer's instructions.

   c. Inspect cabinets for foreign objects.

   d. Inspect battery units.

   e. Inspect power modules.

2. Mechanical Inspection:

   a. Check UPS and external MBC internal power wiring connections.

   b. Check UPS and external MBC terminal screws, nuts, and/or spade lugs for tightness.

3. Electrical Inspection:

   a. Verify correct input and bypass voltage.

   b. Verify correct phase rotation of mains connections.

   c. Verify correct UPS control wiring and terminations.

   d. Verify voltage of battery modules.

   e. Verify neutral and ground conductors are properly landed.

   f. Inspect external maintenance bypass switch for proper terminations and phasing.

4. Site Testing:

   a. Ensure proper system start up.

   b. Verify proper firmware control functions.

   c. Verify proper firmware bypass operation.

   d. Verify proper maintenance bypass switch operation.

   e. Verify system set points.

   f. Verify proper inverter operation and regulation circuits.

   g. Simulate utility power failure.

   h. Verify proper charger operation.

   i. Document, sign, and date test results.

C. On Site Operational Training: During the factory assisted start up, operational training for site personnel shall include, but shall not be limited to, key pad operation, LED indicators, start up and shutdown procedures, maintenance bypass and AC disconnect operation, and alarm information.

PART 4 – FIELD QUALITY CONTROL

4.01

A. Manufacturer Field Service:

1. Worldwide Service: The UPS manufacturer shall have a worldwide service organization available, consisting of factory trained field service personnel to perform start up, preventative maintenance, and service of the UPS system and power equipment. The service organization shall offer 24 hours a day, 7 days a week, 365 days a year service support.

2. Replacement Parts: Parts shall be available through the worldwide service organization 24 hours a day, 7 days a week, 365 days a year. The worldwide service organization shall be capable of shipping parts within four working hours or on the next available flight, so that the parts may be delivered to the Owner within 24 hours.

4.02 WARRANTY

A. All components of the UPS system shall be covered by a standard one-year limited factory warranty and service protection package.

B. One-year limited factory warranty shall include replacement coverage for the UPS parts for a period of 18 months from shipment or 12 months from start-up, whichever occurs sooner.

C. One-year service protection package shall include 7x24 on-site repair/replacement labor for UPS parts and batteries; 7x24 technical support coverage. Standard response time shall be 8 hours from receipt of call. Manufacturer shall also offer, as an option, 7x24 on-site service support with guaranteed response times of 4, or 2 hours in certain major metropolitan areas. Additional preventive maintenance visits shall be available as an option for both UPS and battery components.

D. Manufacturer shall also include Start-up services consisting of: 5x8 Start-up service of UPS and batteries, with option for 7x24 Start-up. On-site user training, Site Audit, installation and commissioning of monitoring service, and validation of one-year limited factory warranty will be performed during the start-up.

E. Manufacturer shall also offer an optional service plan to provide 7x24 on-site coverage (preventive and corrective) for UPS and batteries, guaranteed response time, remote monitoring, Web access to service site history, annual Site Audit, UPS and battery preventive maintenance visit, and discounts on upgrade and modification kits. Manufacturer shall also provide an optional battery service plan to provide parts-and-labor coverage for partial and full battery strings, either with preventive maintenance or replacement coverage.

END OF SECTION

SECTION 26 50 00

LIGHTING
(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Luminaries and lamp holders
2. Exit signs
3. Emergency lighting units
4. Lamps
5. Ballasts
6. Dimming systems
7. Occupancy sensor systems
8. Photocell controls
9. Time switch

B. Related Requirements:

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
3. Section 26 05 26 - Grounding and Bonding for Electrical Systems
4. Section 26 05 34 - Raceways, Boxes and Supporting Devices
5. Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems
6. Section 26 21 00 - Low-Voltage Electrical Service Entrance
7. Section 26 27 00 - Low-Voltage distribution Equipment
8. Section 26 27 26 - Wiring Devices
9. Section 26 28 16 - Enclosed Switches & Circuit Breakers
10. Section 26 29 13 - Enclosed Controllers
11. Section 26 29 23 - Variable Frequency Motor Controllers
12. Section 26 32 13.13 - Automatic Transfer Switch
13. Section 26 33 63 - Uninterruptible Power Supply

1.02 REFERENCES

A. Furnish products listed by Underwriters Laboratories, Inc., ETL Testing Laboratories, or other testing firm acceptable to the Owner.

B. Conform to requirements of ANSI/NFPA 70.

C. Conform to requirements of NFPA 101 and NFPA 70.

1.03 SUBMITTALS

A. Submit shop drawings, product data, test data, warranties, and other information as appropriate for the following:

1. Luminaires and lamp holders
2. Exit signs
3. Emergency lighting units
4. Lamps
5. Ballasts
6. Dimmers
7. Dimming systems
8. Occupancy sensors
9. Photocell controls
10. Time switch

B. Shop Drawings: Indicate construction details for products which are not manufacturer's standard, when product data does not adequately describe fixture physical characteristics, or upon request by Engineer.

C. Product Data: Provide product data for each luminaire and lighting unit.

D. Submit written warranty for extended warranty items such as batteries and ballasts.

E. Submit luminaire shop drawings in booklet form with a separate sheet for each luminaire type. Indicate clearly on each sheet the proposed luminaire "type" designation, manufacturer, luminaire, lamp, and ballast designation.

F. Submittals shall indicate materials, finishes, metal gauges, overall and detail dimensions, sizes of electrical and mechanical connections, fasteners, welds, joints, end conditions, provisions for the work of others and similar information.

G. A photometric test report showing photometric candlepower distribution, brightness, coefficients of utilization, and paint reflectance shall be included for all fluorescent and HID fixtures. Photometric reports shall be prepared for actual

fixture, lamp, lens, and ballast combination. Certify data as that taken under National Bureau of Standards calibrated test conditions according to standards of the Illuminating Engineering Society; upon request, submit photometric test of proposed fixture prepared by an independent testing laboratory such as ETL.

H. The submittals shall state whether or not the fixture, as an assembly, has been UL tested and approved.

I. Upon request, submit sample products for inspection. Provide luminaires identical with approved samples; retain approved samples at Site for comparison until after all other luminaires have been shipped to Site and installed. Transportation charges for samples shall be paid by Contractor. Unapproved samples will be returned at Contractor's expense. Upon notification of disapproval, immediately submit new samples that meet contract requirements.

J. Provide computerized illumination calculation data for specified interior or exterior areas in digital or isofootcandle format and in such detail as requested.

K. Operating and Maintenance Instructions: Provide maintenance and operating instructions for battery powered lighting units. Include technical data sheets and parts ordering information for components used in all luminaires.

1.04 QUALITY ASSURANCE

A. Warrant all lighting and components for one year after acceptance of the Work and at no additional cost to the Owner, promptly provide and install replacements for luminaires or components which are defective in materials or workmanship; or repair installed equipment at the job Site as necessary to restore first class operating condition. For any time during the warranty period that luminaires are not fully functional due to defects in materials or workmanship, provide, install, and remove suitable temporary lighting. Warrant replacement luminaires in a similar manner for a period of one year following replacement including replacement of defective replacements.

B. Warrant ballasts, batteries, and occupancy sensors as further specified herein.

C. Provide products of firms regularly engaged in the manufacture of interior luminaires or components of similar types and ratings to those required. Such products shall have been in satisfactory use in similar applications for not less than two years.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver luminaries and their components to job Site, factory assembled and wired to the greatest extent practical, in strict accordance with approved shop drawings, samples, certificates and catalog cuts.

B. Protect exposed finishes during manufacture, transport, storage and handling; replace damaged materials.

C. Luminaires shall be stored under cover, above the ground, in clean, dry areas, and be tagged and/or marked as to type and site destination.

PART 2 – PRODUCTS

2.01 GENERAL

A. Provide lighting fixtures as listed on the Lighting, Lamping, and Fixture Schedule on the Drawings and as specified herein that meet the physical, performance and quality standard exhibited by that fixture. Substitutes shall be equal in all respects including mechanical, electrical, physical, performance, photometric, and quality characteristics except minor variances in construction details which do not affect overall quality or performance are permitted.

B. Accessories: Provide required accessories for mounting and operation of each luminaire as indicated.

1. Recessed Luminaires: Provide trim type suitable for ceiling system in which luminaire is installed; design fixtures to operate in a 140 F environment.
2. Thermal Protection: Provide thermal protection devices to meet NFPA 70 requirements.
3. Disconnecting Means: Provide disconnecting means in fluorescent luminaires that utilize double-ended lamps and contain ballast(s) that can be serviced in place.
4. Surface Luminaires: Provide spacers and brackets required for mounting; design for a minimum ambient temperature of 92 F.
5. Pendant Luminaires: Provide swivel hangers, pendant rods, tubes, chains, and other hardware as required and/or indicated to install luminaire at appropriate height.

2.02 FLUORESCENT TROFFERS

A. Provide luminaries with UL or ETL label indicating fixture meets applicable UL 1570 requirements.

B. Bodies: Form from code gauge steel. After fabrication, treat metal parts with a five stage coating of zinc phosphate and finish coat with white polyester powder paint and bake.

1. Light reflecting surfaces of the fixture shall have a minimum initial reflectance of 88% in the visible range of 400-700 nanometers per ASTM Method E-424-71, and shall not yellow or fade with age. Test for fading by covering one half of sample and expose remaining half to a 150 watt

sunlamp placed ½" above reflective surface for 72 hours. Comparison of exposed and unexposed sides shall show no visible fading or deterioration in appearance or reflectance. The percentage of Specular Gloss shall be a minimum of 80% as determined by ASTM Method D-523-T, Procedure A.

C. Design ballast mounting to effectively dissipate heat and allow ballast replacement without the need for special tools. Construct luminaire with a minimum number of joints using only welds, brazing, or screws.

D. Provide fixture enclosures with an easily operated and reliable latch. Enclosure shall hang from fixture body when unlatched and be readily removable for cleaning. Fixture shall be designed to allow relamping without the use of tools. Construct luminaire to be free from light leaks by the inherent design of body and frame. Where gaskets are necessary, securely bond to body or enclosure frame.

E. Enclosure Lenses: Extruded or injection molded as indicated, 100% clear virgin acrylic, minimum transmittance of 80%, photometric performance within +/- 5% of the published photometric data given for the referenced fixture, meeting the following:

1. Lenses designated "A12" or "A12.125" shall be nominal 0.125" overall thickness with 1/8 “or 3/16" male or female prisms with non-curved prism faces. Female prism shall have a maximum depth of 0.053" for 1/8" prisms and 0.080" for 3/16" prisms. Male prisms shall have a minimum unpenetrated thickness of 0.090" or thicker. Lens shall be minimum of 7.5 oz. per square foot and show no visible evidence of sagging in the installed position, be strain free, uniform in appearance, and destaticized.

2. Lenses designated "A19" shall comply with the above except provide minimum 0.1875" nominal overall thickness, minimum unpenetrated thickness of .100".

F. Lamp holders shall be designed to securely hold lamp in place, provide for easy lamp removal and installation, and have low resistance contact to lamp pins suitable for electronic ballasts.

G. Mark fixture with proper lamp characteristics, i.e. "Use .... Lamps only". Affix lamp marking in a location not visible from normal viewing angles, but readily visible to maintenance personnel.

H. Provide wiring between fluorescent lamp holders and associated operating and starting equipment in compliance with UL 1570 and NEC.

I. Provide electronic ballasts and arrange for switching control as indicated on the Drawings. Use multiple lamp ballasts wherever possible; use tandem wiring between fixtures such that the use of one lamp ballasts are limited to single odd fixtures in a room or circuit, except where wiring distances over 10 feet or switch groups make it impractical. In tandem configurations, wire inboard lamps to one ballast and outboard lamps to the other. Ballasts shall be of the same type and manufacturer for ease of stocking replacements.

2.03 FLUORESCENT WRAPAROUND FIXTURE

A. Provide with 15" minimum width heavy duty prismatic acrylic diffuser, which meets, as a minimum, the requirements for "A12" lenses specified above. Linear side prisms shall control visual brightness and direct light onto adjacent ceiling.

B. Housing shall be heavy duty code gauge steel, embossed for maximum rigidity, include embossed mounting projections to allow direct mounting on low density cellulose ceilings.

2.04 FLUORESCENT WET LOCATION FIXTURE

A. Bodies: High impact and UV resistant reinforced polyester housing, UL listed for horizontal mounting in wet locations, equip with wet location fittings.

B. Enclosures: High impact acrylic diffuser, secured to fully gasketed housing by six captive cam-action latches per four foot unit.

C. Finish metal parts with five stage iron phosphate pretreatment and paint with high gloss baked enamel or polyester paint.

2.05 FLUORESCENT STRIP

A. Bodies: Form from code gauge steel; after fabrications treat metal parts with a five stage coating of zinc phosphate, and finish coat with white polyester powder paint and bake.

2.06 HID LUMINAIRES

A. Exterior Housing: Diecast aluminum with five-stage polyester powder paint finish, electrical components solidly heat-sink mounted to housing, type as described on the Drawings.

B. Ballast: High power factor, energy efficient UL 1029 and ANSI C82.4, constant wattage autotransformer (CWA) or regulator, high power factor type, designed to operate on the voltage system to which they are connected.

1. For outdoor installations, provide single lamp ballasts with a minimum starting temperature of -20 F. Construct so that open circuit operation will not reduce its rated life.

2. High Pressure Sodium (HPS) ballasts shall have a solid state igniter/starter with an average life in the pulsing mode of 10,000 hours at the intended ambient temperature. Igniter case temperature shall not exceed 90 C in any mode. Average life is defined as the time after which 50 percent will have failed and 50 percent will have survived under normal conditions.

C. Optics: High efficiency, spun or hydroformed aluminum or glass refractor similar to specified fixture, minimum photometric performance in accordance with fixtures listed on Lighting Fixture Schedule.

2.07 EXIT SIGNS

A. LED Exit Sign Fixture with Battery Backup:

1. Lamps: Manufacturer's standard, light emitting diode (LED) type designed to NFPA 101 and 70 marking of egress requirements. Warrant lamps for 5 years full replacement.
2. Input Voltage: 120 volts for normal power, equip with self-contained battery, solid state charger with brown out protection, and test switch.
3. Battery: Sealed nickel cadmium, warrant for five years full replacement, plus additional 7 years prorata.

B. Construction:

1. Housing: High strength cast aluminum, equip with low profile canopy mount.
2. Housing and Lens in High Abuse Areas: Injection molded polycarbonate.
3. Face: Aluminum or white painted steel stencil face with red letters, 6" high x 3/4" stroke.
4. Directional Arrows: Universal type for field adjustment.
5. Mounting: Universal, for field selection.
6. Mounting in High Abuse Areas: Ceiling or wall as indicated.

2.08 EMERGENCY LIGHTING UNITS

A. Self-contained emergency lighting unit.

1. Input Voltage: 120 volts.
2. Battery: Lead calcium maintenance free type, 3 year full, plus 7 year prorated (total 10 year) warranty. Gelled electrolyte batteries are not permitted.
3. Battery Charger: Dual rate type, solid state, with low voltage and brown out protection.
4. Lamps and Lamp holder: LH3-12V halogen, 12 watt, or as specified on the Contract Drawings.
5. Housing: Steel with manufacturer's standard finish.

B. Indicators and Controls: AC ON, RECHARGING; TEST switch, battery charge voltmeter.

C. Electrical Connection: Hardwired.

2.09 LAMPS

A. Manufacturers:

1. General Electric
2. Osram/Sylvania
3. Venture
4. Phillips

B. Provide type and color indicated on the Lighting, Lamping, and Fixture Schedule.

C. LED lamps as indicated on the Light Fixture Schedule.

D. T8 Lamps:

1. Initial lumen rating: 3150, mean lumen rating 2992.
2. Rated lamp life shall be 35,000 hours when operating on Osram Quicktronic Prostart ballast in rapid start mode.
3. Color temperature shall be 4,100oK and color rendering index 85 or better.

E. Rapid start medium bipin T-12 U-bent or 2G11 base single-ended twin tube lamps:

1. Lamp shall be rated at nominal 40 watts, bent in a "U" shape with nominal 6" spacing between legs, minimum initial rated lumen output 3,050 lumens, and minimum rated lamp life 12,000 hours, based on three-hour starts and tested in accordance with IES LM 40-87.
2. LLD shall be a minimum mean lumen value of 87% of the initial lamp lumens at 40% of rated life, and 81% at 70% of rated life.
3. Lamp life, color temperature, and color rendering index shall be as specified above for 32 watt lamp.

F. T-8 U-Tube, 1" diameter, 31 watt, 6" leg spacing Lamps:

1. Lamps shall only be operated on ballasts designed for T-8 lamps.
2. Rated lamp life shall be at least 15,000 hours or 20,000 hours, per IES LM 40-87, operating in an instant start or rapid start mode, respectively.
3. LLD shall be a minimum mean lumen value of at least 90% of the initial lamp lumens at 40% of rated life and 84% at 70% of rated life.
4. Lamp life, color temperature, and color rendering index shall be as specified above for 32 watt lamp.

G. Compact Fluorescent-General:

1. Lamp shall be rare earth phosphor type with a correlated color temperature (CCT) of 3500 Kelvin, and color rendering index (CRI) of 80 or greater (NEMA designation RE 735).

2. Minimum LLD shall be a mean lumen value of 85% at 40% of rated life.

3. Installation shall conform to application manufacturers' recommendations for enclosed or open operation; of both lamps and ballasts.

H. Compact Fluorescent (Twin or Quad) Tube Lamps for Use with Preheat Ballasts and Starters:

1. Lamps shall be designed for operation with ballasts/starters system provided with luminary.

2. Lamp wattage and lumen rating shall be as indicated on the Drawings.

I. 400 watt clear metal halide HID.

1. ANSI Specification Number M59.
2. Operating position: base-up + 15°F.
3. Nominal bulb diameter: 3.5".
4. Base type: Mogul screw.
5. Nominal light center length: 5".
6. Maximum overall length: 8.3".
7. Lamp shall only be operated on ballasts designed for this type lamp.
8. Initial rated lumen output shall be at least 41,000 lumens.
9. Average rated lamp life shall be at least 20,000 hours when operated at ten (10) hours per start.

J. Mean lumens at 40% of rated life shall be at least 28,000 lumens.

2.10 FLUORESCENT BALLASTS

A. Acceptable Manufacturers: Osram/Sylvania, or approved equal, selected for lamp and switching configuration indicated on the Drawings.

B. Where relevant, ballasts shall conform to UL 935, "Fluorescent Lamp Ballasts"; ANSI C82.1, "Ballasts for Fluorescent Lamps - Specification"; ANSI C82.2, "Methods of Measurement of Fluorescent Lamp Ballasts"; ANSI NFPA/70; and Public Law 100-357 National Appliance Energy Conservation Amendment of 1988, as applicable.

C. Ballasts shall not exhibit excessive noise during start-up or steady state operation. Any ballast or group of ballasts in a space which contribute more than 1 db to the

background room noise level when measured with a sound meter calibrated to the "A" scale will be considered defective.

D. Ballasts shall:

1. Withstand line transients as defined in ANSI/C62.41.

2. Contain no polychlorinated biphenyls (PCBs) and shall be labeled "NO PCBs."

3. Safely and reliably operate in a room ambient temperature from 50 F to 105 F for an input voltage of plus or minus 10 percent about the center design voltage. Provide low temperature fluorescent ballasts having a minimum starting temperature of -20 F in luminaires located where the ambient temperature may fall below 32 F.

4. Operate the lamps at a frequency between 20 and 40 KHz from an input frequency of 60 Hz.

E. Mark the ballast to indicate the required supply voltage, frequency, RMS current, current surge during starting, input watts, and power factor at the design center voltage, open circuit voltage, crest factor and efficacy.

F. Performance:

1. Voltage: As scheduled.

2. Power factor corrected to at least 95% lagging, maximum Total Line Current Harmonic Distortion 10%.

3. Tests shall be made in fixtures designed only for the number of lamps being tested.

4. For other applications (higher ambients, etc.) the tests should be operated with equivalent lamp wall temperatures plus or minus 4 C.

5. The light output shall not vary by more than plus or minus 15 percent for a plus or minus 10 percent variation of the input voltage about the center design voltage.

6. The ballast shall operate the lamps in a manner that will not adversely curtail the normal life of the lamp.

7. The ballast shall be able to withstand a single input surge of 6,000 volts from a 50 ohm 50 KHz damped sinewave source.

8. Flicker shall be less than 5 percent.

9. Audible noise levels shall be equivalent to the Class A rating of CBM certified ballasts.

10. Ballasts shall meet the requirements of the Federal Communications Commission Rules and Regulations, Chapter 18, Part C (RF Lighting Devices), regarding radio frequency interference (RFI) and electromagnetic interference (EMI).

11. Ballasts shall safely operate the specified lamps for two, three, or four lamp combinations in accordance with its rating. Failed lamps shall not affect ballast life.

12. Power factor shall be not less than 90 percent, crest factor not more than 1.6, and total harmonic content not more than 10 percent of input current.

G. Certifications: Ballasts shall be certified, labeled or listed by UL, CBM or ETL. Upon request, submit a test report from an independent testing laboratory certified by a qualified registered professional engineer upon request showing that the electronic ballasts meet or exceed all the performance requirements in this specification.

H. Warrant ballast and lamp system in accordance with Osram/Sylvania “Quick 60 Limited Warranty with ballast warranted for 60 months and lamp for 36 months.

2.11 COMPACT FLUORESCENT BALLASTS

A. Ballasts and related hardware shall be designed to operate on the voltage system to which they are connected and be UL listed for operating the specified lamps in accordance with ANSI C82.1 and C78, as applicable, or in accordance with the specified lamp manufacturer's recommendations where no ANSI standards exist.

B. Ballasts for indoor use shall start lamps at a starting temperature of 50 F. For outdoors applications or where ambient temperatures may fall below 50 F, manufacturers' minimum starting temperatures for lamps and ballasts shall be -20 F.

C. Design ballasts to withstand line transients as defined in IEEE Publication 587, Category A, provide Class P thermal protection and sound rating of "A" for interior applications.

D. Ballasts shall not contain polychlorinated biphenyls (PCBs).

E. Lamp current crest factor shall not exceed 1.7 when tested with the lamps specified.

F. Warrant for two years, follow applicable manufacturers' recommendations for enclosed or open operation of both lamps and ballasts.

G. Electronic rapid or instant start ballasts for use with Compact Fluorescent Lamps without Integral Starters shall comply with the following:

1. Ballasts shall comply with 2.11.A-F, above.

2. Ballasts shall be designed expressly to operate the lamps specified.

3. Ballasts shall meet the requirements of the Federal Communications Commission Rules and Regulations, Chapter 18, Part C (RF Lighting Devices), regarding radio frequency interference (RFI) and electromagnetic interference (EMI).

4. Ballasts shall have a frequency of operation of 20 KHz or greater and incorporate adequate 60 Hz filtering in order to operate with less than 5% flicker (maximum 0.20 Flicker index) with any rare earth phosphor lamp suitable for the ballasts.

5. Ballasts shall be high power factor type with a power factor of 0.9 or greater.

6. Ballast total harmonic distortion shall not exceed 10%.

7. Light output (ballast factor) shall be no less than 0.85 when tested with a compatible lamp.

2.12 OCCUPANCY SENSOR SYSTEMS

A. Acceptable Manufacturers:

1. Watt Stopper
2. Unenco
3. Approved Equal

B. General:

1. All sensors, control units, transformers, power packs, switchpacks, and relays of the systems shall be UL listed under Section 508 Industrial Control Equipment and conform to applicable portions of the National Electrical Code to provide automatic operation of lights in response to space occupancy, like devices produced by Watt-Stopper or approved equal.

2. Provide sensors that will be able to detect typical motion (e.g. walking in corridors, writing and computer use in offices) throughout the accessible portions of spaces lighted by controlled luminaires. Provide additional sensors at no extra cost as needed to provide the required coverage.

3. Rate system for operation in ambient temperatures up to 115F.

4. Time delay, (after occupants are no longer present before lights are automatically switched off), shall be a linear adjustment with a range including at least 30 seconds to 15 minutes. Sensitivity to motion shall be a linear adjustment.

5. Calibration, time, or sensitivity adjustments shall be accomplished using common hand tools and not require the use of separate keys or pins.

6. Units that allow light to be forced on during periods of no occupancy shall do so by means of a covered, concealed switch within the unit to prevent access by unauthorized personnel.

7. All occupancy sensors shall include an LED, clearly visible throughout sensor coverage range, which flashes each time the unit senses motion.

8. Units shall be capable of operating the fluorescent ballasts in the luminaires being controlled and shall switch all fluorescent and compact fluorescent lamp types without noticeable delay.

9. Occupancy sensors and system components shall have a minimum 3-year warranty.

10. The switching capacity of occupancy sensing units or systems shall exceed the ballast input wattage of the lighting system to be switched.

11. Select components and locate so as to avoid false triggering by heating or cooling systems, computers and VDTs, adjacent spaces and windows.

12. Units shall be equipped to allow adjustment of field of view, as required to prevent false triggering due to adjacent spaces, corridors, etc.

13. For large areas requiring multiple sensing units and/or the use of switching relays or power packs shall use 10 to 24 volt DC class 2 wiring between sensing and controlling units.

14. Design wall mounted sensing units to fit in single or two gang switch boxes at a height of 3 to 5 feet.

15. Design ceiling mounted sensing units to be mounted at a height of 8 feet or more.

16. Design sensors to permit running low voltage sensor wires (use 600 volt rating) in same conduit as 120 volt supply and load wires, or provide separate conduit run for control wires.

C. Corridor/Stairwell Applications:

1. All units shall be the fail-safe type so that in the event of an occupancy sensor unit or system failure lights will turn on or remain on.

2. Corridor applications shall use units designed and manufactured specifically for linear coverage (not area) in one, two, or three directions, as appropriate.

3. Sensing units shall be placed so that motion is detected at all points in the corridor or stairwell.

4. Sensor control shall exclude designated, constant-burn sources so that minimal illumination required by applicable codes is provided after occupancy sensors have switched off primary lighting.

D. Infrared Occupancy Sensors:

1. Install so that all points where occupants might be stationary in the space are in the direct field of view of the sensor.

E. Automatic Occupancy Sensors:

1. Occupancy sensors and systems shall switch lights on and off automatically depending on the state of the local manual switches. Turning off manual switches will turn off lights. If manual switches are left on, the occupancy sensor will turn off the lights when no occupancy is sensed. If the manual switches are off, they must be turned on when entering an area. If the manual switches are left on, the occupancy sensor will switch on the lights when entering an area.

F. Calibration and Troubleshooting:

1. Occupant sensor calibration shall be performed by the Contractor prior to system turnover and rechecked and recalibrated three months later (or as recommended by sensor manufacturer). Contractor shall first arrange for and receive on-site training by a representative of the system manufacturer in a number of spaces representing the range of applications (wall mounted, ceiling mounted, open office, small office, rest room, ambient sensing, etc.) on the project. Training shall include appropriate maintenance personnel from the building operations staff.

2. Specific instructions for calibration and troubleshooting shall be provided as part of the O&M manual which represents the range of applications (wall mounted, ceiling mounted, open office, small office, rest room, photocell sensing, etc.) on the project.

2.13 PHOTOCELL SWITCH

A. UL 773 or UL 773A, hermetically sealed cadmium-sulphide cell rated 240 volts ac, 60 hertz with single-throw contacts rated 1000 watts, and 600 volts.

B. Mount switch in a cast weatherproof aluminum housing, with swivel arm mount, in a high impact resistant, noncorroding and nonconductive molded plastic housing, with an EEI-NEMA locking-type receptacle.

C. The switch shall turn on below 3 footcandles and off at 3 to 10 footcandles. A time delay shall prevent accidental switching from transient light sources. Mount a directional lens in front of the cell to prevent fixed light sources from creating a turnoff condition. Aim switch according to manufacturer's recommendations.

2.14 TIME SWITCH

A. Digital multi-purpose, 120 volts, 1 channel, 24 hour time switch. Provide switch with battery backup to maintain accurate time for a minimum of 72 hours following power failure. Provide time switch with a manual on-off bypass switch. Housing for the time switch shall be surface mounted, NEMA 1 enclosure conforming to NEMA ICS 6.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Examine adjacent surfaces to determine that surfaces are ready to receive Work.

B. Install wiring in accordance with Division 26.

C. Install luminaires and accessories in accordance with manufacturer's instructions, as indicated, with equipment, materials, parts, attachments, devices, hardware, hangers, cables, supports, channels, frames and brackets necessary to make a safe, complete, and fully operative installation.

D. Install luminaires plumb, square, and level with ceiling and walls, in alignment with adjacent luminaires, and secure in accordance with manufacturers' directions and approved shop drawings. Conform to the requirements of National Electrical Code ANSI/NFPA 70.

1. Specified or indicated mounting heights are to be to the bottom of each luminaire for suspended and ceiling mounted luminaires, and to the center of each luminaire for wall mounted luminaires. Obtain approval of exact mounting for luminaires on the job before installation is commenced and, where applicable, after coordinating with type, style, and pattern of ceiling being installed.
2. Provide pendant accessory to mount suspended luminaires and exit signs at height indicated. Use swivel hanger on sloped ceilings.
3. Support surface mounted luminaires from ceiling grid tee structure; provide auxiliary support laid across top of ceiling tees and fasten to prohibit movement.
4. Install recessed luminaires to permit removal from below and install earthquake clips.

5. For lighting fixtures mounted in or on suspended ceilings, provide two support hangers per fixture so that each is independently supported from the building structure.

6. Provide two support hangers for the minimum security fixtures so that each is independently supported from the building structure.

7. Install lamps in luminaires and lamp holders.

8. Ground non current carrying parts of electrical equipment in accordance with UL and NEC provisions.

E. Install lighting fixtures where indicated on the plans; plans may be scaled for approximate locations; minor adjustments are permitted to avoid conflicts. Fixture placement that does not conform to the layout indicated shall be corrected; if in doubt about correct placement consult Engineer prior to roughing in. Install all lighting so that it is securely fastened, rows are uniformly spaced and in alignment, and fixture rests flat on mounting surface.

F. Install ballasts and fixtures to avoid amplifying hum. Any ballast or fixture which develops an excessive hum within one year shall be replaced.

G. Where multilevel switching is indicated, all outer lamps shall be switched together and all inner lamps together.

H. Install 2 x 2 fixtures for consistent lamp orientation within each room.

3.02 ADJUSTING AND CLEANING

A. Align luminaires and clean lenses and diffusers at completion of Work.

B. Aim adjustable luminaires and lamp holders as indicated or as directed.

C. Adjust directional arrows on exit signs to meet approval of authority having jurisdiction.

D. Clean paint splatters, dirt, and debris from installed luminaires.

E. Touch up luminaire and pole finish at completion of Work.

F. Re-lamp luminaires which have failed lamps at completion of Work.

3.03 OWNER INSTRUCTION

A. Provide on-site training of Owner's personnel in operation of controls systems by a factory trained manufacturer's representative. Include instruction in programming time controls to obtain required control functions. Provide one follow-up visit if necessary.

END OF SECTION

SECTION 31 00 00

EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide excavating, filling, backfilling, stockpiling, bedding, compacting, grading, protection, installation and removal of support of excavation and other Work necessary for the construction of pipelines, structures, pavements, and appurtenant Work in accordance with this Section, the Drawings and applicable reference standards listed in Article 1.

B. Related Requirements

1. 31 10 00 Site Clearing

2. 31 25 00 Erosion Controls

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. MassDOT Standard Specifications and Supplements, except for Compensation sections

2. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

3. ASTM D6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

C. Sample Test Reports and Evaluations

1. Materials gradations

2. Backfill moisture-density relationships

D. Source and Field Quality Control Submittals

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Waste Management and Disposal

1. Legally dispose of excess or unsuitable material at no additional cost to Owner.

1.08 SITE CONDITIONS

1. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Pipe and Structure Bedding: 3/4 inch sized crushed stone; durable, clean angular rock fragments obtained by breaking and crushing rock material meeting the criteria of the M2.01.4 of the MassDOT Standard Specifications and Supplements for bedding beneath pipe and structures, to 6 inches above the crown of the pipe:

Sieve analysis by weight:

Sieve Size (inches)	Percent Passing by Weight
1	100
3/4	95-100
1/2	35- 70
3/8	0- 25

B. Suitable Backfill: well-graded granular material, of which at least 25 percent by weight shall be retained on the #40 sieve and contain less than 35 percent finer than a #200 sieve by weight, predominantly free from organic matter, man-made materials, ice, snow or other deleterious material and have characteristics so it can be readily placed and compacted. Place 6 inches above the crown of the pipe and around structures 6 inches above the crown of the highest pipe and up to the underside of the pavement section.

C. Structural Fill: gravel material, for structure backfill per M1.03.1 Type b of the MassDOT Standard Specifications and Supplements, consisting of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials having suitable moisture content to allow for proper compaction as specified in Paragraph 3.08 of this Section. Unsuitable structural fill: soil that is too wet for proper compaction.

Gradation:

Sieve Size	Percent Passing by Weight
3 inch	100
1/2 inch	50 - 85
#4	40 - 75
#50	8 - 28
#200	0- 10

D. Gravel Borrow: processed gravel for backfill per M1.03.1 of the MassDOT Standard Specifications and Supplements, consisting of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. Coarse aggregate percentage of wear: not more than 50 by the Los Angeles Abrasion Test.

Gradation:

Sieve Size	Percent Passing by Weight
3 inch	100
1-1/2 inch	70-100
3/4 inch	50-85
#4	30-60
#200	0-10

E. Sand: Sieve analysis by weight:

Sieve Size	Percent Passing by Weight
3/8-inch	100
#4	95-100
#16	50-85
#100	2-10

F. Silty Sand: Sieve analysis by weight:

Sieve Size	Percent Passing by Weight
1-inch	100
#4	50 – 100
#40	20 – 70
# 200	12 - 50

G. 3/4 Inch Crushed Stone: Durable crushed rock or crushed gravel stone; crushed stone per M2.01.4 of the MassDOT Standard Specifications and Supplements, free of ice, snow, sand, silt, clay, loam, shale, or other deleterious matter; graded within the following limits:

Sieve Size	Percent Passing by Weight
1 inch	100
3/4 inch	90 - 100
1/2 inch	10 - 50
3/8 inch	0 - 20
#4	0 - 5

H. Drainage Stone: 1-1/2" crushed stone per M2.01.1 of the MassDOT Standard Specifications and Supplements consisting of durable, clean angular rock fragments obtained by breaking and crushing rock material:

Sieve Size	Percent Passing by Weight
2 inch	100
1-1/2 inch	95 - 100
1 inch	35 - 70
3/4 inch	0 - 25

I. Controlled Density Fill (CDF) (Flowable Fill): excavatable and used to limit settlement, lateral movement, undermining, washout and other hazards created by earthwork operation as shown on the Drawings and when excavating around structures, utilities, sidewalks, pavements, and other facilities. Batch CDF at concrete plant.

1. Portland Cement: AASHTO M85.

2. Fly Ash: AASHTO M4.05.02.

3. Sand: M4.02.02 of MassDOT Standard Specifications and Supplements.

4. Water: M4.02.04 of MassDOT Standard Specifications and Supplements.

5. Air Entraining Admixture: M4.02.05 of MassDOT Standard Specifications and Supplements.

6. Compressive Strength: 28 day = 30-80 psi, 90 day = 100 psi

7. Slump: 10 - 12 inches

J. Unsuitable materials: material containing excessive clay, vegetation, organic matter, debris, pavement, stones or boulders over 6-inches in greatest dimension, and frozen material and will not provide a suitable foundation or structural support for the pipe or material unsuitable for use in backfill.

K. Geotextile Fabric: Propex Geotex NW-801, Skaps GT-180, Tencate Mirafi 180N, or equal for use as separator between stone fill and existing soils.

2.02 SHORING AND BRACING MATERIALS

A. Provide suitable shoring and bracing materials to support loads imposed. Materials may be used and in serviceable condition and are subject to inspection and approval of the Engineer once delivered to the Site

2.03 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements. **EXECUTION**

3.01 EXAMINATION

A. Verification of Conditions

1. Before starting Work, check and verify governing dimensions and elevations. Survey condition of adjoining properties with Engineer. Take digital video recording any prior settlement or cracking of structures, pavements and other improvements. Prepare a list of such damages,

verified by and signed by Contractor, Engineer, and others conducting the investigation.

2. Coordinate survey. Establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations. Locate datum level used to establish benchmark elevations sufficiently distant so as not to be affected by excavation operations.

3.02 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Site/Field Tests and Inspections

1. During excavation, resurvey benchmarks weekly, employing licensed Land Surveyor or registered Professional Engineer. Maintain accurate log of surveyed elevations for comparison with original elevations. Notify Engineer if changes in elevations occur or if cracks, sags or other damage is evident.

3.03 EXCAVATION

A. Remove materials encountered to the limits shown on the Drawings, designated in the Specifications or as required by the Owner.

1. Do not perform excavation below normal grade to remove and replace unsuitable materials until approved by the Engineer.

2. Do not perform excavation of rock, boulder or unsuitable materials until material to be excavated has been cross-sectioned and classified by Engineer.

B. Earth Excavation: removal and disposal of pavements, curbing and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, and other materials encountered that are not classified as rock excavation or unauthorized excavation. Legally dispose of surplus materials resulting from excavation and not needed for use on the Project, as determined by the Engineer. Obtain necessary permits legal disposal of surplus material.

C. Excavation in Asphalt Pavement Areas

1. Saw cut or mill to full depth through existing pavement prior to any excavation for pipe or structure placement. Minimize disturbance of remaining pavement. Cut and remove the minimum amount of pavement required to do the Work.

2. Use shoring and bracing where sides of excavation will not stand without undermining pavement.

3. Keep material and soil stockpiles a minimum 10 feet back from the edge of excavation, or in accordance with the approved support of excavation design, to avoid overloading of the sides of excavation and prevent slides or cave-ins.

4. Remove and dispose of existing pavements in the course of the Work. Take care to avoid mixing existing pavement material with excavation material to be used for backfill.

D. Excavation for Trenches

1. Excavate to widths shown on the Drawings.

2. Produce an evenly graded flat trench bottom at the subgrade elevation required for installation of pipe and bedding material.

3. Load excavated material directly into trucks unless otherwise permitted by the Engineer.

4. Place backfill material directly into trench or excavation. Do not stockpile material to be used as backfill in traffic areas.

E. Unauthorized Excavation: removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer. Unauthorized excavation, as well as remedial Work directed by Engineer including refilling, is at no additional cost to Owner.

1. Refilling Unauthorized Excavation

a. Trenches: Use 3/4-inch crushed stone and stabilization fabric as a separator material, if necessary, as directed by Engineer.

b. Elsewhere: Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer.

F. Excavation Below Normal Grade: When excavation has reached required subgrade elevations, notify Engineer who will make an inspection of conditions. If unsuitable bearing materials, as defined in Paragraph 2.01 above, are encountered at required subgrade elevations, carry excavations deeper as directed by Engineer and replace excavated material with crushed stone or as directed by the Engineer.

G. Excavation Above Normal Grade: If unsuitable materials, as defined in Paragraph 2.01 above, are encountered above normal grade, remove the unsuitable material and dispose of and do not use as backfill on any portion of the Project, unless

otherwise approved by the Engineer. Use suitable stockpiled material approved by the Engineer, to replace the unsuitable material to backfill the trench to the dimensions for pipe and structure bedding and backfill as shown on the Drawings. If suitable stockpile material is not sufficient to backfill the trench to required dimensions, use gravel borrow to complete the trench backfill to the elevation shown for pipe and structure backfill. Furnish and install stockpiled material and gravel borrow at no additional cost to Owner.

H. Material Storage

1. Stockpile and maintain suitable surplus excavated materials for re-use as backfill anywhere within the Project limits as directed by the Engineer. Place, grade, and shape stockpiles for proper drainage. Cover stockpiles when unused to limit infiltration by precipitation.

2. Provide erosion controls around stockpile areas as required by the local Conservation Agent and/or the Engineer at no additional cost to Owner.

3. Locate and retain soil materials at least 10 feet away from edge of excavations or as allowed approved support of excavation design.

I. Field Quality Control

1. Provide in accordance with Division 01 General Requirements.

3.04 ROCK REMOVAL

A. General

1. Notify Engineer immediately of change in classification. Should bedrock be encountered above the trench bottom grade or above the subgrade elevation, expose the bedrock surface and to allow the Engineer to perform the necessary elevation survey and take cross-sectional measurements.

2. Perform Rock Excavation by mechanical methods.

3. Boulders: Remove or partially remove boulders exposed on the sides of or in the bottom of excavations as directed by the Engineer. Remove boulders to not less than 2 feet outside structure walls, not less than 12 inches outside footings, not less than 6 inches below underslab subgrade, not less than the lateral trench width payment lines indicated, and not less than 12 inches below the underside of pipes. Depressions resulting from the removal of boulders and rock shall be refilled with approved compacted bedding. Bedding for refilling will not be paid for separately.

4. Refill unauthorized rock excavations, or excavations made beyond or below the indicated or directed excavation pay limits, with compacted bedding at no additional cost.

5. Remove and dispose of unused rock and boulders off-site.

3.05 SHORING AND BRACING

A. General

1. Provide temporary sheeting, shoring, and bracing in locations where required to protect excavated areas as required for safety or compliance with OSHA and Laws and Regulations per Section 00 73 19, at no additional cost to the Owner. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, additional supports may be ordered to be placed at no additional cost to the Owner. Compliance with such order shall not relieve the Contractor from responsibility for the sufficiency of such supports.

2. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in Laws and Regulations per Section 00 73 19. As a minimum, follow the current OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926.

3. Provide system to resist earth and hydrostatic pressures, including surcharges from surface loads.

4. Maintain shoring and bracing while excavation is open.

5. If not leaving in place, remove systems in stages to prevent disturbance of soils and damage to structures and improvements. Fill voids as soon as sheeting is withdrawn.

B. Provide shoring and bracing designed by a Massachusetts Registered Professional Engineer to protect existing buildings, utilities, and other improvements and excavation against movement due to caving and to meet safety requirements of OSHA and Laws and Regulations per Section 00 73 19 for shoring and bracing.

1. Wood Sheeting and Bracing: used as needed to make excavation safe and secure. Leave wood sheeting in place.

2. Steel Sheet Piling: to be removed following completion of Work or remain in place when directed by the Engineer. Drive sheet piling prior to excavation where possible. Fill and compact voids outside sheeting to hold sides of excavation in place.

   Steel sheet piling may be left in place at the Contractor's option if approved by the Engineer and at no additional cost to the Owner. Cut off

sheet piling to be left in place at least 5 feet below finish grade or less if directed by the Engineer.

3. Movable box: used where a shoring system is required but steel piling is not called for as determined by Contractor as not all areas of Work will be conducive to the use of a movable box.

C. Field Quality Control

1. Provide in accordance with Division 01 General Requirements.

3.06 DEWATERING

A. Provide in accordance with Division 01 General Requirements.

3.07 BACKFILL AND FILL

A. Do not backfill excavations and trenches until new utilities have been inspected and, if required, tested satisfactorily for conformance with the Drawings and Specifications unless directed otherwise by the Engineer. Place acceptable soil material in layers to required elevations as shown on the Drawings or as specified. Fill, backfill, and compact in accordance with this Section to produce minimum subsequent settlement of the material and provide adequate support for the surface treatment or structure to be placed on the material. Place material in approximately horizontal layers beginning at lowest area to be filled. Do not impair drainage. Replace fill that becomes frozen or saturated in stockpiles with suitable off-Site fill at no additional cost to Owner.

B. Ground Surface Preparation

1. Remove asphalt and concrete pavements, granular base course, existing sandy and gravelly fills, existing organic silty/clay soils, organic peat, vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface to excavation subgrade prior to placement of fills. Scarify surfaces so that fill material will bond with existing surface.

2. When existing ground surface has a density less than that specified under Article 3.07, Compaction, for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

C. Placement

1. Place backfill and fill materials in layers not more than 6 inches in loose depth for material compacted by heavy compaction equipment or hand-

operated tampers. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.

3. Do not allow heavy machinery within 5 feet of structure during backfilling and compacting.

D. Backfilling Excavations

1. Backfill excavations promptly as Work permits, but not until completion of the following:

   a. Inspection and recording locations of underground utilities

   b. Removal of concrete formwork

   c. Removal of shoring and bracing, and backfilling of voids with satisfactory materials

   d. Removal of trash and debris

2. Use care in backfilling to avoid damage or displacement of underground structures and pipe.

3. Backfill under existing utility pipes crossed by new utility pipes with CDF. The CDF will extend continuously from the bedding of the new pipe to the utility pipe crossed, including a 6-inch thick envelope of CDF around the existing utility pipes.

4. Backfill with CDF when clearance between proposed structure and existing structure is 18 inches or less and sufficient clearance is not provided to obtain suitable compaction, in the opinion of the Engineer.

5. Backfill with CDF for trenches within impervious surfaces with pipes containing less than 3 feet of cover.

6. Provide that 3/4 inch crushed stone backfill stands at its own angle of repose. "Haunching" or "forming" with common fill is not allowed.

E. Backfilling Trenches

1. See Trench Detail on the Drawings.

2. Place pipe and structure bedding and gravel bedding to the extent and dimensions shown on the Drawings so that the pipes and structures have complete and uniform bearing.

3. Grade, compact and shape pipe and structure bedding so that the full length of pipe barrel has complete and uniform bearing. Dig bell holes and depressions for joints after the bedding has been graded and compacted, at proper clearance for jointing the pipes.

4. Following inspection and approval of pipe installation by Engineer, carefully hand place and properly compact additional approved bedding to the limits shown on the Drawings. Hand or mechanical tamping on the sides of the pipe.

5. Place 6 inches of suitable backfill in trenches above the crown of pipe as approved, not frozen and without stones larger than 3 inches in the greatest dimension. Spread in layers not exceeding 6 inches in loose thickness and compact each layer by at least 4 passes with an approved vibratory compactor. See Article 3.07 for compaction types and standards. Carefully place trench backfilling to avoid disturbance of new Work and of existing structures. Adjust moisture content of backfill to allow for proper compaction.

6. Bed pipe in pipe and structure bedding (3/4-inch crushed stone except where otherwise indicated. Limits of bedding and requirements for remaining trench backfill are shown on the Drawings.

7. Trenches in cross-country runs: Restore surface to that existing prior to construction, as shown on the Drawings, or required by the Engineer. Mound trench 6 inches above existing grade or as required by the Engineer.

F. Field Quality Control

1. Provide in accordance with Division 01 General Requirements.

3.08 COMPACTION

A. Use methods which produce the required degree of compaction throughout the entire depth of material placed without damage to new or existing facilities and which are approved by the Engineer. Adjust moisture content of soil as required. Remove and replace material which is too wet to compact to required density. Compact each layer as Work progresses.

Compaction Method	Maximum Stone Size	Maximum Loose Lift Thickness		Minimum Number of Passes	
		Below Pavement	Less Critical Areas	Below Pavement	Less Critical Areas
Hand-operated vibratory plate or light roller in confined areas	4 inches	6 inches	8	4	4
Hand-operated vibratory drum rollers weighing at least 1,000 lbs. in confined areas	6 inches	10 inches	12 inches	4	4
Light vibratory drum roller min. weight at drum 5,000 lbs., min. dynapac force 10,000 lbs.	8 inches	6 inches	18 inches	4	4
Medium vibratory drum roller min. weight at drum 10,000 lbs., min. dynapac force 20,000 lbs.	8 inches	6 inches	24 inches	6	6

B. Degree of Compaction (minimum densities):

Fill and Backfill Location	Density
Top 3 feet under pavement grade	95% of max.
Below top 3 feet under pavement grade	92% of max.
Pipe Bedding	92% of max.
Beside structure foundation walls	95% of max.
Maximum density:	ASTM D698, modified
Field density tests	ASTM D1556 (sand cone) or ASTM D6938 (nuclear methods)

Note: Fill that is too wet for proper compaction shall be disked, harrowed, or otherwise dried to proper moisture content for compaction to the required density. If the fill material cannot be dried within 48 hours of placement, remove and replace with drier fill.

C. Field Quality Control

1. Provide in accordance with Division 01 General Requirements.

2. Testing

a. Determine actual in place densities using field tests as directed by the Engineer and in accordance with Division 01 General Requirements.

b. Perform additional Work to obtain proper compaction if in-place densities do not meet the specified densities. Retesting may be required by the Engineer.

3. Minimum Number of Tests

a. Suitable Backfill: Compact backfill in maximum loose lifts per table above. For each lift make one field density test every 50 linear feet.

b. Pavement Sub base: Make at least one field density test of sub base for every 50 linear feet of paved area.

3.09 GRADING

A. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Grade areas adjacent to structure lines to drain away from structures and to prevent ponding.

C. Finish surfaces: free from irregular surface changes and as follows.

1. Lawn or Other Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 feet above or below required subgrade elevations.

2. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than plus or minus 1 inch above or below required subgrade elevation.

D. Compaction: After grading, compact subgrade surfaces to the percentage of maximum density for each area classification.

3.10 DISPOSAL OF EXCESS MATERIALS

A. Legally dispose of excess or unsuitable material at no additional cost to Owner.

3.11 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

3.12 MAINTENANCE

A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction. Immediately repair any subsequent settling and provide such maintenance for the remainder of the Contract at no additional expense to the Owner.

C. Prior to paving upon the sub-grade, remove soft or unsuitable material and replace with suitable backfill material. Bring low sections, holes, or depressions to the required grade with approved material. Shape entire sub-grade to line, grade, and cross section and thoroughly compact.

D. Provide erosion control measures in accordance with Laws and Regulations and in accordance with Division 01 General Requirements. Keep roads free of debris. Use suitable watertight vehicles for hauling wet materials over roads and streets. Clean up materials dropped from or spread by vehicles promptly or when directed by the Engineer.

END OF SECTION

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SECTION 31 10 00

SITE CLEARING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Site clearing and grubbing

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Definitions

1. Clearing: cutting and disposing of trees, downed timber, stubs, brush, bushes, snags, rubbish, debris, and other objectionable matter and materials and the removal and storage of fences, signs, walks, guard rails, curbs and other items to be restored.

2. Grubbing: removal and disposal of stumps, roots, duff, foundations and other objectionable matter and materials to a minimum of 6 inches below original ground surface.

3. Topsoil: friable loam surface soil found in a depth of not less than 4 inches from the original ground surface. “Satisfactory” topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inch diameter, and free of weeds, roots, and other objectionable material.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.06 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Store trees, plants and shrubs in protected areas and give ample water to keep them in a thriving condition for subsequent replanting.

C. Store slate and flagstone walk sections, granite and stone curbs, fences, signs, guard rails and other items removed at approved locations for subsequent reinstallation.

D. Do not obstruct roads, driveways, sidewalks, gutters and drainage ditches, swales and channels with stored materials.

1.07 **SITE CONDITIONS**

A. Locations of trees, plantings, vegetation, sidewalks, curbs and other living and nonliving items shown on the Drawings were determined by actual surveys at the time surveys were made and conditions may have changed. Verify existing site conditions.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify limiting boundaries such as permanent and temporary easements, property lines, rights-of-way and grading limits have been accurately located and clearly marked.

B. Verify pipeline routings and other items of Work have been accurately located and clearly marked.

3.02 PREPARATION

A. Mark all trees, plantings and other objects which are to be removed, trimmed, cut, or removed and preserved. Inspect these items with the Engineer prior to start of Work. Do not remove or trim unmarked items unless approved by Engineer.

B. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.

C. Protect existing objects not indicated to be removed. Avoid interference with the use of, and passage to and from, adjacent buildings, facilities, driveways, walks, drainage systems and road.

D. Saw-cut pavements required to be removed in advance, including highways, driveways and walks, but do not remove until the Work is ready to be installed.

E. Do not remove highway signs, guard rails and other control, safety and warning devices until just prior to the installation of the Work.

F. Leave items affecting traffic, safety, lives and the containment of humans and animals and essential to the protection of property or the operation of a business in place as long as possible and replace as soon as possible when such items must be removed.

3.03 PERFORMANCE

A. General

1. Do not use explosives for clearing and grubbing operations.

2. Limit the area of clearing and grubbing to the minimum area possible to allow for proper installation of Work and to preserve plantings and natural vegetation to the maximum extent. Conduct Work so that present growth will blend with the limits of construction and a natural appearance will be attained.

3. Confine clearing and grubbing operations to:

   a. areas where Work will be performed but to minimum extent possible to allow proper installation of Work;

   b. within grading limits as shown on the Drawings; and

   c. within Owner easements and property lines of lands owned by Owner.

4. Employ measures to avoid erosion.

5. Do not disturb property markers unless absolutely necessary. If necessary to disturb or remove a property marker, comply with Division 01 General Requirements and employ a registered land surveyor to establish the property marker location, mark area, and replace property marker as soon as possible.

B. Stripping Topsoil

1. Strip topsoil within limits as designated on Drawings or as required to prevent mixing with underlying subsoil or objectionable material.

2. Stop topsoil stripping at a sufficient distance to prevent damage to main root systems of trees indicated to be left standing.

3. Stockpile topsoil in storage piles in areas shown or where directed and provide for drainage of surface water. Cover storage piles as necessary to prevent windblown dust and erosion.

4. Surplus loam and topsoil not required for completion of the Work shall remain the property of the Owner. Stockpile surplus material on-Site and maintain and protect until Work is complete.

C. Trees and Plantings

1. Remove only those items marked for removal in grassed, planted and open areas.

2. Trees

a. Notify property owners in advance of tree trimming or removal to allow property owner to cut and remove trees and retain debris unless otherwise directed.

b. Remove and/or trim trees in wooded areas only as required. Minimize damage to trees that are to be left standing. Immediately remove and legally dispose of debris.

c. Timber and wood removed by Contractor shall become the property of Contractor.

d. Trim trees evenly to achieve neat severance with the least possible damage to the tree.

e. apply wet burlap to prevent drying out where roots are cut or damaged.

D. Pavements, Walks, Curbs and Guard Rails

1. Remove existing pavements, walks, and curbs to the limits shown on Drawings, or if not shown, to the minimum extent possible.

2. Saw-cut asphalt and concrete paved surfaces before removal.

3. Carefully remove slate and flag stone walks, granite and stone curbs and guard rails to the minimum extent possible. Terminate removals at a joint or guard rail post. Store and protect for reuse.

E. Walls, Fences, and Other Obstructions

1. Carefully remove walls, fences, signs, sheds and other obstructions encountered and store for subsequent replacement.

F. Promptly remove and legally dispose of materials not specified to be stored or re-used. Do not burn debris unless approved and required permits are obtained.

G. Replant and restore surfaces. Comply with requirements of Section 32 90 00 for planting.

H. Replace materials that have been removed in order to perform the Work to the original condition as approved.

END OF SECTION

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SECTION 31 25 00

EROSION CONTROLS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide and maintain devices to control erosion, siltation, sedimentation and dust that occur during construction operations in accordance with this Section and applicable reference standards listed in Article 1.03.

   a. Undertake every reasonable precaution and do whatever is necessary to avoid erosion of soil and to prevent silting of drainage ditches, storm sewers, rivers, streams, and lakes.

   b. Provide measures to control dust caused whether on or off the project site.

   c. Exposure of soils on embankments, excavations, and graded areas shall be kept as short as possible. Initiate mulching, seeding and other temporary erosion control practices as specified.

   d. Install erosion control measures in any ditch, swale or channel before runoff is allowed to flow to the resevoir.

   e. Dewater trench to install materials in the dry.

   f. Contain water pumped from trenches and excavations. Trench dewatering and pipe dewatering shall not be discharged to the waterway.

   g. Employ the use of siltation control devices at all times to prevent runoff from entering water way.

B. Related Requirements

1. Divison 31 Earthwork, all sections

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. Massachusetts Erosion & Sedimentation Control Guidelines

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

B. Schedule of Implementation

1. General

a. It is important that pollution prevention measures, erosion and sedimentation control, be employed before, during and after soils are exposed. Prior to soil disturbance or soil storage, measures shall be implemented first, to the extent possible; to ensure that such measures are in-place before the activity occurs. Additional measures shall be employed as the Work progresses. Implementation and maintenance shall occur as necessary until the site is permanently stabilized.

2. Soil Stabilization

a. All disturbed areas shall be stabilized with temporary and permanent erosion control practices as soon as practicable, but no more than 14 days after construction activity on a particular portion of the site has temporarily or permanently ceased. Two exceptions to this requirement apply to the project: (1) where construction activities will resume on the particular portion of the site within 21 days; and (2) where snow cover precludes initiation of stabilization measures.

3. Inspections

a. Inspections of disturbed soil areas, material storage areas exposed to precipitation and erosion control measures will be inspected by both the Contractor and the Engineer a minimum of once every 14 days and also within 24 hours after any storm event greater than 0.5 inches of rainfall. Deficiencies in the erosion control measures identified by the inspections shall be immediately corrected.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Siltation Fence
2. Mulch
3. Temporary Erosion Control Matting

4. Siltation Control Devices

C. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Regulatory Approvals

1. Conform to all requirements of applicable federal, state and local permits, including the "Erosion and Sedimentation Control Details", and the City of Marlborough, Conservation Commission.

C. Pre-Construction Testing

1. Meet with the Engineer to discuss erosion control requirements prior to the start of construction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements

PART 2 – PRODUCTS

2.01 MATERIALS

A. Siltation Fence: Mirafi Environfence, Amoco 1380 Silt Stop, or approved equal.

B. Mulch: Type and use as specified by the Erosion & Sedimentation Control Guidelines.

1. Long fibered hay, grass mowings, or straw, in dry condition and which are relatively free of weeds and foreign matter detrimental to plant life.

2. Mulch binder: An asphalt emulsion mulch binder of type acceptable to the Engineer.

3. Mulch netting: Plastic or nylon mesh netting with approximate openings of 1/4 inch to 1 inch; or other netting approved by the Engineer.

C. Temporary Erosion Control Matting: Type and use as specified by the BMP's.

1. Rolled matting blanket consisting of curled wood excelsior, coconut fiber, straw or paper bound with a weave of twisted craft paper, cotton cord or plastic mesh.
2. Provide staples for fastening matting to the ground. Staples shall be fabricated in a "U" shape from 11 gage or heavier stiff steel wire, 6 to 12 inches in length and 1 to 2 inches across.

D. Temporary Seed: Seed variety and applied rate are selected based upon the date of application, and is determined by the following table. Equivalent seed mixture based on its suitability for use in controlling erosion of the various soil types and slopes may be used as approved by the Engineer.

Dates	Seed	Applied Rate
4/1 to 7/1	Oats	1.8 lb/1,000 ft2
8/15 to 9/15		
4/1 to 7/1	Annual Ryegrass	0.9 lb/1,000 ft2
5/15 to 8/15	Sundangrass	0.9 lb/1,000 ft2
9/15 to 10/15	Winter Ryegrass	2.6 lb/1,000 ft2

E. Sod:

1. Grown from certified seed of adapted varieties to produce high quality sod free of any serious thatch, weeds, insects, diseases and other pest problems.
2. At least one year old and not older than three years. Cut with a 1/2 inch to 1 inch layer of soil.

F. Drains: Flexible drains consisting of collapsible neoprene pipe, minimum 8 inch diameter.

G. Stone Check Dam: Aggregate for stone check dams shall consist of hard, durable rock, sieve analysis by weight:

Sieve Size	% Passing by Weight
6"	90 - 100
1.5"	0 - 40
No. 4	0 - 5

H. Hay Bales:

1. Consist of rectangular shaped bales of hay or straw weighting at least 40 pounds per bale.
2. Free from noxious weed seeds and rough or woody materials.

I. Siltation Control Devices

1. Dirtbag® or Engineer approved equivalent, to be used on the discharge of any trench dewatering setup.

PART 3 – EXECUTION

3.01 PREPARATION

A. Surface Preparation

1. Temporary Erosion Control Matting:

a. Conform to grades and cross sections for slopes and ditches shown on the Drawings.

b. Finish to a smooth and even condition with all debris, roots, stones, and lumps raked out and removed.

c. Loosen soil surface to permit bedding of the matting.

d. Unless otherwise directed, apply seed prior to placement.

3.02 INSTALLATION

A. Siltation Fence:

1. Construct as shown on Drawings. Install parallel to contours where possible, prior to site clearing and grading activities.

2. Bury lower edge of fabric at least 6 inches below ground surface to prevent underflow.

3. Curve ends of fence uphill to prevent flow around ends.

4. Inspect frequently; repair or replace any damaged sections.

5. Remove fence only when adequate grass catch has been established.

B. Mulch:

1. Undertake immediately after each area has been properly prepared.

2. When seed for erosion control is sown prior to placing the mulch, place mulch on the seeded areas within 48 hours after seeding.

3. Apply mulch at 1.5 to 2.0 tons per acre. Mulch applied between the dates of November 1 through March 31 for winter stabilization shall be applied at 3.0 to 4.0 tons per acre.

4. Blowing chopped mulch will be permitted.

5. Hay mulch should cover the ground enough to shade it, but the mulch should not be so thick that a person standing cannot see ground through the mulch.

6. Remove matted mulch or bunches.

C. Temporary Erosion Control Matting:

1. Place strips lengthwise in the direction of the flow of water.

2. Where strips are laid parallel or meet as in a tee, overlap at least 4 inches.

3. Overlap ends at least 6 inches in a shingle fashion.

4. The up-slope end of each strip of the matting shall be turned down and buried to a depth of not less than 6 inches with the soil firmly tamped against it.

5. The Engineer may require that any other edge exposed to more than normal flow of water be buried in a similar manner.

6. Build check slots at right angles to the direction of the flow of water. Space so that one check slot or one end occurs within each 50 feet of slope length. Construct by placing a tight fold of the matting at least 6 inches vertically into the ground, and tamp the same as up-slope ends.

7. Bury edges of matting around the edges of catch basins and other structures.

8. When ordered, additional seed shall be spread over matting, particularly at those locations disturbed by building the slots. Matting shall then be pressed onto the ground with a light lawn roller or by other satisfactory means.

9. Drive staples vertically into the ground flush with the surface.

10. On slopes flatter than 4:1, space staples not more than 3 feet and one row, alternately spaced, down the center.

11. On grades 4:1 or steeper, place staples in the same three rows, but spaced 2 feet apart.

12. On all overlapping or butting edges, double the number of staples, with the spacing halved; all ends of the matting and all required check slots shall likewise have staples spaced every foot.

D. Temporary Seeding:

1. Seed with appropriate seeds and application rates from the table in paragraph 2.01D of this Section. Seed shall be sown at the rate indicated, on the pure live seed basis.

2. Mulch areas where temporary seeding has been applied. Do not mulch seeded areas where matting will be immediately installed.

3. If temporary seeding does not achieve adequate growth by November 1, an additional layer of mulch shall be applied at that time.

E. Topsoil Storage:

1. Topsoil which is stockpiled on the site for use in loam applications shall be placed out of natural drainages, in 8 foot high piles which have side slopes of 50% to 70%.

2. Install siltation fence around the base of the pile to prevent eroding soil from washing into drainages.

3. Any topsoil piles which are to remain for a period of 21 days or more shall be covered with temporary seed and mulch immediately following stockpiling.

F. Store Check Dam:

1. Place in locations indicated on Drawings or as ordered to provide for temporary control of erosion and sedimentation.

2. Install as directed by the Lowell Conservation Commission and Engineer.

G. Hay Bales:

1. Place as ordered to provide for temporary control of erosion, and in ditches at 100 foot minimum intervals.

2. Install as shown on Drawings, and stake with required stakes.

H. Dust Control:

1. Utilize the application of sprinkled water and calcium chloride to reduce the emission of air-borne soil particulates from the Project site.

I. Other Temporary Measures:

1. Utilize other temporary erosion control measures as directed by the Engineer.

3.03 REPAIR/RESTORATION

A. Remove silt from siltation fence when it has reached one-half the fence height, or prior to expected heavy runoff or siltation.

B. Repair matting if any staples become loosened or raised, or if any matting becomes loose, torn, or undermined, make satisfactory repairs immediately.

3.04 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Site/Field Tests and Inspections

1. Inspect erosion control practices immediately after each rainfall and at least daily during prolonged rainfall or snowmelt for damage. Make appropriate repairs or replacement at no additional cost to the Owner, until project acceptance.

3.05 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

B. Removal of Temporary Erosion Control:

1. Remove temporary materials and devices when permanent soil stabilization has been achieved. Re-use materials in good condition if approved by the Engineer.

2. Level and grade to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

3. Remove unsuitable materials from site and dispose of in a lawful manner.

3.06 MAINTENANCE

A. Maintain areas mulched or matted, at no additional cost to the Owner, until project acceptance.

B. Maintain detention basins by removing silt that reaches a depth of over one foot, at no additional cost to the Owner, until project acceptance.

END OF SECTION

SECTION 31 35 00

SLOPE PROTECTION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide slope protection, riprap, and erosion control blankets as shown on the Drawings and as specified in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 31 00 00 – Earthwork

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. Massachusetts Highway Department Standard Specifications for Highways and Bridges, Division 1, Section 7.02.

2. Massachusetts Wetlands Protection Act, 310 CMR 10.00.

B. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.04 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Riprap: Submit sieve analysis for riprap

2. Erosion Control Blanket: Submit product information, a sample of material to be used, and the manufacturer's installation instructions including anchoring details, for approval by ENGINEER.

C. Samples and Mockups: as specified in Article 1.06.

D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.07 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Riprap

1. Riprap stone shall be sound, durable rock which will not disintegrate due to exposure to water or weather, and angular in shape such as rough, unhewn quarry stone or fragments obtained by blasting, breaking or crushing natural rock. Rounded boulders or cobbles shall not be permitted. Flat, platy stones and shale or slate rock with its largest length dimension three times greater than its shortest dimension shall not be permitted.

2. Riprap Gradation: Stone size shall correspond to the inch dimension indicated on Drawings. The D50 of the stone size represents 50% of the stone passing the D50 dimension sieve screen. The D20 of stone size, 20% passing, shall be one half the D50 dimension. The maximum size limit, D100, shall be twice the D50 stone size dimension.

D20 = 20% passing 1/2 D50 dimension sieve
D50 = 50% passing D50 dimension sieve
D100 = 100% passing 2 D50 dimension sieve

B. Erosion Control Blanket

1. Wood Excelsior Blanket: Machine produced blanket of curled wood excelsior with 80% of the fibers being 6 inches or longer. The wood fibers shall be evenly distributed throughout the blanket and a covered with a photodegradable plastic mesh. Typical weight of 0.9 pounds per square yard. Curlex by American Excelsior, or approved equal.

2. Straw Blanket: A machine produced blanket consisting of 100% straw, with a polyproplyene net on the top and bottom surfaces and sewn

together with biodegradable thread. Typical weight of 0.5 pounds per square yard. S150 by North American Green or approved equal.

2.02 ACCESSORIES

A. Tools

1. Erosion Control Blanket Anchors: Wooden pegs or metal staples as recommended by the manufacturer for the installation of the erosion control blanket. The fasteners shall not be longer than 9 inches.

2. Filter Cloth and Protection Fabric shall be as specified in Section 31 00 00 - Earthwork.

2.03 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 PREPARATION

A. Surface Preparation

1. Riprap:

a. Subgrade Preparation: Grade and compact areas to receive geotextile protection to a uniform slope.

b. Geotextile Placement: Place geotextile under the areas to receive riprap stone as shown on the Drawings. Place fabric in one continuous piece, overlapping ends a minimum of 12 inches, with the uphill sheet shingled over the downhill sheet in the direction of water flow.

3.02 INSTALLATION

A. Riprap Placement:

1. Place riprap to full depth shown on Drawings in one operation without special handwork, measured perpendicular to the face of the slope to obtain a uniform appearance true to line and grade. Place larger stones at bottom of slope. Place stones in close contact, with interlocking of face stones and backing stones. Fill openings between stones with smaller stones. Loose stones or excessively large stones tending to project above the average general surface shall be embedded, re-oriented, or discarded.

B. Erosion Control Blankets:

1. Immediately following seeding, install erosion control blankets within drainage channels and on all exposed soil slopes which are 25% or steeper grade, and where shown on Drawings. Install blankets according to the manufacturer's recommended methods and anchoring spacings.

3.03 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.04 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 31 41 00

SHORING AND BRACING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. General: Provide shoring and bracing necessary to protect existing buildings, utilities, and other improvements and excavation against movement due to caving in accordance with this Section and applicable reference standards listed in Article 1.03; and as required to meet OSHA safety requirements of shoring and bracing. Remove bracing as required.

   a. Shoring and bracing systems include, but are not limited to, the following:

      1) Wood sheeting

      2) Steel sheet piling

      3) Movable box

   b. Wood Sheeting and Bracing: Provide wood sheeting and bracing as needed to make excavation safe and secure. Leave wood sheeting in place where directed by the ENGINEER. Wood sheeting ordered left in place will be incidental to installation of piping and payment item(s).

   c. Steel sheet piling: Provide steel sheet piling, to be removed following completion of Work, where shown on the drawings or where directed by the Engineer. Payment will be incidental to installation of piping, gate valves, tees and water services. Piling is to remain in place when directed by the Engineer. Payment for permanent piling to remain in place will be incidental to installation of piping and payment item(s).

      Steel sheet piling may be left in place at the Contractor's option if approved by the Engineer. No additional payment will be made for this piling.

      No payment will be made for steel sheet piling used for the Contractor's convenience.

   d. Movable box: Provide where a shoring system is required but steel piling is not called for. Cost of movable box system is incidental to other work items.

B. Related Requirements

1. 31 00 00 – Earthwork

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. OSHA

2. State requirements set forth in Section Division 01

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Design calculations and drawings for shoring and bracing system

C. Samples and Mockups: as specified in Article 1.06.

D. Design Data/Submittals

1. Submit design calculations and drawings for shoring and bracing system and other data prepared and sealed by a Massachusetts Registered Professional Engineer. The design and calculations shall be submitted to the Engineer for review solely for the purpose of determining whether the system will have an impact on the complete project.

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Design

1. Assign design of shoring and bracing to a Massachusetts Registered Professional Engineer.

C. Regulatory Approvals

1. Comply with local codes and OSHA requirements

1.07 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General: Provide suitable shoring and bracing materials which will support loads imposed. Materials need not be new, but should be in serviceable condition.

B. Steel sheet piling and shapes (corners, etc.): Continuous interlocking type; section modules and type of section as required by design.

C. Bracing members: Wood timbers or A36 steel members.

D. Bolts: ASTM A307.

2.02 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Check and verify governing dimensions and elevations.

B. Survey condition of adjoining properties with Engineer.

C. Take photographs, recording any prior settlement or cracking of structures, pavements and other improvements.

D. Prepare a list of such damages, verified by dated photographs, and signed by Contractor, Engineer, and others conducting the investigation.

3.02 PREPARATION

A. Surface Preparation

1. Survey adjacent structures and improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify

benchmarks and record existing elevations. Locate datum level used to establish benchmark elevations sufficiently distant so as not to be affected by excavation operations.

3.03 INSTALLATION

A. General

1. Provide system to resist earth and hydrostatic pressures, including surcharges from surface loads.

2. Locate shoring and bracing to clear permanent construction and to permit forming and finishing of concrete.

3. Maintain shoring and bracing while excavation is open.

4. Removal of Systems: Remove systems in stages to prevent disturbance of soils and damage to structures and improvements. Fill voids as soon as sheeting is withdrawn.

B. Steel Sheet Piling and Bracing:

1. Drive sheet piling prior to excavation where possible. Fill and compact voids outside sheeting to hold sides of excavation in place.

2. Brace as required to prevent distortion of piling and other bracing members. If necessary to move a brace, install new bracing prior to removal of original brace.

3. Cut off sheet piling to be left in place at least five feet below finish grade.

3.04 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Site/Field Tests and Inspections

1. During Excavation, resurvey benchmarks weekly, employing licensed Land Surveyor or registered professional Engineer. Maintain accurate log of surveyed elevations for comparison with original elevations. Notify Engineer if changes in elevations occur or if cracks, sags or other damage is evident.

3.05 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Furnish and install tack prime coat, hot mix asphalt pavement base and surface courses and miscellaneous patching in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. MassDOT Standard Specifications and Supplements, except for Compensation sections

2. MassDOT Construction Details

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with the Division 01 General Requirements.

1. Product Data

2. Manufacturer Instructions

B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 BITUMEN FOR TACK PRIME COAT

A. Provide in accordance with MassDOT Standard Specifications and Supplements Section 460 and MassDOT Construction Details.

2.02 HOT POURED RUBBERIZED ASPHALT SEALANT

A. Provide in accordance with MassDOT Standard Specifications and Supplements Section 460 and MassDOT Construction Details.

2.03 HOT MIX ASPHALT SURFACE COURSE STANDARD TOP

A. Provide in accordance with MassDOT Standard Specifications and Supplements Section 460, M3.11.03 and MassDOT Construction Details.

2.04 HOT MIX ASPHALT BASE COURSE

A. Provide in accordance with MassDOT Standard Specifications and Supplements Section 460, M3.11.03 and MassDOT Construction Details.

2.05 HOT MIX ASPHALT FOR MISCELLANEOUS USES

A. Provide in accordance with MassDOT Standard Specifications and Supplements Section 472 and MassDOT Construction Details.

2.06 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Place hot mix asphalt base and top courses on roadways, sidewalks and other areas to maintain traffic access/egress to all properties abutting any Work and for the safe passage of pedestrian and vehicular traffic in accordance with MassDOT Standard Specifications and Supplements Section 460 and MassDOT Construction Details.

1. Provide 2-inch minimum compacted thickness depth of hot mix asphalt base course to achieve the necessary base course grade in support of finish grade pavement elevations indicated on the Drawings or as directed by the Engineer.

2. Apply bitumen for prime/tack coat at a rate of 1/10 to 1/20 gallons per square yard over the hot mix asphalt base course immediately prior to the installation of top course, as shown on the Drawings or as directed by the Engineer. Clean surface of sand and foreign matter and dry before applying the prime coat.

3. Provide 2-inch minimum compacted thickness depth of hot mix asphalt surface course (Standard Top) to achieve the finish grades indicated on the Drawings or as directed by the Engineer.

4. Apply hot poured rubberized asphalt sealant to longitudinal and transverse joints.

B. Install hot mix asphalt for patching and handwork on roadway surfaces that cannot be installed mechanically and when directed by the Engineer in accordance with MassDOT Standard Specifications and Supplements Section 472 and MassDOT Construction Details.

3.02 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 32 31 13

CHAIN LINK FENCING AND GATES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Furnish and install chain link fences and gates with 8' fabric height and fence slats as shown on Drawings, and provide signs as specified in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 31 00 00 – Earthwork

2. Section 03 30 00 – Cast-in-Place Concrete

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM A121 Specification for Metallic-Coated Carbon Steel Barbed Wire

2. ASTM A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric

3. ASTM A491 Specification for Aluminum-Coated Steel Chain-Link Fabric

4. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot- Dip Galvanized Coatings

5. ASTM A824 Specification for Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link

6. ASTM F552 Standard Terminology Relating to Chain Link Fencing

7. ASTM F567 Standard Practice for Installation of Chain Link Fence

8. ASTM F626 Specification for Fence Fittings

9. ASTM F900 Specification for Industrial and Commercial Swing Gates

10. ASTM F1043 Specification for Strength and Protective Coatings of Metal Industrial Chain Link Fence Framework

11. ASTM F1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

12. ASTM F1345 Specification for Zinc-5% Aluminum-Mischmetal Alloy-Coated Steel

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Manufacturer's technical data

2. Installation instructions for metal fencing and gates

3. Product data on fabric, posts, and accessories

C. Shop Drawings

1. Submit Shop Drawings showing dimensions and details of fencing and gates, including post installation.

2. Supply Shop Drawings showing the relationship of operating systems with gate components, including details of all major components.

D. Samples and Mockups: as specified in Article 1.06.

1. Submit sample of fence to demonstrate fabric finish, color and gauges. Sample size to be 6-inch x 12-inch minimum.

E. Certificates

1. Gate in compliance with ASTM F 2200, Standard Specification for Automated Vehicular Gate Construction.

2. The gate operator shall be in compliance with UL 325 as evidenced by UL listing label attached to gate operator.

F. Design Data/Submittals

1. Deliver two copies of operation and maintenance data covering the installed products. Manual to include parts list showing manufacturer's names and part numbers for the gate operator.

G. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Qualifications: per Division 01 General Requirements and as follows..

1. Provide chain link fences and gates as complete units controlled by a single source including necessary erection accessories, fittings, and fastenings.

2. Manufacturer and installer to each have a minimum five years' experience in chain link fence construction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.09 MAINTENANCE

A. Extra Materials: Furnish as specified below. Make interchangeable with and same material and workmanship as corresponding original parts.

1.10 WARRANTY

A. Special Warranty/Extended Correction Period

PART 2 – PRODUCTS

2.01 GENERAL

A. Dimensions shown for pipe, roll-formed, and H-sections are outside dimensions.

2.02 STEEL FENCING

A. Fabric

1. No. 6 gauge (0.148") finished size steel wires, 2" mesh, with top selvages knuckled for fabric 72" high and under, and both top and bottom selvages twisted and barbed for fabric over 72" high.

2. Furnish one-piece fabric widths.

3. Fabric finish, galvanized, ASTM A 392, Class II, with not less than 2.0 oz. zinc per sq. ft. of surface.

B. Framework

1. Galvanized steel, ASTM A 120 or A 123, with not less than 1.8 oz. zinc per sq. ft. of surface. Bottom frame of fence shall be tension bar only, no rail.

C. Hardware and Accessories

1. Galvanized, ASTM A 152, with zinc weights per Table I.

D. Source Quality Control

1. Provide in accordance with Division 01 General Requirements.

2.03 FRAMING AND ACCESSORIES

A. End, Corner and Pull Posts

1. Minimum sizes and weights as follows: 6' fabric height, 2.875" OD steel pipe, 5.79 lbs. per lin. ft., or 3.5" x 3.5" roll-formed sections, 4.85 lbs. per lin. ft.

B. Clarifier Fence End, Corner and Pull Posts

1. Minimum sizes and weights as follows: 4' fabric height, 2.875" OD steel pipe, 5.79 lbs. per lin. ft., or 3.5" x 3.5" roll-formed sections, 4.85 lbs. per lin. ft.

C. Line Posts

1. Space 10' o.c. maximum, unless otherwise indicated, 2.375" OD steel pipe, 3.65 lbs. per lin. ft. or 2.25" x 1.875" H-sections, 2.64 lbs. per lin. ft.

D. Gate Posts

1. Furnish posts for supporting single gate leaf, for nominal gate widths as follows:

Leaf Width	Gate Post	lbs./lin. ft.
Up to 6'	3.5" x 3.5" roll-formed	4.85

section or 2.875" od pipe 5.79

E. Top Rail

1. Manufacturer's longest lengths, with expansion type couplings, approximately 6" long, for each joint. Provide means for attaching top rail securely to each gate corner, pull and end post.

   1.66" OD pipe, 2.27 lbs. per ft. or 1.625" x 1.25" roll-formed sections, 1.35 lbs. per ft.

F. Post Brace Assembly

1. Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375" diameter rod and adjustable tightener.

G. Post Tops

1. Weather tight closure cap (for tubular posts), one cap for each post.

   Furnish caps with openings to permit passage of top rail.

H. Stretcher Bars

1. One-piece lengths equal to full height of fabric, with minimum cross-section of 3/16" x 3/4". Provide one stretcher bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into post.

I. Stretcher Bar Bands

1. Space not over 15" o.c., to secure stretcher bars to end, corner, pull, and gate posts.

J. Pedestrian Gates

1. Fabricate pedestrian gate frames of 2" OD pipe. Metal and finish to match framework. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware and accessories.

2. Assemble gate frames by welding or with special fittings and rivets, for rigid connections. Use same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to gate frame at not more than 15" o.c. Attach hardware to provide security against removal or breakage. Install diagonal cross bracing consisting of 3/8"

diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist, if required. Top and bottom rails required.

K. Pedestrian Gate Hardware

1. Furnish the following hardware and accessories for each gate.

   Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch

L. Wire Ties

1. For tying fabric to line posts, use wire ties spaced 12" o.c. For tying fabric to rails and braces, use wire ties spaced 24" o.c. For tying fabric to tension wire, use hog rings spaced 24" o.c.

2. Manufacturer's standard procedure will be accepted if of equal strength and durability.

M. Locks

1. Provide one pad lock for pedestrian gate

N. Signs

1. Two signs, 10" x 14" duraflex .040 gauge aluminum equal to Model 10-03-300 by Safety Sign Co., to read as follows:

   NOTICE
   NO TRESPASSING

O. Barbed Wire

1. Shall consist of three strands of twisted wire, 12-½ gage, with 4 point barbs of 14 gauge wire on 3” spacing. Barbed wire shall be galvanized and conform to ASTM A-121, chain link fence grade. Barbed wire supporting arms shall be at an angle of 30 degrees from fence and vertical at gate posts, and shall be of sufficient strength a 250lb load applied at the outer strand.

P. Source Quality Control

1. Provide in accordance with Division 01 General Requirements.

2.04 CHAIN LINK INTERNAL TRACK ALUMINUM CANTILEVER SLIDE GATE

A. Aluminum cantilever slide gate single leaf 20 foot opening by 8 feet high plus 1’ 0” (304.8 mm) 3 strands of barbed wire shall be of the internal roller design per ASTM F1184 Type II Class 2. Cantilever slide gate to be constructed of ASTM B221 aluminum members welded and designed for maximum structural integrity.

Vertical external and internal members minimum 2" (50 mm) square, spaced maximum 8' 0" (2.44 m) on center. Gates having fabric greater than 8' 0" (2.44 m) in height require a horizontal member. The top horizontal member shall be a one-piece precision extruded structural framing member having an integral enclosed track. Bottom horizontal member to be minimum 2" x 4" (50 x 100 mm). Adjustable diagonal X trusses shall be installed in each gate panel to transfer the alternating forces as the gate slides. The gate opening portion shall be filled with chain link fabric stretched taut and secured to the frame members. Chain link fabric shall match the fence system specification. The overall gate structure shall be a minimum of 40% larger than the gate opening to support the cantilevered portion of the gate in the closed position with minimum deflection per ASTM F1184. The minimum 40% back frame does not require the installation of chain link fabric for those gates not to be electrically operated. [Electrically operated gates per ASTM F2200 and UL 325 required the back frame to be filled with fabric.] Single leaf cantilever design for openings larger than 30' 0" (9.15 m) up to 40' 0" (12.2 m) shall be fabricated by welding together two horizontal top structural/track members creating a dual track system. Single track gates up to 30' 0" (9.15 m) opening require two support posts and two internal truck assemblies. Dual track gates over 30' 0" (9.15 m) up to 40' 0" (12.2 m) require two sets of dual posts and four internal truck assemblies.

B. Internal truck assemblies shall be capable of swiveling to accommodate gate movement and ensure full contact of the four support wheels and two guide wheels to the internal track surface. The galvanized steel truck assembly post bracket, truck assembly vertical support axle as well as the support wheels shall be designed to handle static and dynamic forces required to support and operate the gate. The truck assembly, support axle and internal wheels shall be comprised of stainless steel or galvanized steel components.

C. Galvanized steel bottom guide roller brackets containing two 3" (75 mm) rubber wheels shall be supplied to keep the bottom of the gate plumb and in proper alignment.

D. Single gates shall be supplied with a galvanized steel latch mechanism capable of securing the gate with a padlock accessible from either side. Double gates to have galvanized drop rod to hold inactive leaf and a latch mechanism capable of securing the gate with a padlock accessible from either side. Provide drop rod receiver to engage center drop rod. [Electrically operated gates per ASTM F2200 and UL325 shall not contain any latch or locking mechanism]

E. Cantilever gate posts shall be 4.00" (101.6 mm) OD [Grade 1 pipe ASTM F1083] [Grade 2 pipe ASTM F1043 Group IC] per section 2.03. Single leaf cantilevers up to 30' 0" (9.15 m) require three 4" (101.6 mm) OD posts, dual track single leaf cantilevers over 30' 0" (9.15 m) up to 40' 0" (12.2 m) require two sets of pre fabricated dual 4.00" (101.6 mm) OD support posts and one 4" (101.6 mm) latch post. (Gate is supported in the center of the dual posts.

2.05 FENCE SLATS

A. Fence slats shall be compatible with fences specified in this specification. Fence Slats shall provide a natural hedge look.

B. Core shall be made with 16-gauge, braided galvanized wire and needles shall be made with 3 millimeter PVC.

C. Fence slats shall provide approximately 90% wind load and privacy factor, be flame retardant, and be UV stabilized.

D. Manufacturer: Pexco HedgeLink™ or Engineer Approved Equal.

PART 3 – EXECUTION

3.01 GENERAL

A. Do not begin installation and erection before final grading is completed, unless otherwise permitted.

B. Install equipment of this section in strict accordance with the company's printed instructions unless otherwise shown on the contract drawings.

3.02 EXCAVATION

A. Drill holes for posts of diameters and spacings shown, in firm, undisturbed or compacted soil.

B. If not shown on DRAWINGS, excavate holes to minimum diameters as recommended by fence manufacturer.

C. Unless otherwise indicated, excavate hole depths approximately 6" lower than post bottom, with bottom of posts set not less than 4" below finish grade surface.

3.03 INSTALLATION

A. Setting Posts:

1. Center and align posts in holes 6" above bottom of excavation. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.

B. Top Rails:

1. Run rail continuously through post caps, bending to radius for curved runs. Provide expansion couplings as recommended by fencing manufacturer.

C. Brace Assemblies:

1. Install braces so posts are plumb when diagonal rod is under proper tension.

D. Tension Wire:

1. Install tension wires before stretching fabric and tie to each post with not less than 6 gauge galvanized wire. Fasten fabric to tension wire using 11 gauge galvanized steel hog rings spaced 24" o.c.

E. Fabric:

1. Leave approximately 2" between finish grade and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.

F. Stretcher Bars:

1. Thread through or clamp to fabric 4" o.c., and secure to posts with metal bands spaced 15" o.c.

G. Gates:

1. Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

H. Tie Wires:

1. Use U-shaped wire, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least 2 full turns. Bend wire to minimize hazard to persons or clothing.

I. Fasteners:

1. Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

J. Signs: Install along each of the two fences.

K. Sliding Gate and Operator:

1. The gate system is to comply with ASTM F2200 and UL 325.

2. Obstruction Sensing Systems:

a. The inherent motor current sensors shall be part of the gate operator system and shall not be removed or bypassed.

b. The installing contractor shall be responsible to ensure that appropriate external secondary entrapment protection devices be installed for the specific site conditions to protect against all potential entrapment zones. Proper operation of these safety devices shall be verified and training as to the operation and maintenance of these devices for the users and owners shall be documented.

3.04 SYSTEM ACCEPTANCE & VALIDATION

A. Acceptance Test:

1. Test each system function.

2. Supply all equipment necessary for system adjustment and testing.

B. Test and Explain Safety Features:

1. Each system feature and device is a separate component of the gate system.

2. Read and follow all instructions for each component.

3. Ensure that all instructions for mechanical components, safety devices and the gate operator are available for everyone who will be using the gate system.

4. The warning signs shipped with the gate operator shall be installed in prominent position on both sides of the gate.

C. System Validation:

1. The complete system shall be adjusted to assure it is performing properly.

2. The system shall be operated for a sufficient period of time to determine that the system is in proper working order.

3. Ensure the owner is clear with regard to the safety points concerning the basic operational guidelines of the safety features of the gate operator system. These safety points are listed in the operator manual and shall be read prior to system use.

3.05 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.06 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 33 11 00

WATER UTILITY DISTRIBUTION PIPING, VALVES, AND FITTINGS

PART 1 – GENERAL

1.01 SUMMARY

A. Provide pipe, valves, fittings, tapping sleeves, couplings, hydrants, line stops, and thrust restraint required for installation of the Work in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. 31 00 00 - Earthwork

2. 40 90 00 – Instrumentation and Control for Process Systems

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards: The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless otherwise noted, the most recent version of the listed publications, including revisions, at time of bid opening shall apply.

B. ASTM INTERNATIONAL (ASTM)

1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

2. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

3. ASTM A536 - Standard Specification for Ductile Iron Castings

C. AMERICAN WATER WORKS ASSOCIATION (AWWA)

1. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids.

3. ANSI/AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings, 3 in through 48 in (75 mm through 1200 mm), for Water and Other Liquids

4. ANSI/AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

5. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings for Water

6. ANSI/AWWA C115/A21.15 - Water Treatment – Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges

7. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges

8. AWWA C116/A21.16-09 – Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings

9. AWWA C150/A21.50 - Thickness Design of Ductile-Iron Pipe

10. AWWA C151-09 - Ductile-Iron Pipe, Centrifugally Cast.

11. AWWA C153 - Ductile-Iron Compact Fittings, 3-in Through 64-in for Water and Other Liquids.

12. AWWA C600 - Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.

13. AWWA C651 - Disinfection Water Mains

D. INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

1. ISO 228-1 (2000) Pipe Threads Where Pressure-Tight Joints Are Not Made on The Threads - Part 1: Dimensions, Tolerances and Designation

E. All products used in the construction that come in contact with drinking water shall meet the National Sanitation Foundation Standard 61 for Drinking Water System Components - Health Effects. The primary focus of the standard is on contaminants or impurities, which may be imparted indirectly to drinking water. The products and/or materials covered include, but are not limited to, protective materials (coatings, linings, liners, etc.), joining and sealing materials (solvent cements, welding materials, gaskets, etc.), and mechanical devices used in transmission/distribution systems, (valves, etc.).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions including include catalog cut sheets and dimensional data for each type of process pipe, tube, fitting, gaskets, hardware, and appurtenances.

2. Material safety data sheets in conformance with 29 CFR 1910 Section 1200(g) accompanying each chemical products delivered for use in pipe installations, including all solvents, solvent cements, glues and other materials that may contain hazardous compounds.

C. Shop Drawings

1. Layout and dimensions of equipment, major components, key alignment locations, and locations of bolt holes and indicate where access points for maintenance and operations are located on the equipment. Show critical field dimensions and actual pipe lengths, diameters, fittings, and appurtenances.

2. Show joint couplings and fittings and specifically identify styles. Show layouts and dimensions of piping and pipe supports for pipe systems.

D. Certificates

1. Certified affidavit of compliance from the pipe manufacturer stating that the pipe, fittings, gaskets, linings and exterior coatings for the Project have been manufactured and tested in accordance with AWWA and ASTM standards and requirements specified herein.

E. Design Data/Submittals

1. Thrust restraint dimensions with sufficient bearing area to counteract thrust forces for each location.

F. Manufacturer Instructions

1. Manufacturer's recommended shipping, unloading, storage, installation, testing, operation and maintenance procedures including a list of special tools and equipment required to maintain the units.

G. Qualification Statements: as required by Article 1.04B. per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Unless otherwise indicated, all fittings and appurtenances shall be of the same type and grade of materials as the connecting pipe. All products provided under this section shall conform to current AWWA and ANSI specifications as appropriate to the type of pipe specified.

C. All welding shall be conducted under qualified welding procedures. All welders and operators shall be certified in accordance with the latest applicable AWS and ANSI codes for shop and project site welding of piping work. Provide written proof of certifications upon request from the Engineer.

D. All products used in the construction that come in contact with drinking water shall meet the National Sanitation Foundation Standard 61 for Drinking Water System Components - Health Effects. The primary focus of the standard is on contaminants or impurities, which may be imparted indirectly to drinking water. The products and/or materials covered include, but are not limited to, protective materials (coatings, linings, liners, etc.), joining and sealing materials (solvent cements, welding materials, gaskets, etc.), and mechanical devices used in transmission/distribution systems, (valves, etc.).

E. Comply with the requirements of the Lowell Regional Water Utility

F. Comply with State Plumbing Code and local plumbing codes where more stringent

G. Comply with requirements of Section 4 of AWWA C601, “Preventative Measures During Construction” for cleanliness.

H. Line stops shall be installed by a licensed Contractor specializing in installation of line stops. Contractor shall have successfully completed at least three (3) line-stop installations in the past five (5) years. At a minimum, line stop Contractor shall have successfully completed three (3) line stop installations on cast iron water mains 24-inch or larger in diameter. Submit line stop Contractor qualifications and Project references to Owner with materials submittal for review.

I. Certifications

1. All products in contact with potable water shall be ANSI/NSF Standard 61 certified.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Packing, Shipping, Handling, and Unloading

1. It is the responsibility of the Contractor to unload and string pipe. Pipe shall be lifted off the truck and placed on the ground with care and in accordance with manufacturer's recommendations to prevent damage to the pipe. Rolling the pipe off the truck or dropping the pipe is prohibited. The Contractor shall utilize padding on all hooks, slings, and pipe tongs used for unloading so as to prevent damage to the piping. Dropping of pipe during unloading shall not be acceptable. Care shall be taken so as not to skid piping against stationary piping during unloading or stacking.

2. Handling of chemicals for piping installation shall be in accordance with ASTM F 402 standards.

C. Acceptance at Site

1. Inspection of all piping and fittings shall be conducted by the Contractor after delivery on site. All piping shall be subject to rejection at any time on account of failure to meet that which is outlined in the Contract Documents. Pipe which has been rejected after delivery shall be specifically marked for "non-use" and shall be removed from the job site at no additional cost. The acceptance of any Manufacturer's pipe samples prior to shipment shall not be equal to the Engineer's acceptance of all piping delivered to the job site.

D. Storage and Protection

1. Pipe may be stacked, but no more than three layers high and only with proper blocking in between layers. The bottom row of the piping stack shall be elevated from the ground surface. The piping shall be supported off the ground through the use on timbers, rails, or concrete as recommended by the piping Manufacturer.

2. The interior of all piping and fittings shall be kept clean and free from dirt or other foreign material at all times. Utilize suitable caps or wrapping to prevent entry of dirt or foreign material into the piping. Exercise extra care when handling cement lined pipe. Damage to the interior lining of piping shall render it unfit for use.

3. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping. Protect flanges and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.09 WARRANTY

A. Provide in accordance with Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 BURIED DUCTILE IRON PIPE AND FITTINGS

A. Design Criteria

1. Pipe shall be ductile iron pipe meeting ANSI/AWWA C150/A21.50 and C151/A21.51 standards.
2. Fittings shall be ductile iron meeting ANSI/AWWA C110/A21.10 or C153/A21.53 standards.
3. Pipe and fitting joints shall be mechanical joint meeting the requirements of ANSI/AWWA C111/A21.11. All mechanical joints shall be restrained by restraint devices, specified below.
4. Pipe and fittings shall have a minimum thickness Class 52 per ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51.
5. Accessories such as gaskets, glands, bolts, nuts, etc., shall be designed in accordance with AWWA/ANSI C-111/A21.11 and shall be furnished as required to make all piping systems complete.
6. Interior of pipe and fittings shall be double cement lined per ANSI/AWWA C104/A21.4.
7. Exterior of pipe and fittings shall have an asphaltic, shop applied primer coating meeting AWWA C151, C115, C110, and C153 standards.
8. Pipe and fittings shall be permanently marked with the Manufacturer, Date of Manufacture, Size, Type, Class/Wall Thickness, and Standard Produced to (ASTM, AWWA, ANSI, etc.).

B. Manufacturers

1. U.S. Pipe & Foundry Company Inc.
2. American Cast Iron Pipe Company
3. Clow Water System Company
4. Or equal

C. Finishes

1. Provide Manufacturer’s standard exterior asphaltic shop coating in accordance with ANSI/AWWA C151/A21.51

D. Source Quality Control

1. Provide in accordance with Division 01 General Requirements.

2.02 SOLID SLEEVE TYPE COUPLINGS

A. Design Criteria

1. Provide solid sleeve type couplings to join buried plain end pipes as shown on the Drawings, as specified. In cases where the outside diameters of the piping segments to be connected differ, provide "reduction/expansion" sleeve type couplings.

   a. All sleeve couplings will connect existing Cast Iron plain end pipe with new Ductile Iron plan end pipe.

2. Sleeve type couplings shall also be provided for all exterior below grade piping runs prior to entering and exiting buildings or structures. The couplings shall be installed prior to the building or structure wall penetration to allow for differential settlement of the piping and structure.

3. All sleeve type couplings shall conform to the provisions of AWWA C 219 standards. All sleeve type couplings shall be rated for use with the same operational pressure as the connecting pipes.

4. All coupling lugs and sleeves shall be in accordance with ASTM A536, Grade 65-42-12 standard. All washers shall be in accordance with ASTM A 325M standards. All couplings shall be fitted with plastic plugs to protect the bolt holes.

5. Provide sleeve couplings on all piping buried directly under a structure at the structure's expansion joints. In applications where the piping is encased in concrete, provide a minimum of 3-inch-thick Styrofoam placed perpendicular to the horizontal centerline of the coupling.

6. Fasteners: All bolts shall be installed such that a minimum of 1/4 inch of the bolt projects beyond the surface of the nut. All hexagonal nuts shall be in accordance with ANSI B18.2 standards. Hexagonal nuts shall have threads in accordance with ANSI B1.1 standards. All bolts shall be in accordance with ASTM A 307 and ANSI B1.1 standards. All bolts shall be square or hexagonal head type. Bolts shall be threaded over the full length. All bolt ends shall be rounded or chamfered. Bolts shall be coarse thread fit type. Provide 316 stainless steel hardware for all sleeve type couplings.

7. Gaskets: Provide gaskets to match the particular service application. Unless otherwise specified or recommended by the coupling Manufacturer. The coupling gasket shall match the gasket material used for the piping system.

8. Middle Ring: The pipe stop within the inner surface of the middle ring of couplings shall be omitted as required to permit removal of valves, flow meters, equipment, and appurtenances. All other couplings shall be

provided with pipe stops. The middle ring of each sleeve type coupling shall have a thickness at least equal to that of the connecting piping on which the coupling is to be used. All sleeve type couplings shall be a minimum of 10 inches long for pipe 30 inches and larger. All sleeve type couplings shall be a minimum of 7 inches long for pipe under 30 inches in diameter. Couplings which are designed to be self-restrained shall not be required to meet the minimum middle ring length requirements specified.

9. Sleeve couplings shall be harnessed and restrained in conformance with AWWA Manual M11.

B. Acceptable Vendors:

1. Dresser Piping Specialties
2. Smith-Blair Inc.
3. Engineer Approved Equal

C. Finishes

1. Provide Manufacturer's standard Fused-Bonded Epoxy in accordance with AWWA C116/A21.16.

2.03 HDPE / MECHANICAL JOINT ADAPTORS

A. Design Criteria

1. Mechanical joint adaptors shall be used to join IPS or ductile iron size polyethylene pipe to any ANSI/AWWA C153 ductile iron compact fitting. Adaptors shall be injection molded from NSF-listed polyethylene resin PE 3408 and meet the applicable requirements of ASTM D-2513. Adaptor shall be fully compliant with AWWA C906. Adaptor shall be compatible for heat fusion with any pipe manufactured from a like or similar resin. Fittings shall have the same pressure rating as the system piping.

B. Source Quality Control

1. Provide in accordance with Division 01 General Requirements.

2.04 RESTRAINT DEVICES FOR MECHANICAL JOINT DUCTILE IRON PIPE AND FITTINGS

A. Design Criteria

1. Restraint devices for mechanical joint pipe and fittings shall meet ANSI/AWWA C111/A21.11 or C153/A21.53 standards.

2. Restraint devices shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C110/A21.10.

3. The devices shall have a working pressure rating of 350 psi for 3-16 inch and 250 psi for 18-48 inch. Ratings are for water pressure and must include a minimum safety factor of 2 to 1 in all sizes.

4. Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536. Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 BHN.

5. An identification number consisting of year, day, plant and shift (YYDDD) (plant designation) (Shift number), shall be cast into each gland body.

6. Flange class and bolt hole layout shall match connecting mechanical joint flange.

B. Finishes

1. All wedge assemblies and related parts shall be processed through a phosphate wash, rinse and drying operation prior to coating application. The coating shall consist of a minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat.

2. All casting bodies shall be surface pretreated with a phosphate wash, rinse and sealer before drying. Casting shall be shop coated with manufacturer's standard Fusion Bonded Epoxy in accordance with AWWA C116/A 21.16.

C. Source Quality Control

1. Provide in accordance with Division 01 General Requirements and as follows.

   a. Three (3) test bars shall be incrementally poured per production shift as per Underwriter's Laboratory (U.L.) specifications and ASTM A536.

   b. Testing for tensile, yield and elongation shall be done in accordance with ASTM E8.

   c. Chemical and nodularity tests shall be performed as recommended by the Ductile Iron Society, on a per ladle basis.

   d. All physical and chemical test results shall be recorded such that they can be accessed via the identification number on the casting. These Material Traceability Records (MTR's) are to be made available, in hard copy, to the purchaser that requests such documentation and submits his gland body identification number.

Production pieces that are too small to accommodate individual numbering, such as fasteners and wedges, shall be controlled in segregate inventory until such time as all quality control tests are passed. These component parts may then be released to a general inventory for final assembly and packaging.

2.05 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

A. Design Criteria

1. The Polyethylene pipe and fittings shall be DR 11, Class 160, and fittings made in accordance with ASTM D3350-04, with a cell classification of 345434C equal to DRISCOPLEX 4100 PE 3408 high-density polyethylene IPS size piping for potable water distribution and transmission mains. All joints shall be heat fusion joints, using the butt fusion method.

B. Finishes

1. All pipe shall be permanently imprinted with the manufacturer's brand name, pipe size, product standard, ASTM specification, recommended working pressure and production code. The letters shall be at least 3/16 inches high and repeated on the pipe at intervals of no less than every five (5) feet.

C. Source Quality Control

1. Provide in accordance with Division 01 General Requirements and as follows.

2.06 GATE VALVES, FITTINGS, AND STOPS

A. Fittings: Pipe fittings shall be ductile iron, cement lined fittings. All fittings, except those associated with the flange pipe systems, shall have mechanical joints. The fittings shall be designed in accordance with the latest revision of AWWA/ANSI C153/A21.53 or AWWA/ANSI C110/A21.10, ductile iron and rated for 350 PSI working pressure for 3-inch through 24-inch diameter. All exterior fittings are to be bituminous coated, cement lined and seal-coated as previously specified for ductile iron pipe.

B. Accessories: Accessories such as gaskets, glands, bolts, nuts, etc., shall be designed in accordance with AWWA/ANSI C-111/A21.11 and shall be furnished as required to make all piping systems complete.

C. Gate valves: Gate valves shall be manufactured in accordance with the latest revision of ANSI/AWWA C-515. Gate valves shall be OPEN RIGHT, mechanical joint, resilient wedge, non-rising stem type, designed for minimum 250-psi working pressure. Gate valves shall meet or exceed requirements

AWWA C-515 of latest revision, shall be UL listed and FM approved. The valves shall be manufactured of high-strength ductile iron with a wall thickness meeting or exceeding the requirements of AWWA C-515. The wedge shall be ductile iron, gray iron, or copper alloy fully encapsulated in rubber in accordance with AWWA C-515, provided with protective wedge guide covers, symmetrical and shall seal equally well with flow in either direction. Valve stems shall be sealed by three (3) O-rings, with two (2) of the O-rings residing above the thrust collar. O-rings above the thrust collar shall be replaceable under full working pressure and with the valve in the full open position. Exterior nuts and bolts shall be type 304 stainless steel, with hexagonal heads and with dimensions conforming to ANSI B18.2.1. The operating nut shall be 2-inch square, ductile iron and constructed to ensure even valve operating input torque. Valve body gaskets shall be of the pressure energized O-ring style. The waterway shall be smooth and oversized with no depressions or cavities in the seat area that will allow foreign material to accumulate and affect closure or sealing. The valve body and bonnet shall be fusion bonded epoxy coated, inside and out per AWWA C-550. The coating shall be electro-statically applied prior to assembly and certified to ANSI/NSF 61 Standard. The valves shall be of the non-rising stem design with sealing accomplished by double "O" rings and shall OPEN RIGHT (CLOCKWISE). Gate valves shall be fully assembled in the USA according to AWWA Specifications.

D. Hydrants shall be American Darling B-84-B-5, as manufactured by AMERICAN Flow Control of Birmingham, Alabama; Mueller Super Centurion 250, as manufactured by Mueller Water Products, Inc., of Atlanta, Georgia; or Guardian K-81A, as manufactured by Kennedy Valve, of Elmira, New York; or approved equal. Hydrants shall be fully assembled and factory tested in the USA according to AWWA Specifications, shall be traffic type designed for installation in a trench that will provide five (5) foot minimum cover, shall be rated for 250 psi working pressure, and shall have a 5-1/4-inch main valve opening. Hydrant shoe shall be fusion applied epoxy coated. All bolts and nuts below ground level shall be stainless steel and shall not be metric. Hydrants shall be equipped with one 4-1/2-inch steamer nozzle and two 2-1/2-inch hose nozzles. All nozzles shall be National Standard Thread. Hydrants shall open right (clockwise) and must be marked with an arrow and the word “OPEN” cast into the body or bonnet of the hydrant to indicate the direction to turn the stem to open the hydrant.

E. Corporation Stops: Corporation stops shall be as manufactured by A.Y. McDonald, Ford, Mueller or approved equal, conforming to the latest revision of AWWA Standard C800 and shall be individually inspected and tested for leaks by air pressure under water. Corporation stops shall be ball type, straight-through/full port design, with AWWA Standard (CC) inlet threads and compression outlet, designed to prevent blow-out and shall be bubble-tight at 300 psig working pressure. The stop shall be “No-Lead Brass”, defined for this specification as UNS Copper Alloy No. C89520 or C89833 in accordance with the chemical and mechanical requirements of ASTM B584 and AWWA C-800 with double O-ring type Buna-N seals. The ball shall be coated with a nontoxic,

non-water soluble, self-lubricating film (Teflon or equal). Corporation stops shall be capable of being installed using a standard tapping machine.

F. Curb Stops: Curb stops shall be as manufactured by A.Y. McDonald, Ford, Mueller or approved equal, conforming to the latest revision of AWWA Standard C800 and shall be individually inspected and tested for leaks by air pressure under water. Curb stops shall be ball type, straight-through/full port design, rated for 150 psig working pressure, with compression joints on both ends, a drain and shall be open right. The stop shall be "No-Lead Brass", defined for this specification as UNS Copper Alloy No. C89520 or C89833 in accordance with the chemical and mechanical requirements of ASTM B584 and AWWA C-800 with double O-ring type Buna-N seals and positive shut-off in either direction. The ball shall be coated with a nontoxic, non-water soluble, self-lubricating film (Teflon or equal).

G. Unions: Unions shall meet or exceed AWWA C800 standards, be compression type, with a pressure rating greater than the valve or fitting with which the union is used.

H. Repair Clamps: Single band, stainless steel 6 inches through 20 inches.
1. Ford
2. Mueller
3. ROMAC
4. Or approved equal

I. Repair Couplings:
1. Ford
2. Mueller
3. ROMAC
4. Or approved equal

J. Valve Boxes: Each exterior valve shall be provided with a valve box. Valve boxes shall be cast iron and of the slide type. They shall be so designed and constructed as to prevent the direct transmission of traffic loads to the pipe or valve. The box shall be adjustable through at least 6 inches vertically without reduction of lap between sections to less than 4 inches. The length shall be as necessary to suit the ground elevation. The inside diameter of the box shall be at least 5-1/4 inches. Covers shall be close fitting and substantially dirt-tight with the word "WATER" cast in. The top of the cover shall be flush with the top of the box rim.

K. Service Boxes: Shall be manufactured in the United States, buffalo style, slide type, with the top, cover and base constructed of heavy cast iron. The cover shall fit flush with the top of the box and be a locking type with a brass pentagonal nut and the word "WATER" cast in the cover.

2.07 TAPPING SLEEVES

A. General: Unless otherwise specified, sleeves shall be stainless steel construction meeting ASTM A240 type 304 and rated for 150 psig maximum working pressure. Tapping sleeve shall have a mechanical joint outlet in accordance with AWWA C111. Mechanical joint outlet shall be cast from ductile iron, meeting ASTM A536. Tapping sleeves shall include all hardware and accessories necessary to assemble the sleeve to the pipe. Gasket shall be full circumferential Styrene Butadiene Rubber (SBR) per ASTM D 2000 MAA 610 and NSF 61 certified. Mechanical joint gasket shall be Styrene Butadiene Rubber (SBR) per ASTM D 2000 MAA 610. Styrene Butadiene Rubber (SBR) for gaskets must be compounded for water service. Tapping sleeves shall be field measured to determine class required. Outlet flanges dimensions and drilling shall comply with ANSI B16.1, class 125 and with MSS SP-60. Tapping sleeve shall meet requirements of AWWA C223. All valves furnished shall be open right and shall be in accordance with valve requirements specified herein. Verify pipe material and diameter in the location sleeve will be installed.

B. Source Quality Control

1. Provide in accordance with Division 01 General Requirements.

2.08 ACCESSORIES

A. General: Provide anchorages for tees, plugs, caps, and bends. After installation, apply a full coat of asphalt or other acceptable corrosion-retarding material to surfaces of rods and clamps.

B. Pipe Clamps: Low carbon steel, ANSI/SP-69 and SP-58

C. Clamps, Straps and Washers: Steel, ANSI/ASTM A506.

D. Rods: Steel, ANSI/ASTM A575.

E. Rod Couplings: Malleable iron, ANSI/ASTM A197.

F. Bolts: Steel, ANSI/ASTM A307.

G. Cast Iron Washers: ANSI/ASTM A126, Class A.

H. Thrust Blocks: 3000 psi concrete (min.).

I. Pipe Lubricant: Suitable for use in potable water supply.

2.09 CAST IRON PIPE LINE STOP FITTING

A. Fitting shall be full encirclement type, split tee. It shall consist of two halves; (1) an upper flange saddle half with interior of the saddle plate adjacent to and

concentric with the O.D. of the nozzle and grooved to retain a gasket which shall seal the saddle plate to the exterior of the main; (2) a lower bottom solid half with bolting arrangement for fastening to upper half.

B. General: Manufacturer shall exercise extreme care to insure that weldments are of adequate strength, properly shaped, securely reinforced, and free from distortion that could stress the pipe during installation, pressure tapping, or line stopping operations. All steel shall meet the requirements of ASTM A36, as a minimum. All weldments shall be braced and stress relieved.

C. Material Drawings: Submit to Engineer five (5) sets of Drawings, furnished by manufacturers, fully and distinctly illustrated and describing the fittings proposed to be furnished.

D. Flange: The outlet of each fitting shall be machined from a 150 lb. forged steel flange (ASTM A181 or A105) or from pressure vessel quality steel plate (ASTM A285, Grade C); flat faced and drilled per ANSI B16.5). Suitable independently operated locking devices shall be provided in the periphery of the flange to secure the completion plug.

E. Nozzle: The nozzle shall be fabricated from steel pipe (ASTM A234). After welding and stress relief, the nozzle shall be accurately bored as follows to accommodate the plugging head.

F. Machine an internal circular shoulder to seal against the circumferential gasket carried on the plugging head.

G. Completion Plug: The completion plug shall be machined from a stress relieved carbon steel weldment. It shall contain two (2) circumferential grooves: one to receive the locking devices from the flange, and the second to contain a compressible "O" ring to seal pressure tight against the bore of the flange.

H. Blind Flange: Each fitting shall be closed with a blind flange. Facing and drilling of the blind flange shall be compatible with that of the flange. Minimum blind flange thickness shall be that of AWWA Spec. 207, Class D.

I. Saddle Alignment Marking: Each saddle half shall be matched and marked with serial numbers, to insure proper alignment in the field.

J. Fasteners: All bolts, studs, and nuts and drain/equalization fittings shall be of the heavy series.

K. Gaskets: Shall be molded from elastomer compounds that resist compression setting and are compatible with water in the 32 to 140 deg. F temperature range.

L. Upper Flange Saddle: Shall consist of a saddle plate, a flange, and a nozzle. The interior of the saddle plate, adjacent to and concentric with the O.D. of the nozzle, shall be grooved to retain a gasket which shall seal the saddle plate to the exterior

of the pipe. This gasket shall constitute the only seal between the main and the fitting.

1. Saddle plate shall be of a minimum of 0.375 inch in thickness. It shall be shaped to be concentric to the outside of the ductile iron main. The smallest I.D. of the saddle and its interior rings shall exceed the O.D. of the main by a minimum of 0.250 inch to allow for ovality of the main.

2. A nozzle of 0.375 inch min. wall thickness shall be securely welded to the saddle plate.

3. The flange shall be securely welded to the nozzle. After welding, the assembly shall be braced, stress relieved, and bored to receive the completion plug and the circumferential gasket of the line stop machine plugging head.

4. Bolt, nut of stud, nut, and washer assemblies shall be furnished to draw the upper and lower saddles together for sealing. Bolting brackets shall be gussetted.

M. Lower Saddle Plate: Saddle plate shall be of a minimum 0.375 inch thickness and shall be shaped to be concentric to the outside brackets shall match upper half.

2.10 LINE STOP MACHINERY

A. The equipment shall consist of a folding plugging head that contains an elastomer sealing element. The plugging head is advanced into and from the main by means of a linear actuator. When retracted, the plugging head and carrier are housed in an adapter, bolted pressure tight between the tapping valve and the actuator.

B. Plugging Head: The diameter of the plugging head shall be the same as the pipe size. Plugging head shall open mechanically and sealing element is in full contact with the bore of the main when fully seated.

C. Sealing Element: The element shall be monolithically molded from a suitable polyurethane compound. The element shall be flat in a plane perpendicular to the flow in the main and seal against the I.D. of the main when plugging head is in the full open position.

2.11 DRAIN NOZZLES

A. Provide drain pressure taps between line stops to allow quick determination of shutdown adequacy.

B. If required, provide measures necessary to establish equalization for removal of the plugging head.

C. The outlet of each drain nozzle shall be sealed with a blind flange, mechanical joint plug, or a screwed pipe cap.

D. The drain tapping fitting shall consist of a saddle plate with an integral flanged nozzle to which a tapping valve can be attached in a pressure tight manner.

1. The interior of the saddle plate, adjacent to and concentric with the O.D. of the nozzle, shall be grooved to retain a gasket which shall seal the saddle plate to the exterior of the pipe.

2. Saddle shall be clamped to main by a minimum of two "U" shaped stainless steel straps assemblies or solid back of sufficient cross section to contain a minimum line pressure of 200 psig.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verification of Conditions

3.02 PREPARATION

A. Coordinate all Work with Owner.

B. Locate existing water mains prior to installation of new work

C. Demolition/Removal

1. Existing pipe and fittings and associated materials shall be removed and disposed of as indicated on Drawings.

3.03 GENERAL INSTALLATION

A. General: All materials to be used shall be stored and handled in accordance with the manufacturer's recommendations. The Contractor is Responsible for replacing at his/her cost any pipe and/or material damaged during the course of unloading or construction.

B. Pipe Unloading: It is the responsibility of the Contractor to unload and string pipe. Pipe shall be lifted off the truck and placed on the ground with care and in accordance with manufacturer’s recommendations to prevent damage to the pipe and the cement-lined interior of the pipe. Rolling the pipe off the truck or dropping the pipe is prohibited. Pipe may be stacked, but no more than three layers high and only with proper blocking in between layers.

C. Pipe Jointing: For exterior piping, all joints shall be made in a dry trench and in accordance with the manufacturer's recommendations and the best practices for

class of pipe laid. The ends of the pipe shall be wiped clean with a dry cloth before making the joint.

D. Trench Payment Limit: For all exterior piping, fittings, valves and appurtenances, the payment limits for excavation and backfill shall be a maximum of 7 feet wide, and 6-inches below the invert of the proposed pipe, fitting, etc.

E. Pipe Laying:

1. Installation of ductile iron water main and appurtenances shall be in accordance with the requirements of AWWA C600 (latest revision). The pipe shall be accurately laid to the line and grades shown and to the satisfaction of the Owner. Where necessary, the line and grade may be adjusted by the Owner from that shown on the Drawings to meet field conditions, and no extra compensation shall be claimed therefore.

2. New pipe shall be installed with a minimum of 5 feet of cover, measured from pipe crown to finished grade, unless otherwise shown on the Drawings or approved, in writing, by the Owner.

3. Where new pipe is to connect to existing pipe with less than 5 feet of cover exist, off-sets or joint deflection, in accordance with the allowances specified below, shall be used to transition from existing pipe elevation to new pipe elevation.

4. All pipe installed within 3 feet of a culvert or with less than 5 feet of cover (where approved) shall be insulated with a minimum 2-inch, 40 pound density Styrofoam material. The insulation shall extend the width of the trench, a minimum of 4 feet, above the pipe envelope and on the vertical sides of the trench bottom from the bottom to above the pipe envelope. No pipe shall be installed with less than 5 feet of cover without prior written approval of the Owner.

5. Joint Deflection: When it is necessary to deflect pipe from a straight line in either the horizontal or vertical plane, the maximum joint deflection shall not exceed that specified in AWWA C-600 (latest revision) or the maximum allowable deflection permitted by the manufacturer.

6. When mechanical joint, push-on joint, or similar pipe is installed, the bell of the pipe shall be cleaned of excess tar or other obstruction and wiped out before the cleaned and prepared spigot of the next pipe is inserted into it. The gasket, bell, and spigot shall be lubricated with gasket lubricating compound compatible with potable water. The new pipe shall be shoved firmly into place until properly seated and held securely until the joint has been completed. All pipes shall be pushed home by a method that protects the driving end of the pipe. Also, a minimum of two copper or bronze wedges shall be driven between each cast iron and/or ductile joint.

7. Pipe shall be installed beginning at the stub end, unless otherwise approved by the Owner. The interior of each length of pipe shall be swabbed and wiped clean before laying the next length. Whenever the Work is stopped, whether temporarily or for an extended period, the end of the pipe shall be carefully protected to prevent dirt, water, or other extraneous material from entering the pipe by use of a construction cap. Bedding shall be as shown on the plans. No pipe shall be covered or trench backfilled until approved by the Owner.

8. In areas where the Contractor's trenching operation exceeds the typical section, the Contractor may be required to use a higher strength class pipe in lieu of the designated class at no additional cost to the Owner.

9. Restrained joints shall be provided for water mains where any bends, tees, plugs, wyes, or valves are installed. The length of joint restraint shall be in accordance with AWWA Ductile Iron Pipe and Fittings Manual of Practice M41.

F. Valve Installation: All valves shall be installed in accordance AWWA C-600, AWWA C-515 and the manufacturer’s recommendations. Valves shall bear no stresses due to loads from the adjacent pipe. All valves shall be inspected before installation and they shall be cleaned and well lubricated before being installed in the line. Secure to distribution main by means of rods or retainer glands.

G. Pipe Cutting:

1. Where required, sections of pipe may be cut to provide shorter sections of pipe necessary for the construction. The cutting of the pipe shall be done in accordance with the pipe manufacturer's recommendations and subject to the approval of the Owner.

2. In general, the pipe material shall be cut by using a saw or milling process, approved by the pipe manufacturer. The pipe shall be cut, not broken. The cut end of the pipe shall be square to the axis of the pipe and any rough edges ground smooth.

H. Thrust Blocks: Thrust blocks may be used when use of a joint restraint system is not feasible or in conjunction with a joint restraint system, where required by Owner. Concrete used for thrust restraint shall be 3,000 psi (minimum) and shall be sized in accordance with the thrust block schedule provided shown on the Drawings.

I. Water Service Piping: Extend water service piping of size and in location as indicated on the Drawings, or as directed by the Owner. Water services 1-inch or less in diameter shall be replaced with 1-inch Type K copper tubing. Water services 1 ¼-inch to 2-inches in diameter shall be replaced with 2-inch Type K copper tubing. Water services shall be replaced to the property line, as determined by the Owner, unless otherwise shown or approved.

J. Repair Clamps: Repair clamps are not considered as permanent repairs. If a section of main is found to be defective, it shall be cut out and a new section of pipe shall be installed using solid cast couplings, at no additional cost to the Owner.

K. Line Stop

1. Confirm caliper of pipe O.D. prior to ordering line stop materials. Confirm range marked on line stop sleeve with pipe diameter prior to installation to ensure installation of appropriately sized sleeve.

2. Verify location of line stop with Owner prior to beginning excavation. Excavate access pit and shore trench in accordance with Contract Documents. Thoroughly clean pipe surface to remove all dirt, rock, scale and foreign material in area where line stop sleeve is to be installed.

3. Installation shall be accomplished by Contractor and personnel skilled and experienced in the procedures specific to installation of line stops for the pipe diameters and pipe materials specified or shown on the Drawings.

4. Clean exterior of pipe to remove any debris, corrosion, deposits or other surface irregularities that may interfere with proper seating or sealing of each line stop fitting. Any defects that could interfere with proper installation of the line stop fitting or line stop head shall be immediately reported to the Owner.

5. Precast Concrete Cylinder Pipe Sleeve Installation:

a. Install line stop sleeve into position, being careful not to fold gasket and tighten in accordance with manufacturer's Specifications. Re-torque as recommended by manufacturer. Under no circumstances shall the sleeve be forced, reshaped or bent by excessive tightening of the saddle studs while the fitting is assembled around the main. Any retrofitting required shall be accomplished with the fitting removed from the main and shall be immediately reported to the Owner. Any damage resulting to the fitting, accessories or pipe shall be repaired or replaced at the Contractor's expense to the Owner's satisfaction.

b. Assemble the upper and lower saddle such that the saddle assembly is drawn up against the pipe to compress the gaskets. Wet the exterior surface of the nozzle half of the pipe by pouring water into the grout hoppers.

c. Grout upper saddle plate with rich, high early strength, non-shrink grouting material of Portland cement mixture. Grout mixture shall have a fluid consistency suitable to allow the grout to flow between the saddle plate and the main surface.

d. Expose cylinder by chipping exterior concrete coating from the main to expose the reinforcing cages and pre-stressed wires. Exercise extreme caution during cylinder exposure operations to avoid damaging the cylinder.

e. Thoroughly clean and prepare the surface of the cylinder to insure a pressure-tight seal to the gland gasket. Carefully remove surface imperfections such as weld seams.

f. Pressure test fitting to verify satisfactory gland to cylinder seal. Test pressure shall not exceed manufacturer recommended amount to avoid collapsing cylinder and liner.

g. Grout entire volume between the nozzle and the anchor neck with grout material. Vibrate nozzle to eliminate air pockets. Allow grout to thoroughly set before mounting temporary valve.

6. Cast Iron Pipe Sleeve Installation:

a. Install line stop sleeve into position, being careful not to fold gasket and tighten in accordance with manufacturer's Specifications. Re-torque as recommended by manufacturer. Under no circumstances shall the sleeve be forced, reshaped or bent by excessive tightening of the saddle studs while the fitting is assembled around the main. Any retrofitting required shall be accomplished with the fitting removed from the main and shall be immediately reported to the Owner. Any damage resulting to the fitting, accessories or pipe shall be repaired or replaced at the Contractor's expense to the Owner's satisfaction.

b. Pressure test fitting to ensure seal. Remove test plug and connect testing apparatus to line stop sleeve assembly. Test pressure shall be in accordance with manufacturer's recommendations. At a minimum, test pressure shall be 1.25 time pipeline pressure.

7. Provide 3,000 psi minimum concrete for thrust restraint and to support pipe. Allow concrete to cure 24-hours before installing line stop equipment. Submit thrust restraint design plan for line stops for approval prior to mounting temporary valve or line stop machinery.

8. Mount temporary tapping valve to line stop fitting and drain nozzle(s). Mount tapping machine, open temporary valve and pressure tap pipe. Retract cutter, close temporary valve and remove tapping machine. Provide coupon to Owner being careful to keep coupon intact. Mount line stop machine, open temporary valve and insert line stop head into main. Test for shutdown.

9. Cut downstream main and Work as proposed.

10. Retract line stop head, close temporary valve and remove line stop machine.

11. Install completion machine, open valve and insert completion plug. Remove completion machine and temporary valve open insertion of completion plug.

12. Install blind flange in accordance with manufacturer's Specifications and backfill in accordance with Contract Documents.

13. Line stop operation shall be accomplished without reduction of water pressure in the main(s). It shall be the responsibility of the Contractor to verify pressure prior to commencing the installation.

14. Line stop operation shall provide a satisfactory shutdown capable of stopping pipe flow sufficiently to allow the proposed Work to be performed without the need for excessive dewatering. In the event of excessive leakage from line stop operations prohibits installation of the Work, the Contractor shall Work with the Owner to determine the measures required to establish a workable shutdown, at no additional cost to the Owner.

15. Thrust and Support Blocking

    a. Submit thrust restraint design plan for line stops for approval prior to mounting temporary valve and pressure tapping machinery. Thrust restraints shall be designed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. Contractor shall install concrete thrust and support blocking in accordance with submittal. Blocking shall reach a minimum cure strength specified by submittal before any valves or machinery shall be mounted onto the Line-Stop fitting.

16. Cutting Operation

    a. Drilling equipment shall be in good condition, and equipped with power drive to insure smooth cutting and to minimize shock and vibration. Cutting equipment shall be carbide tipped and capable of being renewed without removal from Site.

L. Repair water piping damaged during construction.

3.04 SPECIAL REQUIREMENTS

A. Pressure Pipe - Ductile Iron: Valves shall bear no stresses due to loads from the adjacent pipe.

B. Assembling Mechanical Joints: Surfaces against which the gasket will come in contact shall be thoroughly brushed with a wire brush prior to assembly of the

joint. The gasket shall be cleaned. The gasket, bell, and spigot shall be lubricated by using gasket-lubricating compound compatible with potable water. The spigot shall be inserted into the bell until it is correctly seated. The gasket shall then be seated evenly in the bell at all points, centering the spigot, and the gland shall be pressed firmly against the gasket. After all bolts have been inserted and the nuts have been made up finger-tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint to the proper tension by means of a torque wrench. Mechanical joints shall be assembled with mechanical joint retainer glands where appropriate.

C. Torque mechanical joint bolts with a torque wrench to the range specified in AWWA C-600. Mechanical joint bolts shall be re-torqued to the range specified in AWWA C-600 after waiting a period of two hours. If effective sealing of the joint is not attained at the maximum torque specified, the joint shall be disassembled and thoroughly cleaned, then reassembled. Bolts shall not be overstressed to tighten a leaking joint.

3.05 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.06 STARTUP & COMMISSIONING

A. Provide in accordance with Division 01 General Requirements and as follows;

B. Disinfection

1. General: Flush and disinfect piping in accordance with the latest revision of AWWA C-653 and C-651. Prevent contaminated or highly chlorinated water from entering new or previously disinfected mains.

2. Flushing and draining: Flush using water from existing main. Drain at hydrant first and then building. Provide the following minimum flow in gallons per minute: 4 inch diameter - 100 GPM; 6 inch diameter - 220 GPM; 8 inch diameter - 390 GPM; 12 inch diameter - 880 GPM.

3. Sampling: Provide sampling taps in accordance with the latest revision of AWWA C-651. Take one sample at each location as described in Section 5 of AWWA C-651. No hose of fire hydrant shall be used in the collection of samples.

4. Equipment: Provide water pumps with adequate metering devices. Provide chlorine injection pumps or chlorinators, which allow accurate measurement of chlorine being introduced to water service.

5. Personnel: Submit names of personnel or firm to perform disinfection Work.

6. Neutralization: The Contractor shall be Responsible for neutralizing the chlorine residual of the disposed water. Neutralization chemical tablets and dosages listed in Appendix C of AWWA C651 (latest revision) are recommended.

7. Once piping has been accepted and put in service, remove sample taps provided to sample in accordance with AWWA C-651 to the corporation stop.

C. Testing of Process Piping (see below for Ductile Iron Piping)

1. Perform hydrostatic testing of completed lines. Apply 1.5 times the working pressure for 20 minutes, 2-psi gage drop or less is acceptable.

2. Perform operational testing of valves by opening and closing under water pressure to insure proper operation.

D. Testing of Ductile Iron Piping

1. Perform pressure and leakage tests under Owner supervision, in accordance with the latest revision of AWWA C-600 and the requirements set forth below.

2. Duration of hydrostatic testing shall be a minimum of two (2) hours. The test pressure shall be not less than 1.5 times the working pressure at the lowest point, and in no case less than 150 psi.

3. The allowable leakage for ductile iron pipe shall be determined by the formula:

$$L = \frac{SD\,(P\,½)}{148{,}000}$$

Where L is the testing allowance (makeup water) in gallons per hour, S is the length of pipe tested in feet, D is the nominal diameter of the pipe in inches, and P is the average test pressure during the hydrostatic test in psi.

For convenience, the following table may be used to estimate allowable leakage for ductile iron water main installations:

CIPRA RECOMMENDED ALLOWABLE LEAKAGE PER 1000-FT. OF PIPELINE*
(GALLONS PER HOUR)

Avg. Test Pressure	NOMINAL PIPE DIAMETER - INCHES					
PSI	4	6	8	10	12	16
450	0.57	0.86	1.15	1.43	1.72	2.29
400	0.54	0.81	1.08	1.35	1.62	2.16
350	0.51	0.76	1.01	1.26	1.52	2.02
300	0.47	0.70	0.94	1.17	1.40	1.87

Avg. Test Pressure	NOMINAL PIPE DIAMETER - INCHES					
PSI	4	6	8	10	12	16
275	0.45	0.67	0.90	1.12	1.34	1.79
250	0.43	0.64	0.85	1.07	1.28	1.71
225	0.41	0.61	0.81	1.01	1.22	1.62
200	0.38	0.57	0.76	0.96	1.15	1.53
175	0.36	0.54	0.72	0.89	1.07	1.43
150	0.33	0.50	0.66	0.83	0.99	1.32
125	0.30	0.45	0.60	0.76	0.91	1.21
100	0.27	0.41	0.54	0.68	0.81	1.08

For mechanical or push-on joint pipe with 18-ft. nominal lengths. To obtain the recommended allowable leakage for pipe with 20-ft. nominal lengths, multiply the leakage calculated from the above table by 0.9

If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

3.07 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 33 12 25

PREFABRICATED WATER UTILITY PUMPING STATION

PART 1 – GENERAL

1.01 SUMMARY

A. Provide one (1) factory built, factory delivered, above ground prefabricated water utility booster pumping station with all the necessary internal piping, pumps, motors, valves, HVAC , electrical and controls and other necessary appurtenances required for complete operation. Installed facility on a fabricated steel base and enclosed in a structure as shown on the plans and as specified herein. The water booster station shall be complete when delivered and will not require internal contractor construction except to install the power service through the service conduit provided for that purpose and to install and connect the antenna. The pump station shall be in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Foundations and slab-on-grade have been designed for a 55,000 lbs unfactored prefabricated building structure as shown on the drawings. The contractor shall be responsible for any redesign and additional materials associated with changes to the foundation and slab-on-grade that the selected pump station should require.

C. The Owner has determined that specifying proprietary control equipment for the Project is in the public's best interest. The Owner would like to standardize on Allen Bradley Programmable Logic Controllers and Operator Interface Terminals due to reliability and compatibility with existing systems, including replacement parts.

D. The booster station control panel shall be provided and installed per the SCADA system electrical panel drawings.

E. Manufacturers

1. Engineered Fluid, Inc.
2. Precision Systems
3. Smith & Loveless Inc.
4. Jensen Engineered Systems
5. Engineer approved equal

F. Related Requirements

1. Division 03 - Concrete
2. 09 90 00 – Painting and Coating
3. Division 26 – Electrical
4. Division 31 - Earthwork
5. 33 11 00 – Water Utility Distribution Piping
6. 40 91 00 - Instruments

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American National Standards Institute (ANSI)
2. Hydraulic Institute (HI) Standards
3. Institute for Electrical and Electronics Engineers (IEEE) Standards
4. National Electrical Manufacturers Association (NEMA) Standards
5. American Water Works Association (AWWA) Manual M11: Steel Pipe – A Guide for Design and Installation

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

B. Provide Manufacturer Services in accordance per Division 01 General Requirements;

1. Provide the services of the manufacturer's representative to assist with installation and field testing as specified herein. Each person day shall be of 8 hour duration.

a. Manufacture of prefabricated pumping station- minimum 3 person days.

b. Manufacturer of pumping units- minimum 2 person days

c. Manufacturer of variable frequency drives- minimum of 2 person days

C. Training

1. Provide training on all facets of the Pumping Station operation in accordance with Division 01 General Requirements.

2. Provide four training sessions, each of 4 hours duration.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Complete list of all items to be provided including supplier and delivery schedule.

2. Manufacturer's specifications and product data for all individual components that make up the booster pump station, including pump curves, required to demonstrate compliance with requirements which shall include complete parts listing showing materials of construction with applicable HI, ANSI, ASTM and other standards.

3. Complete list of spare parts

C. Certificates

1. Provide a building design certification letter, signed and sealed by a Professional Engineer licensed in the State of Massachusetts, stating the modular structure complies with the Eighth Edition of the Massachusetts State Building Code.

2. Submit sworn certificate that the pump casings have passed the hydrostatic pressure test as specified.

3. Certified pump factory tests and performance curves

4. Certificate of required insurances of prefabricated pumping station manufacturer

D. Shop Drawings: The following submittals are required

1. The submittals shall contain a minimum of two (2) full size drawings, size 24" x 36"; one (1) each covering the booster pump station and the electrical control schematic.

2. The booster pump station drawing shall be specific to this project and drawn to scale in at least three (3) different views as well as illustrate the Massachusetts Electrical Code (MEC) clearances per Section 110-26 of the Code.

3. Total weight of pumping station, piping, valving and pumping equipment as well as all equipment housed within the pumping station. Maximum localized loading in pounds per sq ft shall be provided.

4. Motor data and variable frequency drive data.

5. Pipe and Fittings:

   a. Piping layouts, schedules, dimensioned piping, fittings, location of valves and appurtenances and jointing details. Methods and location of supports and all pertinent technical specifications for all piping provided for a complete piping system.

   b. Description of all preparations, priming, painting, linings and coatings applied.

   c. All design data and calculations in accordance with AWWA M11.

6. Valves and Appurtenances:

   a. Dimensions and materials of construction and descriptive literature.

   b. Certified hydrostatic test data, per manufacturer's standard procedure.

7. Description of surface preparation and shop priming and painting, including manufacturer names and dry film thicknesses.Samples and Mockups

8. Standing seam roof panel sample, painted to color chosen by client.

9. Exterior wall finish samples of color chosen by client.

E. Manufacturer Instructions

1. Installation manual including storage, transportation, leveling, alignment, wiring, pre-start, checklist, and initial startup procedures.

F. Source and Field Quality Control Submittals

1. Provide the name of the factory service manager, their employee number, telephone number with extension and number of years with the company. List also each start-up service technician, their employee number and years of service with the company.

Manufacturer shall provide a start-up service report following testing, start-up, and training.

G. Qualification Statements

1. The manufacturer shall provide statements and documentation meeting qualification in Article 1.06.

2. Provide a full size photocopy of the manufacturer's combination UL/manufacturer logo Packaged Pumping Station label.

H. Warranty

1. Provide the manufacturer's formal warranty policy.

I. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1. Complete service manuals including copies of all drawings, description of operation, maintenance data and schedules, and replacement parts lists. Submit manuals in 3-ring binders including table of contents, and heavy duty tab section dividers.

2. The manufacturer shall provide three (3) full- size hard copies and one (1) electronic copy of as-built record drawings of the pump station and all of its components.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Qualifications: per Division 01 General Requirements and as follows.

1. The manufacturer of the selected equipment shall be a business regularly engaged in the manufacturing, assembly, construction, start-up and maintenance of water distribution equipment of the type required for this project. The manufacturer shall have at least ten (10) years of successful experience in providing stations of the type, design, function and quality as required for this project and shall have at least ten (10) similar installations.

2. The booster pump station manufacturer shall furnish premises/operations and products/completed operations general

liability insurance from an insurance company with a rating of A-V according to the most recent Best's Key Rating Guide, in an amount equal to $5,000,000 per occurrence. The insurance certificate must be included with the manufacturer's submittal. The coverage must be provided by an insurance carrier licensed and admitted in the state of manufacturing.

C. Independent Testing

1. Pump and motor vibration analysis

D. Certifications

1. The pump station manufacturer shall be required to affix an Underwriter's Laboratory (UL) Label attesting that the assembled equipment complies with the Packaged Pumping Station (QCZJ) UL Listing Category. This label shall be inclusive of the entire station with enclosure to demonstrate compliance with the Massachusetts Electrical Code (MEC) requirements for working clearances and wiring procedures. Equipment manufactured without this third party certification label or equipment manufactured by an outside source or "brokered equipment" defined as systems not assembled on the premises of the named manufacturer by that company's employees will not be allowed.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Packing, Shipping, Handling, and Unloading

1. Spare parts shall be packed in containers bearing labels clearly designating contents and pieces of equipment for which they are intended.

C. Storage and Protection

1. Manufacturer shall store all equipment in accordance with manufacturer's instruction. Electrical equipment shall be stored in weatherproof, ventilated enclosures.

2. Pump shall not, under any conditions, be allowed to sit out-of-doors unprotected.

3. The Adjustable Frequency Controller shall be protected against damage at all times. The controller shall be stored in a clean, dry environment with temperature and humidity within the range as

specified by the controller manufacturer. Space heaters shall be energized during storage, as recommended by the equipment manufacturer.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.09 MAINTENANCE

A. Extra Materials: Furnish as specified below. Make interchangeable with and same material and workmanship as corresponding original parts.

1. The manufacturer’s recommended spare parts shall be provided prior to equipment start-up. They shall be packaged and identified by name, function, and equipment.

1.10 WARRANTY

A. The warranty is the sole responsibility of the booster station manufacturer and that manufacturer's warranty shall be provided in written form for inclusion with both the submittal covering the specified equipment and the O&M manuals provided with that equipment.

B. The manufacturer's warranty shall at a minimum cover:

1. A period of one (1) year commencing upon successful start-up, after authorized manufacturer's start-up, not to exceed eighteen (18) months from the date of shipment.

2. The warranty period shall be inviolate regardless of any component manufacturer's warranty for equipment and components within the station.

3. The manufacturer's warranty shall cover all equipment, components and systems provided in or with the station by the manufacturer of the station, exclusive of those components supplied by and/or installed by others independent of the manufacturer of record for this station.

4. The warranty shall provide for the station manufacturer to bear the full cost of labor and materials for replacement and/or repair of faulty or defective components so there shall be no cost incurred by the Owner for this work during the warranty period.

5. The manufacturer's warranty policy is amended only by the items considered consumables, i.e., light bulbs, pump seals, pump

packing, lubricants and other maintenance items consumed by usage.

6. No assumption of contingent liabilities for any component failure during manufacturer's warranty is made.

7. The exterior building panels shall be warranted to be free from unnatural discoloration, cracking or aggregate loss for 15 years.

C. It is the intent of this manufacturer's warranty to gain for the Owner a single source responsible party for all components specified herein. "Second party" or "pass through" warranties will not be accepted.

D. If the submitted written manufacturer's warranty does not meet the minimum requirements set forth above, that submittal will be rejected.

PART 2 – PRODUCTS

2.01 PREFABRICATED STRUCTURE

A. Performance/Design Criteria

1. The station building enclosure shall be a factory assembled, modular structure attached to the pump station base structure and requiring no additional assembly at the job site.

2. The structure shall comply with the design criteria per the Eighth Edition of the Massachusetts State Building Code and the following minimum design values:

a. Building Occupancy Category = 3

b. Basic Wind Speed, V= 100 mph

c. Wind Importance Factor, I= 1.15

d. Ground Snow Load, Pg = 55 psf

e. Roof Snow Load Slope Factor, Cs = 1.0

f. Roof Snow Exposure Factor. Ce = 1.0

g. Snow Load Thermal Factor, Ct = 1.10

h. Snow Load Importance Factor, I = 1.10

i. Flat Roof Snow Load, Pf = 46.6 psf

j. Roof design shall account for unbalanced snow loads per Code

k. Seismic Coefficient, Ss = 0.31

l. Seismic Coefficient, S1 = 0.074

m. Seismic Importance Factor, I = 1.25

n. Seismic Site Class = D

o. Seismic Design Category = B

3. The materials specified are specifically chosen to be resistant to moisture degradation and infestation and be maintainable.

4. Building insulation system shall comply with the Eighth Edition of the Massachusetts State Building Code and the ASHRAE Standard 90.1-2007. Minimum building wall insulation shall be R-13 in wall framing cavities with additional R-7.5 continuous insulation. Roof insulation shall be minimum R-38 in the roof attic. Insulation shall be foam-in-place polyurethane material applied between the interior and exterior sheathing forming a closed cell bounded by the steel framing. The insulation shall have a minimum density (compressibility) of 1.7 - 1.8 lbs/cu. ft. nominal and shall be applied to the thickness required to provide the specified minimum R values. The insulation shall have a ASTM E-84 flame spread index of 20 and smoke developed of 450.

5. Building framing materials shall comply with the A.I.S.I. Specification for the Design of Cold-formed Steel Structural Members and to Standards ASTM C-955, ASTM C-1007, ASTM C-645, ASTM C-754 and ICBO 4782P. and 4784P. A framing design incorporating the members covered by the listed specifications and standards shall develop a structure meeting or exceeding the building design criteria listed above.

6. The building structure shall be fabricated using steel C-studs as wall framing members. The size, placement and spacing of studs shall be in accordance with the design criteria and material standards. The wall C-studs shall be a minimum 2" x 3 5/8" size of 20 gauge material minimum.

7. Sheathing

a. The exterior wall sheathing shall be ½" thick, exterior, C-C grade plywood.

b. The roof sheathing shall be 5/8” thick, exterior, C-C grade plywood.

c. The interior wall and roof/ceiling sheathing shall be ½" thick, exterior, C-C grade plywood.

d. OSB or particle board sheathing will not be allowed.

8. All interior wall & ceiling surfaces shall be covered with .090" thick FRP (fiberglass reinforced plastic) sheeting of pebble grain, gloss, white finish. The individual wall faces shall be covered with one continuous sheet. The FRP sheets shall be glued to the plywood sheathing requiring no fasteners. Corner moldings of like FRP material shall be installed & finished in a workmanlike manner.

9. Openings in the sidewalls and/or roof shall be as shown and be fully framed out and supported using single or multiple framing members sufficient to support and fasten those devices or equipment items requiring a framed opening, these being access hatches, HVAC equipment, pipe passages, conduit passages, door and window openings and other special purpose openings as might be shown and required.

10. The attaching of devices or equipment to the building at a framed opening shall be done fully according to the device manufacturers mounting instructions.

11. The aluminum entry doors with doorframe shall be double opening equipment doors of total size 6'0" by 7'0". The doors and frame shall have a polyester painted and baked finish, white in color. One door shall have a lockset, stainless steel exterior handle, interior panic type exit device and top mounted door closer with hold-open device.

12. Each door shall be 0.019" thick stucco embossed aluminum panels, 1¾" thick with pressure injected polyurethane foam core for a minimum R12 insulation value. Each door shall be flush design with rolled edges for style, strength and corrosion resistance. Three (3) 12 gauge, stainless steel, fixed pin hinges shall be included. The active door shall include a 12" by 12" window.

13. The doorframe jamb, header and sill shall be 0.062" thick aluminum extrusions. The frame shall be weather-stripped with a weather seal of closed cell foam encased in a thermoplastic elastomer (TPE) skin.

14. The building shall be fabricated up from and securely attached to a framework fabricated of 2" x 6" steel tubing welded at each corner to form a base frame serving as a stable base for handling and transporting the building prior to attaching the building to the station base skid. Manufacturer shall provide anchorage clips to permanently attach the modular building to the concrete support pad. The base frame shall be grit blasted to a SP-6 finish and coated with the specified coating material. The base frame shall be

provided with removable lifting eyes to facilitate handling of the building for placement on the base equipment skid.

15. The building enclosure shall be firmly and securely attached to the steel base structure. as determined by structural analysis so as to maintain the live load and wind load ratings as specified and to resist shearing and tearing in the process of transporting and placing the finished station.

16. The steel floor plate of the base structure shall extend a full 3/8" beyond the outer edge of the building enclosure to allow for the application of silicone caulking completely around the building so as to make the base joint moisture proof and insect proof. The station manufacturer shall apply this caulking prior to shipment.

17. Exterior treatment of the building shall be provided with panels with small aggregate and routed offset brick pattern. Color is to be determined by Owner. Panels shall be natural stone aggregate embedded in a reinforced polymer to produce a composite panel that is lightweight, fire-resistant and durable. The panels shall be warranted to be free from unnatural discoloration, cracking or aggregate loss for 15 years.

18. The wood rafter roof system will be installed at the factory. The roof shall be a wood hip rafter system on 16" centers, deck with 5/8-inch CDX plywood, and covered with 30 lb. felt underlayment. The manufacturer will provide aluminum fascia and soffit. The roof system shall have a 3:12 minimum pitch and 6" overhang.

19. A prefabricated, 26-gauge standing seam metal panel roof shall be installed at the factory. The panels shall have a MS Colorfast 30 and an acrylic coated Galvalume® finish. The panels shall meet UL Standard 2218, Class 4 impact resistant and UL Standard 790, Class A fire resistant rating. The panels shall be manufactured by Metal Sales, Inc. or approved equal.

20. Building Substructure: The packaged booster pump station base/floor system substructure shall be made up of steel plate and standard structural steel shapes of the sizes and weights as shown on the plans for this item. The substructure shall be designed to support the building live and dead loads plus the burden imposed by loading, transporting and unloading of this equipment. All steel plates used in the substructure shall meet or exceed the requirements of ASTM-A36. The structural shapes (channels and angles) shall be of the thickness/ weight as shown on the plans for this item and shall meet or exceed the requirements for ASTM A-

36. The structural rectangular or square tubing shall be of the wall gauge as shown on the plans for this item and shall meet or exceed the requirements for ASTM A-500 Grade B.

21. Skid Insulation: The steel skid shall be insulated with a isocyanurate (flame retardant urethane) foam insulating material. The insulation shall be applied in each of the spaces between the structural members by spray and other approved methods. The insulation shall be 3 inches thick and have a minimum density (compressibility) of 1.7-1.8 lbs/cu. ft. nominal and shall be applied to the thickness required to provide a minimum R value of 21. The insulation shall have an ASTM E-84 flame spread rating of less than 30.

22. Piping Penetrations: Where suction and discharge piping, or any other pressure piping, passes through the station base/floor system substructure that area of the floor shall be provided with a grout sleeve. The installing contractor shall be responsible for furnishing and installing grout.

23. Safety Floor Matting: The walkway areas (that space from the entrance to the control panel and the entire MEC clearance area) shall be covered with a rubber drainage runner. The runner shall be medium duty, 1/2 inch minimum thickness of open slot design allowing fluids to drain under standing or walking surfaces. The runner shall have a tread design to promote sure footing. The underside of the runner shall have a raise knob design to permit aeration and drainage, and to reduce runner fatigue. The runner shall not be glued to the floor.

24. Delivery-Lifting Device:. Installation Contractor shall provide their own rigging that complies with the manufacturer's recommendations for lifting the assembly without damage.

25. Corrosion Protection

a. All surfaces of the exposed steel structure, interior and exterior, shall be gritblasted equal to commercial blast cleaning (SSPC SP6).

b. Following grit blasting, all weldments will be pretreated by hand with brush using Tnemec Series 69 Hi-Build Epoxoline II or equal coating to provide additional corrosion protection. Following the pretreatment full coating application shall take place.

c. The base coating shall take place immediately after surface preparation. The protective coating shall be Tnemec Series 69 Hi

Build Epoxoline II or equal consisting of a two-component, high solids, epoxy system formulated for high build application for protection and finishing of steel and having excellent chemical and corrosion resistant properties. The epoxy system shall be self-priming and require no intermediate coatings.

d. Following the base coating application, a full finish coating application shall take place. The protective coating shall be Tnemec Series 61 Hi Build Epoxoline or equal, gray in color, consisting of a two-compartment, high solids, epoxy system formulated for high build application for protection and finishing of steel and having excellent chemical and corrosion resistant properties. The epoxy system shall be self-priming and require no intermediate coatings. The base and finish coats shall provide a total dry mil thickness of 8.0 mils.

e. The floor area of the completed booster pumping station, not protected by the floor matting, shall receive an additional coat of "non-skid" Tnemec Series 61 Hi-Build Epoxoline or equal. The total dry mil thickness on the unprotected floor area shall provide a 14.0 mil coverage.

B. Source Quality Control

1. Provide in accordance with Division 01 General Requirements.

2.02 END SUCTION PUMPS

A. Description: Horizontal end suction, centrifugal type pumps complete with electric motor, baseplate, couplings, and all necessary appurtenances.

B. Service Conditions: The pumps will be used to pump treated (chlorinated) potable drinking water. Pump materials and design shall be such to meet all regulations for service fluid. The following conditions of service shall be strictly adhered to:

1.	Name:	Pump #1	Pump #2, Pump #3
2.	Number of Units:	One (1)	Two (2)
3.	Type of Drive:	Variable Speed	Variable Speed
4.	Discharge Size, min:	3 IN.	6 IN.
5.	Suction Size, min:	4 IN.	8 IN.
6.	Design Capacity:	500 US GPM	1,600 US GPM
7.	Design Head:	214 FT TDH	214 FT TDH

8.	Efficiency at Design, min:	79.61%	83.33%
9.	Rotational Speed, max:	3,580 RPM	1,790 RPM
10.	Impeller Size, min:	7.76 IN.	14.67 IN.
11.	Drive Horsepower, max:	40 BHP	150 BHP
12.	NPSHR at Design, max:	19.3 FT	9.3 FT

C. Materials of Construction: The pumps shall be of lead-free construction and be of the following material types, or approved equal:

1.	Name:	Pump #1, Pump #2, and Pump #3
2.	Casing:	Ductile Iron (ASTM A536 GR65)
3.	Impeller:	Bronze (ASTM B584-844)
4.	Shaft:	High Grade Steel (SAE 1045)
5.	Shaft Sleeve:	316 SS
6.	Mechanical Seals:	Refer to Mechanical Seal details, below
7.	O-rings:	Buna N
8.	Case Wear Rings:	316 SS
9.	Bearing Housings:	Cast Iron
10.	Baseplate:	Steel

D. Casing: Volute type, bolted to adapter, with recessed lock fit to insure alignment. No stud or bolt holes are tapped through casing to liquid ways. Tapping openings provided for priming, venting, draining and suction and discharge gauge connections. Casings shall be shop tested under a hydrostatic pressure of at least 150% of the specified design head. The interior of the casing shall be smooth and free from defects. A coating shall be applied to the pump interior and shall be NSF 61 certified. Drilling and dimensions of the flanges shall conform to the ANSI/ASME B16.1 standard, Class 250 rating.

E. Impeller: Enclosed, single suction type, cast in one piece. All impellers are to be statically balanced to insure smooth operation, also hydraulically balanced except in some small sizes where end thrust is but a minor factor.

F. Wearing Rings: Renewable type; maintain proper running clearance with impeller hubs to minimize leakage between suction and discharge.

G. Shaft Sleeves: To be shouldered on shaft near impeller and covers full length of shaft from impeller hub to motor end bracket. Seals by compression between shaft sleeve and impeller hub, also between sleeve and shoulder on shaft, protecting shaft from contact with liquid.

H. Stuffing Box: The stuffing box shall be cast integral with the pump casing. The stuffing box shall contain a mechanical seal, as specified below. Adequate space shall be available for access to the seal area for maintenance and adjustment.

I. Mechanical Seal

1. All mechanical seal components shall be split in half except for seal faces. Seal faces shall be solid (un-split) for initial installation at rotating equipment manufacturers only.

2. Materials of Construction: The mechanical seals shall be of the following material types, or approved equal

a.	Gland and rotary holder:	316 stainless steel
b.	Springs:	Elgiloy
c.	The rotary face:	solid silicon carbide or alumina creamic
d.	The stationary seal face:	solid silicon carbide or carbon
e.	Elastomers:	Fluoroelastomer, EPR or Aflas

3. The seal shall be installed outside of the sealing chamber/stuffing box. Repair/replacement of the seal shall be accomplished without any rotating equipment disassembly.

4. The seal shall be of stationary, hydraulically balanced, o-ring design to reduce heat generation, face wear and minimize horsepower consumption. The design will seal both positive pressure and vacuum.

5. The seal shall be mechanically loaded with multiple springs. The springs will be isolated from the pumped product to eliminate corrosion or clogging problems.

6. Two flush ports with standard 3/8” NPT tapped connections shall be provided in the gland.

7. The rotary holder shall have a drive pin to ensure positive drive of rotating parts.

8. The seal shall be capable of sealing up to 28 inches of vacuum to 400 PSIG, dependent upon size and materials.

9. Provide one spare parts kit for each mechanical seal.

J. Adapter: Maintains rigid assembly between motor and casing. Machined lock between adapter and motor end bracket keeps adapter & casing in permanent alignment with motor and extended motor shaft.

K. Motor: The motor shall be horizontal and in accordance with the latest NEMA standards, and shall have the following characteristics:

1. Enclosure: TEFC

2. Number of Phases: Three (3)

3. Cycles: 60 Hz

4. Voltage: 480 Volt

5. Speed: 3,600 RPM (Pump #1), 1,800 RPM (Pump #2, #3)

6. Service Factor: 1.15 (minimum)

   a. The service factor is reserved for variations in voltage and frequency.

7. Motor Size: 40 HP (Pump #1), 150 HP (Pumps #2, #3)

   a. Each motor shall have a sufficient horsepower rating to operate the pump at any point on the pump's head-capacity curve without overloading the nameplate horsepower rating of the motor, regardless of service factor.

8. Premium Efficiency Inverter Duty Rated

9. Provide resistive temperature devices (RTDs) for thermal protection of motor and upper and lower bearings. The RTDs shall be interlocked to the pump circuit within the drive cabinet in order to shut down the pump upon high motor temperature or high bearing temperature.

10. Shaft grounding brushes.

11. Provide vibration sensors equal to Robert Shaw Model 376A with dry contacts to wire to VFD or SCADA system.

L. Pump/Motor Vibration Isolation Pads: The pump/motor assembly shall be mounted to a fabricated steel base built specifically for the pump/motor to be mounted. Each mounting or attachment point shall be complete with a vibration isolation pad. The pad will be in two (2) parts, a 1/4" base layer followed by a

5/8" upper layer and be a nominal 2" x 2" square size for pump/motor combinations weighing up to 1500 pounds.

M. Equipment, including pump, motor and baseplate shall be surface prepared and finished painted with manufacturer's standard finish compatible with the requirements of Section 09 90 00.

N. Manufacturer

1. Armstrong
2. Flowserve
3. Hayes
4. American-Marsh
5. Ruhrpumpen
6. Engineer approved equal

O. Source Quality Control

1. Provide in accordance with Division 01 General Requirements.
2. Tests and Inspections
   a. Pumps should undergo hydrostatic testing and factory performance testing, and pass, prior to shipment to the pump station manufacturer.
   b. Each pump shall be factory tested in accordance with the latest version of the Hydraulic Institute Standards. Certified copies of Hydrostatic Test Report shall be supplied prior to conducting pump performances tests.
   c. Each pump shall be tested and data recorded at its operating conditions of service as stated herein. Sufficient test point readings shall be made to establish complete head, flow capacity, efficiency and brake horsepower curves for each pump.
   d. One pump of each size shall be tested at five additional equally spaced speeds between minimum and maximum speeds.
   e. All gauges and other test instruments shall be calibrated within 30 days of the scheduled test and certified calibration data shall be provided. All flow meters shall be calibrated within 2 years of the scheduled test and certified calibration data shall be provided.

f. A complete test report, including certified characteristic curves shall be submitted and approved prior to shipment of pumps.

3. . Factory pressure testing of process piping

a. When the station plumbing is completed, the pressure piping within the station (including valves, pumps, control valves, and fittings), connections as make up the entire system shall be hydrostatically tested at a pressure of 1.5 times the working pressure. The test pressure shall be applied for a minimum of 20 minutes, during which time all joints, connections and seams shall be checked for leaking. Any deficiencies found shall be repaired and the system shall be retested.

b. The results of this testing shall be transmitted in writing to the Engineer prior to shipment of the station and shall note test pressure, time at full pressure and be signed by the Quality Control Manager or test technician.

2.03 INTERIOR PROCESS PIPING

A. General

1. All interior water piping shall be steel pipe conforming to the specifications below, or approved equal.

2. Piping shall be flanged or shop welded.

B. Performance/Design Criteria

1. Steel pipe shall conform to material specification ASTM A-53(CW) for nominal pipe size four (4) inch and smaller and ASTM A-53(ERW) Grade B for nominal pipe size five (5) inches and larger.

2. Steel butt-welding fittings shall conform to material specification ASTM A-234 Grade WPB and to the dimensions and tolerances of ANSI Standards B16.9 and B16.28 respectively.

3. Forged steel flanges shall conform to material specification ASTM A-105 Class 60 and/or ASTM A-181 for carbon steel forgings and to the dimensions and tolerances of ANSI Standards B16.5 as amended in 1992 for Class 150 and Class 300 flanges.

4. The piping sizes shall be as shown on the drawing.

a. Size 10 inch and below Schedule 40

b. Size 12 inch and above Standard weight (.375" wall)

5. All pipe welds shall be performed by certified welders employed by the pump station manufacturer. Welders shall be qualified under the provisions of ANSI/AWS B2.1 or ASMW Section IX. As part of the equipment submittal, the pump station manufacturer shall provide copies of the welding certificates of the employees who are to perform the pipe welds. Recertify welders if required.

6. All welding will be shop welding, no field welding will be permitted.

7. All plumbed devices within the station eventually requiring service, such as meters, control valves, pumps and like equipment, shall be easily removed from the piping by the presence of appropriately placed and sufficient quantity of adaptors and couplings as shown on the drawings; no less than the quantity of couplings and adaptors shown shall be allowed.

C. Finishes

1. Finish Materials

a. Steel piping shall have applied to it a Fusion Bonded Epoxy Coating on the interior and exterior of pipe surfaces that conforms to AWWA C-213-91 for steel water pipelines. The powder coating product shall be National Sanitation Foundation (NSF) Standard 61 certified material. The final product shall be capable of meeting Salt Spray Resistance ASTM B117 (1000 hour) with no blistering, undercutting or rust bleed; Humidity Resistance ASTM D2247 (1000 hour) with no blistering, undercutting or rust bleed; and Impact Resistance of ASTM G14-72 (160 in. lbs.). The Fusion Bonded Epoxy Coating shall provide a minimum total dry mil thickness of 12-16 mils. The epoxy powder coating shall be Pipe Clad 1500 Red latest revision from Valspar, Inc. or equal.

b. Contractor may use its standard protective coatings provided that it can demonstrate its standard is equivalent to the Fusion Bonded Epoxy Coating as specified in AWWA C-213.

c. Prior to shipment of the station, the station manufacturer shall provide in writing to the Engineer certification that the fusion bonded epoxy coating has been applied to all internal surfaces of the steel piping using the proper method. Said certification shall show under the station manufacturer's letterhead:

1) Date of application;

2) Material manufacturer and product designation including a product data sheet for the coating;

3) Applier of the fusion bonded coating, name, address and phone number;

4) Notarized signature of an officer of the station manufacturing company stating the fusion bonded epoxy coating was applied to AWWA Standard C213-91 or the latest revision.

D. Source Quality Control

1. Provide in accordance with Division 01 General Requirements.

2. Tests and Inspections

a. Prior to shipment the station manufacturer shall provide in writing to the Engineer certification that the piping has undergone pressure testing meeting the Execution section of this specification.

2.04 ELASTOMER PIPE CONNECTORS

A. General

1. The suction and discharge of each booster pump shall include an elastomer connector to help isolate vibration and noise in the piping system.

B. Performance/Design Criteria

1. Provide single arch flexible connectors of the expansion/vibration type for connection to pumps and equipment as specified and as shown on the Drawings. Guides shall be provided for each expansion joint.

2. All Elastomer Pipe Connectors shall be designed for the axial movements required for the specified application along with the maximum axial force required to compress the joint. The Connectors shall prevent axial, lateral and rotational movement and vibration from being transmitted to the piping and equipment. All Connectors shall be designed for the test pressure of the connecting piping

C. Provide harnessed units to prevent over elongation of the Connectors. Harness units shall be the manufacturer’s standard design and consist of drilled plates, stretcher bolts and rubber washers backed by metal washers. Harness restraints shall conform to AWWA Manual M11.

D. Unless otherwise specified or shown on the Drawings, all Connectors for liquid service, of the same type, style, and duty shall be supplied by a single Manufacturer. All Manufacturers named or otherwise shall comply with the Contract Documents. The manufacturer of the Connectors shall be a member of the Rubber Expansion Joint Division of the Fluid Sealing Association. All liquid service Connectors shall be a product of the following Manufacturers:

1. General Rubber Corporation - Style 1025
2. Mercer Rubber Company - Series 450
3. Red Valve Company Inc. - Type J-1
4. Engineer Approved Equal

E. Materials of Construction

1. Connectors shall be manufactured of butyl rubber surrounded by high grade woven cotton or suitable synthetic fiber and individual solid steel ring reinforcement. All soft rubber fillers shall be integrally cured into the arches to provide a smooth flow path to prevent settling of material, grit, sludge etc., into the arch. The rubber used shall be specifically designed for water service. The Connectors shall include a three-ply abrasion resistant liner.

2.05 FLANGED COUPLING ADAPTORS

A. General

1. Flanges Coupling Adaptors shall be manufactured in accordance with AWWA C-207.Body and flange per ASTM A513. Nuts and bolts shall comply with AWWWA C111/ANSI A21.11. Gasket shall be Grade 27 BUNA s. Coatings shall be manufacturer’s standard and comply with NSF -61.
2. Flange Coupling Adaptors shall be restrained in accordance with AWWA Manual M11.

B. Finishes

1. Provide Manufacturer’s standard Fused-Bonded Epoxy in accordance with ANSI/AWWA C213.

2.06 SLEEVE COUPLINGS

A. Design Criteria

1. Provide solid sleeve type couplings to join plain end pipes as shown on the Drawings, as specified. In cases where the outside diameters of the piping segments to be connected differ, provide "reduction/expansion" sleeve type couplings.

   a. Two 12 -inch sleeve couplings will connect new 12-inch Ductile Iron plain end pipe with new 12 –inch Steel plain end pipe.

2. All sleeve type couplings shall conform to the provisions of AWWA C 219 standards. All sleeve type couplings shall be rated for use with the same operational pressure as the connecting pipes.

3. All coupling lugs and sleeves shall be in accordance with ASTM A36, standard. All washers shall be in accordance with ASTM A 325M standards. All couplings shall be fitted with plastic plugs to protect the bolt holes.

4. Fasteners: All bolts shall be installed such that a minimum of 1/4 inch of the bolt projects beyond the surface of the nut. All hexagonal nuts shall be in accordance with ANSI B18.2 standards. Hexagonal nuts shall have threads in accordance with ANSI B1.1 standards. All bolts shall be in accordance with ASTM A 307 and ANSI B1.1 standards. All bolts shall be square or hexagonal head type. Bolts shall be threaded over the full length. All bolt ends shall be rounded or chamfered. Bolts shall be coarse thread fit type. Provide 316 stainless steel hardware for all sleeve type couplings.

5. Gaskets: Provide gaskets to match the particular service application. Unless otherwise specified or recommended by the coupling Manufacturer,. The coupling gasket shall match the gasket material used for the piping system.

6. Middle Ring: The pipe stop within the inner surface of the middle ring of couplings shall be omitted as required to permit removal of valves, flow meters, equipment, and appurtenances. All other couplings shall be provided with pipe stops. The middle ring of each sleeve type coupling shall have a thickness at least equal to that of the connecting piping on which the coupling is to be used. All sleeve type couplings shall be a minimum of 10 inches long for pipe 30 inches and larger. All sleeve type couplings shall be a minimum of 7 inches long for pipe under 30 inches in diameter. Couplings which are designed to be self-restrained shall not be required to meet the minimum middle ring length requirements specified.

7. Sleeve couplings shall be harnessed and restrained in conformance with AWWA annual M11

B. Acceptable Vendors:

1. Dresser Piping Specialties
2. Smith-Blair Inc.
3. Engineer Approved Equal

C. Finishes

1. Provide Manufacturer's standard Fused-Bonded Epoxy in accordance with ANSI/AWWA C213

2.07 BUTTERFLY VALVE

A. All metallic butterfly valves for water & wastewater service shall conform to AWWA C504 Class 150B standards for frequent operation. The valves shall provide bubble tight shut-off at the specified and rated pressure. The Manufacturer shall provide a certified performance affidavit which demonstrates that the valves meet and have been tested in accordance with AWWA C504 Class 150B standards. Any exceptions to AWWA C504 Class 150B standards shall be provided in writing by the Manufacturer.

B. The valve body shall be provided with integrally cast hubs for through boss-type shaft bearing housings. A stuffing box shall be provided at the operator end of the vane shaft. The valves shall be provided with permanently self-lubricating body bushings. The body bushings shall be provided to withstand the all bearing loads from the valve. The valve shall be provided with resilient seats retained in the body or in the disc edge. The valve seats shall be in accordance with AWWA C504 standards.

C. All butterfly valves for liquid service shall be designed and constructed in accordance with the following criteria:

1. Size: Smaller Than 24 Inches - Match to Piping Size as Shown on Drawings
2. End Connections: Flanged, per ANSI 125
3. Body: Cast Iron per ASTM A 126 Class B, Epoxy Coated
4. Disc: Cast Iron per ASTM A 48/A 48M Class 40; Ni-resist ASTM A 436 Type 1; or Ductile Iron ASTM A 536 Grade 65-45-12
5. Minimum Water Pressure Rating: 150 psi

6. Valve Operator: See **Error! Reference source not found.** Valve Actuator Schedule

7. Shaft: 316 Stainless Steel

8. Packing: EPDM

9. Resilient Seat: EPDM

D. The valve shaft shall be designed for the respective torsional and shearing forces when the valve is opened and closed as well as the maximum dynamic seating torque. The shaft diameter shall not be reduced except for connection to the valve operator. The shaft shall be ground and polished to minimize bearing and seal wear.

E. Gear actuators shall be totally enclosed and designed in accordance with AWWA C504 standards to prevent the entry of dirt or water. The valve actuators shall be provided with permanent indicators to show the position of the butterfly valve disc. The markings shall be raised or engraved. The valve packing shall be sealed using o-rings or be of the self-compensating v-type. The valve packing shall be held in place by a corrosion resistant gland or retainer plate. The valve shall not require removal from the line for replacement of seals.

F. Neck extensions with extension shafts shall be provided with valves as required to locate valve operators as shown on the plans.

G. All water service butterfly valves of the same type, style, and duty shall be supplied by a single Manufacturer. All water/wastewater service butterfly valves shall be a product of the following Manufacturer:

1. Dezurik Water Controls - Model BAW (AWWA)

2. Henry Pratt Company - Model 2FII

3. Clow Valve Company - Style 4500

4. Engineer Approved Equal

2.08 CHECK VALVES

A. Performance/Design Criteria

1. Each pump discharge pipe run shall include a globe type, non slam check valve. The body of the check valve shall be cast iron. The plug and seat shall be bronze and conform to ASTM Designation B 584. The seat shall contain a Buna-N seal to provide zero leakage. The seal design shall provide for both a metal to metal low and high

pressure without over-loading or damaging the Buna-N seal. The guide bushings shall be bronze copper alloy and conform to ASTM Designation B-584. The valve spring and seat retainers shall be stainless steel and conform to ASTM Designation A 313. The valve plug shall be guided at both ends by a center shaft integral with the valve plug. Alignment of the center shaft shall be provided by guide bushings.

B. Manufacturer

1. Val-Matic
2. Cla-Val
3. Dezurik
4. Approved Equal

2.09 AIR RELEASE VALVE

A. Air Release Valves shall be automatic float operated valves designed to release accumulated air from a piping system while the system is in operation and under pressure.

B. Valves shall be manufactured and tested in accordance with AWWA C512 and shall be NSF/ANSI 61 certified.

C. Valve connection shall be threaded with NPT inlets and outlets. The body inlet connection shall be hexagonal for a wrench connection. The valve shall have to additional NPT connections for the addition of gauges, testing, and draining.

D. The cover shall be bolted to the valve body and sealed with a flat gasket. Resilient seats shall be replaceable and provide drop tight shut off to the full valve pressure rating. Floats shall be unconditionally guaranteed against failure including pressure surges. Mechanical linkage shall provide sufficient mechanical advantage so that the valve will open under full operating pressure. Simple lever designs shall consist of a single pivot arm and a resilient orifice button.

E. The valve body and cover shall be constructed of ASTM A126 Class B cast iron for working pressures up to 300 psig. The orifice, float and linkage mechanism shall be constructed of Type 316 stainless steel. Non-metallic floats or linkage mechanisms are not acceptable. The orifice button shall be Viton for simple lever valves.

F. Orifice opening shall be 1/8 inch for suction pipe and 3/32 inch for discharge piping.

G. The exterior of the valve shall be coated with a universal alkyd primer.

H. Manufacturer

1. Val-matic

2. Flowmatic

3. Dezurik

4. Engineer approved equal

2.10 ANTI-CONDENSATION INSULATION

A. Process piping shall be insulated to control condensation.

B. Insulation material shall be molded rigid fiberglass rated for 500 degrees F. Insulation shall have a minimum density of 3.5 lbs/cu ft and a maximum "K" factor of 0.24 at 75 degrees F mean temperature. Insulation shall be a mimium thickness of 1 inch.

C. Jacket shall be kraft paper bonded to aluminum foil reinforced with fiberglass yarn and self sealing lap with maximum permeability of 0.02 perms with field applied 0.016-in thick aluminum jacket.

D. All materials and intergrated insulation assemblies furnished shall have flame spread ratings of not over 25 (fire resistive), smoke developed ratingof not over 50 and fuel contributing rating of not over 50, as established by tests conduvted in accordance with Interior Federal Standard No. 00136B, entitled " Interior Federal Standard Flame –Spread Properties for Materials" and National Fire Code of the NFPA. Treatment of jackets or facings shall to impart flame and smoke safety must be permanent.

E. Paint exterior in accordance with Section 09 90 00 Painting and Coatings.

2.11 PIPE SUPPORTS

A. Where possible, process piping hangers and supports shall be a Manufacturer's standard product. All products specified or otherwise shall conform to the requirements of MSS SP-58 and MSS SP-69 standards.

B. Pumping Station manufacturer may support piping solely from the concrete floor slab with Custom Fabricated Pipe Supports provided the requirements contained herein are met.

C. Piping Forces

1. Provide supports for all pipe and tubing to prevent significant stresses in the material, valves, fittings and other connected pipe appurtenances. All supports and anchors shall be designed to secure the pipe in the intended position and alignment. All supports and anchors shall be designed to secure all pipe and tubing against excessive dislocation due to thermal expansion and contraction.

2. The pipe supports and anchor design shall specifically account for internal flow forces, all probable external forces from equipment connection, human contact, and all seismic forces. Provide and install all structural steel members as required to brace any piping system from excessive dislocation. All pipe fittings and appurtenances connected to equipment shall be supported in a manner to prevent any strain from being imposed on the equipment or piping systems. All pipe supports shall be installed such that they do not induce point loadings on the piping. All supports shall distribute pipe loads evenly along the pipe circumference.

   a. All valves shall be provided with a supporting system. Supporting of valves by the connected piping shall not be acceptable.

D. Coupling Support

1. All couplings shown on the Drawings and as specified for connection to pumps, equipment, and appurtenances shall be provided with supports..

2. All such couplings shall be rigidly supported, to prevent transfer of force to the equipment. Fixed or restraining supports shall not be installed between a flexible coupling and the connected piece of equipment/appurtenance.

E. Support Spacing

1. All supports shall be provided with appropriate spacing such that the sag of the pipe (if any) is within the limits of the piping Manufacturer. The support design and layout shall be such that it permits drainage of the pipe line. The support design and layout shall minimize bending stresses on the supported piping from concentrated loads between supports.

F. Dissimilar Metals

1. Provide protection against corrosion due to Dissimilar Metals.

2. All copper piping shall be protected from galvanic corrosion from contact with ferrous metals. Provide corrosion protection by

wrapping the copper pipe with 1/16 inch thick neoprene, sheet metal and a galvanized protection shield with isolators.

G. Insulated Pipe

1. All insulated piping shall be provided with a rigid insulating saddle at each pipe support location. Provide protection shields at each support location.

H. General Pipe Support Spacing

1. All solid metallic process piping shall be provided with supports spaced in strict accordance with the pipe Manufacturer's recommendations. Provide a minimum of one (1) support per pipe section at joints, changes in direction, and valves. At a minimum provide supports in accordance with the following:

Pipe Size (Inches)	Maximum Span (feet)
1½ inches & smaller	5 feet
2 inches to 4 inches	10 feet
5 inches to 8 inches	15 feet
10 inches & larger	20 feet

2. Small diameter metallic piping, including but not limited to steel, copper piping, copper tubing, and stainless steel shall be provided with supports spaced at a maximum of five (5) feet.

3. All stainless steel piping shall be provided with neoprene isolators between the pipe and supports to prevent dielectric corrosion. Where stainless steel supports are used neoprene isolators shall not be required.

I. Materials of Construction

1. All rods, clamps, hangers, inserts, anchor bolts, brackets, components, and appurtenances for "Interior" pipe supports shall be constructed of 304 stainless steel. All supports for copper pipe shall be copper plated or shall have a minimum 1/16 in plastic coating.

2. All process piping support systems shall be constructed of the following materials based on location unless otherwise specified or indicated on the Drawings:

3. All fasteners and related hardware for supports including but not limited to nuts, bolts, and washers shall be 316 stainless steel regardless of location. Fasteners for submerged support locations shall be 316 stainless steel.

J. Anchors

1. The Contractor shall anchor piping. The anchor design and materials shall be in accordance with ANSI/ASME B.31 standards. Additional anchoring shall be provided as approved by the Engineer. All anchors shall be 316 stainless steel regardless of installation location.

2. Anchors for floor supports and all related appurtenances shall be in accordance with the following. Size all supports as required for proper support as well as to provide compatibility with the associated pipe support.

   a. Hilti - Kwok-Bolt

   b. Simpson Strong-Tie - Wedge All

   c. Powers Power-Stud

   d. Engineer Approved Equal

K. Custom Fabricated Pipe Supports

1. Whenever possible the Contractor shall utilize standard piping supports and appurtenances. If standard supports are not suitable for an application, the Contractor shall furnish custom fabricated structural steel shapes, concrete, and anchor hardware for support of process piping systems. All custom fabricated supports shall be of approved materials of construction identical to items previously specified herein. All anchor hardware shall be similar to items previously specified herein and shall meet the minimum requirements for support as approved by the Engineer. All custom fabricated piping supports shall be subject to the approval of the Engineer.

   a. All pipe support systems shall meet all requirements of this Section and all related Sections as well as the Drawings. Complete design details of the pipe support system and system components shall be submitted for review and approval as specified. No hanger or support shall be installed without the written approval of the Engineer. The pipe support system shall not impose loads on the supporting structures in excess of the loads for which the supporting structure was designed

2.12 PRESSURE GAUGES

A. General

1. Provide pressure gauges on the suction and discharge flanges for each pump as shown on the Drawings.

B. Performance/Design Criteria

1. Combination pressure gauges shall have a built-in pressure snubber and 4 1/2 inch minimum diameter faces and be turret style, black phenolic case with clear glass face. The movement shall be rotary, of 400 Series stainless steel with teflon coated pinion gear and segment. The gauge shall be bottom connected and accept a 1/4" NPT female thread. Combination pressure gauge range and scale graduations shall be in psi and feet of water as follows:

a. Suction Pressure 0 to 100 psi, 10 psi figure intervals, with graduating marks every 1 psi (0-230 feet H2O).

b. Discharge Pressure – 0 to 200 psi, 20 psi figure intervals, with graduating marks every 5 psi (0-460 feet H2O).

2. Gauges shall be furnished as part of a complete factory assembly , including guage, snubber, liquid fill, isolation ball valve and threaded stainless steel connecting tubing.

C. Manufacturer

1. Gauges shall be Ashcroft Duragauge Plus Model 1279XLL or approved equal.

2.13 PRESSURE INDICATING TRANSMITTERS

A. General

1. Provide a pressure indicating transmitter on the suction and discharge header as indicated on the Drawings.

B. Performance/Design Criteria

1. The following instrument shall sense gauge pressure and transmit a 4-20 mA DC signal. The instrument shall measure pressure of a predetermined span. Range shall be fully adjustable throughout using allowable span and range limits. The accuracy shall be +/- 0.20% of span.

2. The transmitter shall provide analog output and include a standard LCD with pushbuttons to provide Intelligent transmitter configuration directly from the on-board pushbuttons. The two-line digital indicator shall display the measurement in any selected units. The pushbuttons shall provide calibration of zero and span, setting

of linear output, forward or reverse direction, external zero enable or disable, damping, failsafe action and local display including upper and lower range value selection.

3. All process-wetted parts of the instrument shall be Type 316L stainless steel. The transmitter shall be protected by a gasketed, weatherproof NEMA 4X enclosure. The transmitter shall be approved for use in hazardous locations (Nonincendive for Class 1 and Class II, Division 2 locations; intrinsically safe or explosion-proof for Class 1 and Class II, Division 1 locations).

4. The transmitter shall weigh less than 3.3 lbs. and have a 1/2 inch NPT male thread. The instrument shall be IGP10 I/A Series Intelligent Guage Pressure Transmitters as manufactured by the Foxboro Company, or approved equal.

5. There shall be two (2) units required for this project to measure and transmit station suction pressure and discharge pressure.

6. Low Suction Pressure Alarm/Cutout

a. The site operation shall have logic that suspends pump operation and activates alarm indicators in the event the station suction pressure falls to a point equal to or less than the low suction cutout setpoint. The pressure must remain equal to or less than the low suction alarm setpoint for a period of no less than 60 seconds, after which the low suction alarm/cutout will latch on. The low suction alarm/cutout will turn off when the suction pressure of the station rises to a point equal to or greater than the low suction cutout/alarm restore setpoint and a period of no less than 120 seconds has elapsed.

2.14 ELECTROMAGNETIC FLOW METER

A. General

1. The electromagnetic meter is specified in Section 40 91 00.

B. Meter Test Port

1. The meter installation shall be complete with a meter test port as shown on the Drawings. The test port shall be installed a minimum of two (2) diameters downstream of the meter. The test port shall consist of a NPT coupling in the pipe downstream of the meter capable of accommodating a threaded by hose connection adapter. The connection shall be plugged.

2.15 ELECTRICAL EQUIPMENT STANDARDS

A. The manufacturer of electrical control panels and their mounting and installation shall be done in strict accordance with the requirements of UL Standard 508 and the Massachusetts Electrical Code (MEC) latest revision and local code so as to afford a measure of security as to the ability of the eventual owner to safely operate the equipment. No exceptions to the requirements of these codes and standards will be allowed; failure to meet these requirements will be cause to remove the equipment and correct the violation.

B. U.L. Listing

1. All service entrance, power distribution, control and starting equipment panels shall be constructed and installed in strict accordance with Underwriter's Laboratories (UL) Standard 508 "Industrial Control Equipment." The UL label shall also include an SE "Service Entrance" rating stating that the main distribution panel is suitable for use as service entrance equipment. The panels shall be shop inspected by UL, or constructed in a UL recognized facility. All panels shall bear a serialized UL label indicating acceptance under Standard 508 and under Enclosed Industrial Control Panel or Service Equipment Panel

2. The panel shall be UL 508 listed. The UL 508 "sticker" shall be clearly displayed in the appropriate location within the panel. The UL 508 listing shall be in the name of the equipment manufacturer. Third party substitutions of UL 508 listed equipment shall be strictly prohibited.

3. Refer to the Electrical Specification 26 27 00 “Low Voltage Distribution Equipment” and 26 21 00 “Low Voltage Electrical Service Entrance” for further requirements on panels and enclosures.

C. Equipment Grounding

1. Each electrical equipment item in the station shall be properly grounded per Section 250 of the National Electrical Code and the Massachusetts Electrical Code. Items to be grounded include, but are not limited to service equipment distribution panel, pump motor frames, control panel, transformer, convenience receptacles, dedicated receptacle for heater, air conditioner, dehumidifier, lights, light switch, exhaust fans and pressure switches.

2. Refer to the electrical construction drawings for grounding the radio telemetry system.

3. Refer to Electrical Specification Section 26 05 26 “Grounding and Bonding for Electrical Systems” for further grounding requirements on the electrical system.

D. AIC Rating

1. All electrical service equipment, distribution panels, breakers, etc. shall have an AIC rating as shown on the panel schedules of the construction drawings and as called for in the Division 26 specifications.

2.16 ELECTRIC PANELS

A. Panel Mounting Hardware;

1. Metal uni-strut framing channel shall be used exclusively for mounting of all electrical panels and electrical components except for those specifically designated otherwise.

2. Refer to the electrical construction drawings and specifications for all electrical requirements related to the electrical panels.

2.17 ADJUSTABLE FREQUENCY AC CONTROLLERS

A. The station manufacturer shall furnish and install a complete Adjustable Frequency Controller System as described in this specification and as detailed on the applicable drawings.

B. The station manufacturer shall be responsible for the installation and start-up of the equipment covered by this specification.

C. The Adjustable Frequency Controller shall be UL and CSA certified and shall comply with the latest applicable standards of ANSI, IEEE and NEMA. The controllers shall be rated as shown on drawings and in specifications.

D. There shall be provided three (3) variable frequency drive (VFD) units at the following motor loads:

1. 40 horsepower (HP)

2. 150 horsepower (HP)

3. 150 horsepower (HP)

E. Reference Electrical Specification section 26 29 23 “Variable Frequency Motor Controllers” for all electrical related requirements for the Variable Frequency Controllers.

2.18 ELECTRICAL APPARATUS

A. Phase Monitor

1. A phase monitor shall be supplied to protect three-phase equipment against phase loss, undervoltage and phase reversal conditions. When a fault is sensed, the monitor output relay opens within two seconds or less to turn the equipment off and/or cause an audio or visual alarm. Both Delta and Wye systems may be monitored. The monitor shall have an automatic reset and shall also include an adjustable voltage delay. The monitor shall have an indicator LED (glows when all conditions are normal and shall monitor phase sequence: ABC operate (will not operate CBA). The phase monitor shall be UL approved and CSA certified. The phase monitor shall be tied into the station's SCADA system via a digital input to the PLC.

B. Surge Arrestor

1. A secondary surge arrestor shall be provided at the main circuit breaker. Housing shall be Noryl and be ultrasonically sealed. Valve blocks shall be metal oxide with an insulating ceramic collar. Gap design shall be annular. The lead wire shall be permanently crimped to the upper electrode forming part of the gap structure. Arrestors shall be UL and CSA listed Lightning Protective Devices. The unit shall provide for 300,000 amp/Ǿ protection with surge counter and time stamp feature.

C. Power Transformer

1. 480V, 3-phase primary to 120/208 three phase, 4-wire secondary power for the auxiliary circuits within the scope of the booster station shall be obtained by use of a 15 KVA dry type, step down transformer. The transformer shall be wall mounting type, in a NEMA 3R non-ventilated weatherproof enclosure. Transformer shall operate with noise levels equal to or less than ANSI and NEMA standards. Transformer insulation shall be Class 180c. The unit shall be "UL" approved for indoor/outdoor application. Reference Electrical Specification Section 26 27 00 for further requirements for dry type transformers.

D. Automatic Transfer Switch

1. The automatic transfer switch shall be an 800A, 480V, 3-pole, 4-wire with a solid neutral and shall meet all the requirements as indicated in Electrical Specification section 26 32 13 13.

E. Source Quality Control

1. Provide in accordance with Division 01 General Requirements.

2.19 SCADA CONTROL PANEL

A. The SCADA Control panel shall be provided as shown on drawings I-A00 through I-A10.

B. Operation Description - PLC & VFD Constant Pressure Control System

1. This system shall control a total of three (3) pumps all starting via variable frequency drive (VFD) based upon station discharge pressure with safety cutouts based upon suction pressure. The control system shall include the PLC and its control panel as shown in the SCADA electrical panel drawings. The programming of the PLC system shall be by others. The pumps at the station shall be operated so as to maintain a pressure set point. The set point shall be adjustable from either the local OIT or via radio commands from the Lowell regional Water Utility's water treatment plant.

2. The output for each pump shall be adjusted by varying the speed at which it operates. The speed shall be controlled by a VFD, as specified in this document, and the calculation of needed pump speed shall be performed by the PLC which shall have input to it a signal directly proportional to the outlet pressure. The PLC shall employ a standard Proportional Integral and Derivative (PID) control algorithm to calculate the speed output needed to maintain the constant outlet pressure.

3. Pump staging for each pump shall be accomplished via the demand based on discharge pressure as calculated via the Programmable Logic Controller (PLC) control algorithms. The pump performance curves shall determine the demand levels at which the pumps shall be staged on. Each pump shall operate automatically to adjust the output of the selected pump in order to maintain a constant output pressure from the station.

4. Each pump operating shall alternate after each pumping cycle automatically. If a called pump is failed or turned off, the PLC shall automatically switch the pump call to the available pump(s). Manual speed control shall be accomplished through the use of a speed adjustment feature on each VFD unit.

5. All pumps shall shutoff when the desired pressure is met and the speed of the pump is at or below approximately 40% for a period of

at least 2 minutes. A pump shall be called for when the pressure drops to below an operator entered pump call point.

6. Each VFD shall connect to a panel mounted Hand-Off-Automatic (HOA) switch. The HOA shall provide the PLC with a NO contact for Automatic control position status. The VFD shall provide the PLC with a NO contacts for drive fault and run status.

C. Programmable Logic Controller

1. Provide a microprocessor based programmable logic controller that can be used in a stand alone configuration and can be networked into a larger system. It shall be suitable for telemetry applications performing as an intelligent RTU. The unit shall be fully programmable and capable of performing control relay logic, including timing, counting, sequencing, and interlocking.

2. The PLC/RTU shall have a modular chassis design which allows for ease of future expansion. The processor module shall be easily removed from the I/O chassis for treatment or repair. The I/O chassis shall have slots for installing I/O cards, communica¬tions, or other special function modules.

3. All I/O cards and modules, with the exception of the CPU, shall be capable of being installed in any open slot in the chassis.

4. The PLC/RTU shall have a modular power supply which mounts directly to the I/O chassis and can be easily serviced or replaced. The system shall be capable of being powered on 120VAC or 24VDC, by simply choosing different power supply modules.

5. The processor shall have solid state RAM memory to store the application program, process data, and alarm status. This memory shall have both capacitor and battery backup in the event that input power to the processor is lost. The processor shall have the ability to automatically go into the RUN mode on a power cycle, provided there are no major or unrecoverable processor faults.

6. The PLC/RTU shall be rated to operate from 0 to 60 Degrees C, with a humidity rating of 5 to 95% (non condensing). The PLC/RTU must be UL listed and CSA certified. All module circuit boards shall be encased and protected such that, when properly installed, they are not exposed to accidental contact by personnel or other objects.

7. The PLC/RTU shall be of high quality and reliability with replacement processors, power supplies, chassis, I/O and specialty

modules that are readily available on an urgent or emergency basis. All PLC/RTU products shall be fully supported and available for purchase for up to seven (7) years from the date of the original system purchase.

8. Product maintenance training shall be available from factory trained support representatives.

9. The PLC shall be as manufactured by Allen Bradley Company of 1201 South Second Street, Mikwaukee, WI 53204 or equal. Model number shall be 1747-L532. All required communication modules and accessories shall be included for a complete and functional system per the SCADA panel drawings Bill of Materials sheet.

D. Electrical Apparatus - PanelviewTM 300 Micro Operator Interface

1. The PLC control system shall include a front panel mounted display for the operator interface. The display shall have a monochrome backlight 2.87" x 1.67" LCD with 128 x 64 pixel resolution. The display shall have 4 function keys. Unit shall have 240K of flash memory. Unit shall have a battery backed real time clock.

2. The operator interface shall be as manufactured by ALLEN-BRADLEY CO., Mikwaukee, WI 53204, model number 2711-M3A19L1. All required communication modules, cables and accessories shall be provided for a complete and operational system.

E. It will be the responsibility of the booster station manufacturer to furnish and install the antenna surge suppressor junction box as shown on drawing I-A10 Antenna Mounting & Grounding Details. The contractor is responsible for driving and wiring the grounding rod. Programming of the radio to be done by others.

F. Devices

1. Hand Off-Automatic switches shall be oil tight, 3 position maintained and be located on the front of each packaged variable frequency drive.

Pump #1

Pump #2

Pump #3

2. Nameplates shall be furnished on all panel front mounted switches and lights.

3. The control panel door shall be complete on the interior with a stick-on transparency containing an "as-built" reproduction of the electrical control panel schematic. The wiring diagram shall be a corrected "as built" copy and contain individual wire numbers, circuit breaker numbers, switch designations and control function explanations.

G. Conduit and Wiring

1. The service entrance conduits shall be rigid steel conduit, individually sized to accept the inbound service conductors and telemetry/telephone/radio cables, and shall be installed from the main power or control panel through the equipment enclosure floor and terminate exterior to the equipment enclosure. The service entrance exterior conduit connection points shall be capped or plugged for shipment.

2. All wiring within the equipment enclosure and outside of the control panel or panels shall be run in conduit except for the watertight flexible conduit and fittings properly used to connect pump drivers, fan motors, solenoid valves, limit switches, etc., where flexible connections are best utilized. Only the dehumidifier where furnished by the original manufacturer with a UL approved rubber cord and plug, shall be plugged into a receptacle.

3. Equipment Enclosure Conduit Rigid, heavy wall, Schedule 40 PVC with solvent weld moisture proof connections, in minimum size 3/4" or larger, sized to handle the type, number and size of equipment conductors to be carried in compliance with Article 347 of the Massachusetts Electrical Code and NEMA TC 2, Federal WC 1094A and UL 651 Underwriter's Laboratory Specifications.

4. Flexible Connections Where flexible conduit connections are necessary, the conduit used shall be liquid tight, flexible, totally nonmetallic, corrosion resistant, nonconductive, U.L. listed conduit sized to handle the type, number and size of equipment conductors to be carried in compliance with Article 351 of the Massachusetts Electrical Code.

5. Motor Circuit Conductors Sized for load. All branch circuit conductors supplying a single motor of one (1) horsepower or more shall have an ampacity of not less than 125 percent of the motor full load current rating, dual rated type THHN/THWN, as set forth in Article 310 and 430 B of the Massachusetts Electrical Code, Schedule 310 13 for flame retardant, heat resistant thermoplastic, copper conductors in a nylon or equivalent outer covering.

6. Control and Accessory Wiring Sized for load, type MTW/AWM (Machine tool wire/appliance wiring material) as set forth in Article 310 and 670 of the Massachusetts Electrical Code, Schedule 310 13 and NFPA Standard 79 for flame retardant, moisture, heat and oil resistant thermoplastic, copper conductors in compliance with NTMA and as listed by Underwriter's Laboratories (AWM), except where accessories are furnished with a manufacturer supplied UL approved rubber cord and plug.

7. Instrumentation wiring for transmitting 4-20mA DC signals shall be shielded, 2-conductor, minimum #18 AWG, equal to Belden No. 8760.

H. Receptacles

1. Reference contract drawings and specification section 26 27 26 for requirements.

I. Lighting

1. Reference contract drawings and specification section 26 50 00 for lighting requirements.

2.20 HVAC EQUIPMENT

A. Heating/Cooling/Exhaust

1. The unit shall be one piece, wall mounted, factory assembled, precharged, prewired, tested and ready to operate. The unit shall have a limited warranty of five years on parts and five years on the compressor. The unit shall be approved and listed by Underwriters' Laboratories, Inc. Unit performance shall be certified in accordance with Air Conditioning and Refrigeration Institute Standard 210/240-89 for Unitary Air-Source air conditioners or latest standard.

a. One (1) each exterior wall mounted, hard-wired as shown;

b. Enclosed weatherproof casing constructed of 20 gauge galvanized steel, finished with baked-on polyester enamel paint;

c. One (1) washable filter;

d. Remote adjustable thermostat;

e. Cooling capacity in tons: 3;

f. Cooling Capacity: 36,000 BTUH at 480 volts, 3 phase;

g. Amps: 20;

h. Twin indoor blowers, SCFM maximum/minimum: 1285/885 at 0.2" static pressure;

i. Electrical supplemental heater: 15 kW;

B. Dehumidifier

1. One (1) each, installed as shown.

2. Capacity 25 pints per 24 hours (AHAM Standard DH-1).

3. Compressor rated 1/5 HP, 4.1 amps, 400 watts.

4. Condensate piped direct to removable holding tank, provided.

5. 120 volt A.C. operation by dial-controlled adjustable humidistat.

6. UL listed rubber cord.

2.21 SUMP PUMPS

A. Provide submersible centrifugal sewage grinder pump(s) as specified herein and as shown on the drawings. The pumps furnished for this application shall be as manufactured by Zoeller Pumps Gould, Liberty or approved equal.

B. Performance: 25 GPM at 10 feet of TDH

C. Construction: Each pump shall be of the sealed submersible type incorporating features normally found in pumps furnished for the heavy-duty industrial or municipal markets. These features include:

1. The pump volute, motor, and seal housing shall be high quality gray cast iron, ASTM A-48, Class 30.

2. The pump shall feature a multiple strainer inlet that prevents clogging from foreign objects and provides optimum operation and reduced maintenance.

3. All external mating parts shall be machined and Buna N O-Ring sealed.

4. All fasteners exposed to the pumped liquid shall be 300 series stainless steel.

5. All power cords shall be water resistant UL or CSA approved with double insulation and sized as a function of amperes draw.

D. Motor and Shaft The stator, rotor and bearings shall be mounted in a sealed submersible type housing. Single-phase motors shall be Shaded Pole, with automatic reset thermal overload protection. Full Load and, Locked Rotor Amps

as well as Run winding resistance shall be tabulated for each pump. Motor shall be ¼ HP, 60 HZ, 3450 RPM, 1 Ph, 115 V.

E. Bearings, shaft and mechanical seal: An upper radial and lower thrust bearing shall be required. The upper bearing shall be bronze while the lower bearing is heavy-duty single row ball. They are both permanently, continuously lubricated and cooled by the dielectric oil, which fills the motor housing. The motor shaft shall be corrosion resistant steel and sealed from the pumped liquid with a carbon ceramic mechanical seal.

F. Impeller: a thermoplastic, eight vane, non-clog design with three pump out vanes on the backside. These vanes wash out grit and stringy material that will damage the shaft and mechanical seal.

G. All pumps shall be capable of automatic operation.

H. Provide all pumps with a tilt-sensitive wide-angle float switch sealed in a non-corrosive PVC enclosure. The switch shall be UL listed for water and sewage and QSA certified. The float switch shall also be fitted with a piggyback plug that allows the pump to be operated manually without removal from the sump.

PART 3 – EXECUTION

3.01 INSTALLERS

A. Qualified per Division 01 General Requirements.

3.02 EXAMINATION

A. Verification of Conditions

1. Contractor and manufacturer's representative shall make themselves familiar with the site to ready themselves for pump station installation.

3.03 PREPARATION

A. Protection

1. The Adjustable Frequency Controller shall be protected against damage at all times. The controller shall be stored in a clean, dry environment with temperature and humidity within the range as specified by the controller manufacturer. Space heaters shall be energized during storage, as recommended by the manufacturer.

3.04 INSTALLATION

A. Special Techniques

1. The electrical apparatus and control panel design, assembly, and installation, and the integration of component parts shall be the responsibility of the manufacturer of record for this booster pumping equipment. The manufacturer shall maintain at their regular place of business a complete electrical design, assembly and test facility to assure continuity of electrical design with equipment application. Control panels designed, assembled or tested at other than the regular production facilities or by other than the regular production employees of the manufacturer of record for this booster pumping equipment will not be approved. The entire pumping station interior shall be pre-wired by the vendor. The only wiring termination by the electrical contractor shall be the service conductors terminated at the vendor supplied main circuit breaker.

B. Interface with Other Work

1. Contractor shall be responsible for coordination with station manufacturer, transfer of prefabricated pump station from delivery truck, and installation on site.

2. Electrical contractor shall be responsible for terminating service connections in station, as described above.

C. Sequences in accordance with Division 01 General Requirements.

3.05 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Site/Field Tests and Inspections in accordance with Paragraph 3.06 Startup & Commissioning

3.06 STARTUP & COMMISSIONING

A. Provide in accordance with Division 01 General Requirements.

B. Pump Tests

1. Field Pump Tests:

a. After all pumps have been installed and connected and after inspection, operation, and adjustment has been completed by the manufacturer's representative, the pumping equipment, including

the pumps, motors, and drive shafts shall be field tested in the presence of the Engineer to operate without vibration or overheating and for general performance and fitness for the service specified. Vibration analysis and dynamic balancing shall be performed by a qualified and independent testing company. Results of these tests shall be submitted to the Engineer.

b. The quantity of water discharged by the pumps and the pumping heads shall be measured by the equipment to be installed. The equipment shall be calibrated prior to the tests.

c. Duration of the tests shall be as determined by the Engineer. This testing of the complete system shall cover all duty conditions outlined in this Section of the Specifications and to develop a field test curve comparable to the factory test curve. If equipped with a VFD, vibration testing shall be performed at speed intervals of 10% from 100% to 60% speed. The pumping systems shall not exceed the allowable vibration values outlined in the ANSI/HI Standards under any of the operating conditions outlined in the Specifications. The vibration testing shall be conducted in the presence of the pump field service representative and the Engineer in accordance with procedures outlined in Division 01 Requirements.

d. If a pumping unit fails to deliver the design capacity under the design pumping heads the station manufacturer shall, at their own expense, on the written request of the Engineer, replace the motor, impellers, or any other parts, or provide any other required modifications to improve the unit until the specified capacity and efficiency are fulfilled. Repeat tests if necessary to obtain results acceptable to the Engineer.

e. In the event vibration exceeds the specified limits and the cause of the vibration is attributable to the pumping equipment, the equipment manufacturers shall make the necessary balancing or alignment adjustments to bring the equipment to within the specified limits.

f. At the discretion of the Owner or his representative, an additional independent vibration analysis may be conducted on each of the split case pumps.

C. All piping shall be field tested and disinfect in accordance with section 33 11 00 prior to performing field pump tests.

D. Testing, checkout and start-up of the Adjustable Frequency Controller equipment shall be performed under the technical direction of the station manufacturer's service technician. Under no circumstances are any portions of the drive system

to be energized without authorization from the station manufacturer's representative.

E. All marred and damaged shop coatings shall be repaired so as to maintain the coating integrity as per the manufacturer's requirements.

3.07 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTI0N 34 71 13

GUARDRAILS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Furnish and install steel guardrails in accordance with the specifications and in close conformity with the lines and grades shown on the plans or established by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE INCLUDES

A. Section 31 00 00 – Earthwork

B. Section 03 30 00 – Cast in Place Concrete

1.03 SUBMITTALS

A. Product Data: Manufacturer's technical data, and installation instructions for steel guardrails.

B. Shop Drawings: Submit Shop Drawings showing dimensions and details of steel guardrails, including post installation.

PART 2 - PRODUCTS

2.01 GENERAL

A. Materials shall meet the requirements specified in the following Subsections of Division III, Materials:

1. Steel Beam Highway Guard Type SS M8.07.0.

PART 3 - EXECUTION

3.01 GENERAL

A. The construction of guard rail shall include the assembly and erection of all components parts and materials complete at the locations shown on the plans or as directed.

3.02 STEEL POSTS

A. Posts shall be set plumb, in hand or mechanically dug holes, or driven, and then backfilled with acceptable material placed in layers and thoroughly compacted.

B. If driven the posts shall be provided with suitable driving caps and equipment used which will prevent battering or injury to posts. Posts damaged or distorted as a result of driving shall be removed and replaced with approved posts.

C. Guard posts to be sent in areas of proposed bituminous concrete surfacing shall be erected prior to laying the surrounding finished surface unless otherwise permitted by the Engineer.

D. Posts shall be spaced as shown on plans.

3.03 STEEL BEAM RAIL

A. The rail shall be erected so as to form a smooth continuous rail conforming to the required line and grade. The rail element shall be spliced by lapping in the direction of the traffic or by other approved methods. The holes in the rail element nearer the posts shall be slotted to facilitate erection and to permit expansion. The rail shall make full contact at each splice.

B. All bolts, except where otherwise required at expansion joints shall be drawn tight. Bolts through expansion joints shall be drawn up as tightly as possible without being too tight to prevent the rail elements from sliding past one another longitudinally.

END OF SECTION

SECTION 40 05 00

PROCESS PIPE, FITTINGS, AND APPURTENANCES

PART 1 – GENERAL

1.01 SUMMARY

A. Provide process pipe, fittings, couplings, valves, and supports as shown on the Drawings and as specified herein and/or are required to complete the work outlined in the Contract Documents in accordance with this Section and applicable reference standards listed in Article 1.03. Provide all related appurtenances and accessories to provide complete operational piping systems.

B. Pipe and appurtenances for the Stackpole Pumping Station are included in Section 33 12 25 Prefabricated Water Utility Pumping Station.

C. Related Requirements

1. 40 90 00 – Instrumentation and Control for Process Systems

2. 43 21 00 – Sample Pumps

3. 09 90 00 – Painting and Coating

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards: The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

B. ASME INTERNATIONAL (ASME)

1. ASME A13.1 Scheme for the Identification of Piping Systems

2. ASME B1.1 Unified Inch Screw Threads (UN and UNR Thread Form)

3. ASME B16.1 Cast Iron Pipe Flanges and Flanged Fittings Classes 25, 125, and 250

4. ASME B16.3 Malleable Iron Threaded Fittings Classes 150 and 300

5. ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings

6. ASME B16.26 Standard for Cast Copper Alloy Fittings for Flared Copper Tubes

7. ASME B16.15 Cast Bronze Threaded Fittings Classes 125 and 250

8. ASME B1.20.1 Pipe Threads, General Purpose (Inch)

9. ASME B16.9 Factory-Made Wrought Buttwelding Fittings

10. ASME B16.26 Standard for Cast Copper Alloy Fittings for Flared Copper Tubes

11. ASME B16.2 Nonmetallic Flat Gaskets for Pipe Flanges

12. ASME B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

13. ASME B31.1 Power Piping

14. ASME B31.3 Process Piping

C. ASTM INTERNATIONAL (ASTM)

1. ASTM A 53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

2. ASTM A 153/A 153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

3. ASTM A 181 Standard Specification for Carbon Steel Forgings, for General-Purpose Piping

4. ASTM A 193/A 193M Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service

5. ASTM A 197 Standard Specification for Cupola Malleable Iron

6. ASTM A 234 Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

7. ASTM A 240 Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels

8. ASTM A 269 Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service

9. ASTM A 307 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

10. ASTM A 312/A 312M Standard Specification for Seamless, Welded, and Heavily Worked Austenitic Stainless Steel Pipes

11. ASTM A 380 Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems

12. ASTM A 47/A 47M Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process

13. ASTM A 479/A 479M Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels

14. ASTM A 733 Standard Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples

15. ASTM A 774/A 774M Standard Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures

16. ASTM A 778 Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products

17. ASTM B 117 Standing Practice for Operating Salt Spray (Fog) Apparatus

18. ASTM B 61 Standard Specification for Steam or Valve Bronze Castings

19. ASTM B 62 Standard Specification for Composition Bronze or Ounce Metal Castings

20. ASTM B 68 Standard Specification for Seamless Copper Tube, Bright Annealed

21. ASTM B 75 Standard Specification for Seamless Copper Water Tube

22. ASTM B 88 Standard Specification for Seamless Copper Water Tube

23. ASTM C 150 Standard Specification for Portland Cement

24. ASTM D 1238 Melt Flow Rates of Thermoplastics by Extrusion Plastometer

25. ASTM D 1248 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable

26. ASTM D 1598 Time-to-Failure of Plastic Pipe Under Constant Internal Pressure

27. ASTM D 1599 Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings

28. ASTM D 1784 Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

29. ASTM D 1785 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

30. ASTM D 2235 Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings

31. ASTM D 2239 Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter

32. ASTM D 2464 Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

33. ASTM D 2466 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40

34. ASTM D 2467 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

35. ASTM D 2564 Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems

36. ASTM E 96/E 96M Standard Test Methods for Water Vapor Transmission of Materials

37. ASTM F 402 Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings

38. ASTM A 530/A 530M General Requirements for Specialized Carbon and Alloy Steel Pipe

39. ASTM A 632 Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing (Small-Diameter) for General Service

40. ASTM F 493 Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings

41. ASTM F 593 Stainless Steel Bolts, Hex Cap Screws, and Studs

42. ASTM F 594 Standard Specification for Stainless Steel Nuts

D. AMERICAN WATER WORKS ASSOCIATION (AWWA)

1. AWWA C104/A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

2. ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings, 3 in through 48 in (75 mm through 1200 mm), for Water and Other Liquids

3. ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

4. AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings for Water

5. ANSI/AWWA C115/A21.15 Water Treatment – Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges

6. AWWA C115/A21.15 Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges

7. AWWA C150/A21.50 Thickness Design of Ductile-Iron Pipe

8. AWWA C151-09 - Ductile-Iron Pipe, Centrifugally Cast.

9. AWWA C153 - Ductile-Iron Compact Fittings, 3-in Through 64-in for Water and Other Liquids.

10. AWWA C600 - Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.

11. AWWA C651 - Disinfection Water Mains.

E. INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

1. ISO 228-1 Pipe Threads Where Pressure-Tight Joints Are Not Made on The Threads - Part 1: Dimensions, Tolerances and Designation

F. MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

1. MSS SP-58 Standard for Pipe Hangers and Supports - Materials, Design and Manufacture

2. MSS SP-89 Pipe Hangers and Supports - Fabrication and Installation Practices

3. MSS SP-69 Standard for Pipe Hangers and Supports - Selection and Application

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions including include catalog cut sheets and dimensional data for each type of process pipe, tube, fitting, gaskets, hardware, and appurtenances.

2. Material safety data sheets in conformance with 29 CFR 1910 Section 1200(g) accompanying each chemical products delivered for use in pipe installations, including all solvents, solvent cements, glues and other materials that may contain hazardous compounds.

C. Shop Drawings

1. Layout and dimensions of equipment, major components, key alignment locations, and locations of bolt holes and indicate where access points for maintenance and operations are located on the equipment. Show critical field dimensions and actual pipe lengths, diameters, fittings, and appurtenances.

2. Show joint couplings and fittings and specifically identify styles. Show layouts and dimensions of piping and pipe supports for pipe systems.

D. Certificates

1. Certified affidavit of compliance from the pipe manufacturer stating that the pipe, fittings, gaskets, linings and exterior coatings for the Project have been manufactured and tested in accordance with AWWA and ASTM standards and requirements specified herein.

E. Design Data/Submittals

1. Provide a detailed submittal for pipe identification which shall include each pipe color and label for each of the respective fluid designations for review by the Engineer.

F. Manufacturer Instructions

1. Manufacturer's recommended shipping, unloading, storage, installation, testing, operation and maintenance procedures including a list of special tools and equipment required to maintain the units.

G. Qualification Statements: as required by Article 1.06.Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Unless otherwise indicated, all fittings and appurtenances shall be of the same type and grade of materials as the connecting pipe. All products provided under this section shall conform to current AWWA and ANSI specifications as appropriate to the type of pipe specified.

C. All welding shall be conducted under qualified welding procedures. All welders and operators shall be certified in accordance with the latest applicable AWS and ANSI codes for shop and project site welding of piping work. Provide written proof of certifications upon request from the Engineer.

D. All piping systems, components, and appurtenances in contact with potable water (including potable water during any stage of treatment or conditioning) shall be certified to meet the requirements of ANSI/NSF 61 for water service.

E. Flanges on the discharge piping and fittings for High Lift Pump No. 2 from the pump discharge flange to the existing control valve shall be ANSI B16.1 Class 250.

F. Certifications

1. All products in contact with potable water shall be ANSI/NSF Standard 61 certified.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Packing, Shipping, Handling, and Unloading

1. It is the responsibility of the Contractor to unload and string pipe. Pipe shall be lifted off the truck and placed on the ground with care and in accordance with manufacturer’s recommendations to prevent damage to the pipe. Rolling the pipe off the truck or dropping the pipe is prohibited. The Contractor shall utilize padding on all hooks, slings, and pipe tongs used for unloading so as to prevent damage to the piping. Dropping of pipe during unloading shall not be acceptable. Care shall be taken so as not to skid piping against stationary piping during unloading or stacking.

2. Handling of chemicals for piping installation shall be in accordance with ASTM F 402 standards.

C. Acceptance at Site

1. Inspection of all piping and fittings shall be conducted by the Contractor after delivery on site. All piping shall be subject to rejection at any time on account of failure to meet that which is outlined in the Contract Documents. Pipe which has been rejected after delivery shall be specifically marked for "non-use" and shall be removed from the job site at no additional cost. The acceptance of any Manufacturer's pipe samples prior to shipment shall not be equal to the Engineer's acceptance of all piping delivered to the job site.

D. Storage and Protection

1. Pipe may be stacked, but no more than three layers high and only with proper blocking in between layers. The bottom row of the piping stack shall be elevated from the ground surface. The piping shall be supported off the ground through the use on timbers, rails, or concrete as recommended by the piping Manufacturer.

2. The interior of all piping and fittings shall be kept clean and free from dirt or other foreign material at all times. Utilize suitable caps or wrapping to prevent entry of dirt or foreign material into the piping. Exercise extra care when handling cement lined pipe. Damage to the interior lining of piping shall render it unfit for use.

3. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping. Protect flanges and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

4. Store rubber products under cover out of direct sunlight. Do not store materials directly on the ground. Keep the inside of couplings, connectors, and fittings free of dirt and debris.

5. Materials delivered and placed in storage shall be stored with protection from the weather, excessive humidity variation, excessive temperature variation, dirt, dust and/or other contaminants. Proper protection and care of materials before, during and after installation shall be the Contractor's responsibility. Any materials found to be damaged shall be replaced at the Contractor's expense. Materials shall be stored with protection from puncture, dirt, grease, moisture, mechanical abrasions, excessive heat, ultraviolet (UV) radiation, or other damage.

E. Waste Management and Disposal

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.09 MAINTENANCE

A. Extra Materials: Furnish as specified below. Make interchangeable with and same material and workmanship as corresponding original parts.

PART 2 – PRODUCTS

2.01 INTERIOR DUCTILE IRON PIPE AND FITTINGS

A. Design Criteria

1. Pipe shall be ductile iron pipe meeting ANSI/AWWA C150/A21.50 and C151/A21.51.

2. Fittings shall be ductile iron meeting ANSI/AWWA C110/A21.10 or C153/A21.53.

3. Pipe and fitting joints shall be flat-faced flanged meeting ANSI/AWWA C110/A21.10, C115/A21.15, and C153/A21.53. Flanges shall meet ANSI A21.10 or ANSI B16.1 (when A21.10 is not available) Class 125 standard and be rated for 350 psi working pressure for 3-inch through 24-inch diameters (250 psi minimum for 30-inch through 48-inch diameters).

4. Flange gaskets shall be full face type styrene-butadiene rubber (SBR) elastomer per ANSI/AWWA C111/A21.11 and shall be a minimum of 1/8” thick. Gaskets shall be high performance type satisfying the special requirements of ANSI/AWWA C111/A21.11 Appendix C, Sec. C.2.

5. Hardware: Bolts shall meet ANSI B18.2.1 standard and nuts shall meet ANSI B18.2.2 standard. Nuts and bolts shall be of heavy hex design and shall be made of Type 316 stainless steel.

6. Pipe and fittings shall have a minimum thickness Class 53 per ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51.

7. Interior of pipe and fittings shall be double cement lined per ANSI/AWWA C104/A21.4.

8. Exterior of pipe and fittings shall have a 3 to 5-mil thick, single-component, moisture-cured urethane shop applied primer coating in accordance with specification section 09 90 00 Paints and Coatings. A rust

preventive coating shall also be shop applied to the machined face of flanges.

9. Pipe and fittings shall be permanently marked with the Manufacturer, Date of Manufacture, Size, Type, Class/Wall Thickness, and Standard Produced to (ASTM, AWWA, ANSI, etc.).

B. Manufacturers

1. U.S. Pipe & Foundry Company Inc.

2. American Cast Iron Pipe Company

3. Clow Water System Company

4. Or equal

C. Finishes

1. Finish coatings shall be in accordance with specification section 09 90 00 Paints and Coatings.

D. Source Quality Control

1. Provide in accordance with Division 01 General Requirements.

2.02 SLEEVE TYPE COUPLINGS

A. Design Criteria

1. Provide solid sleeve type couplings to join plain end pipes as shown on the Drawings, as specified. In cases where the outside diameters of the piping segments to be connected differ, provide "reduction/expansion" sleeve type couplings.

2. All sleeve type couplings shall conform to the provisions of AWWA C 219 standards. All sleeve type couplings shall be rated for use with the same operational pressure as the connecting pipes.

3. All coupling lugs and sleeves shall be in accordance with ASTM A536, Grade 65-42-12 standard. All washers shall be in accordance with ASTM A 325M standards. All couplings shall be fitted with plastic plugs to protect the bolt holes.

4. Fasteners: All bolts shall be installed such that a minimum of 1/4 inch of the bolt projects beyond the surface of the nut. All hexagonal nuts shall be in accordance with ANSI B18.2 standards. Hexagonal nuts shall have threads in accordance with ANSI B1.1 standards. All bolts shall be in accordance with ASTM A 307 and ANSI B1.1 standards. All bolts shall

be square or hexagonal head type. Bolts shall be threaded over the full length. All bolt ends shall be rounded or chamfered. Bolts shall be coarse thread fit type. Provide 316 stainless steel hardware for all sleeve type couplings.

5. Gaskets: Provide gaskets to match the particular service application. Unless otherwise specified or recommended by the coupling Manufacturer. The coupling gasket shall match the gasket material used for the piping system.

6. Middle Ring: The pipe stop within the inner surface of the middle ring of couplings shall be omitted as required to permit removal of valves, flow meters, equipment, and appurtenances. All other couplings shall be provided with pipe stops. The middle ring of each sleeve type coupling shall have a thickness at least equal to that of the connecting piping on which the coupling is to be used. All sleeve type couplings shall be a minimum of 10 inches long for pipe 30 inches and larger. All sleeve type couplings shall be a minimum of 7 inches long for pipe under 30 inches in diameter.

B. Acceptable Vendors:

1. Dresser Piping Specialties
2. Smith-Blair Inc.
3. Engineer Approved Equal

C. Finishes

1. Provide Manufacturer’s standard rust inhibitor primer.

2.03 BUTTERFLY VALVE

A. All metallic butterfly valves for water & wastewater service shall conform to AWWA C504 Class 150B standards for frequent operation. The valves shall provide bubble tight shut-off at the specified and rated pressure. The Manufacturer shall provide a certified performance affidavit which demonstrates that the valves meet and have been tested in accordance with AWWA C504 Class 150B standards. Any exceptions to AWWA C504 Class 150B standards shall be provided in writing by the Manufacturer.

B. The valve body shall be provided with integrally cast hubs for through boss-type shaft bearing housings. A stuffing box shall be provided at the operator end of the vane shaft. The valves shall be provided with permanently self-lubricating body bushings. The body bushings shall be provided to withstand the all bearing loads from the valve. The valve shall be provided with resilient seats retained in the body or in the disc edge. The valve seats shall be in accordance with AWWA C504 standards.

C. All butterfly valves for liquid service shall be designed and constructed in accordance with the following criteria:

1. Size: As shown on Drawings
2. End Connections: Flanged, per ANSI 125
3. Body: Cast Iron per ASTM A 126 Class B, Epoxy Coated
4. Disc: Cast Iron per ASTM A 48/A 48M Class 40; Ni-resist ASTM A 436 Type 1; or Ductile Iron ASTM A 536 Grade 65-45-12
5. Minimum Water Pressure Rating: 150 psi
6. Valve Operator: Refer to specification section 40 92 13. Valve shall be compatible with specified valve operator.
7. Shaft: 316 Stainless Steel
8. Packing: EPDM
9. Resilient Seat: EPDM

D. The valve shaft shall be designed for the respective torsional and shearing forces when the valve is opened and closed as well as the maximum dynamic seating torque. The shaft diameter shall not be reduced except for connection to the valve operator. The shaft shall be ground and polished to minimize bearing and seal wear.

E. Gear actuators shall be totally enclosed and designed in accordance with AWWA C504 standards to prevent the entry of dirt or water. The valve actuators shall be provided with permanent indicators to show the position of the butterfly valve disc. The markings shall be raised or engraved. The valve packing shall be sealed using o-rings or be of the self-compensating v-type. The valve packing shall be held in place by a corrosion resistant gland or retainer plate. The valve shall not require removal from the line for replacement of seals.

F. Neck extensions with extension shafts shall be provided with valves as required to locate valve operators as shown on the plans.

G. All water service butterfly valves of the same type, style, and duty shall be supplied by a single Manufacturer. All water/wastewater service butterfly valves shall be a product of the following Manufacturer:

1. Dezurik Water Controls
2. Henry Pratt Company
3. Clow Valve Company
4. Engineer Approved Equal

2.04 PVC PIPE & FITTINGS

A. General

1. Pipe and fittings shall be flanged or socket welded Schedule 80 PVC pipe. The pipe shall conform to ASTM D 1785 standards, PS 21-70, PVC 1120. Pipe material shall be Type I, Grade I, compound cell classified 12454-B per ASTM D 1784 standards. The PVC compound shall be gray in color. The pipe marking shall indicate the pressure rating in psi for water at 73°F, per ASTM D 1785 standards, as well as the manufacturing date code. The pipe shall have a minimum hydrostatic design stress of 2,000 psi at 73ºF.

2. Schedule 80 fittings shall comply with ASTM D 2467 standards.

3. Flange dimensions shall conform to ASME B16.1, Class 125 standards unless otherwise indicated or required for connection to pumps, tanks, equipment, and appurtenances.

4. Unions shall utilize Viton O-rings or a material compatible with the process fluid.

5. Pipe, fittings, and solvent cement for use with potable water shall be certified by NSF standard No. 14 and 61 and the seal shall be included on the pipe.

6. All bolts, nuts, washers, and other fastening devices shall be designed for use in corrosive service environments. All fastening devices shall be Type 316 stainless steel and conform to ASTM F 593 and ASTM F 594 standards. All nuts and bolts shall be installed with an anti-seize compound of molybdenum disulfite base.

7. Manufacturer:

   a. North American Specialty Products

   b. J-M Manufacturing Company

   c. Harvel Plastics Inc.

   d. Or equal

B. PVC Cement

1. All cement for socket welded connections shall be "Low VOC" emission, heavy bodied, medium setting, high strength solvent cement. When bonding sodium hypochlorite piping, sodium hydroxide piping or any other acid piping system the cement shall be specially formulated for the

chemical application. The PVC cement shall conform to ASTM F 402, ASTM D 2564 and ASTM F 493 standards.

2.05 PVC BALL VALVE (TRUE UNION)

A. All thermoplastic ball valves shall be Industrial type manufactured to ASTM F 1970 standards. All PVC ball valves shall be constructed from PVC Type I, per ASTM D 1784 standards, Cell Classification 12454. All O-rings shall be compatible with the pumped fluid as specified and as recommended by the valve Manufacturer. All valves shall have a stem with double O-ring stem seals. All valve handles shall be polypropylene with a built-in lockout mechanism. All valve union nuts shall have Buttress threads. All valve components shall be replaceable without removing the valve from the piping line.

B. For potable water applications, all valves shall be certified by NSF International for use in potable water service.

C. The valve shall not require any special tools. All PVC ball valves shall be designed in accordance with the following criteria:

1. Size: Match to Piping Size as Shown on Drawings
2. End Connections: True Union socket
3. Valve Body, Ball, Carrier, End Connector & Stem: PVC
4. Valve Seat: compatible with fluid
5. Gaskets, Seals, & O-Rings: compatible with fluid
6. Valve Operator: Lever

D. All exterior chemical feed valves shall be provided with locking handles as required or as shown on the Drawings. The locking mechanism shall prevent the unauthorized operation of the valve. The valve shall be able to be locked in the open or closed position. Provide keyed locks suitable for each locking valve.

E. All PVC ball valves of the same type, style and duty shall be supplied by a single Manufacturer. All PVC ball valves shall be a product of the following Manufacturer:

1. Asahi/America Inc.
2. Spears Manufacturing Company
3. Hayward Industrial Products Inc.
4. Engineer Approved Equal

2.06 PVC BALL CHECK VALVE (TRUE UNION)

A. All PVC check valves shall be Industrial type manufactured to ASTM F 1970 standards constructed from PVC Type I, per ASTM D 1784 standards, Cell Classification 12454. All materials shall be compatible with the pumped fluid as specified and as recommended by the valve Manufacturer. All valves shall be certified by NSF International for use in potable water service. Valves shall be rated for 150 PSI at 70°F.

B. All PVC ball check valves shall be designed in accordance with the following criteria:

1. Size: Match to Piping Size as Shown on Drawings
2. End Connections: True Union socket
3. Valve Body, Ball, Carrier, End Connector & Stem: PVC
4. Valve Seat: FPM or EPDM, whichever is most compatible
5. Gaskets, Seals, & O-Rings: FPM or EPDM, whichever is most compatible

C. All PVC check ball valves of the same type, style and duty shall be supplied by a single Manufacturer. All PVC check ball valves shall be a product of the following Manufacturer:

1. Asahi/America Inc.
2. Spears Manufacturing Company
3. Hayward Industrial Products Inc.
4. Engineer Approved Equal

2.07 NEEDLE VALVE (CONSTANT FLOW VALVE)

A. Needle valve shall be rated for a max pressure of 150 psi. Bubble tight, low torque shutoff. Fitting shall be globe style, straight with FNPT connections. Valve size as shown on plans. Body, stem, and handle shall be PVC material. Seal shall be PTFE. Valve shall meet ASTM D1784.

2.08 PVC Y-TYPE STRAINERS

B. All sediment strainers shall be "clear" Y-type constructed from PVC Type I, ASTM D 1784 Cell Classification 12454 or CPVC Type IV, ASTM D 1784 Cell Classification 23447. All Y-strainers shall have replaceable screens. All threaded Y-Strainers shall have Special Reinforced (SR) threads. All Y-Strainers, sizes 1/2 inch - 2 inches shall be pressure rated to 150 psi, sizes 3 inch - 4 inch to 90 psi for water at 73°F. The strainers shall be designed for installation in both the "horizontal" and "vertical". All Y-strainers shall be designed and constructed in accordance with the following criteria:

5. Size: 1/2 Inch to 4 Inch - Match to Piping Size as Shown on Drawings
6. End Connections: True Union Socket (Connections to "Type PVC" Piping)
7. End Connections: Flanged (Connections to Metallic Piping)
8. Body: "Clear" PVC ASTM D 1784
9. O-Rings: EPDM
10. Screen: PVC
11. Plug: PVC ASTM D 1784
12. Mesh: 20 Mesh (1/32 inch openings)

B. Provide two (2) additional spare strainer screens for each y-strainer. Provide one (1) spare 40 mesh (1/64 inch opening) screen and one (1) 60 mesh (0.009 inch opening) screen for each strainer.

C. All PVC Y-Strainers of the same type, style, and duty shall be supplied by a single Manufacturer. The PVC Y-Strainers shall be a product of the following Manufacturer:

1. Asahi/America Inc.
2. Spears Manufacturing Company
3. Hayward Industrial Products Inc.
4. Engineer Approved Equal

2.09 PIPE SUPPORTS

A. Where possible, process piping hangers and supports shall be a Manufacturer's standard product. All products specified or otherwise shall conform to the requirements of MSS SP-58 and MSS SP-69 standards.

B. Piping Forces

1. Provide supports for all pipe and tubing to prevent significant stresses in the material, valves, fittings and other connected pipe appurtenances. All supports and anchors shall be designed to secure the pipe in the intended position and alignment. All supports and anchors shall be designed to secure all pipe and tubing against excessive dislocation due to thermal expansion and contraction.

2. The pipe supports and anchor design shall specifically account for internal flow forces, all probable external forces from equipment connection, human contact, and all seismic forces. Provide and install all structural steel members as required to brace any piping system from excessive dislocation. All pipe fittings and appurtenances connected to equipment shall be supported in a manner to prevent any strain from being imposed on the equipment or piping systems. All pipe supports shall be installed such that they do not induce point loadings on the piping. All supports shall distribute pipe loads evenly along the pipe circumference.

a. All valves shall be provided with a supporting system. Supporting of valves by the connected piping shall not be acceptable.

C. Coupling Support

1. All couplings shown on the Drawings and as specified for connection to pumps, equipment, and appurtenances shall be provided with supports..

2. All such couplings shall be rigidly supported, to prevent transfer of force to the equipment. Fixed or restraining supports shall not be installed between a flexible coupling and the connected piece of equipment/appurtenance.

D. Support Spacing

1. All supports shall be provided with appropriate spacing such that the sag of the pipe (if any) is within the limits of the piping Manufacturer. The support design and layout shall be such that it permits drainage of the pipe line. The support design and layout shall minimize bending stresses on the supported piping from concentrated loads between supports.

E. Dissimilar Metals

1. All stainless steel piping shall be isolated from all ferrous metals including galvanized steel. Provide a neoprene sheet and/or stainless steel protection shields to prevent direct contact when installed.

2. All copper piping shall be protected from galvanic corrosion from contact with ferrous metals. Provide corrosion protection by wrapping the copper pipe with 1/16 inch thick neoprene, sheet metal and a galvanized protection shield with isolators.

F. Insulated Pipe

1. All insulated piping shall be provided with a rigid insulating saddle at each pipe support location. Provide protection shields at each support location.

G. General Pipe Support Spacing

1. All solid metallic process piping shall be provided with supports spaced in strict accordance with the pipe Manufacturer's recommendations. Provide a minimum of one (1) support per pipe section at joints, changes in direction, and valves. At a minimum provide supports in accordance with the following:

Pipe Size (Inches)	Maximum Span (feet)
1½ inches & smaller	5 feet
2 inches to 4 inches	10 feet
5 inches to 8 inches	15 feet
10 inches & larger	20 feet

2. Small diameter metallic piping, including but not limited to steel, copper piping, copper tubing, and stainless steel shall be provided with supports spaced at a maximum of five (5) feet.

3. All stainless steel piping shall be provided with neoprene isolators between the pipe and supports to prevent dielectric corrosion.

Where stainless steel supports are used neoprene isolators shall not be required.

H. Materials of Construction

1. All rods, clamps, hangers, inserts, anchor bolts, brackets, components, and appurtenances for "Interior" pipe supports shall be constructed of 304 stainless steel. All supports for copper pipe shall be copper plated or shall have a minimum 1/16 in plastic coating.

2. All process piping support systems shall be constructed of the following materials based on location unless otherwise specified or indicated on the Drawings:

3. All Interior Building Piping: 304 Stainless Steel

4. All fasteners and related hardware for supports including but not limited to nuts, bolts, and washers shall be 316 stainless steel regardless of location. Fasteners for submerged support locations shall be 316 stainless steel.

I. Anchors

1. The Contractor shall anchor piping. The anchor design and materials shall be in accordance with ANSI/ASME B.31 standards. Additional anchoring shall be provided as approved by the Engineer. All anchors shall be 316 stainless steel regardless of installation location.

2. Anchors for floor supports and all related appurtenances shall be in accordance with the following. Size all supports as required for proper support as well as to provide compatibility with the associated pipe support.

a. Hilti - Kwok-Bolt

b. Simpson Strong-Tie - Wedge All

c. Powers Power-Stud

d. Engineer Approved Equal

2.10 FINISHINGS & COATINGS

A. All coatings and lubricants in contact with "Potable Water" shall be certified as acceptable for use with that fluid. If the valve Manufacturer does not require finished coating on any interior surfaces, then the Manufacturer shall state so in writing and no finish coating shall be required, if approved by the Engineer.

B. Unless otherwise specified, all iron body valves shall be exterior primed with a shop coat of an Engineer approved rust-inhibitive primer. The primer shall be applied in accordance with the instructions of the paint Manufacturer. The primer shall be compatible with the finish coat provided. Unless otherwise specified, the finish coat shall match the coating of connecting pipe in type and color. All field painting shall be in accordance with section 09 90 00 Paints & Coatings. Stainless steel, brass, bronze, and plastic body valves shall not require coating.

C. Unless otherwise specified or noted, all interior ferrous surfaces shall be given a shop finish of an asphalt varnish or epoxy coating in accordance with AWWA C550 and AWWA C509 standards.

D. The epoxy paint shall be either a two-part liquid material or a heat-activated (fusion) material except that only a heat-activated material shall apply if a valve coating is specified as "fusion" or "fusion bonded" epoxy. The epoxy lining and coating shall have a minimum of 4.0 mils dry film thickness except where it is limited by valve operating tolerances. Safety isolation valves and lockout valves with handles, handwheels, or chain wheels shall be painted "Safety Yellow."

E. Ferrous surfaces obviously not intended to be painted shall be given a shop coat of grease or other acceptable rust-inhibitive coating.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verification of Conditions

3.02 PREPARATION

A. Demolition/Removal

1. Existing pipe and fittings and associated materials shall be removed and disposed of as indicated on Drawings.

3.03 GENERAL INSTALLATION

A. Install each run of piping with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Reduce sizes (where indicated on the Drawings) by use of reducing fittings. Align piping accurately at connections, within 1/16 inch misalignment tolerances.

B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or, if not otherwise indicated, run piping in the shortest route which does not obstruct

usable space or block access for servicing the building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of buildings.

C. All marred and damaged coatings shall be repaired by the Contractor so as to maintain the coating integrity in accordance with the manufacturer's requirements.

D. Filed painting by Painting Subcontractor shall be in accordance with Section 09 90 00 – Painting and Coating.

3.04 INTERIOR DUCTILE IRON PIPE INSTALLATION

A. The Contractor shall install ductile iron piping and fittings true to alignment. Provide rigid pipe supports and anchorage. The support spacing shall be in strict accordance with the recommendations of the piping Manufacturer.

B. The installation and piping support system shall not allow deflection of piping greater than 50% of the maximum deflection as recommended by the piping Manufacturer. Each section of piping and fittings shall be cleaned free of dirt, debris and other foreign material prior to installation. All cleaning shall be in accordance with the recommendations of the piping Manufacturer.

C. All ductile iron piping and fittings shall be installed in accordance with requirements of AWWA C600 standards. Provide all fittings for field routing of piping in addition to those shown on the Drawings to provide for a complete and operational piping system. Provide additional flanges as directed by the Engineer where piping interferes with existing facilities.

D. Pipe Cutting

1. Pipe cutting shall be as approved by the Engineer. Any damage to the interior pipe linings shall be repaired to the satisfaction of the Engineer before installation. If approved by the Engineer, cutting shall be conducted using a saw with blades specifically designed for cutting iron pipe. All cuts shall be at right angles to the axis of the piping. The cuts shall leave smooth edges. Damages to interior pipe linings caused by cutting of pipe shall be repaired to the satisfaction of the Engineer and Owner.

2. The Contractor shall seal the ends of all cut pipe in accordance with the recommendations of the pipe Manufacturer.

3. Field cutting and threading of ductile iron pipe shall not be acceptable under any circumstances, all pipe shall be pre-cut and threaded for flanges at the factory of origin.

E. Joints & Connections

1. Connect piping to equipment in accordance with the instructions of the equipment Manufacturer. When Manufacturer's indicate that equipment shall not support dead loads from piping, the Contractor shall submit, in writing, that the piping installation does not transfer loading from the piping to the equipment, and that all the Manufacturer's requirements have been met. Install piping so as not to impart any strain or loading on the connected equipment

2. All bolts for flanged joints shall be tightened evenly. All bolts shall conform to the size of the flange and well as all ANSI standards. Flanged joints shall be made using gaskets, bolts, and bolt studs with a nut on each end. The Contractor shall utilize studs with nuts where the flange is tapped.

3. The Contractor shall provide tapped pipe connections as shown on the Drawings and as directed by the Engineer. All piping shall be drilled and tapped perpendicular to the longitudinal access of the pipe. All taps shall be designed to seal water tight. The pipe taps shall be of sufficient strength so as to prevent blowouts in pressurized applications. Follow the Manufacturer's instructions when tapping into fittings. All pipe taps shall be in accordance with ANSI A21.51 standards.

3.05 INSTALLATION OF SLEEVE TYPE COUPLINGS

A. All sleeve type couplings shall be installed in strict accordance with the recommendations of the coupling Manufacturer. The Contractor shall thoroughly clean all pipe connecting ends prior to installation of sleeve couplings. The pipe ends shall be cleaned a minimum of 8 to 12 inches from the ends of the piping prior to installation. Provide clean soapy water for use as a gasket lubricant.

B. Install the follower ring then the gasket over each pipe end to a distance of approximately 6 inches from the end of the pipe. Place the middle ring over the center of the joint. Insert the pipe length into the middle ring the full and proper distance. The gaskets and followers shall then be pressed evenly into the middle ring flares.

C. Insert all bolts. All bolts shall be finger tightened prior to the use of tools. Progressively tighten diametrically opposite nuts uniformly around the adapter. Once the nuts can no longer be finger tightened use a torque wrench of the appropriate size and torque for the bolts. Utilize the wrench to progressively and uniformly tighten all bolts.

D. The torque applied shall be in accordance with the recommendations of the coupling Manufacturer. The correct torque as indicated by a torque wrench shall

not exceed 75 foot-pounds for 5/8 inch bolts and 90 foot-pounds for 3/4 inch bolts.

E. Insert and tighten all tapered threaded lock pins. All bolts shall be finger tightened prior to use of tools. Progressively tighten diametrically opposite nuts uniformly around the adapter. Once the nuts can no longer be finger tightened use a torque wrench of the appropriate size and torque for the bolts. Utilize the wrench to progressively and uniformly tighten all bolts.

F. Provide and install harnessing or flange clamp assemblies where shown on the Drawings, as specified or as directed by the Engineer. Harnessing or flange clamp assemblies shall be provided to prevent sleeve couplings from being pulled apart under pressure. It shall be the Contractor's responsibility for locating, providing and installing all restraints. Harnessing, flange clamp assemblies, or tie rods shall be provided on all pressurized lines.

3.06 PVC PIPE INSTALLATION

A. When cutting of piping is required, all burrs, chips, filings, and other associated defects shall be removed from both the pipe inside diameter and outside diameter before joining. Cutting of piping shall be with a hand saw or pipe cutter with blades. The use of pipe cutters with rollers shall not be acceptable. All cut pipe ends shall be beveled approximately 1/16 inch back from the edge of the pipe at an angle of 10 to 15 degrees.

B. Solvent Welding

1. All joints for plastic pipe shall be solvent welded except where flanged joints are required. All pipe and fittings to be socket welded shall be clean of all loose dirt and moisture from the inside and outside diameter of the pipe end and the inside diameter of the fitting. The Contractor shall not socket weld wet piping surfaces.

2. The solvent cement shall be a grade specifically recommended by the piping Manufacturer for the size and schedule of the pipe as well as the process fluid carried. Solvent cements for acidic chemicals shall be in accordance with that previously specified. Prior to solvent welding, all fittings and couplings shall be exposed to the installation atmosphere for at least one (1) hour to the same temperature conditions as the pipe in order to assure proper thermal balance between the piping and associated fitting.

3. A minimum of two (2) coats of solvent shall be applied when recommended by the pipe, fitting, or solvent cement Manufacturer. All piping system joints four (4) inches and larger shall use a primer and finished solvent cement coating prior to assembly. The Contractor shall apply the solvent cement to the socket while keeping both the surface

and applicator wet and in motion for approximately 5 to 15 seconds. The Contractor shall take care so as not to add excess solvent cement. Joints shall not be cramped.

4. The atmospheric and weather conditions affect the solvent welding procedure. In cold weather sufficient time shall be allowed for proper penetration of the solvent cement. Joining of PVC pipe and fittings shall not be conducted in atmospheric conditions below 40ºF, above 90ºF, or when exposed to direct sunlight. The Contractor shall allow for a minimum of 48 hours of drying time before moving the socket welded joint or subjecting any internal or external pressure/force.

5. When solvent welding piping to valves or other appurtenances the Contractor shall take specific care so as not to allow solvent cement to enter the valve. Solvent cement shall not be allowed to run free from joints. All valves shall be solvent welded in strict accordance with the recommendations of the valve Manufacturer.

6. All solvent welded joints shall remain undisturbed for a minimum of 48 hours so as to allow for the development of complete strength.

3.07 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.08 STARTUP & COMMISSIONING

A. Provide in accordance with Division 01 General Requirements and as follows;

B. Testing of Process Piping (see below for Ductile Iron Piping)

1. Perform hydrostatic testing of completed lines. Apply 1.5 times the working pressure for 20 minutes, 2-psi gage drop or less is acceptable.

2. Perform operational testing of valves by opening and closing under water pressure to insure proper operation.

C. Testing of Ductile Iron Piping

1. Perform pressure and leakage tests under Owner supervision, in accordance with the latest revision of AWWA C-600 and the requirements set forth below.

2. Duration of hydrostatic testing shall be a minimum of two (2) hours. The test pressure shall be 1.5 times the working pressure at the lowest point, and in no case less than 150 psi.

3. The allowable leakage for ductile iron pipe shall be determined by the formula:

$$L = \frac{SD\,P^{1/2}}{133{,}200}$$

Where L is the allowable leakage in gallons per hour, S is the length of pipe in feet, D is the nominal diameter in inches, and P is the average test pressure in psi.

For convenience, the following table may be used to estimate allowable leakage for ductile iron water main installations:

CIPRA RECOMMENDED ALLOWABLE LEAKAGE PER 1000-FT. OF PIPELINE*
(GALLONS PER HOUR)

Avg. Test Pressure	NOMINAL PIPE DIAMETER - INCHES					
PSI	4	6	8	10	12	16
450	0.64	0.95	1.27	1.59	1.91	2.55
400	0.60	0.90	1.20	1.50	1.80	2.40
350	0.56	0.84	1.12	1.40	1.69	2.25
300	0.52	0.78	1.04	1.30	1.56	2.08

Avg. Test Pressure	NOMINAL PIPE DIAMETER - INCHES					
PSI	4	6	8	10	12	16
275	0.50	0.75	1.00	1.24	1.49	1.99
250	0.47	0.71	0.95	1.19	1.42	1.90
225	0.45	0.68	0.90	1.13	1.35	1.80
200	0.43	0.64	0.85	1.06	1.28	1.70
175	0.40	0.59	0.80	0.99	1.19	1.59
150	0.37	0.55	0.74	0.92	1.10	1.47
125	0.34	0.50	0.67	0.84	1.01	1.34
100	0.30	0.45	0.60	0.75	0.90	1.20

For mechanical or push-on joint pipe with 18-ft. nominal lengths. To obtain the recommended allowable leakage for pipe with 20-ft. nominal lengths, multiply the leakage calculated from the above table by 0.9.

If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

E. Testing of Valves

1. Test all valves visually for leaks and proper operation under pressure. Test valves to ensure proper valve function and actuation. All valves shall be tested as part of the respective piping system or segment in accordance with Section 40 05 13 Process Pipe and Fittings.

2. Valves may either be tested while testing pipelines, or as a separate test. It shall be demonstrated that valves open and close smoothly with operating pressure on one side and atmospheric pressure on the other, and in both directions for two-way valve applications. Count and record the number of turns required to open and close each valve, and account for any discrepancies with the Manufacturer's data.

3. Air and vacuum relief valves shall be examined as the associated pipe is being filled to verify venting and seating is fully functional. Set, verify, and record set pressures for all relief and regulating valves. Self-contained automatic valves shall be tested at both maximum and minimum operating ranges, and reset upon completion of test to the design value.

4. Take care not to overpressure any valve and appurtenances during testing.

3.09 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 40 90 00

INSTRUMENTATION AND CONTROL FOR PROCESS SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Provide all equipment, instruments, services, appurtenances and labor as specified herein and in the following associated Specifications and as shown on the Drawings:

1. Specification 40 91 00 – Primary Process Measurement Devices
2. Specification 40 94 43 – Programmable Logic Controllers
3. Specification 40 95 13 – Process Control Panels and Hardware

B. Provide all equipment, instruments, services, appurtenances, labor including separate delivery and unloading of the Supervisory Control and Data Acquisition (SCADA) panels as specified herein and in the following associated Specifications and as shown on the Drawings.

1.02 WORK NOT INCLUDED

A. Programming of the Programmable Logic Controllers (PLC), Operator Interface Terminals (OIT), and Human-Machine-Interface (HMI) software shall be by others.

1.03 SUBMITTALS

A. Provide submittals in accordance with Division 01 General Requirements.

B. Prior to submittal to the Engineer, Shop Drawings and submittal information shall be thoroughly checked by the Contractor to insure compliance with Contract Documents. The Contractor shall be Responsible for verifying that all equipment, instruments, and materials submitted upon shall fit within available space and maintain specified physical clearances, and that all equipment is compatible with the operation of the overall system. Submittal to the Engineer of Shop Drawings and submittal information implies that the Contractor has reviewed the information and all requirements have been satisfied.

C. Submittals and Shop Drawings shall consist of the following elements:

1. Project name, location, Project number
2. Contractor name, address
3. Table of contents or index, including equipment, instruments or materials being submitted, utilizing identification consistent with Contract

Documents (equipment designation, instrument tag number, control panel name, etc.), as well as proposed, manufacturer, style/model, and part number.

4. For instrumentation submittals, refer to Section 40 91 00, Primary Process Measurement Devices, for specific requirements.

5. For PLC and OIT submittals, refer to Section 40 94 43, Programmable Logic Controllers, for specific requirements.

6. For SCADA control panel shop drawing submittals, refer to Section 40 95 13, Process Control Panels and Hardware, for specific requirements.

D. The submittal information for each section shall be contained in a single submission. Incomplete or partial submissions shall not be accepted.

E. Operations and Maintenance (O&M) Materials

1. The O&M materials shall include descriptions of all equipment, the nature and intended modes of operation, testing procedures of all units in the System, and safety measures to be taken in operation. All necessary procedures and methods for effective operation of the System shall be included.

2. The O&M materials shall include record Drawings and instructions necessary for the planned maintenance of all equipment in the system. The O&M Manuals will incorporate maintenance procedures and schedules, and they will coordinate and be cross-referenced to detailed operation procedures provided by the manufacturers.

3. Information for O&M manuals shall be organized in three-ring binders, provided with labeled dividers, including a table of contents clearly describing the information included and order.

4. Include in the O&M manuals a list of local service departments of authorized distributors for all equipment, instruments, services and appurtenances installed under this Contract. These service departments should stock the manufacturer’s standard parts and equipment, provide local service options, etc.

5. For instrumentation O&Ms, refer to Section 40 91 00, Primary Process Measurement Devices, for specific requirements.

6. For PLC and OIT O&Ms, refer to Section 40 94 43, Programmable Logic Controllers, for specific requirements.

7. For SCADA control panel O&Ms, refer to Section 40 95 13, Process Control Panels and Hardware, for specific requirements.

1.04 DELIVERY, STORAGE AND HANDLING

A. Coordinate equipment, instrument, and material delivery to coincide with the Project schedule. If the delivery schedule of any equipment, instrument, or material shall affect the overall Project schedule, notify the Engineer in writing immediately. Include in the written notification documentation from the equipment Supplier indicating the revised delivery schedule and reason for the change.

B. When applicable, coordinate delivery of equipment, instruments, or materials to be delivered directly to another trade or vendor for installation in a system or control panel provided under another Specification section.

C. Exercise care while loading, unloading and transporting equipment, instruments and materials to avoid damage. Check all equipment, instruments, and materials for damage or defects within seven (7) days of delivery to the Project Site.

D. Equipment, instruments, and materials required to be stored on Site prior to installation shall be stored in such a manner to avoid damage or exposure to water, dust, or construction debris.

E. Repair or replace, at no additional cost to the Owner, all equipment, instruments and materials that are defective or damaged during installation, to the satisfaction of the Engineer.

1.05 QUALITY ASSURANCE

A. Qualifications

1. The Contractor shall have completed Work of similar or greater complexity on at least three (3) previous Projects within the last five (5) years. Successful completion shall be defined as a finished Project completed on time, without any outstanding claims or litigation involving the Contractor. They shall provide, for a period of not less than twelve (12) months from Final Acceptance of the Project, all labor, tools, materials, and equipment necessary to address issues or defects in any system that result from faulty workmanship, installation, equipment, instruments or materials, and any resulting damage from said defects or faults, at the convenience of the Owner.

2. The Contractor shall furnish control panels fabricated per the Drawings (as shown on the I sheets), by a UL 508A approved Panel Shop regularly engaged in furnishing, installing and wiring similar equipment for use in water and wastewater treatment facilities and that has been in satisfactory operation for at least five (5) years.

B. Instruments, SCADA control panels and materials provided under this Contract shall comply with the Specifications, shall be supplied from manufacturers

regularly engaged in the production of such products, shall be standard products (not special order or custom-made) wherever possible, and shall be of the manufacturer's latest design.

C. Instruments, SCADA control panels, and materials supplied under this Contract shall be subject to approval by the Engineer and shall demonstrate equal appearance, quality, and performance to that specified herein. The supplier is responsible for verifying the availability of all equipment, instruments and materials proposed for use in the execution of this Contract prior to submission to Engineer for approval. If production of equipment, instrument, or material is discontinued, the Contractor shall submit an alternate of comparable quality to the Engineer for approval prior to execution of Work, and at no additional cost to Owner.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.01 GENERAL

A. Instruments, SCADA control panels, equipment, and all other materials provided under this Contract which come with a manufacturer's warranty shall have the warranty transferred to the Owner upon Final Acceptance.

B. After installation, all provided instruments and SCADA control panels shall be powered up, tested, and witnessed by the Engineer for proper termination and operation.

C. After installation, the Contractor shall calibrate each instrument that requires calibration in accordance with the manufacturer's recommended calibration procedure.

END OF SECTION

SECTION 40 91 00

INSTRUMENTATION

PART 1 – GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, tools, materials, and equipment indicated to furnish, install and start up instruments as described in this Division and on the Contract Drawings.

1.02 SUBMITTALS

A. Submit detailed information for each instrument or control device, including manufacturer's descriptive literature and a specific data sheet for each device, in accordance with Division 01, Submittals which shall include as a minimum:

1. Product (item) name used herein and Tag number as shown on the Contract Drawings.

2. Manufacturers complete model number.

3. Location of the device and necessary wiring considerations (intrinsically safe or explosion proof).

4. Input - output characteristics.

5. Range, size, and graduations.

6. Physical size with dimensions, enclosure NEMA classification and mounting details.

7. Materials of construction of all components.

8. Calibration certificates provided by manufacturer.

9. All installation and operation manuals.

B. Contractor shall clearly define exceptions or deviations to the Specifications or Drawings.

C. Contractor shall submit sufficient details to the Engineer for evaluation.

PART 2 – PRODUCTS
2.01 INSTRUMENTATION

A. General

1. Instrumentation supplied shall be of the manufacturer's latest design and shall produce or be activated by signals that are established standards for the water and wastewater industries.

2. Electronic instrumentation shall be of the solid-state type. Analog control signals shall be linear and be industry standard currents of 4 to 20 mA DC (milliampere direct current), however, signals between instruments within the same panel or cabinet may be 1-5 VDC (volts direct current), or the like. No zero based signals shall be allowed.

3. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised an/or converted to compatible standards signals for remote transmission. No zero-based signals shall be allowed.

4. Instruments shall be provided with stainless steel mounting hardware and/or galvanized steel floor stands, wall brackets, or instrument racks as appropriate for each location.

5. Equipment installed in a hazardous area shall meet Class, Group, and Division as shown on the Contract Electrical Drawings, to comply with the National Electrical Code.

6. Indicators and recorder readouts shall be linear in the process units.

7. Transmitters shall be provided with either integral indicators or conduit mounted indicators in process units, accurate to ± 2 percent unless otherwise noted.

8. Electronic equipment shall be of the manufacturer's latest design. Circuit boards and associated components shall have suitable conformal coating to prevent contamination by dust, moisture and fungus. Solid-state components shall be conservatively rated for their purpose to assure optimum long-term performance and dependability over normally anticipated atmospheric conditions of temperature, pressure and humidity. The field-mounted equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.

9. Instruments furnished herein shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single manufacturer, insofar as possible, and shall consist of equipment

models that are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion.

10. Instruments shall include stainless steel equipment tags having instrument number and pertinent calibration and electrical information.

2.02 FLOW INSTRUMENTATION

A. Magnetic Flow Meter

1. Flow Element

a. General
   1) Provide magnetic flow tube as specified herein.
   2) Tag Numbers: See Appendix A

b. Ambient Conditions
   1) Ambient Temperatures (min/max): 35°F - 100°F
   2) Relative Humidity: 5 - 95%, non-condensing

c. Process Conditions

   1) Fluid: Drinking water
   2) Fluid Temperature (min/max): 35°F - 85°F
   3) Fluid Flow (min/max): See Appendix A
   4) Pipe Size: As shown on Contract Drawings

d. Physical

   1) Electrodes: Stainless Steel, non-removable, arranged for ultrasonic cleaning.
   2) Body: Carbon steel.
   3) Liner: Hard Rubber.
   4) Coils: Completely potted with epoxy based compound.
   5) Ends: Carbon steel 150 lb RF flanges
   6) Exterior Surface: Epoxy coated.
   7) Electrical Class: Provide flow tube and transmitter rated for installation in Class 1 Division 1 area where required.
   8) Provide grounding rings for installations where pipe is fabricated from or lined with a non-conductive material.

e. Performance

1) Accuracy: 0.5% between 10-100% percent of flow (including transmitter).

f. Manufacturer or approved equivalent:

1) Endress & Hauser Promag 53
2) Rosemount
3) ABB

2. Flow Indicating Transmitter

a. General:

1) Provide flow indicating transmitter as specified herein, to match flow tube provided.
2) Tag Numbers: See Appendix A

b. Ambient Conditions:

1) Ambient Temperatures (min/max): 35°F - 100°F
2) Relative Humidity: 5 - 95%, non-condensing

c. Functional:

1) Input: Low level input from flow element.
2) Configuration: Provide outputs proportional to flow, both instantaneous and totalized
3) Power Requirement: 120 VAC, 60 Hz
4) Outputs: (1) 4-20 mA output for rate
5) Indicator: Remote LCD display, push button configurator

d. Physical:

1) Enclosure Rating: Provide flow tube and transmitter rated for installation in a Class 1 Division 1 environment where required.
2) Enclosure Type: Waterproof with stainless wall, panel or pipe mounting hardware

3) Mounting: Remote mount from flow tube. See contract drawings for location.

4) Cables: Include cables as needed to connect flow element to transmitter

e. Manufacturer or approved equivalent:

1) Endress & Hauser Promag 53

2) Rosemount

3) Engineer approved equal

B. Flow Indicators

1. Rotameter

a. General

1) Provide variable area flow meters as specified herein.

2) Tag Numbers: See Appendix A

b. Ambient Conditions

1) Ambient Temperatures (min/max): 35°F - 100°F

c. Process Conditions

1) Fluid: Drinking water

2) Fluid Temperature (min/max): 35°F - 100°F

3) Fluid Pressure (max): 125 PSI

4) Fluid Flow (max): 12 GPH

5) Pipe Size: ¼" FNPT, vertical

d. Physical

1) Meter Tube: Machined cast acrylic

2) Scales: Millimeter scales, direct reading, black letters on white background

3) Internal Components: 316L SS

4) Fitting Materials: PVC

5) Connections: In-line

6) O-rings: Viton

e. Performance

1) Accuracy: +/- 6% full scale flow
2) Repeatability: 3%

f. Manufacturer or approved equivalent:

1) Kings Instrument Series 7510
2) Blue-White Industries
3) Approved equal

2.03 PRESSURE INSTRUMENTATION

A. Pressure Transmitters

1. Gauge Pressure Indicating Transmitters

a. General

1) Provide gauge pressure transmitters as specified herein.
2) Tag Numbers: See Appendix A

b. Ambient Conditions

1) Ambient Temperatures (min/max): 35°F - 100°F
2) Relative Humidity: 5 - 95%, non-condensing

c. Process Conditions

1) Fluid: Drinking water
2) Fluid Temperature (min/max): 35°F - 85°F
3) Fluid Pressure (min/max): See Appendix A

d. Functional

1) Diaphragm and Wetted Materials: 316SS
2) Process Connection: 1/2" NPT
3) Enclosure: NEMA 4 X
4) Power: 9-36VDC , loop powered

5) Output: 4-20mA analog signal, proportional to pressure in pipe

6) Display: LCD Display

7) Instrument connection: 1/4" NPT, bracket mounted

8) Approvals: FM rating for general use

e. Performance

1) Accuracy: 1% of full range

f. Manufacturer or approved equivalent:

1) Endress & Hauser Cerabar S Gauge Pressure Transmitter

2) Foxboro

3) Rosemount

2. Gauge Pressure Indicators

a. General

1) Provide gauge pressure indicators as specified herein.

2) Tag Numbers: See Appendix A

b. Ambient Conditions

1) Ambient Temperatures (min/max): 35°F - 100°F

2) Relative Humidity: 5 - 95%, non-condensing

c. Process Conditions

1) Fluid: Drinking water

2) Fluid Temperature (min/max): 35°F - 85°F

3) Fluid Pressure (min/max): See Appendix A

d. Functional

1) Diaphragm and Wetted Materials: 316SS

2) Process Connection: 1/4" NPT

3) Enclosure: NEMA 4 X

4) Dial Indicator: black figures and graduations on white background

5) Pointer: adjustable

6) Display: 4-1/2” glass window

7) Approvals: FM rating for general use

e. Performance

1) Accuracy: 1% of full range

2) Accessories: Include vibration and pulsation dampers

f. Manufacturer or approved equivalent

1) Ashcroft

2) US Gauge

3) Approved equal

2.04 ANALYZERS

A. Turbidity Analyzer and Controller

1. Low Range Turbidity Sensor

a. General

1) Provide low range turbidity sensors as specified herein and on contract drawings. Note the models specified replace existing units with current model.

2) Tag Numbers: See Appendix A

b. Ambient Conditions

1) Ambient Temperatures (min/max): 32°F - 104°F

2) Relative Humidity: 5 - 95%, non-condensing

c. Process Conditions

1) Fluid: Drinking water

2) Fluid Temperature (min/max): 35°F - 85°F

3) Sample Flow Rate: 200 to 750 mL/minute

4) Response Time: 15 seconds for full scale step change

5) Range: 0-10 NTU

6) Resolution: 0.001

d. Functional

1) Turbidimeter Body: Polystyrene

2) Measurement: Nephelometric Photocell

3) Process Connection: 1/4" NPT inlet, 1/2" NPT drain outlet

4) Enclosure: NEMA 4 X, wall mount

5) Power: 100-230VAC, 50/60 Hz

6) Output: See Turbidity Analyzer Controller

7) Approvals: FM rating for general use

e. Performance

1) Accuracy: 2% of full range

f. Manufacturer or approved equivalent

1) Hach 1720E Low Range Turbidimeter

2. High Range Turbidity Sensor

a. General

1) Provide high range turbidity sensors as specified herein and on contract drawings. Note the model specified replaces the existing units with current model.

2) Tag Numbers: See Appendix A

b. Ambient Conditions

1) Sample Temperatures (min/max): 32°F - 122°F

2) Relative Humidity: 5 - 95%, non-condensing

c. Process Conditions

1) Fluid: Drinking water

2) Fluid Temperature (min/max): 35°F - 85°F

3) Sample Flow Rate: 1.0 to 2.0 L/min

4) Response Time: Initial response 45 seconds

5) Range: 0-10 NTU

6) Resolution: 0.01 NTU below 100.0 NTU

d. Functional

1) Turbidimeter Sensor: Non-contact nephelometric photocell

2) Measurement: surface water, continuous read, scattered light at 90 degrees

3) Process Connection: 3/4" NPT inlet, 3/4" NPT drain outlet

4) Enclosure: NEMA 4 X, wall mount

5) Power: 100-230VAC, 50/60 Hz

6) Output: See Turbidity Analyzer Controller

7) Approvals: FM rating for general use

e. Performance

1) Accuracy: 5% of full range

f. Manufacturer or approved equivalent

1) Hach Surface Scatter 7 High Range Turbidimeter

3. Turbidity Controller

a. General

1) Provide microprocessor based dual channel controller for monitoring digital or analog sensor modules. Controller will be used to interface with turbidity sensors listed above. Unless specified, each controller connects to two turbidity sensors.

2) Tag Numbers: See Appendix A

b. Ambient Conditions

1) Ambient Temperatures (min/max): 32°F - 104°F

2) Relative Humidity: 0 - 95%, non-condensing

c. Functional

1) Controller Body: Polycarbonate, NEMA4X

2) Display: LCD with LED back lighting

3) Conduit Openings: 1/2" NPT

4) Enclosure Mounting: Wall, pipe or panel mount with stainless mounting hardware

5) Power: 100-230VAC, 50/60 Hz

6) Output: (4) programmable form C relays, (2) 4-20mA outputs

7) Approvals: FM rating for general use

d. Manufacturer or approved equivalent

1) Hach SC200 Digital Controller

PART 3 – EXECUTION

3.01 INSTALLATION AND MOUNTING

A. Contractor shall furnish the instruments and all labor, tools, material and equipment required to mount instruments in the locations shown on the Contract Drawings, in accordance with manufacturer-recommended mounting practices. The location of equipment, transmitters, alarms and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the Owner or Engineer during construction. Obtain in the field all information relevant to the placing of process control work and in case of any interference with other work, proceed as requested by the Engineer.

B. Contractor shall make all necessary mechanical changes to install new instrumentation equipment provided under this Contract. This work includes all fittings, fabrications, supports, guides, restraints, bolting, gaskets, and accessories. All work shall be done in a workmanlike manner.

C. The instrumentation drawings indicate the intent of the interconnections between the individual instruments. Any exceptions should be noted.

D. Work shall be executed in full accordance with codes and local rulings. Should any work be performed contrary to said rulings, ordinances, and regulations, the Contractor shall bear full responsibility for such violations and assume all costs arising there from.

E. Equipment used in areas designated as hazardous shall be designed for the Class, Group and Division as required on the Electrical Drawings for the locations. All installations shall be in strict accordance with codes.

F. Instrument cabinets located outdoors or in unheated locations shall be provided with heating and/or cooling devices as necessary to maintain all instruments and or electronics installed in those cabinets within their design temperature limits.

G. Brackets and hangers required for equipment mounting shall be provided. They shall be installed in a workmanlike manner and not interfere with any other equipment.

H. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded as directed by the manufacturer of the instrumentation equipment, but in no case shall more than one ground point be employed for each shield.

I. Contractor shall coordinate the installation, the placing and location of system components, their connections to the process equipment panels, cabinets and devices. He shall be responsible to ensure that all field wiring for power and signal circuits are correctly done in accordance with best industry practice and provide for all necessary system grounding to ensure a satisfactory functioning installation.

3.02 INSPECTION AND TESTING

A. Contractor shall furnish the services of the manufacturer of the equipment for checking the installation, making the necessary adjustments and calibrations, placing the equipment in operation, and performing the acceptance tests. Install all instrumentation in accordance with the recommendations of the manufacturer.

B. Contractor shall test and calibrate in place the instrumentation to demonstrate that it meets the accuracy requirements for the conditions specified herein. The Engineer shall witness all field tests and conduct all field inspections. The Contractor shall give the Engineer a minimum of 5 working day notice of the dates and times scheduled for tests. Rectify any deficiencies found and retest work affected by such deficiencies at the Contractor's expense.

3.03 ATTACHMENTS

A. Appendix A – Instrument List

END OF SECTION

Item #	Tag ID	Description	Instrument	Location	Range	Spec Reference	Drawing Reference	Remarks
		Turbidity Sensors						
1	DE-0101	Raw Water Turbidity	Hach Surface Scatter 7	Raw Water Pump Station	0 - 10.000 NTU	41 91 00, 2.04.A.2	E-217	Wired to SC200 Controller
2	DE-2401	Sand Filter Inlet Turbidity	Hach 1720E	10 MG Filter Room	0 - 5.000 NTU	41 91 00, 2.04.A.1	E-215	Wired to SC200 Controller
3	DE-2501	Filter 1 Outlet Turbidity	Hach 1720E	10 MG Room Turbidity Backboard	0 - 4.000 NTU	41 91 00, 2.04.A.1	E-215	Wired to SC200 Controller
4	DE-2502	Filter 2 Outlet Turbidity	Hach 1720E	10 MG Room Turbidity Backboard	0 - 4.000 NTU	41 91 00, 2.04.A.1	E-215	Wired to SC200 Controller
5	DE-2503	Filter 3 Outlet Turbidity	Hach 1720E	10 MG Room Turbidity Backboard	0 - 4.000 NTU	41 91 00, 2.04.A.1	E-215	Wired to SC200 Controller
6	DE-2601	Sand Filter Outlet Turbidity	Hach 1720E	10 MG Filter Room	0 - 4.000 NTU	41 91 00, 2.04.A.1	E-215	Wired to SC200 Controller
7	DE-2402	Dual Media Filter Inlet Turbidity	Hach 1720E	20 MG Filter Room	0 - 5.000 NTU	41 91 00, 2.04.A.1	E-216	Wired to SC200 Controller
8	DE-2504	Dual Media Filter 4 Outlet Turbidity	Hach 1720E	20 MG Filter Room	0 - 1.000 NTU	41 91 00, 2.04.A.1	E-216	Wired to SC200 Controller
9	DE-2505	Dual Media Filter 5 Outlet Turbidity	Hach 1720E	20 MG Filter Room	0 - 1.000 NTU	41 91 00, 2.04.A.1	E-216	Wired to SC200 Controller
10	DE-2506	Dual Media Filter 6 Outlet Turbidity	Hach 1720E	20 MG Filter Room	0 - 1.000 NTU	41 91 00, 2.04.A.1	E-216	Wired to SC200 Controller
11	DE-2507	Dual Media Filter 7 Outlet Turbidity	Hach 1720E	20 MG Filter Room	0 - 1.000 NTU	41 91 00, 2.04.A.1	E-216	Wired to SC200 Controller
12	DE-2602	Dual Media Filter Outlet Turbidity	Hach 1720E	20 MG Filter Room	0 - 1.000 NTU	41 91 00, 2.04.A.1	E-216	Wired to SC200 Controller
13	DE-2801	GAC Outlet Turbidity	Hach 1720E	20 MG Filter Room	0 - 1.000 NTU	41 91 00, 2.04.A.1	E-214	Wired to SC200 Controller
14	DE-2901	Finish Water Turbidity	Hach 1720E	Chemical Room	0 - 1.000 NTU	41 91 00, 2.04.A.1	E-212	Wired to SC200 Controller
		Turbidity Controllers						
Item #	**Tag ID**	**Description**	**Instrument**	**Location**	**Outputs**	**Spec Reference**	**Drawing Reference**	**Remarks**
1	DIT-2401, 2501	Controller for DE-2401 & DE-2501	Hach SC200	10 MG Room Turbidity Backboard	(2) 4-20mA	41 91 00, 2.04.A.3	E-215	Wired to PLC1
2	DIT-2502, 2503	Controller for DE-2502 & DE-2503	Hach SC200	10 MG Room Turbidity Backboard	(2) 4-20mA	41 91 00, 2.04.A.3	E-215	Wired to PLC1
3	DIT-2601	Controller for DE-2601	Hach SC200	10 MG Room Turbidity Backboard	(1) 4-20mA	41 91 00, 2.04.A.3	E-215	Wired to PLC1
4	DIT-2402, 2602	Controller for DE-2402 & DE-2602	Hach SC200	20 MG Room Turbidity Backboard	(2) 4-20mA	41 91 00, 2.04.A.3	E-216	Wired to PLC3
5	DIT-2504, 2505	Controller for DE-2504 & DE-2505	Hach SC200	20 MG Room Turbidity Backboard	(2) 4-20mA	41 91 00, 2.04.A.3	E-216	Wired to PLC3
6	DIT-2506, 2507	Controller for DE-2506 & DE-2507	Hach SC200	20 MG Room Turbidity Backboard	(2) 4-20mA	41 91 00, 2.04.A.3	E-216	Wired to PLC3
7	DIT-2801	Controller for DE-2801	Hach SC200	20 MG Room	(1) 4-20mA	41 91 00, 2.04.A.3	E-214	Wired to PLC3
8	DIT-0101	Controller for DE-0101	Hach SC200	Raw Water Pump Station	(1) 4-20mA	41 91 00, 2.04.A.3	E-217	Wired to PLC16
9	DIT-2901	Controller for DE-2901	Hach SC200	Chemical Room	(1) 4-20mA	41 91 00, 2.04.A.3	E-212	Wired to PLC4
Item #	**Tag ID**	**Description**	**Instrument**	**Location**	**Range/Output**	**Spec Reference**	**Drawing Reference**	**Remarks**
		Pressure Indicating Transmitters						
1	PIT-100	Gauge Pressure Transmitter - Suction	Endress & Hauser Cerabar S	Stackpole Pump Station	0-100 PSI, 4-20mA	41 91 00, 2.03.A.1		Wired to PLC20
2	PIT-101	Gauge Pressure Transmitter - Discharge	Endress & Hauser Cerabar S	Stackpole Pump Station	0-200 PSI, 4-20mA	41 91 00, 2.03.A.1		Wired to PLC20
	Tag ID	**Description**	**Instrument**	**Location**	**Range/Output**	**Spec Reference**	**Drawing Reference**	**Remarks**
		Pressure Indicators						
	PI-100	Gauge Pressure Indicator - Suction	Ashcroft	Stackpole Pump Station	0-300 PSI, NA	41 91 00, 2.03.A.2		
	PI-101	Gauge Pressure Indicator - Discharge	Ashcroft	Stackpole Pump Station	0-300 PSI, NA	41 91 00, 2.03.A.2		
Item #	**Tag ID**	**Description**	**Instrument**	**Location**	**Range/Output**	**Spec Reference**	**Drawing Reference**	**Remarks**
		Magnetic Flow Meter						
1	FIT-100	Magnetic Flow Meter - Booster Station Flow	Endress + Hauser Promag 53	Stackpole Pump Station	0-5000 GPM, 4-20mA	41 91 00, 2.02.A		Wired to PLC20
2	FIT-0301	Magnetic Flow Meter - Basin 1 Flow	Endress + Hauser Promag 53	Water Plant - Basin 1 Intake Vault	0-3472 GPM, 4-20mA	41 91 00, 2.02.A	E-213	Wired to PLC2
3	FIT-0302	Magnetic Flow Meter - Basin 2 Flow	Endress + Hauser Promag 53	Water Plant - Basin 2 Intake Vault	0-3472 GPM, 4-20mA	41 91 00, 2.02.A	E-213	Wired to PLC2
4	FIT-0303	Magnetic Flow Meter - Basin 3 Flow	Endress + Hauser Promag 53	Water Plant - Basin 3 Intake Vault	0-3472 GPM, 4-20mA	41 91 00, 2.02.A	E-213	Wired to PLC2
5	FIT-0304	Magnetic Flow Meter - Basin 4 Flow	Endress + Hauser Promag 53	Water Plant - Basin 4 Intake Vault	0-6944 GPM, 4-20mA	41 91 00, 2.02.A	E-213	Wired to PLC4
6	FIT-0305	Magnetic Flow Meter - Basin 5 Flow	Endress + Hauser Promag 53	Water Plant - Basin 5 Intake Vault	0-6944 GPM, 4-20mA	41 91 00, 2.02.A	E-213	Wired to PLC4
7	FIT-0306	Magnetic Flow Meter - Basin 6 Flow	Endress + Hauser Promag 53	Water Plant - Basin 6 Intake Vault	0-6944 GPM, 4-20mA	41 91 00, 2.02.A	E-213	Wired to PLC4
Item #	**Tag ID**	**Description**	**Instrument**	**Location**	**Range/Output**	**Spec Reference**	**Drawing Reference**	**Remarks**
		Flow Indicator						
1	FI-0101	Raw Water Turbidity Flow Indicator	Kings Instrument 7510	Raw Water Pump Station	0 - 12 GPH	41 91 00, 2.02.B	E-217	
2	FI-2401	Sand Filter Inlet Turbidity Flow Indicator	Kings Instrument 7510	10 MG Filter Room	0 - 12 GPH	41 91 00, 2.02.B	E-215	
3	FI-2501	Filter 1 Outlet Turbidity Flow Indicator	Kings Instrument 7510	10 MG Room Turbidity Backboard	0 - 12 GPH	41 91 00, 2.02.B	E-215	
4	FI-2502	Filter 2 Outlet Turbidity Flow Indicator	Kings Instrument 7510	10 MG Room Turbidity Backboard	0 - 12 GPH	41 91 00, 2.02.B	E-215	
5	FI-2503	Filter 3 Outlet Turbidity Flow Indicator	Kings Instrument 7510	10 MG Room Turbidity Backboard	0 - 12 GPH	41 91 00, 2.02.B	E-215	
6	FI-2601	Sand Filter Outlet Turbidity Flow Indicator	Kings Instrument 7510	10 MG Filter Room	0 - 12 GPH	41 91 00, 2.02.B	E-215	
7	FI-2402	Dual Media Filter Inlet Turbidity Flow Indicator	Kings Instrument 7510	20 MG Filter Room	0 - 12 GPH	41 91 00, 2.02.B	E-216	
8	FI-2504	Dual Media Filter 4 Outlet Turbidity Flow Indicator	Kings Instrument 7510	20 MG Filter Room	0 - 12 GPH	41 91 00, 2.02.B	E-216	
9	FI-2505	Dual Media Filter 5 Outlet Turbidity Flow Indicator	Kings Instrument 7510	20 MG Filter Room	0 - 12 GPH	41 91 00, 2.02.B	E-216	
10	FI-2506	Dual Media Filter 6 Outlet Turbidity Flow Indicator	Kings Instrument 7510	20 MG Filter Room	0 - 12 GPH	41 91 00, 2.02.B	E-216	
11	FI-2507	Dual Media Filter 7 Outlet Turbidity Flow Indicator	Kings Instrument 7510	20 MG Filter Room	0 - 12 GPH	41 91 00, 2.02.B	E-216	
12	FI-2602	Dual Media Filter Outlet Turbidity Flow Indicator	Kings Instrument 7510	20 MG Filter Room	0 - 12 GPH	41 91 00, 2.02.B	E-216	
13	FI-2801	GAC Outlet Turbidity Flow Indicator	Kings Instrument 7510	20 MG Filter Room	0 - 12 GPH	41 91 00, 2.02.B	E-214	
14	FI-2901	Finish Water Turbidity Flow Indicator	Kings Instrument 7510	Chemical Room	0 - 12 GPH	41 91 00, 2.02.B	E-212	

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SECTION 40 92 13

HYDRAULICALLY OPERATED CONTROL VALVES

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish, install, and test, self-contained, electrically powered, hydraulically actuated flow control valves for raw water service as shown on the Drawings and as specified herein. The assemblies shall include but are not limited to all necessary control panels, wall brackets, anchor bolts, conduit, wiring, and other related appurtenances as required. The valve, actuator, switches and ancillary equipment shall be assembled and supplied as a complete integral functioning unit.

1.02 PROPRIETARY EQUIPMENT

A. The REXA Electraulic™ actuator system specified herein is proprietary, and hence the procurement of this equipment shall follow Massachusetts General Law (MGL) Chapter 30, 39M(b). In accordance with MGL Chapter 30, 39M(b), proprietary equipment may be specified and procured if it is for "sound reasons in the public's interest". The Owner has determined that specifying proprietary control equipment for the Project is in the public's best interest. The Owner would like to standardize on REXA Electraulic™ actuator system due to reliability and compatibility of replacement parts.

1.03 RELATED WORK

A. Plumbing and Piping Work is included in Division 22.

B. Electrical Work is included in Division 26.

1.04 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless otherwise noted, the most recent version of the listed publications, including revisions, at time of bid opening shall apply.

B. American Society of Mechanical Engineers (ASME)

A. ASME/ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings

B. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves

C. ASME B16.34 - Valves - Flanged, Threaded, and Welding End

C. American Society for Testing and Materials (ASTM)

A. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

B. ASTM A 193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.

C. ASTM A 194 - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both

D. ASTM F 593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

E. ASTM F 594 - Standard Specification for Stainless Steel Nuts

D. American Water Works Association (AWWA)

A. AWWA C 504 - Rubber Seated Butterfly Valves

B. AWWA C 540 - Power Actuating Devices for Valves and Sluice Gates

E. National Electric Manufacturers Association

A. NEMA - Industrial Control and Systems Enclosures

1.05 SUBMITTALS

A. The following shall be submitted in accordance with Section 01 33 00 “SUBMITTALS”. All submittals shall be in the "English" language with "English" dimensions and units. The submittals shall also include but are not limited to the following:

A. Shop Drawings: Shop drawings shall include descriptive literature, bulletins and/or catalogs of the equipment as well as a complete bill of materials. Include the weights of all components. Provide complete data on the hydraulic operator, and actuator wiring diagrams showing all switches, disconnects, wires, contacts, lights, buttons, terminals, devices, etc. Include a description of the operating features of the actuator, connections to remote and field mounted equipment and logic diagrams.

B. Product Data: The actuator and valve Manufacturers shall submit data including details of construction, extent of shop assembly of the unit and detailed description of installation procedures. The Manufacturers shall submit standard drawings or catalog cuts of the assembled valve and actuator. Specifically indicate any required clearance dimensions for maintenance and operation. The type, thickness, application procedure,

and test for coatings, and non-metallic and metallic linings shall also be included. Provide wiring and control diagrams for the electric actuators. Specifically include all “dry contacts” provided as well as the electrical classification of the units. The Manufacturer shall also provide the Contractor and Engineer with "written documentation" of all control set points which include but are not limited to all hard wired interlock switch set points for the valve actuators to protect them from damage and to ensure proper equipment operation and function.

C. Test Reports: The Manufacturer shall submit performance test reports in booklet form showing all field tests performed to adjust each component and all field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system. Each test report shall indicate the final position and set points of controls.

D. Manufacturer’s Field Reports: To include all requirements of Section 01 33 00 “SUBMITTALS” including but not limited to written certification of proper installation, initial adjustments and satisfactory operations, dated and signed by a Manufacturer's representative.

E. Operation and Maintenance Data: The Manufacturer shall submit operation and maintenance data for the actuated valve assemblies in accordance with Section 01 78 23 “OPERATION AND MAINTENANCE DATA”. The manual shall also include but not be limited to the following:

a. Complete information on operation, installation, lubrication, adjustment, safety precautions, routine and special maintenance disassembly, repairs, reassembly, and trouble diagnostics of each actuated valve. The manuals shall contain attached copies of the factory and field test reports as well as a description of the unit and its component parts.

b. Operation and Maintenance Data shall include all required cuts, drawings, equipment lists, descriptions, etc., which are required to instruct operation and maintenance personnel unfamiliar with such equipment.

1.06 QUALIFICATIONS OF MANUFACTURER

A. The Manufacturer shall be a firm regularly engaged in furnishing similar actuated valve equipment assemblies for use in water treatment facilities. The actuated valve Manufacturer shall have overall responsibility to supply an actuated control valve assembly that meets the requirements of this specification. The actuated valve Manufacturer shall supply a list of twenty (20) installations at which actuated control valve assemblies of their manufacture, and ones similar to those

specified, have been in satisfactory operation for at least five (5) years in water treatment facility applications.

1.07 QUALITY ASSURANCE

A. The valve and hydraulic actuator shall be assembled at the factory by the Actuator Manufacturer. All mounting hardware used for attaching the actuator to the valve shall be designed according to the top-works dimensions for the specific valve type to be supplied by the chosen valve Manufacturer. The valve/actuator combination shall be shipped from the Actuator Manufacturer pre-assembled. **Field mounting of the actuator to the valve shall not be acceptable under any circumstances**.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Surfaces such as female threads, internal mechanical joint ends or flange faces shall be protected from damage during shipment. The Contractor shall inspect the materials delivered to the site for damage. The valves shall be stored with a minimum of handling. The materials shall be stored on site in enclosures or under protective coverings. Rubber gaskets shall be stored under cover out of direct sunlight. Materials shall not be stored directly on the ground. The inside of valves and fittings shall be kept free of dirt and debris.

B. Materials delivered and placed in storage shall be stored with protection from the weather, excessive humidity variation, excessive temperature variation, dirt, dust and/or other contaminants. Proper protection and care of material before, during and after installation shall be the Contractor's responsibility. Any material found to be damaged shall be replaced at the Contractor's expense. Materials shall be stored with protection from puncture, dirt, grease, moisture, mechanical abrasions, excessive heat, ultraviolet (UV) radiation, or other damage. Valves and actuator assemblies shall be handled and stored in accordance with the Manufacturer's recommendations.

1.09 WARRANTY

A. The Manufacturer shall provide a full and comprehensive warranty for the actuated valve systems as well as all other related equipment specified in this section. The equipment shall be warranted to be free from defects in workmanship, design, and materials for a period of not less than one (1) year. If any parts of the equipment supplied under this section should fail during the Manufacturer's warranty period, replacement of parts or the unit itself shall be provided. The units shall be restored to active working service at no expense to the Owner of the equipment. The Manufacturer shall incur all costs including but not limited to parts, labor, service, technicians, shipping, and handling required for restoration of equipment to active service as required under the Manufacturer's warranty.

B. The Manufacturer's warranty shall commence at the date of substantial completion or partial utilization.

1.10 FIELD MEASUREMENTS

A. The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Engineer of any discrepancy before performing the work. The Contractor shall coordinate with equipment supplier to determine and collect required field dimensions to ensure equipment, piping and pipe supports are properly manufactured and located in field.

1.11 SPECIAL TOOLS

A. Furnish one set of all special tools required to completely assemble, disassemble, or maintain the equipment. Special tools shall refer to oversized or specially dimensioned tools, special attachments or fixtures, or any similar items required for maintenance and/or operation of the specified equipment.

PART 2 PRODUCTS

2.01 ACTUATOR DESIGN – GENERAL

A. The hydraulic actuator shall clearly indicate valve position locally. At a minimum the valve actuators shall include electric controls, open/closed position limit switches, and declutchable manual overrides.

B. The actuator shall comply with the requirements and provisions shown on the Contract Drawings. The actuator shall be capable of being mounted in any position. The valve actuators shall be designed for 120 volt, 1 phase, 60 hertz, power supply unless otherwise indicated in the Contract Documents.

C. The valve actuators shall be capable of operation in response to a local manual “OPEN” or “CLOSE” pushbuttons at the actuator or automatically through the SCADA control system. A continuous position feedback system shall be provided between the valve actuator and the SCADA system. The valve actuators shall be equipped with end-of-travel electric limit switches to indicate both “Full Open” and “Full Closed” positions. All valve actuators shall include the ability to transmit a 4-20 mA continuous position indication signal for remote monitoring by the SCADA system.

D. Upon loss of primary power the valves shall maintain their current position.

E. The valve actuators shall be supplied complete with a hydraulic actuator, power module and cylinder, motor power cable, feedback cable, and a dedicated programmable microprocessor controller. The hydraulic actuators shall consist of a quarter turn rack and pinion cylinder assembly which shall be coupled to a power module assembly. The assembly shall be designed to operate at a standard

internal hydraulic operating pressure of 2,000 psi. The actuators shall be specifically designed for 100 percent continuous duty modulating control. The actuator shall provide sufficient force throughout entire valve stroke to overcome valve breakaway/seating friction and process dynamics. The actuator shall be constructed of anodized aluminum and steel with a two part epoxy or powder coating for maximum corrosion resistance. The speed of the actuator shall be electronically adjustable at the actuator primary control panel. The dead band sensitivity shall be selectable at the primary control panel between and provide a minimum of 0.1% to 5% of the calibrated signal span values.

F. Signal repeatability shall be a minimum of 0.10% of full travel. Response shall be virtually instantaneous with zero overshoot of target position.

G. Provide electrical surge protection for each valve actuator assembly.

2.02 VALVE ACTUATOR POWER MODULE

A. The power module shall be directly mounted to the actuator and be filled with 5W50 Castrol Syntec, motor oil. The actuator Manufacturer shall provide the power modules will all required oil. Power modules which utilize hydraulic fluid shall not be acceptable. The power module shall be self-contained. The power module shall be supplied from the factory, hermetically sealed, filled with oil and purged of all air. No centralized hydraulics, filters, or active reservoirs (used during normal operation) shall be acceptable. All oils and lubricants shall be readily available from a local source. The use of special oils and lubricants shall not be acceptable.

B. The hydraulic circuit shall be double-acting and transfer oil from one side of the operating cylinder to the other. No oil shall be transferred to or removed from a reservoir when the actuator makes a position change. The hydraulic power module shall consist of sub-assemblies: servo motor with double ended shaft, positive displacement bi-directional gear pump, flow match valves and a pressurized volume compensating reservoir mounted in a compact hydraulic manifold.

C. The motor shall be directly coupled to the pump within the hydraulic manifold. The motor shall only operate when a valve position change is required. The flow match valves shall provide dual action, acting as a check valve in one direction and a throttling valve for the hydraulic pump in the opposite direction. The valves shall direct hydraulic flow from the pump to cause the actuator to stroke in the direction indicated by the controller.

D. When the motor/pump is stopped, the flow match valves shall be closed, securely locking the actuator in place. A 2 oz. oil reservoir integral to the hydraulic manifold with an indicator button to show oil level shall be provided. The reservoir shall be isolated from the normal hydraulic circuit by suction check

valves and only be used for thermal expansion and contraction of oil in the closed-loop system.

E. The reservoir shall be positive pressure (20 psi) to eliminate atmospheric ingress. A thermostatically controlled cartridge heater shall be included in the hydraulic manifold assembly in order to maintain the oil viscosity below 40^0F ambient temperatures.

2.03 ACTUATOR POWER & CONTROL

A. Two separate power and feedback cables shall be utilized and run in their own conduit from the primary actuator control panel to the actuated valve assemblies as shown on the Drawings. The power cable shall be field wired between the controller and the ten-point terminal strip on the power module. The feedback cable shall be field wired between the controller and the integral feedback thin film potentiometer mounted on the actuator.

B. The feedback potentiometer shall be directly mounted to the actuator output shaft for 1 to 1 ratio position readout. The Contractor shall be responsible for providing cables of sufficient length to run from the primary control panel assembly to the actuated valve assembly.

2.04 ACTUATOR CONTROLLER

A. A microprocessor controller shall be remote mounted and include the CPU board with a five (5) button keypad LED display, motor driver, internal power supply and wire terminations. The controller shall be mounted in the control enclosure. The Controller shall incorporate self diagnostics. In the event of a system malfunction; an error code shall register on the LED display. A 4-20 mA position transmitter shall be included in the controller.

B. The position transmitter shall provide a 4-20 mA output signal that is proportional to actuator position. The valve actuators shall be designed with passive position transmitters. The Contractor shall provide all power and wiring to the actuator local control panels as shown on the Drawings.

C. Local Controls shall be included and shall be mounted on the cover of the control enclosure. The local controls shall include a window to view the LED position display, a two position “Manual/Auto” selector switch and “Open/Close” pushbuttons (push to operate). Three modes of operation shall be provided: “Automatic”, “Local” and “Setup”.

A. Automatic Mode: In “Automatic Mode” the Controller shall accept an external 4-20 mA input control signal for modulating service and position the valve as required.

B. Local Mode: The "Local Mode" shall allow for local Open/Close control from the keypad with the valve position displayed on the LED. The LED shall also display the current input control signal and last error.

C. Setup mode: The controller shall be calibrated in the "Setup Mode" by utilizing a five (5) button keypad and LED to allow the user to calibrate and adjust the actuator operating parameters. The setup parameters shall be stored in a non-volatile memory

2.05 ACTUATED BUTTERFLY VALVE DESIGN REQURIEMENTS

A. The Contractor shall provide a total of six (6) actuated high performance butterfly valve assemblies for raw water service control in the intake vaults at the water treatment facility. The actuated butterfly valve assemblies shall be designed and constructed in accordance with the following requirements.

A. Location: Outdoors, Raw Water Service Piping as Shown on the Drawings

B. Type of Unit(s): Self-Contained, Rotary or Quarter Turn Hydraulic Actuator

C. Number of Unit(s): Six (6) total valves; three (3) 12 inch valves and three (3) 16 inch valves

D. Power Source: 120 Volt, 1 Phase, 60 Hertz

E. Electrical Classification: Unclassified, Electrical Hazard Environment

F. Electrical Enclosure: NEMA 4X, Stainless Steel, For Outdoor Service

G. Valve Type: New, 12 Inch and 16 Inch, AWWA C504 Butterfly Valves

H. Operating Time: 60 Seconds – Fully Open to Fully Closed

I. Stroke Rate: 28.6 Seconds Per 90^0 Rotation

J. Rated Torque Output: 5,000 inch-lbs

K. Manual Override: Declutchable Hand Wheel with Drill Drive

L. Open & Closed Limit Switches: Required – Electric Type

2.06 BUTTERFLY VALVES

A. Butterfly valves shall be manufactured in accordance with the latest revision of AWWA C504, Class 150B and conform to NSF Standard 61. The manufacturer shall have produced AWWA butterfly valves for a minimum of five years.

B. Valve bodies shall be flanged and constructed of ASTM A126, Class B cast iron. Flanged valves shall be fully faced and drilled in accordance with ANSI Standard B16.1, Class 125.

C. Rubber body seats shall be constructed of Buna N rubber and shall be of one piece construction, simultaneously molded and bonded into a recessed cavity in the valve body. Seats may not be located on the disc or be retained by segments and/or screws.

D. Valve bearings shall be of a self-lubricating, nonmetallic material to effectively isolate the disc-shaft assembly from the valve body. Metal-to-metal thrust bearings in the flow stream are not allowed.

E. Valve disc shall be a lens-shaped design to afford minimal pressure drop and line turbulence. Materials of construction shall be ASTM A126, Class B cast iron disc with a stainless steel type 316 edge. Discs shall be retained by stainless steel pins which extend through the full diameter of the shaft to withstand the specified line pressure up to valve rating and the torque required to operate the valve. Disc stops located in the flow stream are not allowed.

F. Valve shafts shall be of stainless steel type 304. At the operator end of the valve shaft, a shaft seal utilizing "V" type chevron packing shall be utilized. "O" ring and/or "u" cup packing is not allowed.

G. All surfaces of the valve interior shall be clean, dry and free from grease before painting. The valve interior and exterior, except for disc edge, rubber seat and finished portions shall be evenly coated with an NSF61 approved 2-part liquid epoxy. Minimum dry film thickness shall be 8 mils minimum.

H. Hydrostatic and seat leakage testing shall be conducted in strict accordance with AWWA Standard C504.

I. The manufacturer furnishing the valves under the specification shall be prepared to provide Proof of Design Test reports to illustrate that the valves supplied meet the design requirements of AWWA C504.

J. All raw water service butterfly valves of the same type, style, and duty shall be supplied by a single Manufacturer. All Manufacturers named or otherwise shall comply with the Contract Documents. All hydraulically operated control butterfly valves shall be a product of the following Manufacturer:

   A. Henry Pratt Model 2FII

   B. DeZURIK AWWA Butterfly Valve

   C. Milliken Valve Company Model 511A

D. Engineer Approved Equal

2.07 MOUNTING ASSEMBLIES

A. The actuator Manufacturer shall provide all necessary mounting assemblies for the hydraulic actuator to the valve; including but not limited to all brackets, mounting legs, plates, etc., to provide a complete an operational assembly as outlined in the Contract Documents. All components of the mounting assembly shall be constructed of epoxy coated 1018 carbon steel.

B. Provide all necessary mounting assemblies for the hydraulic actuator local control panels; including but not limited to all brackets, mounting legs, plates, struts, etc., to provide complete independent support for the local control panel assembly. The local control panel shall be installed above ground next to each valve vault. The Contractor shall coordinate the final location of the local control panel for each actuated valve assembly with the Owner and Engineer prior to installation. All components of the actuator control panel mounting assembly shall be 316 stainless steel.

2.08 HARDWARE

A. Provide all anchor bolts, nuts, washers, and hardware as required for installation of the actuated valve assemblies, control panels, and related appurtenances. All hardware shall be 316 stainless steel.

2.09 FINISHING

A. All ferrous metallic surfaces shall be provided with a two part epoxy or powder coated paint finish in accordance with section 09 90 00, “PAINTS & COATINGS”. Stainless steel, brass, and plastic components shall not be painted.

2.10 NAMEPLATES

A. Each major item of equipment shall have the Manufacturer's name, address, type or style, model or serial number, catalog number, rated capacity, speed, and all other pertinent data on a 304L stainless steel name plate secured to the item of equipment.

2.11 COUPLINGS AND CONNECTORS

A. The Contractor shall furnish all dielectric connectors to provide isolation of differing metallic surfaces between the electrical conduit and the control panel enclosure as required.

2.12 DESIGN BASIS MANUFACTURER

A. All actuated control valves of the same type, style, and duty shall be supplied by a single Manufacturer. All Manufacturers named or otherwise shall comply

completely with the Contract Documents. The Contract Documents for the valve actuators are based upon Koso America Inc. – Rexa Actuators. The Contract Documents for the butterfly valves are based upon Henry Pratt Company. As such, the physical installation, all services, all connections, actuator torque requirements, and all appurtenances were designed around the characteristics of these products.

B. All actuated butterfly valve assemblies for raw water service shall be a product of the following Manufacturer:

A. Koso America Inc. – Rexa Model – X2R5,000

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall install the actuated valves as shown on the Drawings and in accordance with Manufacturer's recommendations. The Contractor shall install valves with stems pointed up, in a vertical position where possible, but in no case with stems pointed downward of the horizontal plane. The Contractor shall allow sufficient room around valves and actuators for maintenance, removal, and proper operation. All valves and all actuators shall be independently supported.

3.02 FACTORY TESTING

A. A detailed shop testing procedure shall be submitted to the Engineer for approval during the initial submittal process. Test procedures shall be written so that all operational and control aspects of the performance specifications will be tested and verified in the hydraulic operator Manufacturer's facility.

B. Continuous position sensing probes shall be tested with their respective interfacing receivers for proper 4-20 mA signal output. Results shall be incorporated as part of the shop test procedure. Cylinders shall be pressure tested and stroked with all integrally mounted switches, probes and controls installed. Limit switches shall be adjusted to verify their contact operation.

C. All parts of the hydraulic operator and electrical controls shall be brought together, assembled and fully tested to verify proper mechanical, electrical and control design and coordination. All remote functions of controls which will originate at equipment provided by others or at cylinder mounted devices shall be simulated. A completed, dated, and signed copy of the detailed test procedure shall be shipped with each piece of equipment for verification of start-up settings.

3.03 BUTTERFLY VALVES

A. Orientation of butterfly valves shall take into account changes in pipe direction. Valve shafts shall be oriented so that unbalanced flows caused by pipe direction changes or other disturbances are equally divided to each half of the disc.

3.04 FIELD TESTING

A. The actuated valve system startup and demonstration period shall include but is not limited to that which is specified herein.

B. Prior to acceptance, an operational test of all actuated valves and control systems shall be performed to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that the equipment is not electrically, mechanically, structurally, or otherwise defective; is in safe and satisfactory operating condition; and conforms to the specified operating characteristics. Prior to applying electrical power to any motor driven equipment, the drive train shall be rotated by hand to demonstrate free operation of all mechanical parts. Tests shall include but are not limited to checks for excessive vibration, leaks in all piping and seals, correct operation of control systems and equipment, proper alignment, excessive noise levels, and power consumption.

C. A valve seating test shall be performed. The Contractor shall test and examine all valves visually for leaks and for proper operation under pressure while completing adjacent piping tests.

D. A valve actuation test shall be performed. The Contractor shall time the valve actuation and record the time. If time from full closed to full open is greater than the operational time previously specified in this section, then valve installation shall not be acceptable.

E. Where applicable, the valves shall be tested in hand mode by opening and closing the valve manually. Where applicable the automatic throttling operation of the valve shall be checked.

F. The Contractor shall furnish all the requirements to conduct a proper field test which include but are not limited to: power, water, facilities, labor, materials, supplies and test instruments.

G. In the presence of a Manufacturer's representative, the Contractor shall test and inspect "all" necessary controls which include but are not limited to: hard wired interlocks required for the actuated control valve package units to function properly without causing damage to the equipment. The Manufacturer's representative shall provide the Contractor and Engineer with the necessary set points “In Writing” prior to the site acceptance test visit as outlined in the submittals.

H. Each actuated valve assembly shall be field performance tested under actual or Engineer and Owner approved simulated operating conditions. Testing shall occur for a continuous 24 hour period without malfunction. The Manufacturer and/or Contractor shall adjust, realign, or modify the actuated valve assemblies as necessary and retest the units until acceptable functionality is obtained. The actuator assemblies shall stroke in a smooth and controlled manner.

I. The actuator Manufacturer shall certify "In Writing" that the actuated valves and control assemblies have been properly installed and are operating correctly.

3.05 RETESTING

A. If any deficiencies are revealed during any test, such deficiencies shall be corrected and the tests shall be re-conducted for a full 24 hours, without malfunction, at no additional cost to the Owner or Engineer.

3.06 MANUFACTURER'S SERVICES

A. Services of a Manufacturer's representative who is experienced in the installation, adjustment, and operation of the electrically operated valves specified shall be provided. The representative shall supervise the installation, adjustment, and testing of the equipment. The Manufacturer's representative shall be present for a period of not less than three (3) trips, and four (4) days, to inspect the installed equipment, supervise the initial test run, and to provide instruction to the plant personnel.

3.07 FIELD TRAINING

A. A field training course shall be provided for designated operating and maintenance staff members. Training shall be provided in conjunction with the visit from the Manufacturer's representative. The visit shall start after the systems are functionally complete but prior to final acceptance tests. Field training shall cover all of the items contained in the operating and maintenance manuals, including normal operations, trouble-shooting, maintenance, lubrication, and other related work.

B. The field training instruction period shall be scheduled at least ten (10) business days in advance with the Owner and shall take place prior to start-up and acceptance by the Owner. Final copies of operation and maintenance manuals specified shall be delivered to the Owner prior to scheduling of the field training course.

END OF SECTION

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SECTION 40 94 43

PROGRAMMABLE LOGIC CONTROLLERS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Provide all labor, materials, equipment and appurtenances to furnish and install the programmable logic controllers and operator interface terminals as specified herein and on the Drawings. This Section covers the following:

1. Programmable Logic Controllers (PLC)

2. Operator Interface Terminals (OIT)

B. Definitions

1. PLC: Programmable Logic Controller

2. RIO: Remote Input/Output Rack

3. OIT: Operator Interface Terminal

4. HMI: Human Machine Interface

5. RTU: Remote Terminal Unit

6. I/O: Input Output

7. SCADA: Supervisory Control and Data Acquisition

1.02 WORK NOT INCLUDED

A. Programming of PLCs, HMI, and OITs shall be by others.

1.03 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary General Conditions and other Specification Sections, which apply to the Work of this Section.

1.04 QUALITY ASSURANCE

A. PLCs and OITs provided under this Contract shall comply with the Specifications, shall be supplied from manufacturers regularly engaged in the production of such products, shall be standard products (not special order or custom-made) wherever possible, and shall be of the manufacturer's latest design.

B. This specification has been developed to establish minimum requirements for the solid-state programmable controllers and OITs designed to provide high reliability in industrial applications. All PLCs, OITs, and associated software provided under this Contract shall meet the requirements of this Specification, unless approved by the Engineer. If production of equipment is discontinued, the Contractor shall submit an alternate of comparable quality to the Engineer for approval prior to execution of Work, and at no additional cost to Owner.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Coordinate equipment, instrument, and material delivery to coincide with the Project schedule. If the delivery schedule of any equipment, instrument, or material shall affect the overall Project schedule, notify the Engineer in writing immediately. Include in the written notification documentation from the equipment Supplier indicating the revised delivery schedule and reason for the change.

B. When applicable, coordinate delivery equipment, instruments, or materials to be delivered directly to another trade or vendor for installation in a system or control panel provided under another Specification Section.

C. Exercise care while loading, unloading and transporting equipment, instruments and materials to avoid damage. Check all equipment, instruments, and materials for damage or defects within seven (7) days of delivery to the Project Site.

D. Equipment, instruments, and materials required to be stored on Site prior to installation shall be stored in such a manner to avoid damage or exposure to water, dust, or construction debris.

E. Repair or replace, at no additional cost to the Owner, all equipment, instruments and materials that are defective or damaged during installation, to the satisfaction of the Engineer.

F. Provide in accordance with Division 01 General Requirements.

1.07 OPERATIONS AND MAINTENANCE DATA

A. Provide in accordance with Division 01 General Requirements.

B. Provide specific operations and maintenance data in accordance with Section 40 90 00, Instrumentation and Controls General Requirements.

C. Provide the following additional data and information.

1. Configuration and programming manuals for each type of PLC provided.

2. Configuration and programming manuals for each type of OIT provided.

1.08 SPARE PARTS

A. Provide spare parts as listed in the control panel Bill-of-Materials.

PART 2 – PRODUCTS

2.01 GENERAL

A. PLC hardware and programming software shall be by the same manufacturer.

B. All PLCs and OITs shall be housed in a control panel as specified per Section 40 95 13, Process Control Panels and Hardware. Power provided to the control panel shall be 120VAC, 60 Hz, single phase.

C. Minimum PLC input/output (I/O) requirements are indicated on the Drawings. Provide at minimum an additional 20% active spare I/O wired to terminal blocks.

D. PLC rack or mounting space provided shall accommodate at minimum 20% spare slots for future expansion.

2.02 PROGRAMMABLE LOGIC CONTROLLERS

A. The PLCs shall be microprocessor based devices and shall be furnished with power supplies, processors, process input and output modules, communication cards as required, rack mounted in the control panel.

1. Power supplies shall be sized to accommodate all analog signals including all spares. The power supply shall accommodate the card's entire I/O capacity (i.e. if 5 analog outputs is required, the power supply shall be sized to handle the full 8 analog outputs of an 8 point card).

B. The PLC shall be capable of stand-alone operation in the event of a SCADA network or SCADA computer failure.

C. The programmable controller system shall use a modular, field expandable design.

D. Modules are defined herein as devices that plug into a chassis or connect to an adjacent module and are keyed to allow installation in only one direction. The design must prohibit upside down insertion or connection of the modules. Modules provided shall be compatible with processor type specified.

E. All hardware of the programmable controller shall operate at an ambient temperature of 0 – 60° C (32 – 140° F), with an ambient temperature rating for storage of (-40) – 85° C ((-40) – 185°F).

F. The programmable controller hardware shall function continuously in the relative humidity range of 5 – 95%, non-condensing.

G. The programmable controller system shall be designed and tested to operate in the high electrical noise environment of an industrial plant.

H. The Programmable controller system shall be UL listed.

I. All module-expandable PLCs and associated modules shall be the following:

1. Processor for new SCADA panels shall be Allen-Bradley Micrologix 1400 series, or approved equivalent.

2. Discrete input modules used shall be 1762-IA8, 1762-IQ16, or approved equivalent.

3. Discrete output modules used shall be 1762-OW16, or approved equivalent.

4. Analog input modules used shall be 1762-IF4, 1762sc-IF8u, or approved equivalent.

5. Analog output modules used shall be 1762-OF4, 1762sc-OF8 or approved equivalent.

2.03 OPERATOR INTERFACE TERMINALS

A. The operator interface terminal shall be color graphic display that connects directly to the PLC's communication port or a communication module and allow viewing and changing of the PLC's parameters.

B. Shall be environmentally rated NEMA 4/4X

C. The OIT shall be powered by 24VDC.

D. The OIT shall be provided with an integrated real time clock with battery backup.

E. The OIT shall have a minimum resolution of 320 x 240 VGA graphics with 15 bit gray scale graphics.

F. The OIT shall be provided with touch screen operation.

G. Minimum display size shall be 6 inch with a 5.7 in viewable area.

H. The OIT shall be provided with 32MB internal Project memory. Unit shall also include Compact Flash port and support USB and ComptFlash memory modules.

I. The OIT shall support real-time trending of process variables.

J. The OIT shall provide active and historical alarm screens with the ability to acknowledge and clear.

K. Provide all communications modules and cables for OIT - PLC communications as necessary. PLC interface shall be Ethernet/IP.

L. Provide and coordinate all communications protocol drivers to establish reliable communications between PLC and OIT.

M. Provide OIT programming & configuration cables.

N. The OIT shall be provided with a licensed copy of programming software.

O. OITs shall be an Automation Direct 6" C-More grayscale touch screen, part number EA7-S6M, or approved equivalent.

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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SECTION 40 95 13

PROCESS CONTROL PANELS AND HARDWARE

PART 1 – GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide all wiring, labor, tools, materials, and equipment necessary to furnish, install, and test control panels and enclosures as specified herein and on the Drawings unless otherwise noted.

B. The Contractor shall furnish, deliver and unload control panels and enclosures as specified herein and on the Drawings unless otherwise noted.

C. Related Requirements

1. Refer to Division 40 for equipment furnished by other sections but require installation and startup to reflect complete integration of the systems, instrumentation, interlocking, interfacing and installation under this section.

2. Refer to Division 26, Electrical for wiring standards and practices.

1.02 WORK NOT INCLUDED

A. Programming of the PLCs, HMI, and shall be by others.

1.03 REFERENCES

A. Construction of panels and the installation and interconnection of all equipment and devices mounted within shall comply with applicable provisions of the following standards, codes and Regulations:

1. National Fire Protection Association 79, Annex "D" Standards, (NFPA)

2. National Electrical Code, (NEC)

3. National Electrical Manufacturer's Association Standards, (NEMA)

4. American Society for Testing and Materials, (ASTM)

5. Operational Safety and Health Administration Regulations, (OSHA)

6. Underwriters' Laboratory, Inc., (UL)

7. American National Standards Institute, Inc. (ANSI)

8. Factory Mutual (FM)

9. The Instrumentation, Systems and Automation Society (ISA)

10. State and Local code requirements.

11. Where any conflict arises between codes or standards, the more stringent requirement shall apply.

1.04 QUALITY ASSURANCE

A. Control Panel Fabricator (hereafter referred to as 'Panel Shop') shall hold a valid UL-508A certification for their panel fabrication facility, and shall have executed a minimum of three (3) Projects of similar scope in the municipal water and wastewater markets in the past five (5) years.

B. Surge protection shall be provided by recognized manufacturer with a minimum of five (5) years' experience in the production of this equipment.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Submit detailed information for the process control panels and enclosures in accordance with Section 40 90 00, Instrumentation and Controls General Requirements.

C. In addition to the requirements of Section 40 90 00, the submittals shall include:

1. Prior to submittal to Engineer, Shop Drawings and submittal information shall be thoroughly checked by Contractor to insure compliance with Contract Documents. Contractor shall be Responsible for verifying that all equipment, instruments and materials submitted upon shall fit within available space and maintain specified physical clearances, and that all equipment is compatible with the operation of the overall system. Submittal to the Engineer of Shop Drawings and submittal information implies that the Contractor has reviewed the information and all requirements have been satisfied.

2. Bill of Materials for each control panel, including panel tag name or number, and component description, quantity, manufacturer name and model number for each component used in the fabrication of the control panel. The Bill of Materials shall be keyed to easily correlate the component shown in the Bill of Materials with the component shown on the control panel Equipment Layout Drawings.

3. Manufacturer's descriptive literature (i.e. catalog information or cut sheet) for each component called out on the Bill of Materials, clearly designate the part number with highlights or arrows.

4. Equipment Layout Drawings for each control panel, indicating any deviations from the Contract Documents.

5. Panel communication diagrams for each control panel, indicating any deviations from the Contract Documents.

6. Power wiring diagrams for each control panel, indicating any deviations from the Contract Documents.

7. PLC I/O wiring diagrams, on a module-by-module basis, indicating any deviations from the Contract Documents.

D. If 'shop drawing'-level control panel Drawings were included in the Drawings, Contractor shall have the option to submit a letter/memo (included with copy of Drawings to be used for fabrication) indicating that Panel Shop shall fabricate control panels as specified.

E. Substitutions of equipment or changes to panel design that deviate from the Drawings shall be submitted to Engineer for review prior to fabrication of control panels.

F. Procurement of materials and manufacture of the control panels shall not begin until related submittals have been reviewed and approved by the Engineer.

G. As-Built Drawings

1. After fabrication of the control panels and factory acceptance testing is complete, Panel Shop shall provide Drawings of the control panels, representing the 'as-built' conditions. Submit panel Drawings in AutoCAD DWG and Adobe PDF file formats, on DVD-R media.

2. As-Built Drawings for the SCADA panel shall be submitted with the panel at delivery of the panel to the job site.

H. Operation and Maintenance (O&M) Information

1. Refer to Section 40 90 00, Instrumentation and Controls General Requirements for O&M material requirements. In addition to the requirements in Section 40 90 00, the control panel section of the O&M manuals shall include:

   a. Record Drawings of the control panels, updated to reflect the panels after checkout and startup.

   b. Installation and operation manuals for all major control panel components, including the network switches, PLCs, I/O modules, communication equipment, etc.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Coordinate equipment, instrument and material delivery to coincide with the Project schedule. If the delivery schedule of any equipment, instrument or material shall affect the overall Project schedule, notify the Engineer in writing immediately. Include in the written notification documentation from the equipment Supplier indicating the revised delivery schedule and reason for the change.

C. When applicable, coordinate delivery equipment, instruments or materials to be delivered directly to another trade or vendor for installation in a system or control panel provided under another Specification section.

D. Exercise care while loading, unloading and transporting equipment, instruments and materials to avoid damage. Check all equipment, instruments and materials for damage or defects within seven (7) days of delivery to the Project Site.

E. Equipment, instruments, and materials required to be stored on Site prior to installation shall be stored in such a manner to avoid damage or exposure to water, dust or construction debris.

F. Repair or replace, at no additional cost to the Owner, all equipment, instruments and materials that are defective or damaged during installation, to the satisfaction of the Engineer.

1.07 SPARE PARTS

A. Provide the following spare parts for the Project.

1. One of each type of surge arrestor

2. 10% spare of each type of fuse used (minimum of 1 spare of each type of fuse used)

3. One of each type of power supply

4. One of each type of intrinsic safety barrier

PART 2 – PRODUCTS

2.01 CONTROL PANEL COMPONENTS

A. The following table contains control panel components and recommended manufacturers for each component.

Control Panel Components	Manufacturer (or approved equivalent)	Comments
Enclosures	Hoffman Hammond Saginaw	Shall be suitable for use in the environments that they will be located (NEMA, NFPA, etc.)
Programmable Logic Controllers (PLCs)		Refer to section 40 94 43, Programmable Logic Controllers
Operator Interface Terminals (OITs)		Refer to section 40 94 43, Programmable Logic Controllers
Wireway	Panduit Hoffman	
DIN Rail	Allen Bradley Phoenix Contact	
Radio Equipment		Match existing Site standards and radio path study as necessary.
Terminal Blocks	Allen Bradley Phoenix Contact Entrelec	Utilize two-tier terminal blocks wherever possible to conserve panel space.
Terminal Block Fuse Holders	Allen Bradley Phoenix Contact Entrelec	Specify fuse holders with blown fuse indicators.
Circuit Breakers	Square D Allen Bradley	
120VAC Surge Suppressors	Phoenix Contact Square D	
Analog Surge Suppressors	Phoenix Contact Citel	
Media Converters	N-Tron B&B Electronics L-Com	Furnish with DIN rail mount converters as required on the network architecture
Fuses	Bussman Ferraz Shawmut	All glass fuses in control panels shall be fast acting style. Motor circuit protection fuses shall be time delay style.
Control Relays	Allen Bradley Square D Omron	Include all required bases, hardware, etc.

Control Panel Components	Manufacturer (or approved equivalent)	Comments
Power Supplies	Sola Phoenix Contact Allen Bradley	Furnish with power supplies sized as required for equipment contained within the enclosures and to supply field equipment connected to the enclosure.
Intrinsic Safety Barriers	Pepperl & Fuchs MTL Phoenix Contact	Discrete barriers shall be 2-channel barriers. Analog barriers shall be two-wire barriers.
Ethernet Switches (Unmanaged)	Moxa B&B Electronics	Switches shall be Furnished with direct-wired low voltage power source within the enclosure.
Ethernet Switches (Managed)	Moxa, B&B Electronics Allen Bradley	All switches shall be Furnished from the same manufacturer.
Fiber Patch Panels	L-Com B&B Electronics	Furnish with panel mount patch panels for incoming fiber optic cables as required
Emergency Power System	Sola Phoenix Contact Meanwell	Include UPS in each control panel sized to Furnish with at least 10 minutes of emergency power.
Panel Heaters	Hammond Hoffman	Furnish with panel heaters for outside control panels where temperature is a concern for electronic components.
Receptacles	Pass & Seymour Hubbel Leviton	Furnish with receptacle for UPS and convenience receptacle in each PLC control panel
Pilot/Status Lights (Push to test)	Allen Bradley General Electric Square D	Color code as follows: Red-Fault, Green-Run
HOR, On/Off, L/R switches and push buttons	Allen Bradley General Electric Square D	Refer to Section 26 27 26, Wiring Devices and Miscellaneous Electrical Equipment. Furnish switches and push buttons with matching nameplate

PART 3 – EXECUTION

3.01 CONTROL PANEL FABRICATION

A. General

1. The control panels shall include programmable logic controller, required I/O modules with chassis (if applicable) and power supply, cables and all appurtenances as specified in this and all applicable sections. The enclosures shall include switches, lights, annunciators and all appurtenances as specified in this and all applicable sections. The panels and miscellaneous materials shall be furnished by one Supplier.

2. All electronic equipment shall be of the manufacturer's latest design, utilizing printed circuitry and epoxy or equal coating to prevent contamination by dust, moisture and fungus. Solid state components shall be conservatively rated for their purpose, to provide reliable performance over ambient atmosphere fluctuations between 0 - 140°F and 0 - 95% relative humidity, non-condensing. The field mounted equipment and system components shall be designed for installation in dusty, humid and slightly corrosive service conditions.

3. Equipment installed in a hazardous area shall meet Class, Group, and Division to comply with the NFPA 70 and CCR, Title 8, Electrical and General Safety Orders.

4. All equipment, cabinets and devices furnished hereunder shall be heavy duty type, designed for continuous industrial service. The PLC system shall contain products of a single manufacturer, and shall consist of equipment models which are currently in production.

5. The following paragraphs describe general fabrication requirements of control panels, enclosures, consoles and cabinets. All control panel assemblies shall be UL listed, to comply with UL 508A standards.

6. Control panel enclosures shall be sized to provide at least 20% spare space, for future expansion, addition of panel components, etc. This shall minimize impact of the addition of unintended equipment during the checkout and startup phases.

7. PLC hardware provided shall accommodate a minimum 20% spare of each I/O type used in the panel, wired to terminals during the fabrication process. This shall minimize impact of unintended I/O requirements added during the checkout and startup phases of the Project.

B. Wiring

1. All interconnecting wiring shall be stranded and shall have 600 volt insulation and be rated for not less than 90 degrees Celsius.

2. Power distribution wiring on the line side of fuses shall conform to Division 26 requirements.

3. Power and low voltage DC wiring systems shall be routed in separate wireways. Crossing of power distribution wiring and control wiring shall be at right angles. Different system wires routed parallel to each other shall be separated by at least 6-inches. Different wiring systems shall terminate on separate terminal blocks. Wiring troughs shall not be filled to more than 60 percent visible fill.

4. All wiring shall terminate onto single-or-double tier terminal blocks, where each terminal is uniquely and sequentially numbered. Direct interlock wiring between equipment will not be allowed. The control panel shall be fabricated with minimum 20% spare terminals. Terminal blocks shall be arranged in vertical rows and separated into groups (power, AC control, DC signal). Terminal blocks shall be the compression screw type. Spring clamp style terminals shall not be accepted.

   a. Discrete inputs and outputs (DI and DO) shall have two (2) terminals per point with adjacent terminal assignments. All active and spare points shall be wired to terminal blocks.

   b. Analog inputs/outputs (AI and AO) shall have a minimum of three (3) terminals per shielded pair. Three (3) terminals shall be provided for direct connection of powered (four wire) loops. Four (4) terminals shall be provided for direct connection of loop powered (two wire) loops. Five (5) terminals shall be provided for connection of analog loops incorporating a local indicator or recorder. One (1) terminal is for shielded ground connections for cable pairs. Ground the shielded signal cable at the PLC cabinet. All active and spare points shall be wired to terminal blocks.

   c. Wire and tube markers shall conform to Division 26 requirements.

   d. Only one side of a terminal block row shall be used for internal wiring. The field wiring side of the terminal shall not be within 6-inches of the side panel or adjacent terminal or within 8-inches of the bottom of the panel.

   e. Whenever possible, the terminals for field wiring shall be located to reduce the amount of routing through wireway necessary to carry the field wiring to the termination point.

5. All wiring (internal to the panel and field wiring) shall be provided with a 'service loop,' to allow for adjustment of the termination point in the

future. The service loop shall be no more than 4-5 inches, and shall be stored in the associated wireway.

6. All wiring to hand switches, etc., which are live circuits independent of the panel's normal circuit breaker protection shall be clearly identified as such.

7. All wiring shall be clearly tagged and color coded in accordance with the National Electric Code. All tag numbers and color coding shall correspond to the panel wiring diagrams prepared by the Engineer. All power wiring, control wiring, grounding and DC wiring shall utilize different color insulation for each wiring system used. The color coding scheme shall be:

   a. Incoming 120 VAC Hot – Black

   b. 120 VAC Hot Wiring (downstream of panel circuit breaker) – Red

   c. 120 VAC Neutral – White

   d. Ground – Green

   e. DC Wiring – Blue

   f. Intrinsically Safe Wiring - Light Blue

   g. Foreign Voltage – Yellow

C. Control Panel Loss of Power

1. Each control panel containing a PLC shall have an input configured to alarm the operators upon loss of main control panel power. This alarm shall be displayed on the SCADA nodes to alert the operators that attention is required.

D. Control Panel Overcurrent Protection

1. All overcurrent protection devices (circuit breakers, fuses) shall be properly sized to protect the devices and the loads to which they are associated.

2. Circuit Breakers

   a. Circuit breakers in the panel shall be sized to protect the associated equipment, and to provide the necessary power to operate.

3. Fuses

   a. Glass fuses not associated with motor circuit protection shall be specified as fast-acting style. Fuses associated with motor circuit protection shall be specified as time delay style.

E. Lightning/Surge Suppression

1. Lightning/surge suppression shall be provided to protect the control panel and associated equipment from surges on the incoming power circuits, or those induced by lightning strikes and propagated along the signal or power lines connected to the control panels. Surge protection shall be provided by qualified manufacturer complying with requirements in Article 1.04. Surge protection shall be sized properly for its intended purpose.

2. 120VAC surge suppression

   a. The incoming 120VAC power source for the control panel shall be provided with surge suppression in the control panel. Surge suppressors shall be provided with an auxiliary contact, connected to the PLC, to indicate surge suppressor failure. Install surge suppression in strict accordance with manufacturer's recommendations.

3. Analog signal surge suppression

   a. Analog signals connected to equipment or instrumentation that is located outside the building where the control panel is installed shall be supplied with DIN-rail mounted surge suppression in the control panel. Provide surge protection at both ends of the signal cable and mount surge protection as close to the equipment, instrument or termination point as possible. Provide with a minimum of 10kA surge current suppression.

4. Telephone Line and Ethernet surge suppression

   a. Copper-based telephone lines and Ethernet cabling connected to the control panel that leaves the building where the control panel is installed shall be provided with surge suppression in the control panel. Provide surge protection at both ends of the telephone or Ethernet cabling and mount surge protection as close to the termination point as possible.

F. Selector Switches, Pushbuttons and Pilot Lights

1. All selector switches, pushbuttons and pilot lights required for the enclosures shall be provided in accordance with Section 26 27 26, Wiring Devices and Miscellaneous Electrical Equipment.

G. Uninterruptible Power Supplies

1. Each control panel containing a PLC shall be provided with an uninterruptible power supply (UPS) sized to provide a minimum of ten (10) minutes of power in the event of main control power loss. The UPS

shall be provided with relay contact outputs, connected to the PLC, to indicate UPS fault and UPS low battery conditions.

H. Ethernet Switches

1. Ethernet switches shall be configured to accept the number of connections shown on the Drawings.

2. Ethernet switches shall be provided with a minimum of 20% spare RJ-45 ports available for future expansion.

I. Seal Fail and Motor Temperature Relays

1. Pumps, mixers, etc. equipped with proprietary seal fail and motor temperature relays, shall require these relays to be mounted in the SCADA control panel. The seal fail and motor over temperature alarm contacts shall be connected to the PLC as discrete inputs.

J. Intrinsic Safety Barrier Panels

1. Intrinsic safety barriers required for interfacing with equipment and instruments located in a classified area shall be mounted in a panel separate from the control panels.

2. Panels housing intrinsic safety barriers shall be laid out to facilitate separation of hazardous and non-hazardous wiring. Wireway containing hazardous area wiring shall be clearly indicated as such.

K. Equipment Mounting/Arrangement

1. All components shall be mounted in a manner that shall permit servicing, adjustment, testing and removal without disconnecting, moving or removing any other component. Components mounted on the inside of panels shall be mounted on removable plates and not directly to the enclosure. Mounting shall be rigid and stable unless shock mounting is required by the manufacturer to protect equipment from vibration. Components shall be identified with suitable plastic or metal engraved tags attached with drive pins adjacent to (not on) each component identifying the component in accordance with the Drawings and these Specifications.

2. All exterior panel mounted equipment shall be installed with suitable gaskets, faceplates, etc., required to maintain the NEMA rating of the panel.

3. A minimum of 1-1/2 inches shall be provided between panel wireway and terminal blocks, to insure that wiring can be accessed easily.

4. Maintain manufacturer recommended spacing around panel-mounted equipment, for heating and ventilation concerns.

5. ISA Recommended Practice RP60.3 shall be used as a guide in layout and arrangement of panels and panel mounted components.

L. Nameplates

1. All panels and panel devices shall be supplied with suitable nameplates which identify the panel and individual devices as required. Each device nameplate shall include up to three lines with the first line containing the device tag number as shown on the Drawings, the second line containing a functional description (e.g., Booster Pump No. 1), and the third line containing a functional control description (e.g., Start).

2. Unless escutcheon plates are specified or unless otherwise noted on the Drawings, nameplates shall be 3/32-inch thick, black and white, Lamacoid with engraved inscriptions. The letters shall be black against a white background. Edges of the nameplates shall be beveled and smooth. Nameplates with chipped or rough edges will not be acceptable. Nameplates shall be affixed to the panels using #4-40 threaded stainless steel button head hex screws.

3.02 CONTROL PANEL QUALITY ASSURANCE

A. Panel Shop shall, upon fabrication of the control panels, apply power to each panel, to ensure that panels are wired correctly and all devices contained within the panels 'power up' properly. Panel Shop shall provide written confirmation to the Engineer that 'power up' test was completed.

B. Panel Shop shall complete a point-to-point wiring checkout for all wiring contained in the control panels, and correct any errors or omissions found during that process. Panel Shop shall provide written confirmation to the Engineer that checkout was completed.

C. Panel Shop shall provide advance notice to the Engineer that control panel fabrication is complete, and shall make the control panels available in their facility for completion of the Factory Acceptance Test by the Engineer or System Integrator. Panel Shop shall not ship control panels prior to execution of the Factory Acceptance Test, unless indicated in writing by the Engineer.

3.03 INSTALLATION AND MOUNTING

A. Contractor shall provide all labor, tools, material and equipment required to mount the SCADA panels. Similarly the Contractor shall provide all labor, tools, material and equipment required to modify the existing Main Control Panel (in control room) and the filter control panel (in filter room). The work shall be done as shown on the Drawings and in accordance to manufacturer-recommended

mounting practices. The location of control panel shown on the Drawings is approximate only. Exact location shall be as approved by the Owner or Engineer during construction. Obtain in the field all information relevant to the placing of process control Work and in case of any interference with other Work, proceed as requested by the Engineer.

B. All control panels shall be powered up upon installation and all field wiring shall be tested for proper termination. All analog signals shall be simulated for a full scale 4-20ma test.

3.04 STARTUP AND TESTING

A. Provide all labor, tools, materials and equipment necessary to assist in the startup and testing of the SCADA system with the Integrator after installation of control panels and instruments, and termination of field wiring to panels is complete. Start up and testing shall be witnessed by OWNER or representative designated by the OWNER.

END OF SECTION

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SECTION 43 21 00

SAMPLE PUMPS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide sample pumps as shown on the drawings and as specified herein.

B. Related Requirements

1. Section 40 05 13 - Process Pipe, Fittings and Appurtenances

2. Division 26 - Electrical

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American National Standards Institute (ANSI)

2. Hydraulic Institute (HI) Standards

3. Institute for Electrical and Electronics Engineers (IEEE) Standards

4. National Electrical Manufacturers Association (NEMA) Standards

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Complete list of all items to be provided including supplier and delivery schedule.

2. Manufacturer's Specifications and product data, including pump curves, required to demonstrate compliance with requirements which shall include complete parts listing showing materials of construction with applicable HI, ANSI, ASTM and other standards.

3. Data on characteristics and performance of each pump type. Data shall include guaranteed performance curves.

4. Certified setting plans with tolerances for anchor bolts.

5. Complete list of spare parts

C. Certificates

1. Submit warranty statement.

D. Manufacturer Instructions

1. Installation manual including storage, wiring, pre-start, checklist, and initial startup procedures.

2. Complete service manuals including copies of all drawings, description of operation, maintenance data and schedules, and replacement parts lists. Submit manuals in 3-ring binders including table of contents, and heavy duty tab section dividers.

E. Source and Field Quality Control Submittals

F. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Qualifications:

1. Manufacturer must have a minimum of five years' experience in the design and manufacture of the equipment in the section.

C. All pumps and appurtenances furnished under this Section shall be furnished by a manufacturer who is fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall operate satisfactorily when installed as shown on the Drawings.

D. All equipment shall be designed and built for 24-hour continuous service at any and all points within the specified range of operation, without overheating, without cavitation, and without excessive vibration or strain.

E. The pumping units required under this section shall be complete. All parts shall be so designed and proportioned as to have liberal strength, stability, and stiffness and to be especially adapted for the service to be performed.

F. All working parts of the pump shall be standard dimensions built to limit gauges or formed to templates, such that parts will be interchangeable between like units and such that the Owner may, at any time in the future, obtain replacement and repair parts.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Packing, Shipping, Handling, and Unloading

1. Spare parts shall be packed in containers bearing labels clearly designating contents and pieces of equipment for which they are intended.

C. Storage and Protection

1. Contractor shall store all equipment delivered to the site in accordance with manufacturer's instruction. Electrical equipment shall be stored in weatherproof, ventilated enclosures.

2. Pump shall not, under any conditions, be allowed to sit out-of-doors unprotected.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.09 MAINTENANCE

A. Extra Materials: Furnish as specified below. Make interchangeable with and same material and workmanship as corresponding original parts.

1. The manufacturer's recommended spare parts shall be provided prior to equipment start-up including, but not limited to a spare mechanical seal, impeller, diaphragm, guidevane, seal ring and wet end kit. They shall be packaged and identified by name, function, and equipment.

2. One set of mechanical seals for each pump.

3. One complete pump of each type.

PART 2 – PRODUCTS

2.01 SAMPLE PUMP – TYPE 1

A. Quantity: Provide seven (7) sample pumps and motors for pumps labeled SP-2201, SP-2301, SP-2401, SP-2402, SP-2601, SP-2602, and SP-2801, as indicated on the drawings.

B. Design Points: At 10 feet of suction lift, pump shall be capable of pumping 19 gpm at 30 PSI discharge pressure and 5 gpm at 60 PSI discharge pressure with a minimum shut-off head of 70 PSI.

C. Pumps shall have a 1-1/4" NPT suction and 1" NPT discharge connection.

D. General: Back pull-out design, corrosion resistant, convertible jet pumps. Nozzle clean out plug included in pump case. Impeller shall be glass filled Noryl for corrosion and abrasion resistance. The pump shall be self-priming. Shall include pump and motor, pressure gauge and bushing, pressure switch with tubing and fittings. Pump shall have bolt down diffuser (guidevanne) with stainless wear ring. Impeller shall be corrosion and abrasion resistant and made of glass filled Noryl. The diaphragm shall retain water in the casing to ensure the mechanical seal does not run dry. The pump shall be capable of operating continuously without damage.

E. Motor: Motor shall be ¾ HP, 60 Hz, 115/230 V capacitor start, single phase, 3500 RPM, UL 778 listed, NEMA standard. It shall have a built-in overload with automatic reset and stainless steel shaft. The motor shall have a maximum temperature rating of 140°F.

F. Finish: Electro-coat paint applied inside and out and baked on for corrosion resistance.

G. Each pump shall be furnished with fabricated steel base

H. Manufacturer: Sample Pumps shall be Goulds Model J7S, or approved equal.

2.02 SAMPLE PUMP – TYPE 2

A. Quantity: Provide seven (7) sample pumps and motors for pumps labeled SP-2501, SP-2502, SP-2503, SP-2504, SP-2505, SP-2506 and SP-2507, as indicated on the drawings.

B. Design Point: 8 gpm at 15 ft TDH. The pump shall have a max flow of 18 gpm and a max head (TDH) of 26 feet.

C. General: Magnetic drive, self-priming, seal-less design, centrifugal pumps. Hi-purity carbon bushings, a priming chamber with basket strainer, O-ring sealed

drain plug, Viton O-ring, carbon bearings, alumina ceramic shaft and thrust washers, and stainless steel external hardware shall be provided.

D. Motor: Motor shall be ¼ HP, 115/230V, 60 Hz, Single Phase, TEFC type

E. Each pump shall be furnished with fabricated steel base

F. Manufacturer: Sample Pumps shall be Sethco Model PMSP-510, or approved equal.

2.03 FINISHES

A. Shop Finishing Methods

1. Sample pump and component equipment is to be furnished with manufacturer's standard finish.

2.04 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Equipment shall be fully tested and checked per manufacturer's standard procedure prior to shipment to the jobsite.

PART 3 – EXECUTION

3.01 PREPARATION

A. Demolition/Removal

1. Remove any existing equipment per the Drawings and Specifications only after the new pumps have been installed, tested, and are operational.

2. Any and all equipment shall be made available to the owner.

3.02 SAMPLE PUMPS

A. Installation

1. The pumping units shall be installed in accordance with the instructions of the manufacturer and as shown on the drawings by the Contractor.

2. The existing sample pumps shall remain in operation until the new pumps are installed, tested and operational.

3. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations.

4. System Integration

   a. Coordinate with Owner performing system integration.

B. Field Quality Control

1. Provide in accordance with Division 01 General Requirements.

2. Site/Field Tests and Inspections

   a. If a pumping unit fails to deliver the design capacity under the design pumping heads, the Contractor shall, at his own expense, on the written request of the Engineer, replace the pump or provide any other required modifications to improve the unit until the specified efficiency or capacity are fulfilled.

   b. All pumping system equipment, including, but not limited to, pumps, motors, and drive shafts shall be tested to check for proper operation and faulty equipment.

3. Manufacturer Field Services

   a. The supplier shall provide a factory trained and certified field representative for a minimum of one (1) eight-hour day excluding travel time to inspect the installation, conduct training, test the system and make any necessary adjustments to verify and insure proper system operation.

   b. The supplier shall submit a written report certifying satisfactory installation and operation.

   c. Any defects in the equipment or failure to meet the requirements of the Specifications shall be promptly corrected by the Manufacturer.

C. Startup & Commissioning

1. Provide in accordance with Division 01 General Requirements.

3.03 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION