PROJECT MANUAL – TECHNICAL SPECIFICATIONS

Roof Replacement Project
City of Lowell

Gorham Street Fire Station
Lowell, MA

September 30, 2014

RBA Project No. 2014058

Prepared by:

33 Center Street, 2nd Floor
Burlington, MA
tel: 781-273-1537
fax: 781-273-1695

TABLE OF CONTENTS

Technical Specifications

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01010	SUMMARY OF WORK	01010-1 to 01010-7
SECTION 01025	MEASUREMENT AND PAYMENT	01025-1 to 01025-3
SECTION 01040	COORDINATION AND MEETINGS.	01040-1 to 01040-4
SECTION 01060	REGULATORY REQUIREMENTS	01060-1 to 01060-1
SECTION 01300	SUBMITTALS.	01300-1 to 01300-4
SECTION 01400	QUALITY CONTROL	01400-1 to 01400-2
SECTION 01500	CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS	01500-1 to 01500-9
SECTION 01600	MATERIAL AND EQUIPMENT	01600-1 to 01600-4
SECTION 01700	CONTRACT CLOSEOUT	01700-1 to 01700-4

DIVISION 2 - SITEWORK

SECTION 02050	DEMOLITION	02050-1 to 02050-7

DIVISIONS 3 THRU 5 - NOT USED

DIVISION 6 - WOOD AND PLASTICS

SECTION 06100	ROUGH CARPENTRY	06100-1 to 06100-10

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07220	ROOF INSULATION	07220-1 to 07220-11
SECTION 07321	SLATE ROOF REPAIRS	07321-1 to 07321-13
SECTION 07510	BUILT-UP ROOFING AND FLASHING.	07510-1 to 07510-23

DIVISIONS 8 THRU 14 - NOT USED

DIVISION 15 - MECHANICAL

SECTION 15400	PLUMBING - ROOF DRAINS	15400-1 to 15400-7

DIVISION 16 – ELECTRICAL – NOT USED

APPENDIX

DRAWINGS

TITLE SHEET	T-1
ROOF AREA PLAN	R-1
BUILT-UP ROOFING DETAILS	R-2
BUILT-UP ROOFING DETAILS	R-3

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

1.02 SECTION INCLUDES

A. The work of this section consists of ***Scope of Work, Codes/Standards & Permits, Contractor's Use of Premises, Examination of Site, Discovery, Authority to Stop Work, Owner Occupancy.***

1.03 SCOPE OF WORK

A. The work contemplated by the Contract Documents includes the Work of all trades required and all labor, equipment, materials and supervision necessary and incidental to the Work indicated. The work of this contract includes selective demolition and renovations of existing construction. The work required by the Contract Documents includes the Work of all trades required and all labor, equipment, materials and supervision necessary and incidental to the Work indicated. The following descriptions of the Work represent a brief summary of the Project. For additional and more complete information refer to the Project Manual and Drawings. The Drawings indicate and show limits of construction for this Project. The Drawings and Project Manual are complementary to each other and both shall be followed to complete the Work.

B. The project scope consists of roofing replacement and associated repairs to the Gorham Street Fire Station. General Bidders are to be DCAM certified in Roofing. The Roofing Contractor shall be the General Contractor.

The General Contractor shall provide and maintain proper supervision of the labor force for project duration. The General Contractor shall provide, for project duration, a competent full-time, *Project Superintendent* who shall remain on site, full-time every workday. The Project Superintendent shall be responsible for providing full-time supervision of the labor force, including but not limited to his employees, his subcontractors, his material suppliers, and his equipment suppliers. His responsibilities shall also include general coordination and management of the job and his attendance is required at all project meetings. He shall not work as a foreman, mechanic, laborer, or tradesman, except with the written permission of the Engineer. The Project Superintendent shall be a Licensed Construction Supervisor in the State of Massachusetts.

C. The project scope consists of roofing replacement and associated repairs. The intent is to provide a sound roofing system that is leak free and weathertight. At project completion, Contractor shall provide a written guarantee that covers all defects in workmanship and materials for a period of two (2) years from date of acceptance, and a roofing system manufacturer's twenty (20) year system warranty. The work area locations are shown on the Drawings.

The general scope of the construction work consists of removing and replacing the existing low-sloped roofing systems with a new cold process built-up roof system (3-plies plus a cap sheet), complete with new rigid board insulation, new edge metal, new flashings, new roof drains, new gutters and downspouts, slate roofing repairs, and repairs to deteriorated roof decking.

D. Project Schedule is as follows:

Project out to bid .....October 1, 2014

General Bids Due .....October 27, 2014

A contract is expected to be promptly awarded to the lowest responsible and eligible bidder. The construction phase is expected to occur during fall 2014.

1.04 CODES, STANDARDS AND PERMITS

A. All work under this Contract shall conform to all codes and standards in effect as of the date of receipt of Bids, which are applicable to this Project. All work shall further conform to specific requirements and interpretations of local authorities having jurisdiction over the Project. These codes, standards and authorities are referred to collectively as "the governing codes and authorities", and similar terms, throughout the Specifications. Determination of applicable codes and standards, and authorities having jurisdiction, shall be the responsibility of the General Contractor, as shall be the analysis of all such codes and standards in regard to their applicability to the Project for the purposes of determining necessary construction to conform to such code requirements, securing all approvals and permits necessary to proceed with construction, and to obtain all permits necessary for the Owner to occupy the facilities for their intended use. In the case of conflicts between the requirements of different codes and standards, the most restrictive or stringent requirements shall be met.

1. The General Contractor shall maintain at the site, for the duration of the construction operations at the site, two (2) copies of all relevant codes and standards listed herein or determined to be applicable to the work. One copy of such codes shall be for the exclusive use of the Owner and Engineer and its consultants, and shall be kept in the Construction Manager's site office.

B. Code Enforcement and Approvals: The General Contractor shall secure the general building permit for the work, and the General Contractor shall conform to all conditions and requirements of the permit and code enforcement authority. The General Contractor shall provide names and license numbers of its

responsible representatives to complete application for permit, and shall receive permit and promptly distribute copies thereof to Owner and Engineer.

C. The General Contractor shall identify all permits (other than general building permit) required from authorities having jurisdiction over the Project for the construction and occupancy of the work, shall prepare the necessary applications and submit required plans and documents to obtain such permits in a timely manner, and shall pay all fees and charges in connection therewith.

1. The General Contractor shall display all permit cards as required by the authorities, and shall deliver photocopies of all permits to the Owner and Engineer promptly upon receipt.

2. The General Contractor shall arrange for all inspections, testing and approvals required for all permits, and shall notify the Engineer and Owner of such inspections at least three business days in advance, so they may arrange to observe.

3. The General Contractor shall comply with all conditions and provide all notices required by all permits.

4. The General Contractor shall perform and/or arrange for and pay for all testing and inspections required by governing codes and authorities, other than those provided by the Owner, and shall notify Engineer and Owner of such inspections at least three business days in advance of all such testing or inspection, so they may arrange to observe.

5. Where inspecting authorities require corrective work in conjunction with applicable codes and authorities, the General Contractor shall promptly comply with such requirements, except in cases in which requirements clearly exceed the requirements of the Contract Documents in which case the Contractors shall proceed in accordance with the procedures for modifications or changes in the work established in the Contract Documents, as amended.

1.05 CONTRACTOR'S USE OF PREMISES

A. The existing building and site will be occupied for the entire construction period. At all times during the demolition, construction, and alterations, the General Contractor shall provide adequate and safe means of egress for all work force in the building and at the same time provide security of the building. "Means of Egress" also includes safe and adequate paths on the site.

B. Prior to beginning work of the Contract, the General Contractor shall meet with the Owner and the Engineer to determine procedures regarding access to and use of site, exterior staging, parking, and storage areas, tree protection, special site conditions, and any other restrictions regarding the use of the site areas surrounding the construction.

C. Where work on public roads or walks, or other work on municipal property or easements is done, all such work shall conform to applicable portions of this Specification and the rules, regulations, and specifications of the public agencies having jurisdiction. Wherever work on a public street is done, a Town special duty police officer must be present arranged and paid for by the General Contractor at no change in contract price. All permits and fees in relation to such off-site work shall be obtained and paid for by the General Contractor.

D. The General Contractor shall keep all public and private access roads and walks clear of debris caused by their work during the entire term of the Contract. They shall repair all public and private streets, drives, curbs, walks, and other improvements where disturbed by work of, or related to, building operations, leaving them in as good condition after completion of the work as before operations started, in accordance with rules, regulations, and specifications of the public agencies having jurisdiction.

E. Limited parking for workmen's personal vehicles shall be permitted on site provided no damage to the existing property is incurred.

F. Access roads and fire-lanes on and about the site shall be kept open and free at all times, except moving traffic, for passage of emergency vehicles.

G. A reasonable sum (cost of equivalent replacement) will be deducted from the Contract Sum for any permanent damage to existing trees or plantings which are outside the construction site area but on the Owner's property or are within the construction site area and are designated to be protected. Damage to trees and plants off the Owner's property shall be fully the responsibility of the General Contractor.

H The General Contractor shall endeavor at all times to maintain as low a level of construction noise as practicable in order not to create a disturbance in the neighborhood. The General Contractor shall provide and maintain portable noise barriers for compressors and generators. Compressors and generators shall be located to prevent fumes from entering occupied space (including abutter properties).

1. Refer to the City of Lowell By-Laws.

2. All workers on the project are required to conduct themselves in a professional manner. Abusive or obscene language will not be tolerated. No obscene gestures, whistles, or cat-calls will be allowed. No soliciting or harassing of neighborhood residents for any reason will be permitted. The Owner reserves the right to have any worker barred from the construction site.

3. Use of alcohol or drugs on property is prohibited.

4. Workers shall wear shirts at all times.

5. Smoking is prohibited on property.

6. No radios are allowed on the work site.

I. The intent of the specifications is that required work shall be performed with a minimum of interference with the public and the Owner's operations. To achieve this end, the General Contractor shall prosecute the work to its completion as soon as possible with full crews of workers during regular working hours, with multiple shift work or overtime hours are indicated in their Progress Schedule as approved. All work at other than regular hours shall be subject to prior approval by Owner.

J. The General Contractor shall confine his apparatus, storage of materials, and operations of his workers to areas as required by the Owner, and shall not unreasonably encumber the premises with his materials. The General Contractor shall keep corridors and exits clear of debris, stored materials, etc. At all times, to provide for normal and fire egress from the building. The premises shall be maintained in a safe, orderly condition at all times.

K. Site Cleaning and Maintenance:

1. Before the start of any work it is required that an inspection is made to determine the existing conditions of the site around the work areas, including areas outside of the Site boundaries in which operations of the Contractors may occur. This should be performed jointly by representatives of each Contractor and Engineer.

2. Unless otherwise specified in the various technical specification Sections, the General Contractor shall take all necessary precautions to prevent the spreading of dirt and dust throughout the area of the work. During demolition and other work, the General Contractor shall take all measures necessary to contain dust and other debris from the work within the limits of the site under their control. The General Contractor shall be responsible for promptly cleaning up all dirt, dust and debris escaping from the work areas or dropped from vehicles traveling to and from the work. All vehicles used for removal of material from the site shall be equipped with covers, in good condition, adequate to contain dust and debris within lawful and acceptable limits. The General Contractor shall provide all facilities for preventing spread of objectionable matter outside of the site areas through washing of vehicles and vehicle wheels, decontamination of vehicles transporting hazardous waste containing materials including asbestos, lead, or other matter, and all other means necessary.

3. Prior to final completion of the Contract, The General Contractor shall remove all spots, stains, dirt and dust from all surfaces, including areas

within other buildings and any portion of property of others, which were the result of the work of this Project to the satisfaction of the Owner.

4. Any damage to the present quarters or equipment of the Owner caused by the General Contractor or their Subcontractors shall be corrected, as directed by the Engineer, at the expense of the Contractors.

L. As a condition of Engineer's certification for Final Completion, restore site areas and areas off the site damaged by work under this Contract to their condition existing at the start of the work unless otherwise directed by the Owner.

1.06 EXAMINATION OF SITE

A. Prior to bidding the General Contractor shall carefully examine the site and the Contract Documents to ensure their knowledge of conditions and requirements affecting the work. No claim for extra compensation or extension of time will be allowed for by the Contractor’s failure to comply with this requirement nor will any condition at the site, whether or not in agreement with conditions shown or called for on the Contract Documents, be allowed as a basis or such claims, except as otherwise specifically provided for.

1.07 DISCOVERY

A. If during the demolition, excavation, disposal, or other work, articles of unusual value, or of historical or archaeological significance are encountered the ownership of such articles is retained by the Owner, and information regarding their discovery shall be immediately furnished to the Engineer. If the nature of the article is such that the work cannot proceed without danger of damaging same, work in that area shall be immediately discontinued until the Engineer has decided the proper procedure to be followed. Any time lost thereby shall be a condition for which the time of the Contract may be extended. All costs incurred after discovery in the salvaging of such articles shall be borne by the Owner.

1.08 AUTHORITY TO STOP WORK

A. The Engineer, the Owner, or their authorized representatives shall retain the right to stop work on the project when, in their judgment, the specifications, the manufacturer's requirements, drawings or similar requirements and conditions are not being fully complied with by the General Contractor or subcontractors.

B. The Engineer, the Owner, or their authorized representatives shall retain the right to stop work on the project when, in their judgment, unforeseen conditions require field changes. The General Contractor shall make watertight the area in construction and the Engineer shall develop the necessary modifications to the design.

C. No claims by the General Contractor for additional compensation or extension of contract schedules shall be allowed due to a suspension of the work ordered by

the Owner or Engineer because of the Contractor's failure to comply with the Contract Documents or due to unforeseen conditions that require field changes.

D. If work is suspended on the project due to the Contractor's failure to comply with the Contract Documents, the Contractor shall immediately take whatever measures are necessary to bring his work on the project into compliance and to resume work.

E. If the Contractor neglects or refuses to bring his work into full compliance with the Contract Documents, the Owner shall retain the right to terminate the Contract.

1.09 OWNER OCCUPANCY

A. The Owner intends to occupy the building during the project. Contractors (under separate contracts) may also be on site during the construction period. The work sequence must be coordinated and approved with the Owner and others working on-site. The General Contractor shall cooperate with the Owner to minimize conflict and to facilitate the Owner's operations.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements and hereby made part of this specification

1.02 SECTION INCLUDES

A. The work of this section consists of ***Project Pricing, Lump Sum Prices, Unit Prices, Unit Price Quantity Measurement, Schedule of Values, Application for Payment, Waivers of Mechanics Liens.***

1.03 PROJECT PRICING

A. Bidder shall complete the Form for General Bid including all requested information.

B. Project pricing is lump sum. Estimated quantities relative to repairs of anticipated deteriorated conditions are included in the lump sum price. Unit prices are requested for any adds or deducts to these estimated quantities.

1.04 LUMP SUM PRICES

A. Lump Sum Prices shall include all costs to provide and install the Work including, but not limited to labor, materials, equipment, supervision, overhead, profit.

1.05 UNIT PRICES

A. Unit Prices shall include all costs to provide and install the Work including, but not limited to labor, materials, equipment, supervision, overhead, profit.

1.06 SCHEDULE OF VALUES

A. The Contractor shall prepare a Schedule of Values for the Work as required by the General Conditions.

B. Submit the Schedule of Values to the Engineer at the earliest feasible date, but in no case later than seven days before the data scheduled for submittal of the Applications for Payment.

C. Update and resubmit the Schedule of Values when change orders result in a change in the contract sum.

1.07 APPLICATION FOR PAYMENT

A. The form of Application for Payment shall be notarized AIA Document G702, "Application and Certification for Payment" supported by AIA Document G703, Continuation Sheet.

B. The date for each progress payment is the 15th day of each month. The period of construction work covered by each Application for Payment is the period ending 15 days prior to the date of each progress payment and starting the day following the end of the preceding period.

C. Complete all entries on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.

2. Include amount of change orders issued prior to the last day of construction period covered by the application.

D. Submit three (3) executed copies of each Application for Payment to the Engineer. One copy shall be complete, including waivers of lien and similar attachments, when required.

E. Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:

1. List of Subcontractors
2. List of principal suppliers and fabricators
3. Schedule of Values
4. Contractor's Construction Schedule
5. Schedule of principal products
6. Submittal Schedule
7. List of Contractor's staff assignments
8. List of Contractor's principal consultants
9. Copies of Permits
10. Copies of authorizations and licenses from governing authorities for performance of the Work
11. Initial progress report
12. Certificates of insurance and insurance policies
13. Performance and Payment bonds

F. Administrative actions and submittals which precede or coincide with submittal of the final Application for Payment include the following:

1. Completion of Project closeout requirements
2. Completion of items specified for completion after Substantial Completion
3. Assurance that unsettled claims will be settled
4. Assurance that Work not complete and accepted will be completed without undue delay
5. Transmittal of required Project construction records to Owner
6. Proof that taxes, fees and similar obligations have been paid
7. Removal of temporary facilities and services
8. Removal of surplus materials, rubbish and similar elements
9. Warranties
10. Waste disposal manifests and certification

1.08 WAIVERS OF MECHANICS LIENS

A. With each Application for Payment submit waivers of mechanics liens from subcontractors or sub-subcontractors and suppliers for the construction period covered by the previous application.

B. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.

C. When an application shows completion of an item, submit final or full waivers.

D. The Owner reserves the right to designate which entities involved in the Work must submit waivers.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01040

COORDINATION

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements and hereby made part of this specification

1.02 SECTION INCLUDES

A. The work of this section consists of ***Project Coordination, Project Superintendence, Project Meetings and Project Progress Schedules.***

1.03 PROJECT COORDINATION

A. The Project Coordination Administrator shall be the Engineer as employed and directed by the Owner. The Contractor shall cooperate fully with the Administrator in allocation of mobilization areas, protection, field offices, storage sheds/areas, traffic and parking facilities.

B. Contractor shall coordinate all aspects of the work (including his and any of his subcontractors), including but not limited to: scheduling, submittals, shop drawings, and permitting so as to ensure efficient and orderly sequencing of the construction.

C. Contractor shall verify that utility requirements of all project related required machinery and equipment are compatible with the building's utilities. Contractor shall coordinate for installing, connecting to, and placing in service, all such required machinery and equipment.

D. Contractor shall coordinate completion and clean up of work on a daily basis, including maintaining water-tightness for project duration

1.04 PROJECT SUPERINTENDENCE

A. The Contractor shall provide and maintain proper supervision of the labor force for project duration. To this end, the Contractor shall provide, for project duration, a competent full-time, *Project Superintendent* who shall remain on site, full-time every workday. The Project Superintendent shall be responsible for providing full-time supervision of the labor force, including but not limited to his employees, his subcontractors, his material suppliers, and his equipment suppliers. His responsibilities shall also include general coordination and management of the job and his attendance is required at all project meetings. He shall not work as a foreman, mechanic, laborer, or tradesman, except with the

written permission of the Engineer. The Project Superintendent shall be a Licensed Construction Supervisor in the State of Massachusetts.

B. Prior to the pre-construction meeting, the Contractor shall provide the Project Superintendent's resume to the Engineer for approval. The Engineer shall have the right, by written notice sent to the Contractor at any time to disapprove such Project Superintendent. The Contractor shall then appoint a new and approved Project Superintendent within one (1) day of receipt of notice. The Contractor shall not remove the Project Superintendent without the Engineer's written approval.

C. The Contractor shall provide appropriate and adequate labor for this project and such labor will work in harmony with all other elements of labor employed or groups taking part in, or concerned with this facility. The Contractor shall promptly remove from work on this project any employee who, in the opinion of the Engineer, is incompetent, unskillful, disruptive or disorderly. Any such person so removed from the work shall not be re-employed on this project without the Engineer's written approval.

1.05 PROJECT PROGRESS MEETINGS

A. Project Progress Meetings will be held on-site for project duration. The Engineer will schedule them in advance. Representatives directly concerned with the work shall be in attendance, including but not limited to, Owner, Engineer and Contractor (including Project Superintendent). The Engineer will maintain a record of the meetings and shall distribute a copy of this record to all participants.

B. Prior to the commencement of the work, a *pre-construction meeting* will be held with the above-mentioned representatives in attendance. The Engineer will maintain a record of the meeting and shall distribute a copy of this record to all participants. A copy of this record shall be incorporated into the Contract Documents. The objectives and agenda of the pre-construction meeting shall include:

1. The execution and distribution of Contract Documents.
2. The execution and distribution of required bonds and insurance certificates.
3. The execution and distribution of required permits.
4. Review the required submittals and shop drawings, including but not limited to: product lists, subcontractors list, schedule of values and construction schedule.
5. Review project assigned personnel, including emergency phone numbers.
6. Review procedures related to permits, submittals, shop drawings, field changes, product substitutions, applications for payments, change orders and contract closeout procedures.
7. Review construction progress schedule including sequencing of events and hours of operation, verify the availability of materials, installer's

personnel, and the equipment and facilities needed to make progress and avoid delays.

8. Review Owner's requirements, his occupancy and use of premises (by both Owner and Contractor), including accessing the work areas, locations of dumpsters and set-up areas, the use of electrical power supplied by the Owner and toilet facilities.
9. Review the technical specifications and drawings, the application requirements, construction facilities, utilities, security, protection, material storage, and housekeeping procedures.
10. Review procedures for all required inspections, testing, certifying and material usage accounting procedures, including maintaining record documents and as-built drawings.
11. Tour representative areas of construction, inspect and discuss the condition of the facility and the Contractor's project approach.
12. Review the notification procedures for weather or non-working days, including procedures for coping with unfavorable conditions and maintaining watertightness on a daily basis.

1.06 PROJECT PROGRESS SCHEDULES

A. Contractor shall prepare and provide his Project Progress Schedule, prior to the preconstruction meeting, to the Engineer for review. The schedule shall show the complete sequence of construction by activity, with dates for beginning and completion of each element of construction. Identify each item by specification Section number. Provide sub-schedules to define critical portions of the entire schedule. Coordinate content with Schedule of Values.

B. The Project Progress Schedule will be reviewed at the preconstruction meeting and will be updated at each construction meeting, or more often as needed. Contractor shall update the schedule after each meeting, identifying changes since previous version, and submit to all parties in advance of the next scheduled construction meeting, or as directed by the Engineer.

C. The Project Progress Schedule shall utilize one of the following acceptable formats: a horizontal bar chart or a computer generated network analysis diagram using the critical path method, generally as outlined in Associated General Contractors of America publication "The Use of CPM in Construction - A Manual for General Contractors and Construction Industry".

D. Contractor shall also provide a separate schedule of submittal dates for shop drawings, product data, and samples, prior to the preconstruction meeting, to the Engineer for review. The schedule shall indicate dates reviewed submittals will be required from Engineer and anticipated delivery dates for products.

E. The above referenced schedules shall indicate revisions as they occur including projected completion date of each activity, activities modified since previous submittal, major changes in scope, and other identifiable changes. The schedules shall provide narrative reports to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken, or proposed,

and its effect including the effect of changes on schedules of separate contractors.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01060

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements and hereby made part of this specification

1.02 SECTION INCLUDES

A. The work of this section consists of ***Project Authorizations and Sales Tax.***

1.03 PROJECT AUTHORIZATIONS

A. The Contractor shall obtain all necessary authorizations, including but not limited to permits, licenses, and easements, for permanent structures and changes, give all necessary notices, pay all legal fees, and comply with all regulations of all authorities having jurisdiction, including, State, County, and City Building and Sanitary Laws, Rules, Ordinances, or Regulations, relating to the building or preservation of public health. The Contractor shall pay all fees and costs as required including filing, inspection and re-inspection costs. No work shall begin until all required project authorizations are obtained and a copy of the building permit, provided by the building department, shall be posted on-site, in view and protected from the weather, for project duration.

1.04 SALES TAX

A. Sales Tax shall be not included in the cost for any and all materials used on this project. The Contractor shall not include the cost of any or all taxes in his bid for all materials to be used for this project.

B. Contractor employed by the City of Lowell, shall be exempt from state sales tax and will be provided with the tax-exempt number or certificate.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

B. Work on the project, which requires submittals, shall not commence and materials shall not be ordered until all necessary submittals including shop drawings, product data, and samples are reviewed and approved in writing by the Engineer.

1.02 SECTION INCLUDES

A. The work of this section consists of ***Schedule, Procedures and Product Data, Shop Drawings, Samples, Contractor's Responsibilities, Submission Requirements, and Engineer's Responsibilities.***

1.03 SCHEDULE

A. Contractor shall provide a schedule of submittal dates for shop drawings, product data, and samples, prior to the preconstruction meeting, to the Engineer for review. The schedule shall indicate dates reviewed submittals will be required from Engineer and anticipated delivery dates for products.

B. The above referenced schedule shall indicate revisions as they occur including projected completion date of each activity, activities modified since previous submittal, major changes in scope, and other identifiable changes. The schedule shall provide narrative reports to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken, or proposed, and its effect including the effect of changes on schedules of separate contractors.

C. Refer to Section 01040 - COORDINATION, 1.06 Project Progress Schedules for information pertaining to the construction sequence schedule.

1.04 PROCEDURES AND PRODUCT DATA

A. Contractor shall submit to the Engineer copies of Manufacturer's Spec and Product Data Sheets, Health and Safety Data Sheets (MSDS sheets to remain on site for project duration and additional copies to be supplied to Owner as requested), and recommended installation procedures, temperature limitations, mix designs for materials, and any other information as required by the technical specifications .

B. Submit eight (8) copies of the manufacturer's printed data all stamped with the Contractor's approval and stating its intended use to the Engineer for review. After review of the manufacturer's printed data by the Engineer, the Engineer will stamp one (1) copy, noting, if necessary, any further action required, and return the copy to the Contractor.

1.05 SHOP DRAWINGS

A. Contractor shall submit Shop Drawings as required by the technical sections of the Specifications. Check and approve Shop Drawings before submitting to the Engineer. Submit checked Shop Drawings stamped with the approval of the Contractor, to the Engineer for review per the accepted schedule of Shop Drawing submissions. Engineer shall review, stamp and return Shop Drawings to the Contractor within ten (10) working days from the date of receipt of Shop Drawings at the Engineer's office.

B. Shop Drawings shall demonstrate that the Contractor understands the intent of the design as detailed and specified in the Contract Documents and show materials (kinds, quality, shapes and sizes), details (fabrication, construction, assembly, and installation) and all required dimensions and measurements. All Shop Drawings shall bear the Contractor's stamp of approval certifying that they have been so checked. Any Shop Drawings submitted without this stamp of approval and Shop Drawings, which, in the opinion of the Engineer, are incomplete or have not been checked adequately, will be returned without review by the Engineer for resubmission by the Contractor.

C. From Suppliers receive eight (8) prints of all Shop Drawings for checking and approval. After review of the Shop Drawings by both the MSBA Commissioning Agent and Engineer, the Engineer shall stamp each print, noting, if necessary, any further action required, and return the prints to the Contractor. All Shop Drawings shall have final review by Engineer before materials are ordered or fabrication is begun. Contractor shall provide the Engineer with seven (7) prints of the final Shop Drawings, reproduced from the corrected original, and provide as many other prints as are required to expedite the Work. Contractor shall only use unmarked final approved Shop Drawings in the field.

1.06 SAMPLES

A. Contractor shall submit samples as required by technical sections of the Specifications. Receive, check, approve and stamp all samples before submitting to the Engineer.

B. Label each sample, giving a complete description of the material, the intended use and the name of the entity submitting the sample. Allow ample time before samples are required for the Work.

1.07 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall review Shop Drawings, Product data and Samples and affix Contractor's stamp prior to submitting to the Engineer.

B. Contractor shall verify existing conditions, field dimensions, catalogue numbers, quantities and similar data.

C. Contractor shall coordinate each submittal with requirements of the Work and of the Contract Documents.

D. Contractor's responsibility for errors and omissions in submittals is not relieved by Engineer's review of submittals. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Engineer's review of submittals, unless Engineer gives written acceptance of specific deviations.

E. Contractor shall thoroughly check all Shop Drawings for completeness, for correctness with respect to field conditions, and for compliance with the Contract Documents before submitting to the Engineer. Notify Engineer in writing, at the time of submission, of deviations in submittals from requirements of Contract Documents.

1.08 SUBMISSION REQUIREMENTS

A. Submittals shall be submitted in an orderly sequence and sufficiently in advance of construction requirements so as to allow ample time for review, resubmitting and rechecking. Accompany submittals with transmittal letter, in duplicate. Shop Drawings: eight (8) blue line prints. Product Data: eight (8) copies.

B. Submittals shall include the following minimum information:
   1. Date and revision dates
   2. Project Title and Project Number
   3. Names of: Engineer, Contractor, Subcontractor, Supplier, Manufacturer
   4. Identification of product or material
   5. Field dimension clearly defined as such. Relation to adjacent structure or
   6. Materials.
   7. Specification Section Number.
   8. Applicable standards- ASTM or Federal Spec.
   9. Blank 3"X4" space for Engineer's stamp, located in bottom right hand corner.
   10. Identification of deviations from the Contract Documents.
   11. Contractor's stamp signed certifying as to review of submittal, verification of existing conditions and field dimensions and compliance with Contract Documents.

C. Contractor shall revise the initial submittal as required and resubmit as specified for the initial submittal. Clearly indicate by clouding and use of revision level

number in triangular symbol, all changes which have been made including those requested by the Engineer.

D. Contractor shall distribute copies of Product Data and Shop Drawings that carry Engineer's stamp to the following:

1. Contractor's file.
2. Job site file.
3. Record documents file.
4. Owner's representative.
5. Fabricator.
6. Supplier.
7. Subcontractors.
8. Local Building Inspector (if required).

E. Contractor shall distribute Samples as required in the technical specifications, but at a minimum they shall be distributed to the Engineer.

1.09 ENGINEER'S RESPONSIBILITIES

A. Engineer shall review submittals and transmit to the Contractor within ten (10) working days after receipt of submittal at the Engineer's office, for Contractor distribution. Engineer shall review for design concept of Project and information provided in the Contract Documents.

PART 2 - PRODUCT (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

1.02 SECTION INCLUDES

A. The work of this section consists of ***Quality Assurance, References and Standards, and Cutting and Patching.***

1.03 QUALITY ASSURANCE

A. All materials used as a component of the roofing system shall be supplied or approved in writing by the roofing system manufacturer. All materials shall be installed to serve their intended function.

B. A licensed contractor approved by the roofing manufacturer and employing personnel experienced and skilled in the application of the manufacturer's roofing and skylight systems shall install the complete system. The Contractor shall have a minimum of five (5) years experience installing the system.

C. All work shall be applied in strict accordance with the provisions of the technical specification. No deviations shall be permitted without written consent from the Engineer. Should a conflict between this specification and the manufacturer's requirements arise, the most restrictive provision, as determined by the Engineer, shall govern.

D. At least one week prior to construction work, a conference shall be held and attended by the Engineer, the Contractor, and the roofing system manufacturer. The purpose of this conference is to review the specifications, details, application requirements, storage area and work to be completed before construction operations begin.

1.04 REFERENCES AND STANDARDS

A. Contractor shall 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.

B. Contractor shall conform to the most current referenced standard and/or reference.

C. Contractor shall obtain and maintain copies of references and standards as required by the Contract Documents. If specified standards or references conflict with Contract Documents, Contractor shall request clarification from Engineer before proceeding.

1.05 CUTTING AND PATCHING

A. All cutting, patching, and drilling shall be the responsibility of the Contractor. Contractor shall repair all cutting, patching, and drilling so as to match the existing surrounding surfaces as required by the Engineer. Contractor is responsible to ensure that the project progress will not be interrupted and that the structural and architectural integrity of the project shall not be altered by misplaced or incorrectly sized penetrations.

B. Contractor shall submit written request in advance of cutting or altering elements that affects the structural integrity, maintenance, efficiency, quality or safety of such elements. .

C. Contractor shall perform cutting and patching so as to:

1. Remove and replace defective and non-conforming Work.
2. Remove samples of installed Work for testing.
3. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Contractor shall execute work by methods that will avoid damage to other Work, and provide proper surfaces to receive new products and/or repairs.

E. Contractor shall maintain integrity of building components and shall refinish surfaces to match adjacent surfaces.

F. Contractor shall identify any hazardous substance or condition exposed during the work To the Engineer for decision or remedy.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

B. All temporary facilities shall be installed, maintained, and removed, leaving the existing permanent facilities, utilities and grounds in their original condition, at the expense of the Contractor. Temporary facilities shall at all times comply with all applicable regulations and shall not create or contribute to a safety, fire, health or other hazard.

C. The Contractor must not interfere with the operations of the facility in any way including personnel, customers, and vehicles. The Contractor must fully cooperate with the Owner and Engineer.

D. No Smoking shall be allowed at any time on the Project site.

E. Maintain strict supervision of use of temporary services. Enforce conformance with applicable standards. Enforce safe practices. Prevent abuse of services and systems. Prevent damages to finishes. Prevent wasteful use of water. Maintain, service and clean facilities.

F. Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on the Project site.

G. All work on the project is to be conducted from areas of the building designated by the Engineer and Owner. The Contractor shall take care not to block any travel lanes, fire lanes, access for fire apparatus, any means of egress, and any shipping/receiving areas of the facility and shall not interfere with the normal operation of the facility.

H. Contractor shall access the project site by his own means, utilizing ladders, staging, etc. No access from the interior will be allowed except with the written permission of the Engineer. Contractor shall be allowed to enter the building during construction to perform visual surveys of his work and during emergency situations.

1.02 SECTION INCLUDES

A. The work of this section consists of ***Temporary Utilities- Electrical, Lighting, Telephone, Water, Sanitary, and Fire Protection; Dust and Fume Control, Debris Control, Rodent and Pest Control, Noise Control, First Aid, Parking Areas, Barricades, Security, Temporary Project Offices and Enclosures, Thermometer, Existing Drawings and Construction Documents, Protection of Existing Landscaping and Pavement, Protection of Work, Project Representation, Emergency Repairs.***

1.03 TEMPORARY UTILITIES

A. ***Electrical:*** Contractor shall provide his own generator for electrical power. Facility's electrical power is not available to the Contractor except for small tools. Owner shall provide power for small tools only at no cost to Contractor for energy, but Contractor must employ a licensed electrician satisfactory to Owner to make all connections and do all work including removal of temporary wiring. Temporary power service shall comply with OSHA Standards. Contractor shall maintain these temporary services in good order throughout the project until Work is complete. The Contractor requiring power shall provide all extension cords.

B. ***Lighting:*** Contractor shall provide all temporary lighting for the Project. Adequate illumination shall be provided for the Work being performed; for safe movement of authorized persons through the project; for public safety and special warning lighting for hazardous conditions; and as required protecting the Project site from unauthorized entry.

C. ***Telephone:*** Contractor shall provide the Project Superintendent with a cellular phone so that he can be reached at all times for Project duration. Engineer and Owner shall be provided with the phone number.

D. ***Water:*** The Owner shall permit the Contractor to use the existing exterior water facilities providing this does not interfere in any way with the normal daily operations of the facility or normal maintenance operations. If special temporary hook-ups or plumbing is required the Contractor shall be solely responsible for the cost incurred. The Contractor shall provide drinking water for all personnel working on the project. The Contractor's use of water on the project shall comply with all federal, state, county and municipal requirements, regulations and restrictions.

E. ***Sanitary:*** The Contractor shall, at his own expense, provide the necessary toilet facilities for his men in a location approved by the Engineer. These facilities shall be open to the use of other Subcontractors and their employees. The toilet shall be removed upon completion of work, and the premises left in a clean and odorless condition. All temporary toilet facilities shall comply with the

requirements of the State, County and City. The Contractor or his Subcontractors shall not use the toilet facilities in the facility.

F. ***Fire Protection:*** Contractor shall provide adequate fire protection and fire prevention for the Project and in no case less than that is required by applicable City, County, State and Federal laws. No open flames or similar sources of ignition shall be allowed in related work or storage areas. Fire extinguishers shall be kept at all times in the immediate work area in all storage and disposal areas, and wherever flammable or combustible materials, or sources of ignition are present. All personnel on the project site shall be informed of the phone number of the local fire department and the location of the nearest telephone and shall be instructed in emergency procedures. Contractor shall instruct all personnel on the project site on the dangers of the materials being installed as well on the combustibility of the existing materials and shall insure that extreme caution is used at all times.

1.04 DUST AND FUME CONTROL

A. Contractor shall take all necessary precautions to (1) keep dust confined in the present work area and (2) prevent hazardous accumulations of dust, fumes, mists, vapors, or gases in areas occupied during construction.

B. Contractor shall submit to the Engineer, for approval, proposed methods used to contain dust and fumes in the work area. At a minimum, Contractor shall provide adequate protection at air intake units so as to prevent dust, fumes, vapors or gases from entering the facility. Contractor shall employ an industrial hygienist to monitor air quality during application of hazardous or volatile materials.

1.05 DEBRIS CONTROL

A. Provide adequate number and size of dumpsters; refuse containers, trucks, chutes, etc. for proper execution of demolition work. All demolition removal containers shall be properly protected and maintained on a daily basis. Owner must approve locations of dumpsters/refuse containers. Contractor shall submit to the Engineer, for approval, proposed methods used to conduct demolition operations and debris control.

B. Contractor shall remove all debris from the project site and shall legally dispose of all debris generated by the project. Debris shall be properly protected (and totally covered at the end of each work day) while on site and shall be properly secured and totally covered before it is transported. Debris shall be removed from the project site on a weekly basis or more often as required to maintain a neat clean site. Project site shall be broom swept on a daily basis.

C. Contractor shall be responsible for any damages to the building; it's contents, and any vehicles as a result of his negligence during the demolition and/or construction process.

1.06 RODENT AND PEST CONTROL

A. Contractor is responsible to provide rodent and pest control as necessary or as required preventing infestation of construction and temporary project offices and enclosures. Employ methods and use materials that will not adversely affect conditions at the Project site or on adjacent properties. Submit copies of proposed program contractor will utilize including products to be used, manufacturer's instructions, areas to be treated, and pollution preventive measures.

1.07 NOISE CONTROL

A. All demolition and construction work that creates excessive noise shall be reviewed with the Owner as to the types of equipment that is intended for use during normal business hours and obtain Owner's approval for such use. Noise limits shall conform to the requirements of the local governing body.

1.08 FIRST AID

A. Contractor shall provide a first aid kit with adequate provisions for the materials being used on site. All Health and Safety Data Sheets for materials being used on site shall be located within the first aid kit.

1.09 PARKING AREAS

A. The Contractor shall instruct all his employees and Subcontractor's employees to park in the area designated by the Owner. The Owner shall supply all necessary permits required for parking. Contractor's field trailer, parking for trucks and trailers, dumpsters, etc. shall be located where directed by the Engineer and the Owner, at the Contractor's cost, and no such new areas shall be used until approved by the Engineer and the Owner Any vehicle, etc., shall be moved and/or rearranged as necessary if so required by the Owner or the Engineer.

B. Contractor shall at all time keep fire lanes, access for fire apparatus, and fire protection and fire equipment clear and unobstructed. Contractor is responsible for the protection and safety of pedestrians and vehicles on the Project site in the areas of construction.

1.10 BARRICADES

A. The Contractor shall provide and maintain suitable barriers as required to prevent public entry, and to protect the work, existing facilities, trees and plants from public construction operations; remove when no longer needed or at completion of Work. Barriers shall conform to city and state laws, ordinances and permit requirements

B. All work areas shall be protected and well marked with fences or barriers and as required by public officials. Provide such barricades, safety and traffic control equipment, and police officer as shall be necessary to restrict traffic from work areas and protect all pedestrians, Owners, tenants, and visitors during construction. Contractor shall provide and maintain all necessary temporary barricades for safe conduct of his work, or as required by federal, state or local laws or ordinances and in accordance with OSHA requirements and other requirements of this specification.

C. The Contractor shall confine his apparatus, the storage of materials, parking and the operations of his workmen to those areas designated or as directed. The Contractor shall cause the minimum possible interference with the operation of the facility, shall not bar or block off any access ways, interfere with any egress ways or exits in or around the building, or move or operate to interfere with any utility lines servicing the building, except as scheduled with and approved by the Owner in advance. During the progress of work the Contractor shall phase construction so as to provide continuous access to the facility during regular operational hours. Barriers shall be provided to limit access to all work areas during construction. Contractor shall provide protection above doorways and walks in the construction area. Parking as required to deliver materials, or otherwise shall be the minimum possible. The Contractor shall confine his operations to the immediate work areas, and shall enter other areas only as specifically directed.

1.11 SECURITY

A. Contractor shall at all times comply with the security measures established by the Owner and Engineer. Contractor shall be responsible for the security of his work and equipment. The Owner is not responsible for losses due to theft.

B. Contractor shall thoroughly familiarize himself with the security measures contemplated by the Owner before submitting his bid as no claims for additional monies due to these security measures will be allowed.

C. Contractor and/or his employees or Subcontractors shall not enter the facility without notifying and receiving permission from the Owner's representative.

D. The Owner, his employees and agents shall not be responsible for the protection and security of the Contractor's equipment, facilities, tools and materials. Contractor shall provide his own security measures, if in his opinion, they are warranted. Contractor's security measures shall be approved by the Engineer and the Owner and shall not interfere or pose a hazard to the Owner, his employees, agents, visitors, customers, the facility or its contents and grounds.

1.12 TEMPORARY PROJECT OFFICES AND ENCLOSURES

A. The Contractor may provide temporary field offices and other temporary enclosures for storage, tools, employee clothes, change convenience and other activities that may be required. Coordinate location with Owner. Area is to be kept clean and must not interfere with safe pedestrian and vehicle flow.

B. The construction office and all storage shall be in secured temporary enclosures. Provide and maintain fire-fighting equipment for all temporary buildings and enclosures. Upon completion of the Project, remove temporary buildings and enclosures from the site assuming all costs in connection with their removal and proper clean-up.

1.13 THERMOMETER

A. Install an official project outdoor thermometer in a shaded-from-the-sun, conveniently readable location, which will give reasonably accurate readings of the actual temperatures, and which can be reached easily for resetting. Thermometer shall be resetable type indicating daily maximum and minimum temperature. Contractor shall keep a permanent daily log of those readings.

1.14 EXISTING DRAWINGS AND CONSTRUCTION DOCUMENTS

A. The Owner shall provide the Contractor with three (3) sets of construction Drawings and Specifications. Additional sets will be provided upon request at cost.

B. Contractor shall keep on the job site at all times the following items:

1. The most revision of the Drawings and Specifications, including all changes made by addenda, sketches, bulletins, and change orders.
2. Health and Safety Data Sheets (MSDS sheets).
3. The most recent issue of approved submittals. Obsolete or unapproved submittals and Health and Safety Data Sheets shall not be kept at the job site.
4. All material evaluation reports.

1.15 PROTECTION OF LANDSCAPING, PAVEMENT AND FURNISHINGS

A. Contractor shall protect existing landscaping and pavement areas as necessary or as required. Do not stockpile/store construction materials or debris materials in such a manner that it will permanently harm the landscaping or the pavement. Provide temporary protection to protect landscaping and pavement.

B. Contractor shall bring back to its original conditions (repair or replace in a manner acceptable to the Engineer and Owner) any portion of the landscaping (including lawns, trees, bushes and plantings), parking areas and pavements or equipment that is damaged by the Contractor or his Subcontractors' operations.

C. Contractor shall temporarily remove, store in the area designated by the Owner and replace in their original locations all furnishings located below skylights to be replaced. All damage to existing furnishings caused by the Work shall be corrected by the Contractor at no additional expense to the Owner.

1.16 PROTECTION OF WORK

A. Contractor shall protect the project site including the building, its contents, all streets, walls, underground and overhead utilities. All areas shall be left in a watertight condition in their entirety at all times. Contractor shall provide protective measures and materials to assure that each element will be without damage or deterioration throughout the entire construction period up to the date of final completion. Any defective elements shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer and Owner. Remove protective coverings and materials at the appropriate time, but no later than final cleaning operations.

B. No work shall take place during inclement weather. No work shall take place when moisture is present on the work area or in any of the materials. The Engineer may order the work stopped when, in his opinion, the weather conditions warrants him to do so. Contractor shall take such measures as necessary to dry out work surfaces so that the work can continue with minimum delay.

C. Contractor shall cover and protect all walls, windows, projections, soffits, etc. where material is to be hoisted or removed from the roof deck. Contractor shall be responsible for all scrapes, stains, and damage to the walls and shall repair or replace any walls, windows, siding, etc., which are damaged by his operations, to the satisfaction of the Engineer and Owner. Any areas damaged shall be restored or cleaned, to the satisfaction of the Owner by the Contractor at no cost to the Owner.

D. Whenever the possibility exists that debris or materials may fall causing a hazard to persons inside or outside the building, the Contractor shall post one or more of his employees to temporarily close these hazardous areas. The person in charge of the facility shall be notified prior to the commencement of work which may pose this type of hazard. Proper barricades shall be provided to prevent normal access to or around these areas.

E. Contractor shall properly protect all areas where falling debris or dust is expected due to his operations. Contractor shall be responsible for providing adequate

personnel to clean and protect these areas. Contractor shall include these costs in the bids.

F. Contractor shall provide measures to ensure that water does not flow beneath a completed section of roof by temporarily sealing the loose edge of the new membrane over the edge of the insulation at the completion of each day's work. Protect finished sections from damage due to roofing operations.

G. Protect the building interior, contents, Owner's employees and customers from all hazards associated with the Contractor's operations.

H. Any damage to the interior of the building or its contents due to the Contractor's operations or to leaks during the Contractor's operations shall be corrected at the Contractor's expense to the satisfaction of the Owner and the Engineer.

I. Any damage to the exterior of the building or any roof top equipment due to the Contractor's operations shall be corrected at the Contractor's expense or to the satisfaction of the Owner and the Engineer.

J. No member of the roof shall be overstressed due to construction loads.

K. Contractor is to provide any necessary protection to the installed work prior to acceptance by the Owner and Engineer. The Contractor at no additional cost to the Owner shall correct any damage incurred during this period.

L. Contractor is to provide any and all necessary protection to the entire roof area to maintain watertightness during the project duration, including existing roof areas not yet roofed. Any interior damages that occur as a result of the Contractor's negligence shall become the Contractor's responsibility and he shall promptly repair and/or replace the damaged items.

1.17 PROJECT REPRESENTATION

A. Contractor covenants and agrees with Owner that it will not make any use whatsoever of or cause others to make or assist others in making any use whatsoever of, any photograph, drawing or other representation of the structure which is the subject matter of this agreement and will not make any use whatsoever of the corporate or trade names, of Owner, or any portion thereof, or any of its trademarks, or any portion thereof, in connection with any advertising, promotion, publicity or other printed material. It is expressly understood and agreed that Contractor's obligation under this provision shall survive performance of the terms of this agreement, its recision or other termination and that this provision shall remain in full force and effect and shall be deemed severable from an independent of the other provisions of this agreement.

B. Contractor shall not place, erect, hang or otherwise display any type of advertising or sign on the project site without the written permission of the Owner.

1.18 EMERGENCY REPAIRS

A. Contractor shall provide Owner and Engineer with the name, address, and home telephone number of the Project Superintendent and at least two tradesmen that can be called in an emergency basis, including nights and other times when the Contractor is not working on the job, to take care of leaks on an emergency basis.

B. Such emergency work will be done at no additional cost to the Owner if such leaks are a result of the Contractor's negligence. If for any reason the Contractor's representatives cannot be reached within two hours, others will make temporary repairs and the Contractor will be backcharged for this work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

B. Work on the project, which requires submittals, shall not commence and materials shall not be ordered until all necessary submittals including shop drawings, product data, and samples are reviewed and approved in writing by the Engineer.

1.02 SECTION INCLUDES

A. The work of this section consists of ***Products, Transportation and Handling, Storage and Protection, Weather and Temperature Requirements, Substitutions.***

1.03 PRODUCTS

A. Products are defined as new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

1.04 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.05 STORAGE AND PROTECTION

A. Contractor shall follow the recommended storage procedures of the manufacturer of the materials being used. No storage on or within the building will be allowed without written permission from the Owner. Any materials brought

to the roof for daily operations or storage shall be evenly distributed on the roof to prevent concentrated loads and shall not overload the structure.

B. All moisture sensitive materials shall be stored in weatherproof trailers or temporary protective shelters and shall be stored at least 4 in. above the ground on stable pallets or skids and shall at all times be completely covered and secured. Tarpaulins or a similar "breathable" material shall be used to cover materials. Rubber or plastic materials shall not be acceptable. Factory applied "shrink packs" or plastic wrappings shall not be acceptable.

C. Materials stored on the ground shall be thoroughly secured against moisture and wind. Materials and their coverings shall be tied and/or weighted to prevent uncovering or blowing of material by the wind. Contractor shall be responsible for damages caused by blowing and improperly stored material and equipment.

D. Materials shall be handled with care and shall not be installed if they have been damaged in any way due to handling, storage or manufacturing defects. Contractor shall promptly mark and remove from the site any damaged or improperly stored materials when so requested by the Engineer.

E. All materials are to be stored at the recommended temperature range as specified by the manufacturer. Contractor shall provide manufacturer’s information to the Engineer concerning storage and handling of flammable or volatiles materials. The “shelf life” materials shall be provided with the date of manufacturer of all perishables. Materials that becomes congealed, thick, non-uniform or otherwise unsuitable for proper application shall be removed from the project site and replaced with new properly stored and tested materials.

F. Provisions for placement of the Contractor's equipment must be planned by the Contractor and submitted to the Owner and the Engineer for approval.

G. Provide off-site storage and protection when site does not permit on-site storage or protection.

1.06 WEATHER AND TEMPERATURE REQUIREMENTS

A. Work shall not commence or proceed, with the exception of the completion of necessary temporary measures to make the building weathertight, when the ambient air temperature is below 32°F unless otherwise specified.

B. Work shall not commence or proceed, with the exception of the completion of necessary temporary measures to make the building weathertight, when precipitation of any kind, or winds in excess of 20 miles per hour are present or imminent or when, in the sole judgment of the Engineer or his authorized representatives, conditions are unfavorable or detrimental to the proper installation of the systems.

C. Work shall not commence or proceed, with the exception of the completion of necessary temporary measure to make the building weathertight, when water, ice

or frost is present on or within the materials or surfaces to which materials are to be applied.

D. Work shall not commence or proceed with the exception of the completion of necessary temporary measures to make the building weathertight when the temperature is too hot to allow proper installation, or when existing or previously installed work is being damaged by the application, or when temperature conditions present a health or safety hazard to the workers on the site.

1.07 SUBSTITUTIONS

A. Whenever the proposal of substitute material, equipment or process is permitted by the Specifications, the proposed substitute material, equipment or process shall be submitted in accordance with the General Conditions and subject to the requirements contained herein and the construction regulations and laws of the Commonwealth of Massachusetts.

B. After the start of construction, the proposal of substitute material, equipment or process will be considered only for one of the following reasons:

1. The manufacture or production of the specified material, equipment or process has been discontinued.
2. The specified material, equipment or process is not available in sufficient quantity or quantities to complete the work. Failure of the Contractor to award subcontracts in sufficient time, or failure of the Contractor and/or subcontractor to place orders for material, equipment or process so as to insure delivery or execution without delaying the Work shall not establish cause for approval of substitutions.
3. Delays beyond the control of the Contractor, such as but not limited to, strikes, lockouts, storms, fires, or earthquakes, which preclude the procurement and delivery of materials or equipment for the Project as included in Contractor's proposal.
4. Advancement of the delivery date provided this advances the overall progress of the Work.
5. Improvement in quality or function of the material, equipment or process.

C. The Contractor must submit a separate request in writing for each proposed substitution, supported with complete data with drawings, specifications, samples as appropriate, including:

1. Comparison of the qualities of the proposed substitution with that specified.
2. Changes required in other elements of the Work because of substitution.
3. Effect on the construction schedule.
4. Cost data comparing the proposed substitution with the product specified.
5. Any required license fees or royalties.
6. Availability of maintenance service and source of replacement materials.

D. Any proposed substitute material, equipment or process shall be subject to the following conditions:

1. Submittal of the proposed substitute material, equipment or process per the General Conditions.
2. Submittal of the request for a substitute early enough to allow ample lead time for the Engineer's review, preparation of the submittals, fabrication and delivery, without delaying the Work.
3. Approval of substitution by the Engineer and Owner.

E. A request for substitution constitutes a representation that the Contractor:

1. Has investigated proposed product and determined that it is equal to or superior in all respects to that specified.
2. Will provide the same warranty for the Substitution as for the specified product.
3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Will reimburse Owner for review or redesign services associated with approval.

F. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

1.02 SECTION INCLUDES

A. The work of this section consists of ***Final Cleaning and Closeout, Project Record Documents, Warranties and Bonds.***

1.03 FINAL CLEANING AND CLOSEOUT

A. Each Subcontractor or Contractor, in addition set forth in the General Conditions, shall at all times keep the premises free from accumulation of waste materials or rubbish caused by his employees or work.

B. At the completion of the Project, the Contractor shall restore or replace all property damaged by his Work and shall remove all spots, paint, smears, soil, concrete, mortar, sealant, adhesives, asphalt, writing, droppings, or other foreign materials, from all Work. Remove all temporary protection from all the Work. Final cleaning shall include as a minimum:

1. Clean site; sweep paved areas, rake clean landscaped surfaces.
2. Remove waste and surplus materials, rubbish, and construction facilities from the site.
3. The Contractor shall clean all walls, windows or other building and grounds elements that have been affected by his work.
4. Repair, patch and touch-up marred surfaces to specified finish to match adjacent surfaces.

C. Contractor shall submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is substantially complete in accordance with Contract Documents and ready for Engineer's inspection. Engineer shall issue a punch list consisting of unacceptable Work and items. Contractor shall immediately make acceptable such punch list items to the satisfaction of the Engineer, and Owner. Contractor shall then notify, in writing, the Engineer that all such punch list items are complete and he is ready for reinspection. Any subsequent costs relative to reinspections that are required due to the Contractor not properly correcting the punch list items shall be paid for by the Contractor, and will be deducted from his final application for payment.

D. Contractor shall not remove crews or equipment until the project is totally completed, including punch list items, without the written permission of the Engineer.

E. If the Contractor fails to totally complete the project by the completion date required by the Contract Documents and as modified by any change orders, the Contractor shall pay all Engineering and Observation costs incurred from this project by the Owner after Contract Completion Date. These costs will be deducted from the Contractor's Final Requisition for Payment.

F. If the Contractor feels that he cannot properly complete the work during the given time constraints, then he shall make provisions for and submit his plans and requirements for working a double shift and/or weekends in order to complete the project by the date given in the Contract Documents.

G. Contractor shall submit Final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

H. Contractor shall submit as-built drawings after substantial completion of the Project. The as-builts shall include, but not be limited to, the sepias of the Drawings incorporating all changes and bulletins (enclosed in clouds), location and size of unit price work, all shop drawings incorporating all changes (enclosed in clouds), and all approved submittals.

I. Closeout submittals include, but are not limited to the following:
   1. Project Record Documents.
   2. Operation and Maintenance Data.
   3. Maintenance Manuals.
   4. As-built Drawings.
   5. Manufacturer’s inspection reports and punch list.
   6. Warranties and Guarantees.
   7. Evidence of payments and release of liens, including but not limited to:
      a. Contractor’s Affidavit of Payment of Debts and Claims-AIA G706.
      b. Contractor’s Affidavit of Release of Liens-AIA G706A, with Consent of Surety to Final Payment (AIA G707), and Contractor’s release of waivers of lien for subcontractors, suppliers and others with lien rights against property of Owner, together with a list of those parties.
   8. Disposal manifests and written certification that all materials removed from the site have been disposed of in strict accordance with existing federal, state and local laws.

1.04 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the Work:

   1. Contract Drawings.

2. Project Manual, including addenda.
3. Specifications.
4. Approved shop drawings.
5. Change Orders and other Modifications to the Contract.
6. Field change authorizations.

B. Store Record Documents separate from documents used for construction. Maintain documents in clean, dry, legible condition; do not use record documents for construction purposes. Make documents available at all times for inspection by Engineer and Owner.

C. Record information concurrent with construction progress.

D. Specifications and Addenda: Legibly mark to record:

1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and Modifications.

E. Record Documents and Shop Drawings: Legibly mark the record set of Contract Documents using a red pencil for all graphic work and red ink for all written work to record actual construction:

1. Field changes of dimension and detail.
2. Location and extent of all repairs.
3. Details not on original Contract Drawings.
4. Changes not made by change order and field change authorization.

F. Legibly mark shop drawings to record changes made after approval.

G. Submit record documents to Engineer at completion of project.

1.05 WARRANTIES AND BONDS

A. The act of the Contractor in executing the Contract or the Work shall be considered as his acceptance of the following guarantees covering the Project:

1. Any materials, workmanship or equipment furnished as part of this Project which prove defective or fail to operate properly, within two (2) years, or as otherwise specified in the Contract Documents, of the date of acceptance of the Work, shall be repaired and/or replaced by the Contractor promptly upon notification from the Owner and without cost to the Owner. Also reference Divisions 2 through 16 for additional warranties and guarantees.

2. Date of acceptance will be established by the Owner and Engineer upon finding all items of this Project have achieved final completion as to quality of workmanship and materials.

PART 2 - PRODUCTS (Not used)

PART 3 - PRODUCTS (Not Used)

END OF SECTION

SECTION 02050

DEMOLITION

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

1.02 SECTION INCLUDES

A. The work of this section consists of the demolition and legal disposal of materials to be removed at specified locations required to complete the roofing replacement and repair work.

B. Demolition work shall include, but is not limited to, the following:

1. The complete removal and legal disposal of the existing roofing systems, and associated components as required to accomplish the work as specified and detailed.

2. The Contractor shall use extreme caution during the roof removal and replacement operations. The Contractor is responsible for maintaining the roofs in a watertight condition during the roof removal and replacement process. The Contractor is responsible for preventing any construction related material from entering the building and the roof drainage system(s) during the roof removal and replacement process.

3. The Contractor shall use extreme caution during reroofing operations. The facilities are operational and contain personnel, furniture, fixtures and equipment. Mechanical equipment such as lighting, electrical conduits, junction boxes, ceiling attachments, etc. may exist in the vicinity of or on the underside of the roof decking. Contractor shall take all necessary precautions so as not to cause any damages. Any damages that interrupt service and/or require repairs to the building, furniture, fixtures or equipment shall be the responsibility of the Contractor at no additional cost to the Owner and shall be repaired immediately.

4. The Contractor shall be responsible for the complete removal and legal disposal of roof decking, interior finishes, concrete and masonry as necessary to allow installation of overflow drains and associated drain leader piping. Roof decking, interior finishes, concrete and masonry shall be replaced after overflow drains and associated drain leader piping work has been completed

C. The Contractor shall use extreme caution during reroofing operations. The facilities are operational and contain personnel, furniture, fixtures and equipment.

Mechanical equipment such as lighting, electrical conduits, junction boxes, etc. may exist in the vicinity of or on the underside of the roof decking. Contractor shall take all necessary precautions so as not to cause any damages. Any damages that interrupt service and/or require repairs to the building, furniture, fixtures or equipment shall be the responsibility of the Contractor at no additional cost to the Owner and shall be repaired immediately.

D. The existing roofing system composition information has been compiled from a variety of sources. Plans and dimensions under which the Work is to be performed are derived from a variety of sources. The existing conditions are provided for information only. Actual conditions may vary. Contractor is required to verify existing roofing system composition, conditions, and dimensions prior to submitting his bid. No additional compensation or time extension will be made for dimensional errors or discoverable inaccuracies related to existing conditions in the contract documents.

E. The drawings indicate and show limits of construction for this project. The specifications specify material and work requirements for this project. Both are complementary to each other and both shall be followed to complete the work.

1.03 RELATED WORK

A. Section 06100 – Rough Carpentry
B. Section 07220 – Roof Insulation
C. Section 07321 – Slate Roof Repairs
D. Section 07510 – Built-up Roofing & Flashing
E. Section 15400 - Plumbing - Roof Drains

1.04 PROJECT COORDINATION

A. The Project Administrator shall be the Owner. The Contractor shall cooperate fully with the Administrator in all aspects of the demolition, including but not limited to, the following: elevator use, loading dock use, allocation of demolition areas, demolition equipment, dumpsters, dump trucks, chutes, protection, hours of operation, and traffic flow.

B. It is the responsibility of the Contractor to coordinate the work of this Section with all other work on the project.

C. The Contractor shall make all necessary arrangements to limit travel on the existing roofing systems. Where it is necessary to travel on the existing roofing systems the contractor shall provide all necessary temporary protection needed to protect the existing roofing systems so as to ensure no leaks into the facility. Any damage to the existing roofing systems caused by work of this contract shall be repaired at no cost to the Owner. The Contractor shall maintain the building in a watertight and weathertight condition through the duration of the contract.

D. Contractor shall coordinate completion and clean up of work on a daily basis, including maintaining water-tightness and weather-tightness for project duration.

1.05 SUBMITTALS

A. The Contractor shall submit for approval the complete sequence of operations for demolition and show how it is coordinated with all other aspects of the job. Work shall not begin until such a schedule has been approved by the Engineer and the Owner.

B. The Contractor shall submit a description of all procedures and equipment to be utilized to perform the demolition work, debris control and disposal. **No heavy mobile equipment shall be permitted on the roof.**

C. Contractor shall submit to the Engineer, for approval, proposed methods used to contain dust and fumes in the work area.

D. Submit copies of proposed rodent and pest control program that contractor will utilize (if it becomes necessary) including products to be used, manufacturer's instructions, areas to be treated, and pollution preventive measures.

E. The Contractor shall perform an existing condition survey of the building, grounds and adjacent areas prior to work commencement. The Contractor shall provide existing conditions documentation (photos and/or DVD) and a list of damaged or deteriorated elements to the Owner and Engineer. The Contractor shall be responsible for repair or replacement of damaged or deteriorated items, not on that list, when the operations of the Contractor are complete, to the satisfaction of the Owner and Engineer, at no change in contract price.

F. The Contractor shall submit proposed methods and required procedures used to remove and legally dispose of any hazardous waste containing materials.

1.06 HAZARDOUS MATERIALS

A. The Contractor is hereby notified that samples of the existing built-up roofing felts (field and flashing plies) were tested for the presence of asbestos containing material, and the results are negative.

B. If any hazardous waste materials, or materials suspected to contain hazardous waste are encountered during construction, demolition, or cutting and patching the Contractor shall contact the appropriate Massachusetts State Agency and the appropriate Federal Agency concerning all questions and the latest procedures for the safe removal, disposal, or encapsulation of these materials and shall adhere to all procedures. The Contractor shall provide the Owner with these procedures prior to any demolition. The Contractor shall also provide the Owner all information related to the safe disposal of such upon project completion (i.e. dumping slips, manifestation reports, etc.).

C. If the Contractor or Subcontractor disturbs, removes, disposes, or encapsulates these materials without written authorization and instructions from the Owner or Architect; or disturbs, removes, disposes, or encapsulates these materials in a manner not in accordance with the authorizations and instructions, the Contractor

and Subcontractor shall indemnify, defend, and hold harmless the Owner and Architect against any loss, damage, or liability arising or resulting from such unauthorized improper acts of the Contractor and Subcontractor; and further, the Owner and Engineer shall not be responsible for any such loss, damage, or liability arising or resulting from the Contractor's or Subcontractor's acts.

1.07 CONTRACTOR'S USE OF PREMISES

A. Contractor shall limit its use of the site for work and for storage to allow for:

1. Owner occupancy and use of the building during construction.

2. Public use of walks, parking lots, and driveways.

B. Do not block exits at any time. Provide protected entranceways at each entrance when working in these areas.

C. Coordinate work on the roof, use of the site, storage areas, and staging areas with the Owner. Limit use of the site and working hours to dates, times, and locations approved by the Owner.

D. Cooperate with the Owner's scheduling requirements for working at an occupied building. Work under this Section shall not interfere with the operation of the building or building occupants at any time.

E. The Contractor is responsible for protecting all materials and equipment stored on the site.

F. Smoking is not permitted on the grounds.

G. Dispose of all trash and debris in a legal manner off-site. Do not throw debris from access equipment or staging. Conduct debris to approved containers on the ground. Locate debris containers only in locations approved by the Owner in advance.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide adequate number and size of dumpsters, refuse containers, trucks, chutes, staging, access equipment, demolition equipment, etc. for proper execution of demolition work.

B. All demolition removal containers shall be properly protected and maintained on a daily basis. Owner must approve locations of dumpsters/refuse containers. Contractor shall submit to the Architect, for approval, proposed methods used to conduct demolition operations and debris control.

PART 3 – EXECUTION

3.01 DEBRIS CONTROL

A. Contractor shall remove all debris from the project site and shall legally dispose of all debris generated by the project. Debris shall be properly protected (and totally covered at the end of each work day) while on site and shall be properly secured and totally covered before it is transported. Debris shall be removed from the project site on a weekly basis or more often as required to maintain a neat clean site. Project site shall be broom swept on a daily basis.

B. Contractor shall be responsible for any damages to the building; its contents, and any vehicles as a result of his negligence during the demolition and/or construction process.

3.02 PROTECTION OF WORK

A. Contractor shall protect the project site including the building, its contents, all streets, walls, underground and overhead utilities. All areas shall be left in a watertight condition in their entirety at all times. Contractor shall provide protective measures and materials to assure that each element will be without damage or deterioration throughout the entire construction period up to the date of final completion. Any defective elements shall be removed and replaced at the Contractor's expense and to the satisfaction of the Architect and Owner. Remove protective coverings and materials at the appropriate time, but no later than final cleaning operations.

B. No work shall take place during inclement weather. No work shall take place when moisture is present on the work area or in any of the materials. The Architect may order the work stopped when, in his opinion, the weather conditions warrants him to do so. Contractor shall take such measures as necessary to dry out work surfaces so that the work can continue with minimum delay.

C. Contractor shall cover and protect all walls, windows, projections, soffits, etc. where material is to be hoisted or removed from the roof deck. Contractor shall be responsible for all scrapes, stains, and damage to the walls and shall repair or replace any walls, windows, siding, etc., which are damaged by his operations, to the satisfaction of the Architect and Owner. Any areas damaged shall be restored or cleaned, to the satisfaction of the Owner by the Contractor at <u>no</u> cost to the Owner.

D. Whenever the possibility exists that debris or materials may fall causing a hazard to persons inside or outside the building, the Contractor shall post one or more of his employees to temporarily close these hazardous areas. The person in charge of the facility shall be notified prior to the commencement of work which may pose this type of hazard. Proper barricades shall be provided to prevent normal access to or around these areas.

E. Contractor shall properly protect all areas where falling debris or dust is expected due to his operations. Contractor shall be responsible for providing adequate personnel to clean and protect these areas. Contractor shall include these costs in the bids.

F. Protect the building interior, contents, Owner's employees and customers from all hazards associated with the Contractor's operations.

G. Any damage to the interior of the building or its contents due to the Contractor's operations or to leaks during the Contractor's operations shall be corrected at the Contractor's expense to the satisfaction of the Owner and the Architect.

H. Any damage to the exterior of the building or any roof top equipment due to the Contractor's operations shall be corrected at the Contractor's expense or to the satisfaction of the Owner and the Architect.

I. No member of the roof shall be overstressed due to construction loads and demolition operations. The Owner assumes no responsibility for the actual condition of the structure.

3.03 REPAIR OF DAMAGES

A. Damage to any portion of the building which results in disruption of or inconvenience to the Owner or his employees shall be immediately repaired or replaced by the Contractor. If such restitution is not promptly made, the Owner shall have the necessary work performed by an outside agency at the Contractor’s expense.

3.04 CLEANING

A. The building and adjacent areas shall be left in a broom-clean condition at the end of each day. On completion of the work of this section and after removal of all debris, the site shall be left in a clean condition satisfactory to the Owner and to the Engineer.

B. At the completion of the Project, the Contractor shall restore or replace all property damaged by his Work and shall remove all spots, paint, smears, soil, concrete, mortar, sealant, adhesives, asphalt, writing, droppings, or other foreign materials, from all Work. Remove all temporary protection from all the Work. Final cleaning shall include as a minimum:

1. Clean site; sweep paved areas, rake clean landscaped surfaces.

2. Remove waste and surplus materials, rubbish, sanitary facilities, and construction facilities from the site.

3. The Contractor shall clean all walls, windows, ductwork, or other building and grounds elements that have been affected by his work.

4. Repair, patch and touch-up marred surfaces to specified finish to match adjacent surfaces.

5. The Contractor shall clean the surface of the roof to the satisfaction of the Engineer, Roofing Systems Manufacturer, and Owner.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

PART 1- GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

1.02 SECTION INCLUDES

A. The work of this Section consists of furnishing and installing all rough carpentry and related items as indicated on the Drawings and specified herein, required to complete the roofing replacement and repair work, including but not limited to the following:

1. Installation of wood blocking at perimeters, expansion joints, and rooftop penetrations.

2. Installation of plywood at vertical surfaces and rooftop penetrations.

3. The Contractor shall include in the Bid his price for random replacement of deteriorated tongue and groove wood decking. Reference paragraph 1.08- Unit Prices for bid quantities. Provide unit prices for changes in the bid quantities for the specified work listed in this section on the Form for General Bid.

B. All materials shall be verified by Contractor to be proper for each intended use, and the entire work of this Section shall be done in such a manner that each installation will perform its intended purpose as applicable, in the finished work.

C. The drawings indicate and show limits of construction for this project. The specifications specify material and work requirements for this project. Both are complementary to each other and both shall be followed to complete the work.

D. Plans and dimensions under which the Work is to be performed are derived from a variety of sources. The existing conditions are provided for information only. Actual conditions may vary. Contractor is required to verify existing roofing system composition, conditions, and dimensions prior to submitting his bid. No additional compensation or time extension will be made for dimensional errors or discoverable inaccuracies related to existing conditions in the contract documents.

1.03 RELATED WORK

A. Section 02050 - Demolition
B. Section 07220 - Roof Insulation

C. Section 07321 – Slate Roof Repairs
D. Section 07510 – Built-up Roofing & Flashing
E. Section 15400 - Plumbing - Roof Drains

1.04 SUBMITTALS

A. Submit the following under the provisions of Section 01300:

1. Manufacturer's or applicator's specification for wood preservative treatment and treatment procedure to be sure that a satisfactory treatment will be obtained.

2. Manufacturer's specification data sheets for all fasteners to be used, clearly identifying such as their intended use.

3. Material Certificates: (1) For lumber specified to comply with minimum allowable unit stresses, indicate species and grade selected for each use and design values approved by ALSC's Board of review; (2) For preservative-treated wood products, indicate type of preservative used and net amount of preservative retained; (3) For products receiving a waterborne treatment, include statement that the moisture content of treated materials was reduced to levels specified before shipment to Project site.

4. Certificates of Inspections: Issued by lumber-grading agency for exposed wood products not marked with grade stamp.

5. Shop drawings of all blocking and other wood assemblies, including anchorage to existing structure. Coordinate Shop Drawings with all relevant work of other trades specified in other Sections. Show compliance with FM Global Loss Prevention Data Sheets 1-29 and 1-49 for all wood nailers at roof edges.

6. Shop drawings of roof edge blocking elevation, coordinated with the approved tapered insulation layout shop drawings.

1.05 CODES AND STANDARDS

A. Except as modified by the requirements of other governing codes and by this specification plywood sheathing, wood decking, wood blocking and its installation shall conform to the provisions and recommendations of the following codes and standards:

1. Factory Mutual Loss Prevention Data Bulletins 1-29 and 1-49.
2. APA: American Plywood Association.
American Softwood Lumber Standard P.S. 20-70
AWPA: (American Wood Preservers Association) C1-A11 Timber Products Preservation Treatment by Pressure Process.
Conform to applicable local building code requirements.

Wood Blocking shall not be less than 2”x6” nominal (1 ½”x5 ½”).
ANSI/SPRI/FM 4435/ES-1; Wind Design Standard for Edge Systems Used with Low-Slope Roofing Systems.
NRCA Roofing & Waterproofing Manual.
SPIB: Southern Pine Inspection Bureau.
NELMA: Northeastern Lumber Grading Association.
NLGA: National Lumber Grading Association.
NDS: National Design Specification for Wood Construction

1.06 CONTRACTOR’S USE OF PREMISES

A. Contractor shall limit its use of the site for work and for storage to allow for:

1. Owner occupancy and use of the building during construction.

2. Public use of walks, parking lots, and driveways.

B. Do not block exits at any time. Provide protected entranceways at each entrance when working in these areas.

C. Coordinate work on the roof, use of the site, storage areas, and staging areas with the Owner. Limit use of the site and working hours to dates, times, and locations approved by the Owner.

D. Cooperate with the Owner’s scheduling requirements for working at an occupied building. Work under this Section shall not interfere with the operation of the building or building occupants at any time.

E. The Contractor is responsible for protecting all materials and equipment stored on the site.

F. Smoking is not permitted on the grounds.

G. Dispose of all trash and debris in a legal manner off-site. Do not throw debris from access equipment or staging. Conduct debris to approved containers on the ground. Locate debris containers only in locations approved by the Owner in advance.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect the existing building and its contents; the premises, including access drives and parking areas; interior finishes; and all site work (landscaping) during all demolition, removal, and repair operations against all risks associated with this work. Replace damaged components at no charge to the Owner and to the satisfaction of the Owner using mechanics skilled in the appropriate trade including all site work.

B. Do not damage existing materials scheduled to remain. Provide adequate protection of the window glass to prevent breakage, scratches, staining, etching, and any other damage during work associated with this Section.

C. Schedule and execute all work to avoid exposing the building and its contents to inclement weather. Prevent water intrusion through the temporary protection.

D. Check all specified items upon Contract signing, and order early so the work is not delayed. Certain materials may require considerable lead-time for delivery.

E. Coordinate with the Owner's representative regarding roof access and hoist or crane locations.

F. Season all wood prior to use by neatly stacking on dunnage in a manner to avoid distortion of wood. Cover with breathable, waterproof, and flame-retardant canvas tarpaulins (not polyethylene) arranged to allow air movement beneath the covers. Do not use any stock with excessive twist or bow. Moisture content shall not exceed 19% at time of installation; 17% for plywood. Store in a secure area assigned by the Owner's representative.

G. Avoid traffic over completed roofing surfaces. Do not use new roof surfaces for storage or work areas. Protect new and existing roof surfaces with smooth 5/8 in. thick (minimum) plywood runways where access is required, and ensure full protection of new and existing roofing surfaces against mechanical damage. Notify the Engineer immediately, and in writing, if anyone abuses or damages roofing or flashing components.

H. Promptly remove from the site all materials or incomplete waterproofing work exposed to any moisture anywhere, at any time, during transportation, storage, handling and installation, or rejected by the Owner.

1.08 UNIT PRICES

A. Include in the bid amount unit prices for changes in the Contract Quantities for the specified work listed in this section on the Form for General Bid. The Contractor shall include in all lump sum bids (contract price) his price for the following:

1. Deteriorated existing tongue and groove decking shall be replaced with new tongue and groove wood decking. The Contractor shall include 200 square feet (SF) as the Bid quantity. Provide unit prices for changes in the bid quantity for the specified work listed in this section on the Form for General Bid

B. The Contractor shall notify the Engineer immediately upon uncovering existing wood showing signs of deterioration, including water damage, rot, warping or excessive deflection.

C. The Contractor shall perform unit price work only when approved by the Engineer. The Contractor shall properly document that the work has been completed. Proper documentation shall include photos and locations shown on the roof plan. Quantity tabulation shall be done on a daily basis by the

Contractor and reported at the construction meetings, or more often as requested by the Engineer.

1.09 WARRANTY

A. The Contractor shall supply the Owner with a minimum two-year workmanship and leak-free warranty. In the event any work related to this section is found to be defective, is not watertight, or otherwise not in accordance with the contract documents within two (2) years of final completion, the Contractor shall repair and/or remove and replace at no cost to the Owner.

PART 2 - PRODUCTS

2.01 DIMENSIONAL LUMBER

A. Materials shall be of sound stock, new, straight, of consistent size, free of stains and mildew.

B. Materials shall be kiln dried to a moisture content of not more than 19%. Pressure treated lumber shall be kiln dried a second time after treatment.

C. Materials shall be surfaced four sides and shall bear the grade and trademark of the association under whose rules it is produced, and a mark of mill identification. Materials shall be construction grade Douglas Fir, Hem-Fir, West Coat Hemlock, West Coast Fir, or Southern Yellow Pine.

D. Materials shall be furnished in the longest practicable lengths with respect to each intended use - at least twelve feet unless shorter lengths are required and/or are specified. Single length pieces shall be used whenever possible.

E. All new wood blocking, nailers, and fencing materials shall be pressure-treated with waterborne salt preservatives that will have no deleterious effect on the roofing materials. Treatment shall be 0.40 lbs. per cubic foot of retention. Treatment shall leave a noticeable tint to wood so that treated wood can be visually differentiated from untreated wood. No oil-based pentachlorophenol or creosote treatments shall be permitted.

F. Dimension Lumber for structural framing shall be one of the following Species and Grade combinations, or equal or better, as approved by the engineer (all dimensions are nominal):

Joists and Rafters (2 to 4 inches thick, 4 inches or wider): Douglas Fir-Larch, No.2; Douglas Fir-Larch (North), No. 1/No. 2; Douglas Fir-South, No. 1; Hem-Fir, No. 2;Hem Fir (North), No.1/No. 2; Mixed Southern Pine, No.2; Southern Pine, No. 2 Non-Dense; Spruce Pine Fir, No. 1/ No. 2; Spruce Pine Fir (South), Select Structural.

4x4 Sill Plates supporting roof framing: Douglas Fir-Larch, Construction Grade; Douglas Fir-Larch (North), Select Structural; Douglas Fir-South, Select Structural; Hem-Fir, No. 1 & Btr; Hem Fir (North), No.1/No. 2; Hem Fir (North), Construction Grade; Mixed Southern Pine, Construction Grade; Southern Pine, No. 2 Dense; Spruce Pine Fir, Select Structural; Spruce Pine Fir (South), Select Structural.

G. Lumber for framing not supporting structural loads, or for miscellaneous blocking shall be of one of the above species groups, No. 2 Grade or Construction Grade, or better.

H. Allowable stresses for Dimension Lumber framing shall not be less than indicated in the following table (in pounds per square inch):

	Fb	Ft	Fv	Fc⊥	Fc	E
Joists/Rafters	825	425	70	335	1100	1,300,000
4x4 Plates	1000	550	70	335	1200	1,000,000
Studs	675	325	70	335	675	1,000,000

I. Replacement roof deck materials shall be construction grade Douglas Fir, Hem-Fir, West Coat Hemlock, West Coast Fir, or Southern Yellow Pine formed to dimensions required to match existing roof decking.

2.02 PLYWOOD

A. Plywood shall be 1/2” thick at vertical surfaces scheduled to be flashed and as an additional layer of wood blocking at go-over roof areas. All plywood shall be exterior grade of Group 1 or 2 species, Type CDX or better. All plywood shall have an APA stamp on it and shall meet the requirements of Product Standard PS 1-95 for Construction and Industrial Plywood.

B. All plywood shall have a maximum moisture content of 15% by weight on a dry basis. Unless kiln dried after treatment, wolmanized plywood is not acceptable due to moisture content requirements herein.

C. Nailers 10" wide and narrower that are indicated as plywood may be a single piece of dimensional lumber as specified in Paragraph 2.01 of this section. Those over 10" in width shall be plywood.

2.03 FASTENERS

A. All fasteners and anchors shall be stainless steel unless otherwise noted.

1. For attaching lumber to masonry: 3/8 in. dia. threaded rods set in a two-component adhesive into grouted CMU cells or solid masonry, 4 in. minimum embedment into backup material. Adhesive may be the following or approved equal:

a. AC100+gold by Powers Fasteners, Inc.

b. HIT-HY 70 injectable mortar by Hilti, with screen tube for support

2. For attaching plywood to masonry: 3/8 in. dia. concrete/masonry screw, length as required to provide 2-1/2 in. minimum embedment into backup material. Fastener may be the following or approved equal:

   a. Wedge-bolt+ by Powers Fasteners, Inc.
   b. Kwik-Con 2 by Hilti

3. For attaching plywood to concrete: 1/4 in. diameter, with countersunk (flat) head, length to provide manufacturer's standard embedment into concrete.

4. For wood-to-wood: Hot dipped galvanized, annular ring nails, 11 ga or in gauges as detailed or required, with length to provide a minimum of 1-1/2 in. embedment into the final piece receiving the nail points, except full depth into plywood.

5. For attaching plywood to wood blocking and all other wood-to-wood connections: No. 10 steel screws with tapered Phillips head, length to provide 1-1/4 in. minimum embedment.

6. Joist hangers, rafter ties, etc.: Galvanized steel, sized to suite framing or as indicated on the drawings.

PART 3 - EXECUTION

3.01 GENERAL

A. Construct all rough carpentry work called for on the drawings plumb, level, and true with tight, close fitting joints. Carpentry shall be securely attached and braced to surrounding construction, and executed in a first-class workmanship manner. Runs of blocking shall be built up plumb, straight and in-line with exterior masonry walls.

B. Blocking shall be built to the same thickness as the insulation to the maximum extent possible, within 1/16" plus or minus. Blocking shall extend at least 2" beyond edge of metal flashing.

C. At continuous blocking runs longer than two (2) feet, the minimum length of blocking shall be two (2) feet.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

   1. ANSI/SPRI/FM 4435/ES-1 – Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems and FM Global Loss Prevention Data Sheets 1-29 and 1-49.

2. Countersink fasteners into wood only to depth for fastener heads to be flush.

3.02 EXAMINATION

A. The Contractor is to exercise extreme caution when removing the existing roofing system to ensure the integrity.

B. Examine surfaces scheduled to receive repair material for unevenness, irregularities, and dampness that would affect quality and execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.

C. Contractor is responsible for verification of all dimensions and existing conditions. Contractor shall provide adequate amounts of rough carpentry products on site daily so as to ensure that the repairs are completed in a timely fashion. Delays and/or temporary roofing due to inadequate amounts of repair product will not be allowed.

3.03 PROTECTION

A. The Contractor shall use extreme caution during wood blocking replacement operations. The facility is operational and contains personnel, furniture, fixtures and equipment.

1. Contractor shall properly protect all areas from falling materials, debris, or dust due to his operations. Contractor shall be responsible for providing adequate personnel to protect, barricade, clean and protect these areas.

2. Protect the building interior, contents, and occupants from all hazards associated with the Contractor's operations.

3. Equipment such as lighting, electrical conduits, junction boxes, ceiling tiles and associated attachment components may exist in the vicinity of or on the underside of the roof decking. Contractor shall take all necessary precautions so as not to cause any damages. Any damages that interrupt service and/or require repairs to the building furniture, fixtures or equipment shall be the responsibility of the Contractor at no additional cost to the Owner and shall be repaired immediately.

4. During wood blocking replacement operations, the Contractor shall post one or more of his employees inside the facility to temporarily close the affected areas. The person in charge of the facility shall be notified by the Contractor prior to the commencement of this work. Proper barricades shall be provided by the Contractor to prevent normal access to or around these areas.

B. Any damage to the interior of the building or its contents due to the Contractor's operations or to leaks during the Contractor's operations shall be corrected at the Contractor's expense to the satisfaction of the Owner and the Architect.

3.04 FASTENING

A. All blocking and plywood shall be fastened to meet or exceed Factory Mutual's requirements and/or recommendations.

B. Fasteners for wood blocking shall be staggered and spaced 12" o.c. when secured to wood blocking. The staggered fastening pattern shall be increased within 8 feet from outside corners to 6" on center. Smaller pieces of blocking, such as penetrations, shall have a minimum of four fasteners per piece. A fastener shall be located no more than four inches from the end of each piece of blocking. Two fasteners are required at the ends of all blocking. Fasteners to penetrate the substrate a minimum of 1-1/4" attaching to wood blocking or 1-1/2" when attaching to steel, concrete, or masonry. Through bolts shall be spaced at 24" o.c. when attaching wood blocking to the cementitious wood fiber and lightweight concrete decking. Through bolts shall be installed from the underside of the cementitious wood fiber deck in areas where the deck is exposed.

C. Counterbore at all bolt heads, nuts, and washers as may be required to provide a flush surface for installation of roofing membrane materials.

D. Plywood used at vertical flashing areas shall be securely fastened to the substrate at the top, middle and bottom with the approved fastener at 6" on center. When used in layers, each layer of plywood shall be secured equally, with fastener spacing as specified herein.

E. Fasteners for wood decking shall be staggered and spaced 12" o.c. when secured to wood blocking or structure. Three fasteners are required at all bearing points. Fasteners shall penetrate the substrate a minimum of 1-1/4".

3.05 FRAMING

A. Select individual lumber pieces so knots and obvious defects will not interfere with placing bolts or proper nailing or making connections.

B. Do not shim any framing component, except as noted in the drawings.

C. All framing shall have full bearing unless otherwise indicated. Finish bearing surfaces so as to give sure and even support. Where framing members slope, use sloped rafter hangers, or cut or notch the ends as required to give uniform bearing surface. Finish all corners of notches with handsaw – do not overcut.

D. All framing shall be installed with any natural crown or camber upward.

E. Do not toe nail any connection that carries vertical load. Use Joist, beam or rafter hangers as required.

F. Do not notch, bore or cut members for pipes, ducts, conduits or other reasons except as shown on drawings or as specifically approved beforehand by the Engineer.

G. Install blocking as required to support items of finish and to cut off draft openings, both vertical and horizontal, between ceiling and floor areas.

END OF SECTION

SECTION 07220

ROOF INSULATION

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

1.02 SECTION INCLUDES

A. The work of this Section consists of furnishing and installing all roofing insulation, air/vapor barrier membrane, and related items as indicated on the Drawing and specified herein, required to complete the roofing replacement and repair work.

B. The replacement insulation, cover board, and thermal barrier board shall be as indicated in the schedule located on Drawings. Polyisocyanurate Rigid Board Roof Insulation (both tapered and flat stock) is specified. The compressive strength of the polyisocyanurate rigid board roof insulation shall be 25 psi. A brief description of the roofing system composition is as follows:

1. At tongue and groove wood deck areas: thermal barrier board to be mechanically fastened to the tongue and groove wood deck, air/vapor barrier membrane to be adhered to thermal barrier board, insulation board to be adhered to air/vapor barrier membrane, insulation to insulation board shall be adhered in insulation adhesive, cover board to be adhered to insulation board in insulation adhesive, and 3 ply built-up roof with modified bitumen cap sheet to be adhered to insulation board with cold process adhesive.

2. Attachment of components to meet or exceed a Factory Mutual fastening rate and pattern (FM 1-75 in the field of the roof, FM 1-90 at roof perimeters, FM 1-135 at roof corners).

C. All materials shall be verified by Contractor to be proper for each intended use, and the entire work of this Section shall be done in such a manner that each installation will perform its intended purpose as applicable, in the finished work.

D. The drawings indicate and show limits of construction for this project. The specifications specify material and work requirements for this project. Both are complementary to each other and both shall be followed to complete the work.

E. Plans and dimensions under which the Work is to be performed are derived from a variety of sources. The existing conditions are provided for information only. Actual conditions may vary. Contractor is required to verify existing roofing system composition, conditions, and dimensions prior to submitting his bid. No additional compensation or time extension will be made for dimensional errors or

discoverable inaccuracies related to existing conditions in the contract documents.

1.03 RELATED WORK

A. Section 02050 – Demolition
B. Section 06200 - Rough Carpentry
C. Section 07321 – Slate Roof Repairs
D. Section 07510 – Built-up Roofing & Flashing
E. Section 15400 - Plumbing - Roof Drains

1.04 QUALITY ASSURANCE

A. All materials used as a component of the roofing system shall be supplied or approved in writing by the roofing system manufacturer. All materials shall be installed to serve their intended function.

B. The insulation manufacturer's technical representative (not a salesperson) shall certify in writing the materials and fastening specified are proper for their particular application. Submission of this letter shall be acceptance of the technical specification, details, and the specified guarantee.

C. The insulation manufacturer's technical representative (not a salesperson) shall visit the site at the initial application of his product and as often as required by the Contractor and Engineer to ensure the specifications, details, requirements and recommendations are followed. During the installation, an inspection shall be made by the technical representative to ascertain that the insulation board has been installed according to the specifications and details and will be accepted by the manufacturer and that the manufacturer will issue the specified warranty.

D. All work shall be applied in strict accordance with the provisions of the technical specification and details. No deviations shall be permitted without written consent from the Engineer. Should a conflict between this specification (and the associated details) and the manufacturer's requirements arise, the most restrictive provision, as determined by the Engineer, shall govern.

1.05 SUBMITTALS

A. Submit the following under the provisions of Section 01300.

1. An approval letter from the insulation manufacturer stating that the insulation, thermal barrier board, cover board, fasteners, insulation adhesive, specified for this project are acceptable (accepting the technical specification and details); stating that the specified guarantee will be issued; and stating that a technical representative will be on site as often as required by the Contractor and Engineer, and as stipulated in this specification.

2. Manufacturer data sheet for all products specified in this Section including but not limited to insulation, cover board, adhesive, fasteners.

3. Manufacturer provided shop drawings for insulation attachment shall be submitted for review and approval. Insulation fastener fastening pattern and adhesive application rate shall be provided. The drawings shall indicate complete layout, fastening pattern, and application rates for all roof areas indicating a Factory Mutual fastening rate and pattern (FM 1-75 in the field of the roof, FM 1-90 at roof perimeters, FM 1-135 at roof corners).

5. Manufacturer's Material Safety Data Sheets for all products specified in this Section.

6. Manufacturer’s uplift resistance test results for insulation fasteners and insulation adhesive.

1.06 CODES

A. Except as modified by the requirements of other governing codes and by this specification, overlay board and its installation shall conform to the provisions and recommendations of the following codes and standards:

1. Insulation board shall have Factory Mutual Class I approval.

2. Factory Mutual Research Engineering Corporation (FM): FM Construction Bulletins 1-28, 1-29 and 1-49.

3. Adhesive attachment and mechanical attachment of rigid board polyisocyanurate roof insulation and cover board shall meet or exceed Factory Mutual's latest wind uplift fastening rate and pattern for a cold applied built-up roofing system over tongue and groove roof decking (FM 1-75 in the field of the roof, FM 1-90 at roof perimeters, FM 1-135 at roof corners).

4. Insulation fasteners and distribution plates shall have Factory Mutual approval for the system specified.

5. Insulation shall carry Underwriters Laboratory (Class A) approval for fire resistance.

6. Conform to Massachusetts State Building Code, latest revision and any applicable local building code requirements.

7. ASTM C 1289, – Standard specification for faced rigid cellular polyisocyanurate insulation board.

8. LTTR – Long Term Thermal Resistance, using techniques from CAN/ULC S770 based on ASTM C1303.

1.07 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.08 STORAGE AND PROTECTION

A. Contractor shall follow the recommended storage procedures of the manufacturer of the materials being used. No storage on or within the building will be allowed without written permission from the Owner. Any materials brought to the roof for daily operations or storage shall be evenly distributed on the roof to prevent concentrated loads and shall not overload the structure.

B. All moisture sensitive materials shall be stored in weatherproof trailers or temporary protective shelters and shall be stored at least 4 inches above the ground on stable pallets or skids and shall at all times be completely covered and secured. Tarpaulins or a similar "breathable" material shall be used to cover materials. Rubber or plastic materials shall not be acceptable. Factory applied "shrink packs" or plastic wrappings shall not be acceptable. Careful control of humidity shall be performed to prevent greater than 10% moisture within composition insulations and overlay boards.

C. Materials stored on the ground shall be thoroughly secured against moisture and wind. Materials and their coverings shall be tied and/or weighted to prevent uncovering or blowing of material by the wind. Contractor shall be responsible for damages caused by blowing and improperly stored material and equipment.

D. Materials shall be handled with care and shall not be installed if they have been damaged in any way due to handling, storage or manufacturing defects. Contractor shall promptly mark and remove from the site any damaged or improperly stored materials when so requested by the Engineer.

E. All materials are to be stored at the recommended temperature range as specified by the manufacturer. Contractor shall provide manufacturer’s information to the Engineer concerning storage and handling of flammable or volatiles materials. The “shelf life” materials shall be provided with the date of manufacturer of all perishables. Materials that becomes congealed, thick, non-uniform or otherwise unsuitable for proper application shall be removed from the project site and replaced with new properly stored and tested materials.

F. Provisions for placement of the Contractor's equipment must be planned by the Contractor and submitted to the Owner and the Engineer for approval.

G. Provide off-site storage and protection when site does not permit on-site storage or protection.

1.09 WARRANTY

A. The roofing contractor shall supply the Owner with a two (2) year workmanship guarantee covering all areas in the Contract. In the event that any work performed by the Contractor or materials supplied by the Contractor are found defective or otherwise not in accordance with the Contract Documents within two (2) years of acceptance of the work by the Owner, the roofing contractor shall remove and replace at no cost to the Owner.

B. Insulation, cover board, fasteners, and adhesive shall be included in the roof membrane manufacturer's 20-year full system warranty. During this period, manufacturer shall make good at his own expense any faults or imperfections that may arise due to defects in the materials as well as from defects in the workmanship involved in their installation. Such repairs shall be made as promptly after observation as weather and site conditions permit.

PART 2 - PRODUCTS

2.01 POLYISOCYANURATE INSULATION

A. Approved polyisocyanurate insulation boards, as supplied by the roofing membrane manufacturer, shall be rigid, closed-cell HCFC FREE polyisocyanurate foam core insulation, integrally bonded to heavy non-asphaltic fiber-reinforced felt facers (top and bottom surface) in the foaming process. Insulation shall meet: FM Standard 4450/4470 Approval; UL Standard 790 (ASTM E 108) Classification; UL Standard 263 Fire Resistance Classification (ASTM E 119). Insulation shall adhere to the following typical physical properties:

PROPERTY	TEST METHOD	VALUE
Water Absorption % Volume	ASTM C 209 ASTM D 2842	<1% <3.5%
Dimensional Stability (Length & Width)	ASTM D 2126	Less than 2%
Compressive Strength	ASTM D 1621	25-psi
Foam Core Density	ASTM D 1622	2.0 pcf nominal
Moisture Vapor Transmission	ASTM E 96	<1.5 perm
Flame Spread	ASTM E-84	25 – 50

* The thermal performance shall be the Long Term Thermal Resistance (LTTR) value, determined in accordance with CAN/ULC S 770 test method.

2.02 ROOF COVER BOARD

A. Wood fiberboard insulation shall be 1/2" thick high-density, asphalt-coated (all sides) wood fiber "cellulosic" insulation that meets federal specifications LLL-1-535B for Class E, 1977 and conforms to the following properties:

Property	Minimum Performance
Thermal Conductivity (Max. (k) At 75° F)	.40
Transverse Load avg. min. lbs.	14
Tensile Strength (Parallel to surface avg. min. psi)	150
Tensile Strength (Perpendicular to surface - avg. min. lbs/ft$^{2)}$	600
Water absorption by volume, max. %	7
Linear expansion (90% R.H. avg. max. %)	.5
Vapor Permeance grains/hr/sq. ft./in. (Hg., min.)	5
Flame Spread (max.) ASTM E84	275
Modulus of rupture avg. min. psi	275
Deflection at specified Min. load avg. max. in.	.75
Thermal Resistance (R-Value) per ½" of material	1.38
Thermal Conductance (C-Value)	.72

2.03 THERMAL BARRIER BOARD

A. Thermal Barrier Board shall be a fire-resistant gypsum core board with additives to enhance fire resistance of the core and complying with ASTM C 36/C 1396, type X; and shall meet the following characteristics: 5/8" Thickness; 4' Width; 6' to 16' Length.

2.04 INSULATION FASTENERS

A. Fasteners and distribution plates shall be designed to attach cover boards and thermal insulation boards to roof decks. Contractor shall arrange for the insulation manufacturer to perform a proper amount of fastener uplift resistance tests for each proposed fastener (minimum of 2 tests are required); submittal of the results is required for approval prior to installation. Fasteners and distribution plates shall be supplied by the roof membrane manufacturer or as required by the roofing system manufacturer so as to obtain the specified wind uplift

requirements and roofing system manufacturer's 20 year warranty, and shall adhere to the following:

1. All fasteners shall meet all published requirements of corrosion resistance by roofing materials manufacturers. The fastener must be Factory Mutual approved and made in America. The fastener shall be coated with CR-10 corrosion resistant coating. When subjected to 30 Kesternich cycles (DIN 50018), the fastener must show less than 15% red dust and surpass Factory Mutual Research Approval Standard #4470.

   Fasteners shall be Heavy Duty Roofing Fastener type with a shank diameter of .190, a minimum diameter thread of .245, Head Diameter of .435, and a #3 Phillips Truss Head Style. The fastener must have 10 threads per inch and have a 30° spade point. The fastener shall be of sufficient length to penetrate the tongue and groove wood roof decking by 1". Careful fastener length selection is required when installing tapered insulation or crickets.

2. Fasteners shall include a corrosion resistant Factory Mutual approved low profile pressure plate, steel hot-dipped galvanized (AZ –55) plate fabricated of SAE 1010 steel (3 inch diameter).

2.05 INSULATION ADHESIVE

A. Solvent-Free, Cold-Process Insulation Adhesive:

1. Insulation adhesive for insulation attachment shall be solvent-free, cold process adhesive designed to attach insulation and recovery boards to each other and to base sheets. Contractor shall arrange for the insulation manufacturer to perform a proper amount of insulation adhesive tests for the proposed insulation adhesive product (minimum of 2 tests are required); submittal of the results is required for approval prior to installation. Insulation adhesive products shall be supplied by the roofing system manufacturer or as required by the roofing system manufacturer so as to obtain the specified roofing system manufacturer's 20-year full systems warranty.

   Insulation adhesive shall be cold-process, solvent-free insulation adhesive, meeting or exceeding the performance characteristics listed below:

Property	Typical Value	Test Method
Volatile Organic Compound	20 g/L	ASTM D 3960-89
Asbestos Content	None	ASTM D 276-87
Viscosity @ 25°C 77°F)	70 Pa s (70,000 cP)	ASTM D 2556-69

NonVolatile Content	99%	
Density @ 25°C (77°F)	1.0 kg/L (8.5 lb/gal)	ASTM D 1875-69
Tensile Strength @ 25°C (77°F)	1379 kPa (200psi)	ASTM D 412-87
Elongation @ 25°C (77°F)	1200%	ASTM D 412-87
Adhesion Strength in shear @ 25°C (77°F)	552 (80 psi)	ASTM D 816-82
T-Peel Adhesion @ 25°C (77°F)	2.6 N/mm (15 lbf/in.)	ASTM D 1876-72
Cold Brittleness	Pass @ -51°C (-60°F)	ASTM D 816-82

2.06 VAPOR BARRIER

A. Vapor barrier shall be self adhering membrane supplied by the cold process built-up roof membrane manufacturer. Acceptable products and manufacturers are as follows: Tremco AVC Membrane as manufactured by Tremco; Aero-Block SA as manufactured by Garland Company, Inc.; Johns Manville Self Adhered Vapor Barrier. Vapor barrier primer (solvent based) shall be supplied by the cold process built-up roof membrane manufacturer.

PART 3 – EXECUTION

3.01 PREPARATION

A. Surface on which the system is to be applied shall be clean, smooth, dry, and free of fins, sharp edges, loose/foreign materials, oil and grease. Before beginning work, a technical representative of the self adhering rubberized asphaltic membrane and the insulation board manufacturer shall examine the surfaces in order to ensure that the substrate is acceptable. Prior to starting the work, the Contractor shall notify the Engineer that the substrate is ready for insulation attachment.

B. Material with imperfections such as pinholes, cracks, handling damage, incorrect thickness (less than specified), etc. shall be rejected and removed immediately from job site.

C. No work shall take place when moisture is present on the roof or in any of the materials. The Engineer may order the work to stop when, in his opinion, the weather conditions warrant him to do so. Contractor shall take such measures as the work can continue with minimum delay so the exposure of building and its contents is minimum.

D. Fumes from adhesive products shall not be allowed to enter into the building during installation. The Contractor must take appropriate measures, to assure that fumes are not drawn into the building through air intakes or through any other openings.

E. No more thermal barrier board, insulation board and cover board shall be installed than can be completely covered with the finished roofing system on the same working day.

F. All installed thermal barrier board, insulation board and cover board must be fully protected from precipitation and condensation damage at all times. Any wet thermal barrier board, insulation board and cover board shall be marked, removed from the site and replaced prior to installation of new membrane.

G. The thermal barrier board, insulation board and cover board shall be neatly cut to fit around roof penetrations and projections. Insulation board and cover board are to be laid in parallel courses with transverse joints staggered with joints in adjoining courses. Wherever possible, the stagger shall be half the panel dimension, but not less than 16” in any case. All joints shall be tight.

H. Thermal barrier board, insulation boards and cover boards shall be installed without gaps or voids and with smooth transitions and tightly fitting joint. No piece of insulation board and cover board shall be cut to fit less than two square feet unless size of opening dictates. The top surface of the cover board shall be flush with the top surface of the wood blocking within a tolerance of + 0 in. and - 1/16 in. with respect to the blocking.

I. Verify that all rooftop penetrations (drains, curbs, nailers, equipment supports, vents, etc.) and other roof accessories are secured properly and installed in conformance with the specifications and drawings.

J. The Contractor shall use extreme caution during reroofing operations. The facility is operational and contains personnel, furniture, fixtures and equipment. Mechanical equipment such as lighting, electrical conduits, junction boxes, etc. may exist in the vicinity of or on the underside of the roof decking. Contractor shall take all necessary precautions so as not to cause any damages. Any damages that interrupt service and/or require repairs to the building furniture, fixtures or equipment shall be the responsibility of the Contractor at no additional cost to the Owner and shall be repaired immediately.

3.02 INSTALLATION – ADHESIVE

A. Install specified cover board using approved adhesive and fasteners in accordance with the specifications, details, manufacturer’s latest written requirements, and as required by governing codes and standards.

B. Cover board shall be attached to insulation board using approved insulation adhesive. Application rate and pattern shall be done in accordance with the approved shop drawing.

C. Apply insulation adhesive directly to approved substrate using continuous ribbons of adhesive beads. Place insulation boards into position onto adhesive beads after allowing adhesive to rise 3/4” to 1”. Insulation boards shall be

stepped in and/or weighted for a proper timeframe to ensure the adhesive has adequately secured the components (roof overlay board to roof insulation).

D. The Contractor shall provide for technical representation by the insulation adhesive manufacturer at all times when the adhesive is being applied for the first three days of use and once every three days thereafter to ensure that proper adhesion is obtained. Simulated uplift resistance field-tests (in accordance with ANSI/SPRI IA-1, 2005 Standard) shall be performed by the insulation adhesive manufacturer representative on completed work areas to ensure that the insulation adhesive is being installed as specified. Field-tests shall be done in various locations as recommended by the manufacturer (a minimum of 2 tests are required). The Contractor shall provide to the Owner and Engineer a report documenting the results of the tests.

The Contractor is required to correct all roof areas that fail the uplift resistance test. Correction may include removal and replacement of the area or may simply include augmentation with mechanical fasteners where practical.

3.03 INSTALLATION – MECHANICAL ATTACHMENT

A. Install specified products using approved mechanical fasteners in accordance with the specifications, details, manufacturer's latest written requirements, and as required by governing codes and standards.

B. Thermal barrier board shall be attached using approved fasteners. Cover board shall be attached to insulation board using approved insulation adhesive. Application rate and pattern shall be done in accordance with the approved shop drawing.

C. Use fastener tools with a depth locator as recommended or supplied by the fastener manufacturer to ensure proper installation. Install the fastener using manufacturer-approved screwshooter. Drive the fastener until a slight depression is seen around the plate. Proper length fasteners are critical and excessive lengths will not be allowed. The fasteners shall be of sufficient length to penetrate the tongue and groove wood roof decking by 1".

D. Care must be taken not to overdrive the fastener and fracture the skin of the thermal barrier board. Fastener must be tight enough so that the plate does not turn. Any overdriven fasteners and/or damaged thermal barrier board shall be the responsibility of the Contractor and shall be replaced immediately at no additional cost to the Owner.

3.04 FIELD INSPECTION

A. The Roofing Materials Manufacturer and the Insulation Materials Manufacturer shall provide observation/inspection services during the roof insulation installation. The technical representative shall provide field surveillance of the installation and shall monitor and report installation procedures, unacceptable

conditions, etc. The insulation installation will be subject to observation and inspection by the Engineer, Owner, Roofing Material Manufacturer's Representative, and Insulation Material Manufacturer's Representative. All costs incurred by the Contractor due to Field Quality Control inspections shall be the sole responsibility of the Contractor and will not be considered grounds for or justification of an increase in the original contract price.

B. The Engineer and the Owner's Project Manager will be on site periodically to observe the work progress and to monitor contract compliance. Any items observed not in compliance with the contract documents shall be identified and promptly corrected by the Contractor.

C. Contractor is to provide any and all necessary protection to the entire roof area to maintain watertightness during the project duration, including existing roof areas not yet roofed. Any interior damages that occur as a result of the Contractor's negligence shall become the Contractor's responsibility and he shall promptly repair and/or replace all damaged items to the satisfaction of the Owner.

END OF SECTION

SECTION 07321
SLATE ROOF REPAIRS

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

1.02 SECTION INCLUDES

A. The work of this Section consists of removing existing slate shingles and all related materials furnishing and installing all slate roofing system components as indicated on the Drawing and specified herein, required to complete the work. The work includes the following:

1. Removal and replacement of individual damaged, cracked, or missing slates, meeting or exceeding ASTM requirements as an S-1 rated roofing slate. The new roofing slate size shall match the size of existing. Color of replacement slate shall match existing slate as close as possible. The contractor shall carry carry 20 slates as the Base Bid quantity.

2. The work of this Section also consists of the removal and replacement of existing step flashing where the conical roof intersects the wall of the tower structure. Replacement of the step flashing also includes saw cutting a new reglet joint for the installation of a new reglet step counterflashing.

B. All materials shall be verified by Contractor to be proper for each intended use, and the entire work of this Section shall be done in such a manner that each installation will perform its intended purpose as applicable, in the finished work.

C. The drawings indicate and show the limits of construction for this project. The specifications specify materials and work required for this project. Both are complementary to each other and both shall be followed to complete the work.

D. Plans and dimensions under which the Work is to be performed are derived from a variety of sources. The existing conditions are provided for information only. Actual conditions may vary. Contractor is required to verify existing roofing system and skylight system composition, conditions, and dimensions prior to submitting his bid. No additional compensation or time extension will be made for dimensional errors or discoverable inaccuracies related to existing conditions in the contract documents.

1.03 RELATED WORK

A. Section 02050 – Demolition

B. Section 06100 – Rough Carpentry
C. Section 07220 – Roof Insulation
D. Section 07510 – Built-up Roofing and Flashing
E. Section 15400 – Plumbing – Roof Drains

1.04 QUALITY ASSURANCE

A. All materials and equipment utilized for the roofing work shall be approved in writing by the Engineer prior to their use. All materials shall be installed to serve their intended function.

B. The work shall be completed by a Roofing Contracting Company experienced and skilled in this type of work. The Company shall have a minimum of ten (10) years experience with this type of work and shall provide proper documentation to the Engineer for review. The Company shall be experienced in installing natural slate roofing and associated copper flashings of the type and scope specified in this section and employing persons with not fewer than ten (10) years of documented experience. The Company shall provide skilled workers, thoroughly trained and experienced in the crafts of natural slate roof systems and who are familiar with this specification and methods required for a warrantable roof. All personnel concerned with the shop fabrication and field installation of copper metal flashing systems must be qualified sheetmetal journeymen who may be assisted by sheetmetal apprentices qualifying for their journeyman status. The foreman of the crew must have at least ten years experience in copper sheetmetal work and in particular with fabrication and installation.

C. Use skilled workmen who are trained especially in properly laying and nailing slate roofing, and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this section.

D. All work shall be applied in strict accordance with the provisions of this technical specification and associated details. No deviations shall be permitted without written consent from the Engineer. Should a conflict between this specification (and the associated details) and the manufacturer's requirements arise, the most restrictive provision, as determined by the Engineer, shall govern.

E. Conform to the regulations of public agencies, including any specific requirements of the town and/or state of jurisdiction.

F. At least one week prior to commencement of the construction work, a conference (preconstruction meeting) shall be held and attended by the Engineer, Contractor, Owner, Owner's Project Manager, and a technical representative of the slate roofing material provider. The purpose of this conference is to review the specifications, details, application requirements, and schedule before construction operations begin.

G. No member of the roof shall be overstressed due to construction loads.

H. Contractor is to provide any necessary protection to the installed work prior to acceptance by the Owner and Engineer. The Contractor at no additional cost to the Owner shall correct any damage incurred during this period.

I. Contractor is to provide any and all necessary protection to the entire roof area to maintain watertightness during the project duration, including existing roof areas not yet roofed. Any interior damages that occur as a result of the Contractor's negligence shall become the Contractor's responsibility and he shall promptly repair and/or replace the damaged items.

J. The Engineer, Owner's Project Manager will be on site periodically to observe the work progress and to monitor contract compliance. Any items observed not in compliance with the contract documents will be identified and shall be promptly corrected by the Contractor.

K. Prior to the final project completion, inspections and testing shall be made by representatives of the Engineer, Owner's Project Manager in order to ascertain that the work has been installed properly. A punch list will be developed by each and copies will be forwarded to the Contractor. Contractor shall immediately correct all punch list items. Deviations from the specifications and/or details must be corrected immediately. Warranty shall be issued upon final acceptance of the work.

L. Prior to the commencement of work, the Contractor shall inspect all roof surfaces to ensure their compliance with the provisions of this specification and the manufacturer's published literature.

M. All surfaces shall be smooth, dry, clean, free of fins or sharp edges, loose or foreign materials, oil or grease.

N. Commencement of work shall be considered acceptance by the Contractor of the area to be roofed as a suitable and properly prepared substrate.

O. No work shall proceed when moisture is present on the roof or in the materials. The Engineer may stop work when, in his opinion, the job conditions warrant him to do so.

1.05 UNIT PRICES

A. Provide unit prices for changes in the Contract Quantities for the specified work listed in this section on the Form for General Bid. The Contractor shall include in all lump sum bids (contract price) his price for the following:

1. Random removal and replacement of deteriorated roofing slates; carry 20 slates as the Base Bid quantity.

B. The Contractor shall notify the Engineer immediately upon uncovering existing wood showing signs of deterioration, including broken or missing slate.

C. The Contractor shall perform unit price work only when approved by the Engineer. The Contractor shall properly document that the work has been completed. Proper documentation shall include photos and locations shown on the roof plan. Quantity tabulation shall be done on a daily basis by the Contractor and reported at the construction meetings, or more often as requested by the Engineer.

1.06 CODES AND STANDARDS

A. Except as modified by the requirements of other governing codes and by this specification, conform to the provisions, recommendations and requirements of the following codes and industry standards:

1. The Slate Book (1st edition) published by Vermont Slate & Copper Services, Inc., Stowe, VT 05672-0430.

2. The Slate Roof Bible (2nd Edition) published by Jenkins Publishing, PO Box 607, Grove City, PA 16127.

3. Roofing and Waterproofing Manual (5th edition) published by the National Roofing Contractors Association (NRCA), 10255 W. Higgins Road, Suite 600, Rosemont, Ill. 60018-5607.

4. National Slate Association.

5. Conform to Massachusetts State Building Code, latest revision, and any local building code requirements.

6. ASTM C 406 – Specification for Roofing Slate.

7. North Country Slate: Slate Roofing-Installation Manual, Fifth Edition.

1.07 SUBMITTALS

A. Submit the following under the provisions of Section 01300.

1. Three slate samples, of each type of new matching slate, with color range and texture selections.

2. Representative samples of each type of fastener with identifying tags.

3. Manufacturer's data sheet for each specified product in this section. Manufacturer’s printed descriptive literature, specifications, and installation instructions; show compliance with specified performance requirements.

4. Manufacturer's Material Safety Data Sheets for all products specified in this Section.

5. Certificates of compliance attesting that the materials meet specification requirements. Material test reports for each slate type, performed by a qualified testing laboratory per ASTM C – 406 as approved by the slate manufacturer.

B. Warranty: Sample warranties.

1. Applicator's Quality Assurance: Submit list of a minimum of 5 completed projects of similar size and complexity to this Work. Include for each project: Project name, location, description of the work, and dates when project occured; Owner; Contractor; Architect; Slate Roofing product.

2. Certificate of origin identifying the country and state in which the slate shingles were quarried and fabricated.

3. Material Safety Data Sheets of all roofing membrane components.

1.08 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

D. Deliver shingles to project site in distributor's crates/pallets, labeled with data indicating source.

E. Handle shingles to prevent chipping, breakage, soiling, or other damage. Protect edges with wood or other rigid material.

F. Place and stack crates/pallets to distribute weight evenly and to prevent breakage or cracking.

G. Stage roofing materials on the building in a manner to avoid significant or permanent damage to the roof deck or structural supporting members.

1.09 STORAGE AND PROTECTION

A. Contractor shall follow the recommended storage procedures of the manufacturer of the materials being used. No storage on or within the building will be allowed without written permission from the Owner. Any materials brought

to the roof for daily operations or storage shall be evenly distributed on the roof to prevent concentrated loads and shall not overload the structure.

B. All moisture sensitive materials shall be stored in weatherproof trailers or temporary protective shelters and shall be stored at least 4 inches above the ground on stable pallets or skids and shall at all times be completely covered and secured. Tarpaulins or a similar "breathable" material shall be used to cover materials. Rubber or plastic materials shall not be acceptable. Factory applied "shrink packs" or plastic wrappings shall not be acceptable.

C. Materials stored on the ground shall be thoroughly secured against moisture and wind. Materials and their coverings shall be tied and/or weighted to prevent uncovering or blowing of material by the wind. Contractor shall be responsible for damages caused by blowing and improperly stored material and equipment.

D. Materials shall be handled with care and shall not be installed if they have been damaged in any way due to handling, storage or manufacturing defects. Contractor shall promptly mark and remove from the site any damaged or improperly stored materials when so requested by the Engineer.

E. All materials are to be stored at the recommended temperature range as specified by the manufacturer. Contractor shall provide manufacturer's information to the Engineer concerning storage and handling of flammable or volatiles materials. The "shelf life" materials shall be provided with the date of manufacturer of all perishables. Materials that become congealed, thick, non-uniform or otherwise unsuitable for proper application shall be removed from the project site and replaced with new, properly stored and tested materials.

F. Provisions for placement of the Contractor's equipment must be planned by the Contractor and submitted to the Owner and the Engineer for approval.

G. Provide off-site storage and protection when site does not permit on-site storage or protection.

1.10 WEATHER AND TEMPERATURE REQUIREMENTS

A. Work shall not commence or proceed, with the exception of the completion of necessary temporary measures to make the building weathertight, when the ambient air temperature is below 32°F unless otherwise specified.

B. Work shall not commence or proceed, with the exception of the completion of necessary temporary measures to make the building weathertight, when precipitation of any kind, or winds in excess of 20 miles per hour are present or imminent or when, in the sole judgment of the Engineer or his authorized

representatives, conditions are unfavorable or detrimental to the proper installation of the systems.

C. Work shall not commence or proceed, with the exception of the completion of necessary temporary measure to make the building weathertight, when water, ice or frost is present on or within the materials or surfaces to which materials are to be applied.

D. Work shall not commence or proceed with the exception of the completion of necessary temporary measures to make the building weathertight when the temperature is too hot to allow proper installation, or when existing or previously installed work is being damaged by the application, or when temperature conditions present a health or safety hazard to the workers on the site.

1.11 CONTRACTOR'S USE OF PREMISES

A. Contractor shall limit its use of the site for work and for storage to allow for:

1. Owner occupancy and use of the building during construction.

2. Public use of walks, parking lots, and driveways.

B. Do not block exits at any time. Provide protected entranceways at each entrance at all times.

C. Coordinate work on the roof, use of the site, storage areas, and staging areas with the Owner. Limit use of the site and working hours to dates, times, and locations approved by the Owner.

D. Cooperate with the Owner's scheduling requirements for working at an occupied building. Work under this Section shall not interfere with the operation of the building or building occupants at any time.

E. The Contractor is responsible for protecting all materials and equipment stored on the site.

F. Smoking is not permitted on the grounds.

G. Dispose of all trash and debris in a legal manner off-site. Do not throw debris from access equipment or staging. Conduct debris to approved containers on the ground. Locate debris containers only in locations approved by the Owner in advance.

1.12 COORDINATION

A. Coordinate all work of this section with other trades. Perform all flashing and sheetmetal work in a timely manner as not to delay other trades. The Contractor shall coordinate all work with the roofing and waterproofing trades, to prevent exposure of the building to inclement weather and leaks, at all times.

1.13 WARRANTY

A. Contractor Warranty: Submit Contractor warranty, covering Work of this Section, in which Contractor warrants the slate roofing and associated copper components and copper flashings to be watertight and leak free. In the event any work is found to be defective, is not watertight, or otherwise not in accordance with the contract documents within two (2) years of final completion, the Contractor shall repair and/or remove and replace at no cost to the Owner.

PART 2 - PRODUCTS

2.01 ROOFING MATERIALS

A. Slate: Roofing slate, meeting or exceeding ASTM requirements as an S-1 rated roofing slate. Slate shall be obtained from a single quarry with consistent color range, physical properties, and texture throughout. The new roofing slate size shall match the size of existing. Color of replacement slate shall match existing slate as close as possible.

1. Natural roofing slate shall be smooth textured (natural cleft: smooth texture), hard, dense, sound rock with chamfered edges; machine punched or drilled for two nails each, except where hand punching of holes fitting hips, valleys, etc. is necessary.

2. All exposed corners shall be practically full. No broken corners on covered ends which sacrifice nailing strength or the laying of a watertight roof will be allowed. No broken or cracked slates shall be used. Slate shall be free of any visible inclusions of oxidizable iron pyrite.

3. Curvature or twist in slate shingles shall not exceed 1/8 inch in 12 inches. Curved slate shingles shall be trimmed and punched to permit them to be laid with convex side up. Knots, knurls and cramps are acceptable on the exposed slate shingle face. Knots, knurls and cramps on the back or covered portion of slate shingles, which prevent close contact of slate shingles or the laying of a watertight roof, will not be accepted.

4. Slate shingles shall be trimmed with 90-degree square corners. Face dimensions of slate shingles shall not differ from those specified by more than 1/8 inch.

B. Fasteners: Nails shall be large-headed slater's solid copper nails of Number 10 or 11 gauge metal. Nails shall be 3d for slates 18 inches or less in length; 4d nails shall be used for slates 20 inch or longer and 6d nails for slates on hips and ridges. Thicker slates require longer and heavier gauge nails. The proper size shall be determined by adding 1 inch to adequately penetrate the roof deck. Nails shall be of the ring shank design. 20 oz. copper for copper (bibs) for slate replacement.

C. Elastic Cement: Elastic cement shall be an approved brand of waterproof elastic slater's cement, asbestos free, colored to match as nearly as possible the general color of the slate. Cement shall conform to ASTM D-4586, Type I, asbestos free.

2.02 COPPER MATERIALS

A. Copper materials are specified for use in replacing the existing step flashing and step flashing counterflashing. Copper materials shall be as follows:

1. Sheet Copper shall be copper for building construction as detailed and specified herein. Only domestic materials shall be used when available. Any copper sheetmetal and roofing shown on drawings and specified herein shall be 20 oz. cold rolled red copper. Sheets shall conform to ASTM specifications B370 or Federal Specification QQ-C-576.

2. Fasteners: Nails used for fastening copper shall be copper or hardware bronze of Stronghold type, or equal, with large flat head. They shall not be smaller than No. 12 Stubs gauge (0.109") and of sufficient length to penetrate roof decking not less than 3/4". Rivets shall be of hard copper, brass, or bronze. Screws and bolts used for fastening copper shall be copper, bronze or stainless steel (passive). Expansion inserts shall be lead, nylon, or suitable plastic.

3. Cleats shall be 2" wide by about 3" long and shall be made of 20 oz. cold rolled red copper, unless otherwise specified. One end shall be locked into seams or into folded edge of copper sheets. Other ends shall be nailed with two nails and folded back over nailheads, unless otherwise noted. When expansion cleats are used they shall be the same overall dimensions as fixed cleats.

4. Solder composition shall be 50% block tin and 50% pig lead conforming to ASTM Specification B32 or Federal Specification QQ-S-571.

5. Flux shall be muriatic acid killed with zinc or approved brand of soldering flux. Acid shall be thoroughly washed off after soldering is completed.

PART 3 - EXECUTION

3.01 GENERAL PREPARATION

A. Surface on which the system is to be applied shall be clean, smooth, dry, free of fins, sharp edges, loose and foreign materials, oil and grease. Before beginning work, Contractor shall examine the surfaces in order to ensure that the substrate is acceptable. Prior to starting the work, the Contractor shall notify the Engineer that the substrate is acceptable and ready .

B. Material with imperfections such as pinholes, cracks, incorrect thickness (less than specified), etc. shall be rejected and removed immediately from job site.

C. No work shall take place when moisture is present on the roof or in any of the materials. The Engineer may order the work to stop when, in his opinion, the weather conditions warrant him to do so. Contractor shall take such measures as the work can continue with minimum delay so the exposure of building and its contents is minimum.

D. After the existing roofing components are removed, the existing roof deck shall be dried out before installation of new roofing component materials. After materials have been removed, the substrate shall be scraped clean of all surface imperfections. Contractor shall inspect the surface to determine that it is smooth and uniform to receive the new work.

E. Fumes from products shall not be allowed to enter into the building during installation. The Contractor must take appropriate measures, to assure that fumes are not drawn into the building through air intakes or through any other openings.

3.02 PREPARATION FOR REATTACHMENT OR REPLACEMENT OF SLATE

A. Contractor shall identify those slates to be re-secured or replaced and confirm location and quantity with Engineer prior to beginning repairs.

B. Remove damaged slate by cutting or pulling out existing nails utilizing a slate ripper tool. Care shall be taken to avoid damaging adjacent slate during the removal process. Slate inadvertently damaged shall be replaced by the Contractor at no additional cost to the Owner. Coordinate removal of damaged slate with Specification Section 02 80 00 (Hazardous Materials Abatement).

C. If slate do not slide out, punch the pointed end of the slate hammer into the slate and pull the slate out.

3.03 SLATE REPLACEMENT

A. After removal of the damaged slate or in areas of missing slate, slide new slate of matching size, texture and color into place and secure with one solid copper nail

inserted through the vertical joint between slates in the course above and one inch (1") below the tail of the slate two courses above. Do not over-drive nails or leave nails projecting.

B. To prevent water from entering into the new nail hole, slide a 3" x 8" piece of concave copper (bib) under the joint between the two slates located above the new replacement slate and over the nail. The bib should be slightly bent to provide a friction fit.

C. When two or more broken slates lie adjacent to each other in the same course, remove a diminishing number of slates from a higher courses to keep the number of bibs to a minimum.

D. Alternate methods of slate replacement, such as the use of metal slating hooks, will be considered if submitted to the Engineer for approval.

3.04 COPPER STEP FLASHING & COUNTERFLASHING REPLACEMENT

A. Surfaces to be covered with sheet metal shall be free from defects of every description and clean of dirt and other foreign matter before sheet metal work is started.

B. Lines, arises and angles shall be sharp and true. Plane surfaces shall be free from waves and buckles. Joints and seams in plain surfaces shall be avoided as far as possible.

C. Sheet metal work exposed to the weather shall be permanently watertight and weather tight, with suitable provisions made for free expansion and contraction without causing leaks.

D. Copper step flashing shall be installed as specified herein and as detailed on the drawings and approved shop drawings.

E. Copper step flashing should be placed upslope of the exposed slate that will overlap it. Fasten step flashing through the flange in the upper corner. Overlap step flashing with new copper step counter flashing as required.

3.05 FIELD INSPECTION

A. The Engineer and the Owner will be on site periodically to observe the work progress and to monitor contract compliance. Any items observed not in compliance with the contract documents shall be identified and promptly corrected by the Contractor.

B. Contractor is to provide any and all necessary protection to the lined gutters to prevent damage and maintain watertightness during the project duration. Any damages that occur as a result of the Contractor’s negligence shall become the Contractor’s responsibility and he shall promptly repair and/or replace all damaged items to the satisfaction of the Engineer and Owner.

3.06 PROTECTION OF WORK

A. Contractor shall protect the project site including the building, its contents, all streets, walls, underground and overhead utilities. All areas shall be left in a watertight condition in their entirety at all times. Contractor shall provide protective measures and materials to assure that each element will be without damage or deterioration throughout the entire construction period up to the date of final completion. Any defective elements shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer and Owner. Remove protective coverings and materials at the appropriate time, but no later than final cleaning operations.

B. No work shall take place during inclement weather. No work shall take place when moisture is present on the work area or in any of the materials. The Engineer may order the work stopped when, in his opinion, the weather conditions warrants him to do so. Contractor shall take such measures as necessary to dry out work surfaces so that the work can continue with minimum delay.

C. Contractor shall cover and protect all walls, windows, projections, soffits, etc. where material is to be hoisted or removed from the roof deck. Contractor shall be responsible for all scrapes, stains, and damage to the walls and shall repair or replace any walls, windows, siding, etc., which are damaged by his operations, to the satisfaction of the Engineer and Owner. Any areas damaged shall be restored or cleaned, to the satisfaction of the Owner by the Contractor at no cost to the Owner.

D. Whenever the possibility exists that debris or materials may fall causing a hazard to persons inside or outside the building, the Contractor shall post one or more of his employees to temporarily close these hazardous areas. The person in charge of the facility shall be notified prior to the commencement of work that may pose this type of hazard. Proper barricades shall be provided to prevent normal access to or around these areas.

E. Contractor shall properly protect all areas where falling debris or dust is expected due to his operations. Contractor shall be responsible for providing adequate personnel to clean and protect these areas. Contractor shall include these costs in their bid.

F. Protect the building interior, contents, Owner's employees, students, and personnell from all hazards associated with the Contractor's operations.

G. Any damage to the interior of the building or its contents due to the Contractor's operations or to leaks during the Contractor's operations shall be corrected at the Contractor's expense to the satisfaction of the Owner and the Engineer.

H. Any damage to the exterior and/or interior of the building or any rooftop equipment due to the Contractor's operations shall be corrected at the Contractor's expense or to the satisfaction of the Owner and the Engineer.

I. No member of the roof shall be overstressed due to construction loads and demolition operations. The Owner assumes no responsibility for the actual condition of the structure.

J. Damage to any portion of the building which results in disruption of or inconvenience to the Owner or his employees shall be immediately repaired or replaced by the Contractor. If such restitution is not promptly made, the Owner shall have the necessary work performed by an outside agency at the Contractor's expense.

3.07 CLEANING

A. The building and adjacent areas shall be left in a broom-clean condition at the end of each day. On completion of the work and after removal of all debris, the site shall be left in a clean condition satisfactory to the Owner and to the Engineer.

B. At the completion of the Project, the Contractor shall restore or replace all property damaged by his Work and shall remove all spots, paint, smears, soil, concrete, mortar, sealant, adhesives, asphalt, writing, droppings, or other foreign materials, from all Work. Remove all temporary protection from all the Work. Final cleaning shall include as a minimum:

1. Clean site; sweep paved areas, rake clean landscaped surfaces.
2. Remove waste and surplus materials, rubbish, and construction facilities from the site.
3. The Contractor shall clean all walls, windows or other building and grounds elements that have been affected by his work.
4. Repair, patch and touch-up marred surfaces to specified finish to match adjacent surfaces.
5. The Contractor shall clean the roof surface to the satisfaction of the Owner and Engineer.

3.08 COMPLETION OF WORK

A. Prior to demobilization from the site, the completed project/work shall be reviewed by the Engineer, the slate roofing supplier's technical representative, Owner's Project Manager, and the Contractor. All defects and items in non-compliance with the specifications, manufacturers' recommendations and the manufacturers' warranty requirements shall be itemized on a punch list. These items shall be corrected by the Contractor prior to demobilization to the satisfaction of the Engineer, the slate roofing supplier's technical representative, and Owner's Project Manager.

B. All warranties referenced in this specification shall have been submitted and accepted the Engineer and Owner. Fully executed warranty documentation shall be submitted to the Engineer and Owner as soon as possible for review and approval. At the completion of the job, the Contractor and manufacturer shall each submit their guarantees to the Owner. Additionally, they shall submit an Inspection and Maintenance Schedule to the Owner.

END OF SECTION

SECTION 07510

BUILT-UP ROOFING AND FLASHING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

1.02 SECTION INCLUDES

A. The work of this section to be performed by the Contractor consists of providing all materials and labor required for the Built-Up Roofing and Flashing work as indicated on the Drawings and specified herein. The roofing system is specified and detailed as follows.

A 3-ply cold applied built-up roofing system incorporating a reinforced, modified bitumen cap sheet set in cold process adhesive (3 plies plus a cap sheet), complete with a manufacturer's 20 year full system warranty. All flashings shall be installed permanently and concurrently with the roofing system in order to maintain a watertight condition as the work progresses.

B. All materials shall be verified by Contractor to be proper for each intended use, and the entire work of this Section shall be done in such a manner that each installation will perform its intended purpose as applicable, in the finished work.

C. The drawings indicate and show limits of construction for this project. The specifications specify material and work requirements for this project. Both are complementary to each other and both shall be followed to complete the work.

D. Plans and dimensions under which the Work is to be performed are derived from a variety of sources. The existing conditions are provided for information only. Actual conditions may vary. Contractor is required to verify existing roofing system composition, conditions, and dimensions prior to submitting his bid. No additional compensation or time extension will be made for dimensional errors or discoverable inaccuracies related to existing conditions in the contract documents.

1.03 RELATED WORK

A. Section 02050 – Demolition
B. Section 06100 - Rough Carpentry
C. Section 07220 – Roof Insulation
D. Section 07321 – Slate Roof Repairs
E. Section 15400 - Plumbing - Roof Drains

1.04 QUALITY ASSURANCE

A. All materials used as a component of the roofing system shall be supplied or approved in writing by the roofing system manufacturer. All materials shall be installed to serve their intended function. All materials used in the roofing system shall be manufactured and supplied by one system manufacturer.

B. A licensed contractor approved and certified by the roofing system manufacturer and employing personnel experienced and skilled in the application of the manufacturer's roofing system shall install the complete roofing and flashing system. The Roofing Contractor's employees shall be experienced in the installation of warranted, cold processed built-up roofing systems. Minimum required experience involves at least 5-years experience installing built-up roofing systems. A written letter of "Certification" or "Approval" from the Roofing System Manufacturer showing that the Roofing Contractor has been "Certified" or "Approved" by the Roofing System Manufacturer for a minimum of five (5) years is required.

C. All work shall be applied in strict accordance with the provisions of the technical specification and details. No deviations shall be permitted without written consent from the Engineer. Should a conflict between this specification (and the associated details) and the manufacturer's requirements arise, the most restrictive provision, as determined by the Engineer, shall govern.

D. At least one week prior to commencement of the construction work, a conference (preconstruction meeting) shall be held and attended by the Engineer, Contractor, Owner, Owner's Project Manager, and a technical representative of the roofing system manufacturer. The purpose of this conference is to review the specifications, details, application requirements, and schedule before construction operations begin.

E. All materials used as a component of the roofing system shall be supplied or approved in writing by the roofing system manufacturer. All materials shall be installed to serve their intended function.

F. No member of the roof shall be overstressed due to construction loads.

G. Contractor is to provide any necessary protection to the installed work prior to acceptance by the Owner and Engineer. The Contractor at no additional cost to the Owner shall correct any damage incurred during this period.

H. Contractor is to provide any and all necessary protection to the entire roof area to maintain watertightness during the project duration, including existing roof areas not yet roofed. Any interior damages that occur as a result of the Contractor's negligence shall become the Contractor's responsibility and he shall promptly repair and/or replace the damaged items.

I. The roofing system technical representative (not a salesperson) shall visit the site during the bidding period and certify in writing the materials specified are

proper for their particular application. Submission of this letter shall be acceptance of the technical specification, details, and this guarantee.

J. The Roofing System Manufacturer shall provide a qualified experienced full time inspector who shall remain on site every day while work is in progress. He shall not be removed from the project without the Engineer's approval as long as Manufacturer employs him. The Roofing System Manufacturer shall provide the name of the proposed inspector and his experience (resume) for review and approval. The Engineer shall have the right, by written notice sent to the Manufacturer at any time to disapprove such inspector. The Manufacturer shall then appoint a new and approved inspector immediately upon receipt of notice.

The Roofing System Manufacturer's inspector shall keep the Engineer and Owner informed as to the progress and quality of the work observed on a daily basis. The inspector shall provide daily inspection reports to the Engineer and Owner on a weekly basis, which shall include project photos. The inspector shall report in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention. The inspector shall confirm in writing, after completion of the project, that manufacturer has observed application procedures and any noted improper applications have been corrected and the manufacturer has completely accepted the application and the specified warranty will be issued.

K. The Engineer and the Owner's Project Manager will be on site periodically to observe the work progress and to monitor contract compliance. Any items observed not in compliance with the contract documents shall be identified and promptly corrected by the Contractor.

L. Prior to the final project completion, inspections shall be made by representatives of the roofing system manufacturer's technical representative, Engineer, and Owner's Project Manager in order to ascertain that the roofing system has been installed properly. A punch list will be developed by each and copies will be forwarded to the Contractor. Contractor shall immediately correct all punch list items. Deviations from the specifications and/or details must be corrected immediately. Warranty shall be issued upon final acceptance of the work.

M. At the completion of the job, the Contractor and manufacturer shall each submit their guarantees to the Owner. Additionally, they shall submit an Inspection and Maintenance Schedule to the Owner.

N. Prior to the commencement of work, the Contractor shall inspect all roof surfaces to ensure their compliance with the provisions of this specification and the manufacturer's published literature.

O. All surfaces shall be smooth, dry, clean, free of fins or sharp edges, loose or foreign materials, oil or grease.

P. Commencement of work shall be considered acceptance by the Contractor of the area to be roofed as a suitable and properly prepared substrate.

Q. No work shall proceed when moisture is present on the roof or in the materials.

The Engineer may stop work when, in his opinion, the job conditions warrant him to do so.

R. All personnel concerned with the shop fabrication and field installation of sheet metal work must be qualified sheet metal journeymen who may be assisted by sheet metal apprentices qualifying for their journeyman status. The foreman of the crew must have at least five years experience in roofing sheet metal work.

1.05 SUBMITTALS

A. Submit shop drawings and product data listed below under provisions of Section 01300:

1. Manufacturer's literature and data sheets of all specified products in this section.

2. A letter from the cold process built-up roofing system manufacturer stating that the Roofing Contractor has been “Certified” or “Approved” by the Roofing System Manufacturer for a minimum of five (5) years.

3. A letter from the cold process built-up roofing system manufacturer identifying the full time inspector; resume to also be included.

4. A letter from the cold process built-up roofing system manufacturer accepting the technical specification and details; stating that the specified guarantee will be issued; and stating that a technical representative will be performing the required daily inspections in accordance with this specification.

5. Manufacturer's field surveillance report(s) and punch list(s).

6. Shop drawings detailing flashings, special joint or termination conditions, pipe supports, and conditions of interface with other materials.

7. Submit a detailed construction sequence schedule.

8. Material Safety Data Sheets of all cold process built-up roofing system components.

B. All details relating to the installation of the system shall be approved by the roofing system manufacturer and installed in such a manner that the manufacturer will furnish the specified warranty for the installation. Engineer will retain right of final acceptance of details and installation.

1.06 CODES AND REGULATORY REQUIREMENTS

A. Except as modified by the requirements of other governing codes and by this specification, conform to the provisions and recommendations of the following codes and standards:

1. Conform to Massachusetts State Building Code, latest revision and any

applicable local building code requirements.

2. Underwriters Laboratories, Inc. (UL): Fire Hazard Classification.

3. Factory Mutual Research Engineering Corporation (FM): FM Construction Bulletins 1-28, 1-29 and 1-49. Cover board to be adhered to the insulation. Insulation to be adhered and mechanically attached to meet or exceed a Factory Mutual fastening rate and pattern (FM 1-75 in the field of the roof, FM 1-90 at roof perimeters, FM 1-135 at roof corners).

4. Roofing and Waterproofing Manual (5th edition) published by the National Roofing Contractors Association (NRCA), 10255 W. Higgins Road, Suite 600, Rosemont, Ill. 60018-5607.

5. Copper & Common Sense Sheet Copper Design Principles and Construction Techniques published by Revere Copper Products, Inc., One Revere Park, Rome, NY 13440-5661 (7th edition).

6. Architectural Sheet Metal Manual published by the Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA), 4201 Lafayette Center Drive, Chantilly, VA 20151-1209 (5th edition).

7. ASTM B32 – Standard Specification for Solder Metal.

8. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

9. ASTM B370 – Standard Specification for Copper Sheet and Strip for Building Construction.

B. Material Safety Data Sheets of all specified products of this section shall be kept on site daily for project duration.

1.07 PROJECT COORDINATION

A. The Project Administrator shall be the Owner. The Contractor shall cooperate fully with the Administrator in all aspects of the roofing installation. The Contractor is responsible for, but not limited to, the following: allocation of demolition areas, demolition equipment, dumpsters, dump trucks, chutes, protection; hours of operation, traffic flow, roofing components installation, sheet metal components installation, sealants and caulking components installation, masonry components installation, roof drainage components installation.

B. It is the responsibility of the Contractor to coordinate the work of this Section with all other work on the project.

C. The Contractor shall make all necessary arrangements to limit travel on the existing and new roof system. Where it is necessary to travel on the existing roofing system the contractor shall provide all necessary temporary protection needed to protect the existing roofing system so as to ensure no leaks into the

facility occur. Any damage to the existing roofing system caused by work of this contract shall be repaired at no cost to the owner.

D. Contractor shall coordinate completion and clean up of work on a daily basis, including maintaining weather-tightness for project duration.

E. Coordinate all work of this section with other trades. Perform all roofing and flashing work in a timely manner as not to delay other trades. The Contractor shall coordinate all work with the other trades, to prevent exposure of the building to inclement weather and leaks, at all times.

1.08 PROJECT PROGRESS SCHEDULE

A. Contractor shall prepare and provide his Project Progress Schedule, prior to the preconstruction meeting, to the Engineer and Owner for review. The schedule shall show the complete sequence of construction by activity, with dates and times for beginning and completion of each element of construction. Provide sub-schedules to define critical portions of the entire schedule. Coordinate content with Schedule of Values.

B. The Project Progress Schedule will be reviewed at the preconstruction meeting and will be updated daily by the Contractor and presented to the Owner and Engineer daily. Contractor shall update the schedule daily, identifying changes since previous version. A review of the schedule will be conducted at each construction meeting, or more often as needed.

1.09 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.10 STORAGE AND PROTECTION

A. Contractor shall follow the recommended storage procedures of the manufacturer of the materials being used. No storage on or within the building will be allowed without written permission from the Owner. Any materials brought to the roof for daily operations or storage shall be evenly distributed on the roof to prevent concentrated loads and shall not overload the structure.

B. All moisture sensitive materials shall be stored in weatherproof trailers or temporary protective shelters and shall be stored at least 4 inches above the ground on stable pallets or skids and shall at all times be completely covered and secured. Tarpaulins or a similar "breathable" material shall be used to cover materials. Rubber or plastic materials shall not be acceptable. Factory applied "shrink packs" or plastic wrappings shall not be acceptable.

C. Materials stored on the ground shall be thoroughly secured against moisture and wind. Materials and their coverings shall be tied and/or weighted to prevent uncovering or blowing of material by the wind. Contractor shall be responsible for damages caused by blowing and improperly stored material and equipment.

D. Materials shall be handled with care and shall not be installed if they have been damaged in any way due to handling, storage or manufacturing defects. Contractor shall promptly mark and remove from the site any damaged or improperly stored materials when so requested by the Engineer.

E. All materials are to be stored at the recommended temperature range as specified by the manufacturer. Contractor shall provide manufacturer's information to the Engineer concerning storage and handling of flammable or volatiles materials. The "shelf life" materials shall be provided with the date of manufacturer of all perishables. Materials that become congealed, thick, non-uniform or otherwise unsuitable for proper application shall be removed from the project site and replaced with new properly stored and tested materials.

F. Provisions for placement of the Contractor's equipment must be planned by the Contractor and submitted to the Owner and the Engineer for approval.

G. Provide off-site storage and protection when site does not permit on-site storage or protection.

1.11 WEATHER AND TEMPERATURE REQUIREMENTS

A. Work shall not commence or proceed, with the exception of the completion of necessary temporary measures to make the building weathertight, when the ambient air temperature is below 50°F unless otherwise specified.

B. Work shall not commence or proceed, with the exception of the completion of necessary temporary measures to make the building weathertight, when precipitation of any kind, or winds in excess of 20 miles per hour are present or imminent or when, in the sole judgment of the Engineer or his authorized representatives, conditions are unfavorable or detrimental to the proper installation of the systems.

C. Work shall not commence or proceed, with the exception of the completion of necessary temporary measure to make the building weathertight, when water, ice or frost is present on or within the materials or surfaces to which materials are to be applied.

D. Work shall not commence or proceed with the exception of the completion of necessary temporary measures to make the building weathertight when the temperature is too hot to allow proper installation, or when existing or previously installed work is being damaged by the application, or when temperature conditions present a health or safety hazard to the workers on the site.

E. The Contractor shall bear full responsibility for providing and maintaining heated temporary storage facilities (storage container, etc.) for cold process roofing adhesives, primers, mastics, sealants, and other related roofing products that are

to be stored at the jobsite. This enclosed temporary storage facility shall be insulated and heated to maintain all job related materials (as described above) at a minimum temperature of 70º F.

F. Bulk tank silos ("bulk totes") for cold process roofing materials must be situated in a suitable heated and insulated enclosure. Materials contained with bulk tank silos must be warmed to permit smooth, uninterrupted delivery of adhesives to the roof surface through conventional hydraulic/pneumatic pump equipment.

G. The type, location, and method of heating for any storage facility must be accepted by the Owner in advance. All temporary storage facilities must be fully secured at the end of each workday.

H. The cold process built-up roofing system may require application during cold weather periods. The Contractor is required to provide suitably trained personnel, experienced in the application of cold process built-up roofing in cold weather.

I. Cold process built-up roofing materials are to be delivered to the roof surface in a warmed condition. To ensure that materials are kept in a warmed condition, deliver a minimum quantity of material to the roof surface. As materials are installed, re-supply the roof surface with additional warmed materials.

J. Any material that becomes "unworkable" shall be removed from the roof surface until warmed to a suitable/acceptable condition. Under no conditions will torches or other types of open flames be used to heat materials. Any water-based materials that are frozen shall be discarded and removed from the jobsite.

1.12 CONTRACTOR'S USE OF PREMISES

A. Contractor shall limit its use of the site for work and for storage to allow for:

1. Owner occupancy and use of the building during construction.
2. Public use of walks, parking lots, and driveways.

B. Do not block exits at any time. Provide protected entranceways at each entrance when working in these areas.

C. Coordinate work on the roof, use of the site, storage areas, and staging areas with the Owner. Limit use of the site and working hours to dates, times, and locations approved by the Owner.

D. Cooperate with the Owner's scheduling requirements for working at an occupied building. Work under this Section shall not interfere with the operation of the building or building occupants at any time.

E. The Contractor is responsible for protecting all materials and equipment stored on the site.

F. Smoking is not permitted on the grounds.

G. Dispose of all trash and debris in a legal manner off-site. Do not throw debris

from access equipment or staging. Conduct debris to approved containers on the ground. Locate debris containers only in locations approved by the Owner in advance.

1.13 WARRANTY

A. Provide roofing Contractor's warranty to cover all defects in workmanship and materials for a period of two (2) years from date of acceptance.

B. The manufacturer shall provide a full system warranty that guarantees all the roofing to be in a watertight condition for a period of twenty (20) years from the date of acceptance. During these periods, manufacturer shall make good at his own expense any faults or imperfections that may arise due to defects in all components of the roofing system to include roofing plies, cap sheet, fasteners, insulation, insulation adhesive, edge metal, membrane flashings, sealants, walkway pad and all related accessories as well as from defects in the workmanship involved in their installation. Such repairs shall be made as promptly after observation as weather and site conditions permit. The warranty shall include coverage for windstorms up to 72 miles per hour.

Warranty shall provide for follow-up inspections, in years 2, 5, 10, and 15 during the term of the warranty; to be performed by the manufacturer. Each inspection shall address all required preventive and remedial maintenance that is required (at no additional costs) to include: general housekeeping and cleanup; repairs to any deficiencies noted throughout the roof area. Each inspection will involve a written summary, with photographs, to be delivered to the Owner describing field conditions and identifying maintenance items, which are required to provide an extended service-life.

PART 2 - PRODUCTS

2.01 BUILT-UP ROOFING MATERIALS

A. It is the intent of this specification to install a long term, durable, quality roofing system. The components of the cold process built-up roofing system shall consist of the following listed acceptable manufacturers and roofing materials. The following cold process built-up roofing manufacturers are acceptable for use on this project:

(1)Tremco; (2) Johns Manville; (3) The Garland Company.

B. **Roofing Base Ply Sheet** shall be:

<u>Tremco System:</u> Composite Ply Sheet HT – Asphalt coated reinforced composite ply sheet (polyester/glass/glass) meeting or exceeding the requirements of ASTM D 4601, Type II.

<u>Johns Manville System:</u> PermaPly 28 – Asphalt coated reinforced composite ply sheet (fiberglass) meeting or exceeding the requirements of ASTM D 4601, Type II.

Garland System: HBR Tribase Plus – SBS polymer modified reinforced composite ply sheet (polyester/glass/polyester) meeting or exceeding the requirements of ASTM D 5147.

C. **Cold Process Adhesive** for use in adhering composite ply sheets and cap sheet shall be asbestos free, low odor, cold process adhesive:

Tremco System: POWERply Standard Cold Adhesive.

Johns Manville System: JM 2-part MBR Bonding Adhesive.

Garland System: Weatherking Cold Adhesive.

D. **Reinforced Modified Bitumen Granule Surfaced Cap Sheet** shall be a fire rated, granule-surfaced (tan color), high tensile reinforced modified bitumen membrane:

Tremco System: high tensile fiberglass reinforced SBS/SEBS/SIS modified bitumen membrane; POWERply Plus HT FR.

Johns Manville System: high tensile polyester reinforced SBS modified bitumen membrane; Dynalastic 250 FR.

Garland System: high tensile polyester reinforced SBS/SIS/ES modified bitumen membrane; Stressply E FR Mineral.

E. **Roofing Flashing System**: To flash vertical surfaces of rooftop penetrations, base walls, and parapets, a 2-ply flashing system is required, described as follows: 1-ply of the specified roofing composite ply sheet as the base layer covered by a layer of the specified reinforced modified bitumen cap sheet.

F. **Related BUR Materials**:

1. Asphalt Mastic: ASTM D 4586-86 fibrated asphalt mastic.

2. Asphalt Primer: ASTM D 41-85.

3. Multiple-Purpose Sealant: FS TT-S-00230C (2), single component, polyurethane sealant.

4. Stripping Adhesive for Metal Flanges: ASTM D 4586-86, asphalt mastic.

5. Stripping Ply for Metal Flanges: Trilaminate reinforced ply sheet.

6. Pitch-Pocket Sealant: Two (2) part, pourable sealant.

7. Fiberboard cants shall be used at all 90º angle changes and where shown on the Drawings. Cants shall have a minimum face diameter at the 45º

edge of not less than 4”. Cants shall be secured to the underlying insulation with cold process adhesive.

8. Walkway Protection Pad:

Tremco System: Trem-Tred.

Johns Manville System: DynaTred Plus Roof Walkway.

Garland System: Carry Tread Walkway.

2.02 METAL FLASHINGS

A. Sheet metal shall be .040-inch thick aluminum with a Fluoropolymer Kynar 500 finish configured as shown in drawings. Colors for edge metal, metal drip edges, parapet caps, blind nailers, and gutters (5” Wide X 4” Deep) shall be chosen by the Owner.

B. Sheet metal shall be .050-inch thick aluminum with a Fluoropolymer Kynar 500 finish configured as shown in drawings. Colors for downspouts (3” Diameter) and continuous cleats shall be chosen by the Owner.

C. 16 oz. copper for reglet counterflashings, step flashing, and blind nailers, and 20 oz copper for Dutch clips. Sheets shall conform to ASTM specifications B370 or Federal Specification QQ-C-576.

D. Solder composition shall be 50% block tin and 50% pig lead conforming to ASTM Specification B32 or Federal Specification QQ-S-571.

E. Flux shall be non-acid type flux manufactured specifically for use with lead coated sheet copper. Flux shall be muriatic acid killed with zinc or approved brand of soldering flux. Acid shall be thoroughly washed off after soldering is completed.

F. 4 lb. lead for drain flashing.

G. 16 oz. lead coated copper for vent pipe flashing.

H. Spacers, hangers, and stiffening bars shall be manufactured from 0.125” x 1” extruded aluminum bar, factory punched for fasteners.

2.03 FASTENERS FOR ATTACHING METAL FLASHINGS

A. For attaching sheet metal to wood, use 3/8" diameter head, 12 ga. annular ring of sufficient length to provide 1" embedment into the substrate or the membrane manufacturer's approved fastener.

B. For attaching termination bar/metal to masonry, use 3/16" x 2" zinc plated flat head screw type masonry fastener. Termination Bar: a 1.3" X 0.10" thick aluminum bar with integral caulk ledge.

C. All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1.25 inch and shall be approved for such use by the fastener manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch and shall be approved for such use by the fastener manufacturer.

D. To prevent corrosion, the indicated fastener materials shall be used with the following sheet metals:

Sheet Metal Type	**Fasteners Type and Material**		
	Nails	**Screws**	**Rivets**
Aluminum	Aluminum or Zinc	Aluminum or Zinc	Aluminum or Zinc
Copper	Copper	Bronze	Copper
Lead-Coated Copper	Copper	Bronze	Bronze
Stainless Steel and Steel	Stainless Steel	Stainless Steel	Stainless Steel

2.04 SEALANTS

A. Sealant use shall be in conformance with manufacturer's instructions. Sealant for terminations per details shall be as accepted by the roof membrane manufacturer based on chemical compatibility.

B. Butyl sealants shall be those conforming with Federal Specification TT-S-001657.

C. One part polysulfide sealants shall be those conforming to Federal Specification TT-S-00230C, Type II, Class A.

D. One part polyurethane sealants shall be those conforming to Federal Specification TT-S-00230C, Type II, Class B.

E. Silicone sealants shall be those conforming to Federal Specification TT-S-00230C, Type II, Class A.

F. Butyl tape shall be of a type produced and recommended by a reputable manufacturer for architectural copper applications.

PART 3 – EXECUTION

3.01 PREPARATION

A. Surface on which the system is to be applied shall be clean, smooth, dry, free of fins, sharp edges, loose and foreign materials, oil and grease. Before beginning work, a technical representative of the roofing system manufacturer shall examine the surfaces in order to insure that the deck, insulation, cants, curbs, nailers, blocking, and accessories are acceptable. Material with imperfections such as pinholes, cracks, incorrect thickness (less than specified), etc. shall be rejected and removed immediately from job site.

B. No work shall take place when moisture is present on the roof or in any of the materials. The Engineer may order the work to stop when, in his opinion, the weather conditions warrant him to do so. Contractor shall take such measures as the work can continue with minimum delay so the exposure of building and its contents is minimum. Verify conditions as satisfactory to receive work. Do not begin roofing until all unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions.

C. Check projections, curbs, and deck for inadequate anchorage, foreign material, moisture, or unevenness that would prevent quality and execution of new roofing system. Verify that work of other trades penetrating roof deck or requiring men and equipment to traverse roof deck has been approved by the Owners Representative, Manufacturer, and Roofing Contractor.

D. After the insulation and cover board attachment is complete and is accepted by the technical representative, and after substrate is dry, Contractor shall inspect the surface to determine that it is smooth and uniform and ready to receive the roofing plies. Prior to starting the roofing ply installation work Contractor shall notify the Engineer that the surface is ready for the work to begin.

E. Fumes from adhesive products shall not be allowed to enter into the building during installation. Appropriate measures must be taken, by the Contractor, to assure that fumes are not drawn into the building through air intakes or through any other openings.

3.02 GENERAL WORKMANSHIP

A. Phased application shall not be permitted; all roofing plies shall be completed each day. Traffic and equipment shall be kept off completed plies until cold-process adhesives have set completely. Ply shall never touch ply; even at roof edges, laps, tapered edge strips, and cants.

B. Provide clean plywood walkways and take other precautions required to prevent tracking of aggregate and foreign material from existing membrane into new work area where aggregate and foreign material pieces can be trapped within new roofing membrane. Contractor shall instruct and police workmen to ensure that aggregate and foreign material is not tracked into new work areas on workmen's shoes or equipment wheels. Foreign materials, including but not limited to, entrapped aggregate and wrapper/packaging materials are not permitted within

the roofing plies. Its discovery is sufficient cause for rejection. Contractor shall immediately correct.

C. Fit plies into roof drain rims; install lead flashing and finishing plies; secure clamping collars; install domes.

D. Extend roofing membrane to top edge of cant at wall and projection bases.

E. Contractor shall immediately correct all deficiencies including, but not limited to: Cut out fishmouths/side laps, which are not completely sealed; patch. Replace all plies, which are not fully and continuously bonded.

F. Roofing, flashing, membrane repairs, and insulation shall be installed and sealed in a watertight manner on same day of installation or before arrival of inclement weather.

G. Preparation work shall be limited to those areas that can be covered with installed roofing material on same day and before arrival of inclement weather.

H. All masonry and metal surfaces to receive flashing shall be primed with the manufacturer's recommended primer. Metal flanges shall be primed both sides, set in mastic over the completed roofing plies, nailed 4 inches on center to blocking, and stripped in with 2 plies (fiberglass mesh / trilaminate sheeting) in uniform layers of white, trowel-grade mastic.

I. All items penetrating the membrane shall be flashed and sealed watertight to the membrane as detailed on the drawings or as required by the roofing system manufacturer, if not detailed.

3.03 ROOFING PLY APPLICATION – THREE (3) LAYERS

A. Onto properly installed substrate, install three (3) base-layers of reinforced ply sheets adhered in cold process adhesive. Adhesive coverage rate: 2.0 gal per 100 SF, interply.

B. Use 12, 24, and 36-inch starter plies to start and finish roof membrane along roof edges and termination's. Overlap each succeeding ply 24 inches. Place ply sheets to ensure water will flow over or parallel to; but, never against exposed edges.

C. Lap ply sheet ends six (6) inches. Stagger end laps twelve (12) inches minimum.

D. Apply cold process adhesive no more than ten (10) feet ahead of each roll being embedded.

E. Extend all plies to top edge of cant strips, across wood blocking and onto drain rims.

F. Broom all plies to ensure complete and continuous seal and contact between adhesive and ply sheets. Broom ends, edges and laps without wrinkles, fish mouths, or blisters. Do not walk on plies until adhesives have set.

G. Roofing ply shall never touch roofing ply, even at roof edges, laps, tapered edge strips, and cants.

H. Cut out fish mouths/side laps, which are not completely sealed; patch. Replace all sheets, which are not fully and continuously bonded.

I. Overlap previous day's work twenty-four (24) inches (minimum).

3.04 MODIFIED BITUMEN CAP SHEET INSTALLATION

A. Over properly installed base plies, install a single-layer of reinforced, modified-bitumen sheeting in cold-process adhesive. Adhesive coverage rate shall be 2.0 gal per 100 square feet.

B. Place modified bitumen cap sheet to ensure water will flow over or parallel to; but, never against exposed edges. The maximum length of each section of cap sheet shall not exceed 18'; allow cut lengths to relax for 30 minutes prior to installation (if above 55ºF) or 60 minutes prior to installation (if below 55ºF). All laps and seams shall be hot air welded.

C. Place the modified bitumen cap sheet neatly in a uniform continuous application of the cold process adhesive. Ensure sheeting is installed without footprints marks/scuffs/stains, etc. Press the cap sheet into the adhesive using a minimum 75 lb. weighted roller to ensure full contact of the back of the membrane into the adhesive.

D. Ensure modified bitumen sheeting is fully adhered at all points, and without excessive bleed-out at laps/seams.

E. Side laps shall be 4" minimum; End laps shall be 6" minimum. Offset membrane laps from the ply sheet laps. Stagger end laps at least 36". Install a full-width layer of modified-bitumen sheeting, centered over end-laps.

F. Extend modified bitumen sheeting to the top edge of cant strips and across all adjacent wood blocking.

G. Ensure modified bitumen sheeting is fully adhered at all points, and without excessive bleed-out at laps/seams. Cut out and patch fish mouths and side laps that are not completely sealed. Replace all sheets that are not fully and continuously bonded.

H. Using electric, hot-air heating units, provide heat-welded connections at all laps/seams. Provide a clean, aesthetically-pleasing final finish throughout all portions of the roof system.

3.05 ROOFING FLASHINGS APPLICATION

A. All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed. If any moisture is allowed to enter under the new roofing due to incomplete flashings, the affected area shall be removed and replaced at the Contractor's expense. All flashings shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces.

B. Felt and Modified Bitumen Sheet Flashing System:

1. Install felt flashing sheet completely to flashing surface, cant, and roofing with cold process adhesive.

2. Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends four (4) inches. Adhere laps with cold process adhesive.

3. Felt flashing width: Sufficient to extend at least six (6) inches beyond toe of cant onto new roof.

4. Install SBS modified bitumen flashing sheet completely to SBS felt flashing with cold process adhesive. Further reference is made to paragraph 3.04.

C. Lead-flanges (Two-Ply Stripping): Set lead-flange in asphalt mastic. Prime lead flange prior to sealing into roof surface. Seal lead flange with two (2) layers of fiberglass reinforcing mesh embedded between alternate applications of asphalt mastic. Extend first ply four (4) inches beyond flange; second ply two (2) inches beyond first ply.

D. Vent pipe penetrations:

1. Wedge plumbing vent tight against deck and properly secure.

2. Apply 1/16-inch uniformly thick layer of trowel-grade, mastic to surface receiving metal flange.

3. Fabricate and install plumbing vent flashing from lead coated copper with soldered lead coated copper. Lead coated copper flange: Four (4) inches wide minimum; extend completely around periphery of vent flashing. Set lead flange into mastic. Neatly dress lead flange with wood block.

4. Prime lead flange with asphalt primer. Fabricate and install integral lead coated copper cap flashing.

5. Install two (2) ply stripping described in general flashing requirements section.

E. Roof drains:

1. After installation of the new roof drain assembly, ensure that drain body is installed flush to roof decking. Provide new galvanized sump pan receiver at drain openings.

2. Install new roofing system onto drain rim.

3. Apply 1/16-inch uniformly thick layer of trowel-grade, white mastic to surface receiving lead flashing.

4. Set single piece lead flashing in mastic centered over drain; extend lead six inches beyond drain rim. Neatly dress lead with wood block.

5. Clamp flashing collar to drain in bed of mastic.

6. Neatly cut lead within drain at rim; remove.

7. Prime lead with manufacturer's recommended primer.

8. Install two (2) courses of fiberglass mesh embedded in alternate applications of trowel-grade, white mastic over primed lead.

9. Seal/plug drain to prevent water entry into building interior until service connection is completed.

10. Provide service connection prior to anticipated rainfall.

F. Perimeter fascia/gravel stop:

1. Extend roofing plies completely across wood blocking horizontal and vertical surfaces.

2. Prior to setting and mechanically fastening flanges of new aluminum flashing, trowel 1/4-inch uniformly thick layer of trowel-grade mastic to roofing surface receiving metal flange.

3. Fabricate new flashing to properly engage continuous cleat assembly and other contours at perimeter.

4. Install six (6) inch layer of fiberglass reinforcing mesh across flange set in trowel-grade mastic. Install second layer of twelve (12) inch wide ply sheet over the mesh. Set the second ply in a full bed of asphalt mastic.

3.06 PERIMETER EDGE METAL

A. The contractor shall install a sealing tape strip between the continuous cleat and wall as a preventive measure against air and wind blown moisture entry.

B. Install continuous cleat fastened at 12” on center at the perimeter of each roof level.

C. Metal shall be in 8’-0” minimum lengths where metal can uniformly follow the profile of the roof structure. When the fascia is 8” or more in width, waviness shall be eliminated by forming one or more longitudinal raised V ridges or steps not less than ½” high in the fascia. These ridges shall stiffen the flat section. They should be spaced proportionally across the width of the fascia.

D. Maximum length of perimeter edge metal either side of corners shall be five feet. Outside corners shall be formed from single length of metal with mitered flange.

E. Fasteners shall penetrate the wood nailers a minimum of 1-1/2” inches.

F. Adjacent sections of metal shall be spaced 1/4” apart to allow for movement in metal. Slip joint metal caps to be installed at all joints.

3.07 METAL FLASHING APPLICATION

A. Workmanship for sheet metal shall be as follows:

1. Surfaces to be covered with sheet metal shall be free from defects of every description and clean of dirt and other foreign matter before sheet metal work is started.

2. Lines, arises and angles shall be sharp and true. Plane surfaces shall be free from waves and buckles. Joints and seams in plain surfaces shall be avoided as far as possible. Metal joints shall be watertight.

3. Sheet metal work exposed to the weather shall be permanently watertight and weather tight, with suitable provisions made for free expansion and contraction without causing leaks. Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.

4. Exposed edges shall be hemmed 1/2 inch in such a manner as to conceal them and provide stiffness.

5. No nails shall be exposed on the face of the finished work except as approved by the Engineer or except as directed herein.

B. The Contractor agrees to guarantee all metal flashings permitted to be reused, the same as new construction under the Contract.

C. Install electrolytic insulation materials between dissimilar metals. Avoid to the greatest extent practical, using dissimilar metals in contact with each other.

D. All sheet metal work shall be cleaned at completion of installation. Grease and oil films, handling marks, contamination from steel wool, fitting and drilling debris shall be removed and the work scrubbed clean. All new exposed metal surfaces shall be free of dents, creases, waves, scratch marks, and solder or weld marks. Daily cleanup and removal from the site of all shavings, clippings, shearing, rivets, fasteners, and whatever other debris resulting from these operations are required.

E. Proceed with flashing work concurrently to cold process built-up roofing installation to prevent water intrusion into the roof assembly and facility. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily. If any moisture is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Contractor's expense.

F. Fasteners exposed to weather shall utilize neoprene washers between the fastener head and the metal flashing.

G. Counter flashings shall overlap base flashings at least 4 inches.

H. Airtight/Watertight and continuous metal hook strips are required behind metal fascias and edge metal. Hook strips are to be fastened 12 inches on center into the wood nailer or masonry wall. Hook strips shall extend past wood nailers over wall surfaces by 1-1/2 inch minimum and shall be securely sealed from air and water entry.

I. Cut-in reglet counterflashing shall be installed as directed herein and as shown on the drawings. Metal counterflashings shall be located a minimum of 8" above the finished roof level.

J. The Contractor shall lift the existing rooftop unit curbs as required to allow for the installation of roofing and flashing. The Contractor shall install metal extender pieces at all exhaust fan and other curbs. Fasten metal extender pieces at 6" o.c. with approved grometted fasteners. Metal extender pieces shall be lapped a minimum of 1-1/2" and shall have a face dimension of 4". The existing exhaust fan and unit curb cover shall be reinstalled. Secure exhaust and unit cover at 12" o.c. with an approved grometted fastener (minimum of two on each side of the curb).

3.08 WALKWAY PAD APPLICATION

A. Prior to application of walkway pads, the Contractor shall inspect the roof. The Engineer and Roofing Materials Manufacturer shall be present.

B. Areas to receive walkway pads shall be at all entrances to the roof, completely around all serviceable rooftop units, at bottom and top of access ladders, underneath all rooftop supports, and as shown on the Drawings.

C. Areas to receive walkway pad shall be clean and free of all debris. Install walkway pads in a full bed of manufacturer provided modified asphalt adhesive. All four corners of each piece shall be fully and firmly set prior to walking on the pad. Leave a minimum of 1” open space in all directions between walkway pads to provide for drainage.

D. Protect walk pads from damage and/or stains. Ensure that men, and/or equipment do not travel across installed walk pads. All stained, soiled and/or damaged walk pads shall be removed and replaced, as directed by the Engineer and Owner.

3.09 TIE IN

A. All flashings shall be installed concurrently with the roofing system in order to maintain a watertight condition as the work progresses (no temporary flashings). When a break in the day's work occurs, a temporary water stop shall be constructed to provide a 100% watertight seal. When the work on the new system is suspended, the stagger of the insulation joints shall be maintained by installing partial fillers. The partial fillers shall be butted up to the existing insulation completely. No voids should exist. The new membrane shall be carried into the water stop. The water stop shall be sealed to the deck and/or substrate so that water will not be allowed to travel under the new or existing roofing. When work is resumed, the contaminated membrane shall be cut out. All sealant, contaminated membrane, insulation fillers, etc. shall be removed from the work area and disposed of off site. None of these materials shall be used in the new work.

B. If inclement weather occurs while temporary water stop is in place, the Contractor shall provide the labor necessary to monitor the situation to maintain a watertight condition.

C. If any water, debris or any other foreign material is allowed to enter the newly completed roofing, the affected area shall be removed and replaced at the Contractor's expense.

3.10 FIELD INSPECTION

A. The Roofing Materials Manufacturer shall provide observation/inspection services during the roof system installation. Roofing System manufacturer’s technical representative shall provide field surveillance of the installation and shall monitor and report installation procedures, unacceptable conditions, etc. Roofing application will be subject to observation and inspection by the Engineer, Owner, and the Roofing Material Manufacturer’s Representative(s). All costs incurred by the Contractor due to Field Quality Control inspections shall be the sole responsibility of the Contractor and will not be considered grounds for or justification of an increase in the original contract price.

B. The Engineer and the Owner's Project Manager will be on site periodically to observe the work progress and to monitor contract compliance. Any items observed not in compliance with the contract documents shall be identified and promptly corrected by the Contractor.

C. Prior to the final project completion, inspections shall be made by representatives of the roofing system manufacturer's technical representative, Engineer, and Owner's Project Manager in order to ascertain that the roofing system has been installed properly. A punch list will be developed by each and copies will be forwarded to the Contractor. Contractor shall immediately correct all punch list items. Deviations from the specifications and/or details must be corrected immediately. Warranty shall be issued upon final acceptance of the work.

D. Contractor is to provide any and all necessary protection to the entire roof area to maintain watertightness during the project duration, including existing roof areas not yet roofed. Any interior damages that occur as a result of the Contractor's negligence shall become the Contractor's responsibility and he shall promptly repair and/or replace all damaged items to the satisfaction of the Engineer and Owner.

3.11 PROTECTION OF WORK

A. Contractor shall protect the project site including the building, its contents, all streets, walls, underground and overhead utilities. All areas shall be left in a watertight condition in their entirety at all times. Contractor shall provide protective measures and materials to assure that each element will be without damage or deterioration throughout the entire construction period up to the date of final completion. Any defective elements shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer and Owner. Remove protective coverings and materials at the appropriate time, but no later than final cleaning operations.

B. No work shall take place during inclement weather. No work shall take place when moisture is present on the work area or in any of the materials. The Engineer may order the work stopped when, in his opinion, the weather conditions warrants him to do so. Contractor shall take such measures as necessary to dry out work surfaces so that the work can continue with minimum delay.

C. Contractor shall cover and protect all walls, windows, projections, soffits, etc. where material is to be hoisted or removed from the roof deck. Contractor shall be responsible for all scrapes, stains, and damage to the walls and shall repair or replace any walls, windows, siding, etc., which are damaged by his operations, to the satisfaction of the Engineer and Owner. Any areas damaged shall be restored or cleaned, to the satisfaction of the Owner by the Contractor at no cost to the Owner.

D. Whenever the possibility exists that debris or materials may fall causing a hazard to persons inside or outside the building, the Contractor shall post one or more of his employees to temporarily close these hazardous areas. The person in charge of the facility shall be notified prior to the commencement of work that may pose this type of hazard. Proper barricades shall be provided to prevent normal access to or around these areas.

E. Contractor shall properly protect all areas where falling debris or dust is expected due to his operations. Contractor shall be responsible for providing adequate personnel to clean and protect these areas. Contractor shall include these costs in their bid.

F. Protect the building interior, contents, Owner's employees and customers from all hazards associated with the Contractor's operations.

G. Any damage to the interior of the building or its contents due to the Contractor's operations or to leaks during the Contractor's operations shall be corrected at the Contractor's expense to the satisfaction of the Owner and the Engineer.

H. Any damage to the exterior of the building or any rooftop equipment due to the Contractor's operations shall be corrected at the Contractor's expense or to the satisfaction of the Owner and the Engineer.

I. No member of the roof shall be overstressed due to construction loads and demolition operations. The Owner assumes no responsibility for the actual condition of the structure.

J. Damage to any portion of the building which results in disruption of or inconvenience to the Owner or his employees shall be immediately repaired or replaced by the Contractor. If such restitution is not promptly made, the Owner shall have the necessary work performed by an outside agency at the Contractor’s expense.

3.12 CLEANING

A. The building and adjacent areas shall be left in a broom-clean condition at the end of each day. On completion of the work and after removal of all debris, the site shall be left in a clean condition satisfactory to the Owner and to the Engineer.

B. At the completion of the Project, the Contractor shall restore or replace all property damaged by his Work and shall remove all spots, paint, smears, soil, concrete, mortar, sealant, adhesives, asphalt, writing, droppings, or other foreign materials, from all Work. Remove all temporary protection from all the Work. Final cleaning shall include as a minimum:

1. Clean site; sweep paved areas, rake clean landscaped surfaces.
2. Remove waste and surplus materials, rubbish, and construction facilities from the site.

3. The Contractor shall clean all walls, windows or other building and grounds elements that have been affected by his work.
4. Repair, patch and touch-up marred surfaces to specified finish to match adjacent surfaces.
5. The Contractor shall clean the roof surface to the satisfaction of the Owner and Engineer.

3.13 COMPLETION OF WORK

A. Prior to demobilization from the site, the completed project/work shall be reviewed by the Engineer, the roofing system manufacturers' technical representative, Owner's Project Manager, and the Contractor. All defects and items in non-compliance with the specifications, manufacturers' recommendations and the manufacturers' warranty requirements shall be itemized on a punch list. These items shall be corrected to the satisfaction of the Engineer, the roofing system manufacturers' technical representative, Owner's Project Manager, by the Contractor prior to demobilization.

B. All warranties referenced in this specification shall have been submitted and accepted the Engineer and Owner. Fully executed warranty documentation shall be submitted to the Engineer and Owner as soon as possible for review and approval. At the completion of the job, the Contractor and manufacturer shall each submit their guarantees to the Owner. Additionally, they shall submit an Inspection and Maintenance Schedule to the Owner.

END OF SECTION

SECTION 15400

PLUMBING-ROOF DRAINS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification.

1.02 SECTION INCLUDES

A. The work of this Section consists of furnishing and installing all plumbing for roof drainage and related items as indicated on the Drawing and specified herein, required to complete the work.

B. Contractor shall replace all existing roof drain assemblies; to include new cast iron drain bowls, clamping rings, drain strainers, anchors, insulation, bolts, lead lining connections, and under deck clamps, as specified and detailed. Contractor shall install plumbing vent extensions as required to conform to the MSBC and as specified herein. Contractor is responsible for providing all connections and alterations to accommodate the new work.

Contractor shall install new overflow roof drain assemblies; to include new cast iron drain bowls, combined clamping ring and solid water dam, drain strainers, adjustable extension sleeves, reversible collar, anchors, insulation, bolts, lead lining connections, and under deck clamps, as specified and detailed. Contractor shall provide and install a new overflow roof drain and related leader piping.

C. Prior to the start of work, Contractor shall inspect and verify the proper functioning of all roof drains and shall identify those that are slow flowing or clogged. In an effort to ensure a free-flowing roof drainage system, **Contractor shall snake free these drains at the start of the project and again at the project's completion for a minimum distance of 100 feet starting from the roof level.**

D. All roof drainage systems for the existing building shall not be made ineffective due to this work. Lines shall be run in a workmanlike manner, and as straight as possible.

E. All materials shall be verified by Contractor to be proper for each intended use, and the entire work of this Section shall be done in such a manner that each installation will perform its intended purpose as applicable, in the finished work.

F. Contractor shall properly protect all areas where falling debris or dust is expected due to his operations. Contractor shall be responsible for providing adequate personnel to clean and protect these areas. Provide protection at all times during construction to maintain watertightness. Contractor shall include these costs in the bids.

G. Protect the building interior, contents, Owner's employees and tenants from all hazards associated with the Contractor's operations.

H. Any damage to the interior of the building or its contents due to the Contractor's operations or to leaks during the Contractor's operations shall be corrected at the Contractor's expense to the satisfaction of the Owner and the Engineer.

I. Any damage to the exterior of the building, roof membrane, or any roof top equipment due to the Contractor's operations shall be corrected at the Contractor's expense to the satisfaction of the Owner and the Engineer.

J. The drawings indicate and show limits of construction for this project. The specifications specify material and work requirements for this project. Both are complementary to each other and both shall be followed to complete the work

K. Plans and dimensions under which the Work is to be performed are derived from a variety of sources. The existing conditions are provided for information only. Actual conditions may vary. Contractor is required to verify existing roof drainage plumbing system composition, conditions, and dimensions prior to submitting his bid. No additional compensation or time extension will be made for dimensional errors or discoverable inaccuracies related to existing conditions in the contract documents.

1.03 RELATED WORK

A. Section 02050 - Demolition
B. Section 06100 - Rough Carpentry
C. Section 07220 - Roof Insulation
D. Section 07321 – Slate Roof Repairs
E. Section 07510 - Built Roofing & Flashing

1.04 SUBMITTALS

A. Submit manufacturer's descriptive literature and data sheets listed below under provisions of Section 01300:

1. Roof drain assembly including insert drains, drain bowls, clamping ring assemblies, drain strainers, anchors, bolts, under deck clamps, leader pipes, hangers, lead and oakum, and insulation.

B. Submit Contractor Quality Assurance supporting documentation as stipulated in Paragraph 1.06.

1.05 DELIVERY, HANDLING AND STORAGE

A. Contractor shall comply with all recommendations of the pipe manufacturer and of applicable Technical Reports of the Cast Iron Soil Pipe Institute for handling and installation.

B. All work and materials shall be protected at all times. The Contractor shall make good all damage caused by his workmen either directly or indirectly. All pipe openings shall be closed with caps or plugs during installation. Equipment shall be tightly covered and protected against dirt, water, chemical or mechanical injury.

C. The Contractor shall do all carting, handling and hoisting for his materials and equipment in a safe and satisfactory manner. Any damage resulting there from shall be repaired or paid for by this Contractor to the satisfaction of the parties concerned, at no additional cost to the Owner.

1.06 QUALITY ASSURANCE

A. All materials shall be installed to serve their intended function.

B. All work shall be performed by a licensed plumber that regularly performs commercial roof drain replacement work. The work shall adhere to the local building codes, regulations, industry standards, and best practices of the trade. The Contractor shall have a minimum of five (5) years experience installing warranted commercial roof drainage systems. Minimum required experience involves the successful installation of at least ten (10) similar projects located in Massachusetts. Contractor shall provide the following supporting documentation:
(1) Name and address of project indicating project name, project date, and number of drains replaced, for each of the ten (10) referenced projects.

(2) Name and phone number of contact person (Owner, Designer, and Roofing Contractor), for each of the ten (10) referenced projects.

(3) Written evidence of plumbing contracting license.

C. All work shall be applied in strict accordance with the provisions of the technical specification and details. No deviations shall be permitted without written consent from the Architect. Should a conflict between this specification (and the associated details) and the manufacturer's requirements arise, the most restrictive provision, as determined by the Architect, shall govern.

1.07 COORDINATION

A. Coordinate all work of this section with other trades. Perform all plumbing work in a timely manner as not to delay other trades. The Plumbing Contractor shall coordinate all work with the roofing and waterproofing trades, to prevent exposure of the building to inclement weather and leaks, at all times.

1.08 CONTRACTOR’S USE OF PREMISES

A. Contractor shall limit its use of the site for work and for storage to allow for:

1. Owner occupancy and use of the building during construction.

2. Public use of walks, parking lots, and driveways.

B. Do not block exits at any time. Provide protected entranceways at each entrance when working in these areas.

C. Coordinate work on the roof, use of the site, storage areas, and staging areas with the Owner. Limit use of the site and working hours to dates, times, and locations approved by the Owner.

D. Cooperate with the Owner's scheduling requirements for working at an occupied building. Work under this Section shall not interfere with the operation of the building or building occupants at any time.

E. The Contractor is responsible for protecting all materials and equipment stored on the site.

F. Smoking is not permitted on the grounds.

G. Dispose of all trash and debris in a legal manner off-site. Do not throw debris from access equipment or staging. Conduct debris to approved containers on the ground. Locate debris containers only in locations approved by the Owner in advance.

1.09 WARRANTY

A. Plumbing Contractor's Warranty: The Plumbing Contractor shall supply the Owner with a minimum two-year workmanship and leak-free warranty. In the event any work related to plumbing is found to be defective, is not watertight, or otherwise not in accordance with the contract documents within two (2) years of final completion, the Plumbing Contractor shall repair and/or remove and replace at no cost to the Owner. The Contractor's warranty obligation shall run directly to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials shall be selected so as to conform to all applicable local state and federal codes.

B. **Roof Drains**: Roof Drains as manufactured by Zurn Industries, Inc., J.R. Smith Mfg. Co., Inc., Josam Co., Inc. Roof drain to be sized so as to match existing diameters; Roof Drain shall be Dura-Coated cast iron body with combination membrane flashing clamp/gravel guard and low silhouette vandal proof cast iron dome. Overflow roof drain bodies shall include inlets that are located 3" above the surface of the roof. Provide all necessary accessories, including, but not limited to the following: under deck clamps (two piece clamps made of Dura-Coated cast iron that secures drain to deck), adjustable extension assembly, static extension, roof sump receiver, and bronze mesh screen over dome to prevent debris from entering drain.

C. **Drain piping**: Cast iron soil pipe of Service weight cast iron with no hub joints or bell and spigot joints or as required to comply with current applicable local, state and federal codes. All pipes shall be supplied in the longest lengths possible so as to minimize pipe joints. Use Dielectric connections or other approved means when connecting pipes of dissimilar material.

D. **Pipe joint**: at roof drain bowl to leader pipe connection shall be sealed with lead and oakum.

E. **Insulation:** Furnish and install the following type pipe covering and insulation as manufactured by Owens Corning, Knauf, Certaineed, or approved equal product. Fiberglass insulation ("K" value of 0.23 at 75° , non-combustible) with fire retardant jacket on all piping's. Laps sealed with Insul-Coustic IC-102 or approved equal. Thickness to be 1". Fittings, flanges and valves to be insulated with either Zeston pre-molded PVC insulation fittings or with molded or mitered fiberglass finished with glass cloth and Insul-Coustic IC-102 or approved equal. All insulation shall have a composite fire hazard rating as tested by ASTM E-E4, NFPA 255, or UL273, not to exceed 25 flame spread and 50 smoke developed. All accessories shall have same component ratings.

F. **Stainless Steel Coupling:** shall be used to extend the height of existing vent pipe penetrations that do not extend a minimum of 18" of the finished roof. Couplings shall conform to ASTM C1540, CSA B 602, & FM 1680 Class 1. Couplings shall consist of a Type 304 stainless steel shield, clamp assembly and a high quality elastomeric gasket conforming to ASTM C 564. Transition couplings conform to ASTM C 1460. Stainless steel couplings shall be SD 4000 stainless steel coupling manufactured by Anaco, or an approved equal product.

PART 3 - EXECUTION

3.01 CLEANING AND TESTING

A. Contractor shall snake clear and clean all referenced drains at **the start of the project and again at the project's completion** for a minimum distance of 100 feet starting from the roof level.

B. Upon completion of work all parts of installation shall be thoroughly cleaned of all foreign material including roofing products, grease, metal cuttings, dirt, etc.

C. All roof drains and piping shall be water tested in, accordance with applicable plumbing code, to verify proper operation and adequately sealed joints and flashing. All testing work shall be performed in the presence of the Engineer or Owner's representative. Leaks developing subsequent to these tests shall not be repaired by mastic or other temporary means. All leaks shall be repaired by removal of the valve, fitting, joints or other sections that are leaking and reinstalling new material.

3.02 DRAIN INSTALLATION

A. Install new drain bowl and new drain leader connection in all drains prior to roof replacement. Install new roof drains in accordance with manufacturer's recommendations ensuring flange is flush with the existing deck, in a receiver pan if necessary and that all lead and oakum seal connections are proper to create a positive watertight connection with the new drain leader pipe including:

1. Flash in flange up to and around vertical drain body bosses.

2. Install clamping ring over raised bosses and tighten clamping ring against flashing until secure. Refer to Section 07510 – Built-up Roofing & Flashing for membrane and flashing termination requirements.

3. Install strainer basket onto clamping ring and lock into place.

4. Install overflow drains with the clamping ring level with the top surface of the roof's full thermal insulation. Inlets shall be located 3" above the top surface of the roof's full thermal insulation.

5. Route overflow leader piping out through exterior masonry walls where shown. Extend pipes clear of exterior wall be two inches and seal the pipe to the cored masonry. Properly hang and support all leader piping.

B. Insulation: Insulation shall be installed in a workmanlike manner by workman regularly engaged in this type of work. Insulate all new drains. Insulate all existing drain piping to the point where it enters the ceiling level below. Insulation to be installed after all surfaces are clean and dry. Insulation on pipe fittings and pipe joints shall not be insulated before the piping is tested and approved. A complete moisture and vapor seal shall be provided over insulation on cold surfaces where vapor barrier jackets, facings, or coatings are required. Anchors, hangers, and other projections shall be insulated and vapor sealed to prevent condensation. All openings, punctures, and staples shall be sealed with vapor barrier compound. Jackets and facings shall be securely and neatly applied to the insulation. Jackets and facings shall be drawn tight and all joints shall have laps or butt strips of material identical with jackets or facings, secured with factory or field applied adhesives or with staples. Jackets on pipe insulation shall have not less than 1-1/2" lap joints at longitudinal joints and not less than 3" wide butt strips at end joints. Insulate all horizontal storm drainage piping.

3.03 EXTENSION OF VENT PIPE PENETRATIONS

A. The plumbing contractor shall conduct a survey of the existing vent pipes on the roof to determine which vent pipes must be extended. This survey will be coordinated the roofing contractor and the tapered insulation plan. Vent pipe penetrations must extend a minimum of 18" above the finished roof system.

B. Vent pipes that are being extended shall be cleaned of all foreign material including roofing products, grease, metal cuttings, dirt, etc. The plumbing contractor shall verify that the vent pipe is not broken, cracked, or has any sharp corners that will damage

the stainless steel coupling. The contractor will cut any pipe that exhibits these conditions prior to the installation of the new coupling.

C. The plumbing contractor shall slide the stainless steel coupling down over the existing vent pipe penetration. Install new cast iron pipe into the stainless steel coupling. The stainless steel sealing clamps shall be torqued to 80-inch pounds.

D. The roofing contractor shall flash the vent pipe penetration in accordance with the Built-Up Roofing flashing details.

END OF SECTION