FLOW DIAGRAM AND CONTROL DIAGRAM EQUIP SYMBOLS

AAV — AIR SEPARATOR

PUMP

OPPOSED BLADE DAMPER W/ TWO POSITION ACTUATOR

OPPOSED BLADE DAMPER W/ MODULATING ACTUATOR

BOILER

PARALLEL BLADE DAMPER W/ TWO POSITION ACTUATOR

PARALLEL BLADE DAMPER W/ MODULATING ACTUATOR

BACKDRAFT DAMPER

EXPANSION TANK
COMPRESSION TANK

CHEMICAL FEED SYSTEM

GENERIC HVAC SYSTEM TAGS

WH 1 — WATER HEATER

P 1 — PUMP

B 1 — BOILER

EQUIPMENT TAG SYMBOLS & ABBREVIATIONS

EQUIPMENT NOT REQUIRING ELECTRIC SERVICE — TAG NO / TAG DATA DATA — SEE SCHEDULE FOR PERFORMANCE REQUIREMENTS — TAG NO / TAG DATA DATA — EQUIPMENT REQUIRING ELECTRIC SERVICE

NOTE: REFER TO SCHEDULES FOR DEFINITION OF EQUIPMENT SPECIFIC DATA LISTED WITHIN TAG BLOCKS.

HVAC GENERAL NOTES

1. GENERAL NOTES APPLY TO ALL DRAWINGS.
2. THIS PROJECT INVOLVES CONSTRUCTION INSIDE AN EXISTING STRUCTURE. CONTRACTORS, BY SUBMITTING A BID, ARE DEEMED TO BE COMPLETELY FAMILIAR WITH THE EXISTING CONDITION OF THE BUILDING AS IT INFLUENCES THE WORK DESCRIBED. ABSOLUTELY NO CLAIMS FOR EXTRA COMPENSATION WILL BE CONSIDERED FOR EXISTING CONDITIONS VISIBLE OR REASONABLY INFERABLE FROM A CAREFUL EXAMINATION OF THE EXISTING BUILDING.
3. THIS CONTRACTOR SHALL INSPECT THE EXISTING FIELD CONDITIONS AT THE SITE AND THE "AS-BUILT" BASE BUILDING CONTRACT DOCUMENTS PRIOR TO THE START OF ANY WORK TO DETERMINE WHAT EFFECT THE EXISTING CONDITIONS WILL HAVE ON HIS WORK. POTENTIAL PROBLEM AREAS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND/OR ENGINEER IMMEDIATELY.
4. THIS CONTRACTOR SHALL CONNECT HIS WORK TO VARIOUS EXISTING PIPING IN THE BASE BUILDING. THE NEW WORK SHALL BE COMPATIBLE WITH THE EXISTING SYSTEMS. LOCATION OF EQUIPMENT OR THE ROUTING OF THE VARIOUS SYSTEMS AS WELL AS OPENINGS IN FLOOR SLABS OR WALLS SHALL BE GOVERNED BY THE EXISTING CONDITIONS AS THEY APPEAR IN THE FIELD OR ON THE "AS-BUILT" DRAWINGS.
5. CARE SHALL BE TAKEN DURING THE INSTALLATION TO NOT DAMAGE OR INTERRUPT BUILDING SYSTEMS AND SERVICES THAT ARE ALREADY INSTALLED. DAMAGE TO SUCH SYSTEMS OR EQUIPMENT CAUSED BY THIS CONTRACTOR DURING INSTALLATION SHALL BE REPAIRED AND/OR REPLACED AT THIS CONTRACTOR'S EXPENSE TO THE COMPLETE SATISFACTION OF THE BUILDING OWNER.
6. SHUTDOWN OF EXISTING SYSTEMS FOR CONNECTION TO EXISTING SERVICES SHALL BE COORDINATED WITH THE CONSTRUCTION MANAGER OR GENERAL CONTRACTOR AND BUILDING OWNER. THIS CONTRACTOR SHALL SUBMIT REQUESTS, WHERE THEY AFFECT THE OPERATION OF THE BUILDING SYSTEMS, AT LEAST ONE WEEK IN ADVANCE OF ANY REQUIRED SHUTDOWN. THE ACTUAL SHUTDOWN PERIOD SHALL BE AS SHORT AS POSSIBLE AND AT A TIME MUTUALLY AGREEABLE TO THE BUILDING OWNER AND THE CONSTRUCTION MANAGER/GENERAL CONTRACTOR.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY HEAT AND DOMESTIC HOT WATER SERVICE DURING SHUTDOWN PERIODS WHEN NECESSARY.
8. DRAWINGS ARE DIAGRAMMATIC, THEREFORE DETERMINE EXACT LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD.
9. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AND TRANSITIONS AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
10. VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. VERIFY AND PROVIDE DUCT AND/OR PIPE TRANSITIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE FABRICATION.
11. ALL MATERIALS AND EQUIPMENT UNLESS SPECIFICALLY INDICATED AS REUSED, SHALL BE NEW.
12. WHEN SECTION OF PIPE IS NOT LABELED FOR SIZE, THE LARGER SIZE INDICATED ON THE CONNECTED PIPE SHALL PREVAIL.

GENERAL

		RISER DOWN (ELBOW)
		UNION
		BALL VALVE
		GAS SHUTOFF VALVE
	ETBR	EXISTING TO BE REMOVED
	CTE	CONNECT TO EXISTING
		CHECK VALVE
		MIXING VALVE

HYDRONIC SYSTEM SPECIFIC ABBREVIATIONS

AS	AIR SEPARATOR	ET	EXPANSION TANK
AAV	AUTOMATIC AIR VENT	EWT	ENTERING WATER TEMPERATURE
CHEM	CHEMICAL FEED	LWT	LEAVING WATER TEMPERATURE
CTK	COMPRESSION TANK	MAV	MANUAL AIR VENT
DOV	DRAIN OFF VALVE	NPSH	NET POSITIVE SUCTION HEAD
		PU	PUMP
		TDH	TOTAL DYNAMIC HEAD

PLUMBING PIPING

CW	CW	COLD WATER
HW	HW	HOT WATER
HWR	HWR	HOT WATER RETURN
G	G	NATURAL GAS PIPING
NPCW	NPCW	NON POTABLE COLD WATER

PLUMBING GENERAL NOTES

1. PLUMBING WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST EDITION OF THE STATE PLUMBING AND GAS CODE INCLUDING ALL LOCAL AMENDMENTS,
2. OBTAIN ALL PERMITS AND PAY ALL FEES ASSOCIATED WITH THIS WORK PRIOR TO COMMENCEMENT.
3. THE DRAWINGS ARE DIAGRAMMATICAL ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT ROUTE OF ALL PIPING, IN FIELD AND IN CONJUNCTION WITH COORDINATION OF ALL EXISTING CONDITIONS, NEW CONSTRUCTION, AND COORDINATION WITH ALL OTHER TRADES TO INSURE THAT ALL THE PLUMBING SYSTEMS WILL FIT INTO THE SPACE.
4. IN ADDITION TO REVIEWING AND COORDINATING WITH THE OTHER TRADES (CIVIL, STRUCTURAL, ARCHITECTURAL, FIRE PROTECTION, HVAC, AND ELECTRICAL) THE CONTRACTOR SHALL VISIT THE SITE AND FAMILIARIZE HIMSELF WITH DETAILS OF CONSTRUCTION.
5. ALL EXISTING CONDITIONS SHOWN ARE APPROXIMATE ONLY. ALL EXISTING CONDITIONS SHALL BE VERIFIED IN THE FIELD.
6. ADDRESS QUESTIONS REGARDING DRAWINGS TO ARCHITECT IN WRITING BEFORE AWARD OF CONTRACT. OTHERWISE, ARCHITECT INTERPRETATION OF MEANING AND INTENT OF DRAWINGS SHALL BE FINAL.
7. VISIT SITE AND EXAMINE CONDITIONS UNDER WHICH WORK MUST BE PERFORMED. REPORT ADVERSE CONDITIONS IN WRITING TO ARCHITECT. COMMENCEMENT OF WORK SHALL BE CONSTRUED AS COMPLETE ACCEPTANCE OF EXISTING CONDITIONS INCLUDING PREPARATORY WORK DONE BY OTHERS.
8. GUARANTEE WORK IN WRITING FOR ONE YEAR FROM DATE OF FINAL ACCEPTANCE. REPAIR OR REPLACE DEFECTIVE MATERIALS OR INSTALLATION AT NO COST TO OWNER. CORRECT DAMAGE CAUSED IN MAKING NECESSARY REPAIRS AND REPLACEMENTS UNDER GUARANTEE AT NO COST TO OWNER.
9. CONTRACTOR MUST PROVIDE AND INSTALL ALL NECESSARY PIPING, FITTINGS, VALVES, EQUIPMENT SUPPORTS AND ANY EQUIPMENT NOT SHOWN ON DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS BUT NECESSARY TO CONFORM TO 248 CMR 10.00 AND PROVIDE A COMPLETE FUNCTIONING SYSTEM.
10. PROVIDE ACCESS TO ALL EQUIPMENT REQUIRING PERIODIC SERVICE AND MAINTENANCE.
11. FURNISH ACCESS PANELS TO THE GENERAL CONTRACTOR FOR INSTALLATION UNDER THE RELATED TRADES.
12. PIPING SHALL RUN CONCEALED IN ALL AREAS WITH THE EXCEPTION OF MECHANICAL ROOMS, AREAS WHERE NO CEILING EXISTS OR WHERE NOTED ON THE PLANS.
13. INSTALL DIELECTRIC COUPLINGS BETWEEN DISSIMILAR MATERIALS.
14. ALL PIPING RUNNING THROUGH BUILDING EXPANSION JOINTS SHALL BE EQUIPPED WITH EXPANSION FITTINGS.
15. INTERRUPTIONS TO EXISTING SERVICES AND SYSTEMS SHALL BE AS SHORT AS POSSIBLE AND AT A TIME AND DURATION APPROVED BY THE ARCHITECT OR OWNER. INCLUDE ALL PREMIUM TIME ASSOCIATED WITH INTERRUPTIONS.
16. ALL NEW SYSTEMS SHALL BE TESTED, BALANCED AND ADJUSTED TO INSURE PROPER OPERATION AND CODE COMPLIANT INSTALLATION. PIPING AND EQUIPMENT SHALL BE TESTED IN ACCORDANCE WITH THE STATE PLUMBING CODE.
17. THE PLUMBING CONTRACTOR SHALL FURNISH AND INSTALL ALL TRAPS, ANGLE STOPS, WASTE ARMS, STRAINERS, TAIL PIECES, FIXTURE SUPPLIES AND ALL OTHER PLUMBING CONNECTIONS TO FIXTURES REQUIRING PLUMBING AND AS REQUIRED FOR A COMPLETE SYSTEM
18. ALL WATER PIPING SHALL BE RUN ON THE WARM SIDE OF BUILDING INSULATION . NO WATER PIPING SHALL BE RUN IN EXTERIOR WALLS
19. THE PLUMBING CONTRACTOR SHALL SUBMIT PROPER DOCUMENTATION FOR ALL BACK FLOW PREVENTERS TO THE LOCAL WATER AUTHORITY FOR APPROVAL. BACK FLOW PREVENTERS SHOULD NOT BE INSTALLED UNTIL APPROVAL HAS BEEN OBTAINED.

CONTRACTOR BIDDING NOTES

1. THE DRAWINGS ARE DIAGRAMMATICAL ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT ROUTE OF ALL PIPING, IN FIELD AND IN CONJUNCTION WITH COORDINATION OF ALL EXISTING CONDITIONS, NEW CONSTRUCTION, AND COORDINATION WITH ALL OTHER TRADES TO INSURE THAT ALL THE PLUMBING SYSTEMS WILL FIT INTO THE SPACE.
2. IN ADDITION TO REVIEWING AND COORDINATING WITH THE OTHER TRADES (CIVIL, STRUCTURAL, ARCHITECTURAL, FIRE PROTECTION, HVAC, AND ELECTRICAL) THE CONTRACTOR SHALL VISIT THE SITE AND FAMILIARIZE HIMSELF WITH DETAILS OF CONSTRUCTION.
3. ALL EXISTING CONDITIONS SHOWN ARE APPROXIMATE ONLY. ALL EXISTING CONDITIONS SHALL BE VERIFIED IN THE FIELD.
4. ADDRESS QUESTIONS REGARDING DRAWINGS TO ENGINEER IN WRITING BEFORE AWARD OF CONTRACT. OTHERWISE, ENGINEER INTERPRETATION OF MEANING AND INTENT OF DRAWINGS SHALL BE FINAL.
5. VISIT SITE AND EXAMINE CONDITIONS UNDER WHICH WORK MUST BE PERFORMED. REPORT ADVERSE CONDITIONS IN WRITING TO ENGINEER. COMMENCEMENT OF WORK SHALL BE CONSTRUED AS COMPLETE ACCEPTANCE OF EXISTING CONDITIONS INCLUDING PREPARATORY WORK DONE BY OTHERS.
6. CONTRACTOR MUST PROVIDE AND INSTALL ALL NECESSARY PIPING, FITTINGS, VALVES, EQUIPMENT SUPPORTS AND ANY EQUIPMENT NOT SHOWN ON DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS BUT NECESSARY TO CONFORM TO 248 CMR 10.00 AND PROVIDE A COMPLETE FUNCTIONING SYSTEM.

DEMOLITION NOTES

1. DISCONNECT AND DISMANTLE EXISTING PLUMBING SYSTEMS AND EQUIPMENT TO BE DEMOLISHED AND LEAVE DEBRIS AND DISCONNECTED EQUIPMENT IN DESIGNATED AREA FOR REMOVAL UNDER SECTION - SELECTIVE DEMOLITION.

GENERIC ABBREVIATIONS

°F	DEGREES FAHRENHEIT	ID	INSIDE DIAMETER
°C	DEGREES CELSIUS	IN	INCHES
Ø	DIAMETER	INSUL	INSULATION
ACV	AUTOMATIC CONTROL VALVE	KW	KILOWATT
AD	ACCESS DOOR	KVA	KILOVOLT AMPERE
ADJ	ADJUSTABLE	L	LENGTH
ADDL	ADDITIONAL	LB	POUND
AFF	ABOVE FINISHED FLOOR	LF	LINEAR FEET
AFG	ABOVE FINISHED GRADE	LVG	LEAVING
ALT	ALTERNATE	M	ONE THOUSAND
AP	ACCESS PANEL	MAX	MAXIMUM
ARCH	ARCHITECT	MBH	THOUSAND BRITISH THERMAL UNITS PER HOUR
ATC	AUTOMATIC TEMPERATURE CONTROL	MCA	MINIMUM CIRCUIT AMPS
ATV	ATMOSPHERIC VENT	MCC	MOTOR CONTROL CENTER
AS	AIR SEPARATOR	MECH	MECHANICAL
AVG	AVERAGE	MEZZ	MEZZANINE
BAS	BUILDING AUTOMATION SYSTEM	MFR	MANUFACTURER
BFF	BELOW FINISHED FLOOR	MIN	MINIMUM
BHP	BRAKE HORSEPOWER	MTD	MOUNTED
BLDG	BUILDING	MV	MIXING VALVE
BLR	BOILER	MU	MAKEUP WATER
BOD	BOTTOM OF DUCT	N/A	NOT APPLICABLE
BOP	BOTTOM OF PIPE	NC	NORMALLY CLOSED
BSMT	BASEMENT	NC	NOISE CRITERIA
BTU	BRITISH THERMAL UNIT	NIC	NOT IN CONTRACT
BTUH	BRITISH THERMAL UNIT PER HOUR	NO	NORMALLY OPEN
C	CONVECTOR	NO.	NUMBER
CF	CEILING FAN	NOM	NOMINAL
CL	CENTERLINE	NTS	NOT TO SCALE
CLG	CEILING	OB	OCTAVE BAND
CO	CLEAN-OUT	OC	ON CENTER
COL	COLUMN	OD	OUTSIDE DIAMETER
COMP	COMPRESSOR	ODP	OPEN DRIP PROOF
CONC	CONCRETE	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
CONN	CONNECTION	OFOI	OWNER FURNISHED OWNER INSTALLED
CONTR	CONTRACTOR	OV	OUTLET VELOCITY
CORR	CORRIDOR	PCF	POUNDS PER CUBIC FOOT
CUF	CUBIC FEET	PD	PRESSURE DROP
CUH	CABINET UNIT HEATER	PH	PHASE
CYL	CYLINDER	PLBG	PLUMBING
D	DRAIN	POS	PROVIDED BY OTHER SECTION(S)
DB	DRY BULB TEMPERATURE	PRESS	PRESSURE
DDC	DIRECT DIGITAL CONTROL	PRIM	PRIMARY
DDCFP	DIRECT DIGITAL CONTROL FIELD PANEL	PSIA	POUNDS PER SQUARE INCH ABSOLUTE
DIA	DIAMETER	PSID	POUNDS PER SQUARE INCH DIFFERENTIAL
DIM	DIMENSION	PSIG	POUNDS PER SQUARE INCH GAUGE
DN	DOWN	PVC	POLYVINYL CHLORIDE
DWG	DRAWING	REP	REPRESENTATIVE
EA	EACH	RET	RETURN
EAT	ENTERING AIR TEMPERATURE	REQD	REQUIRED
EFF	EFFICIENCY	REQS	REQUIREMENTS
ECUH	ELECTRIC CABINET UNIT HEATER	RH	RELATIVE HUMIDITY
ELEC	ELECTRICAL	RM	ROOM
ELEV	ELEVATION	RPM	REVOLUTIONS PER MINUTE
EMER	EMERGENCY	SCH	SCHEDULE
ENT	ENTERING	SOV	SOLENOID OPERATED VALVE
EQUIP	EQUIPMENT	SPECS	SPECIFICATIONS
EXH	EXHAUST	SQ	SQUARE
EXP	EXPANSION	SQFT	SQUARE FEET
FTR	FINNED TUBE RADIATION	SS	STAINLESS STEEL
FCV	FLOW CONTROL VALVE	STD	STANDARD
FG	FIBERGLASS	STDBY	STANDBY
FLEX	FLEXIBLE	STL	STEEL
FLR	FLOOR	SUCT	SUCTION
FLRDR	FLOOR DRAIN	SUP	SUPPLY
FP	FIRE PROTECTION	TA	THROW-AWAY
FPM	FEET PER MINUTE	TAV	THERMOSTATIC AIR VENT
FT	FEET	TEFC	TOTALLY ENCLOSED FAN COOLED
FT/SEC	FEET PER SECOND	TEL	TELEPHONE
FURN	FURNISHED	TEMP	TEMPERATURE
FVNR	FULL VOLTAGE NON-REVERSING	TOD	TOP OF DUCT
GA	GAUGE	TOP	TOP OF PIPE
GAL	GALLONS	TYP	TYPICAL
GALV	GALVANIZED	UH	UNIT HEATER
GC	GENERAL CONTRACTOR	V	VENT
GND	GROUND	VEL	VELOCITY
GPH	GALLONS PER HOUR	VERT	VERTICAL
GPM	GALLONS PER MINUTE	VFD	VARIABLE FREQUENCY DRIVE
GRD	GRADE (GROUND LEVEL)	VTR	VENT THROUGH ROOF
GWB	GYPSUM WALL BOARD	W	WIDTH
H	HEIGHT	W/	WITH
HD	HEAD	W/O	WITHOUT
HP	HORSEPOWER	WB	WET BULB TEMPERATURE
HR	HOUR	WF	WIDE FLANGE
HZ	HERTZ	WG	WATER GAUGE
		WH	WATER HEATER
		WRT	WITH RESPECT TO

HVAC PUMP SCHEDULE

TAG NO.	SERVICE	LOCATION	CASING TYPE	FLUID		GPM	HEAD (FT.)	SHUT-OFF HEAD (FT.)	MOTOR				MANUFACTURER AND MODEL NUMBER (AS STANDARD)	REMARKS
				TYPE	TEMP. (°F)				RPM	HP	V	PH		
P-5	B-5 PRIMARY PUMP	1ST BASE SIDE	INLINE	WATER	180	38	17.5	38.5	3400	½	208	1	GRUNDFOS MAGNA 40-120	1
P-6	DHW	1ST BASE SIDE	INLINE	WATER	180	42.1	16.6	31.0	-	½	115	1	GRUNDFOS UPS 43-100 F	
P-7	DHW	1ST BASE SIDE	INLINE	WATER	180	42.1	16.6	31.0	-	½	115	1	GRUNDFOS UPS 43-100 F	
P-8	DHW	1ST BASE SIDE	INLINE	WATER	180	20.5	15.8	33.0	-	.16	230	1	GRUNDFOS UP 26-99 BF	
P-9	DHW	3RD BASE SIDE	INLINE	WATER	180	20.5	15.8	33.0	-	.16	230	1	GRUNDFOS UP 26-99 BF	

NOTES: 1. PROVIDE THREE SPEED PUMP. 2. PROVIDE PUMP WITH VFD MOTOR AND BUILT IN DIFFERENTIAL PRESSURE SENSOR

HVAC BOILER SCHEDULE (GAS FIRED)

TAG No.	LOCATION	INPUT (MBH)	OUTPUT CAPACITY (NET I=B=R)	MAX. OPER. PRESS. (PSIG)	WATER				FUEL INLET PRESSURE	BURNER				MANUFACTURER AND MODEL NUMBER (AS STANDARD)	REMARKS
			MBH		ENT(°F)	LVG(°F)	GPM	PD (FT)	GAS (IN.WG)	TURN DOWN	BLOWER				
											AMPS	V	PH		
B-5	CONCOURSE-JANITORS CLOSET	399	372	160	180	160	38	21	4-13	5:1	2.0	120	1	LOCHINVAR WH-399	

NOTES: 1.PROVIDE CONDENSATE NEUTRALIZING KIT. 2. PROVIDE WITH LOW WATER CUTOFF CONTROL. LOW WATER CUTOFF SHALL SHUT OFF BOILER WHEN THE WATER LEVEL REACHES THE LOWEST SAFE WATER LEVEL AS ESTABLISHED BY MANUFACTURER. 3. PROVIDE WITH CONCENTRIC VENT KIT. 4. PROVIDE WITH BOILER WALL MOUNT KIT & ASSOCIATED HARDWARE.

INDIRECT FIRED WATER HEATER SCHEDULE

TAG NO.	MANUFACTURER & MODEL No.	TANK STORAGE (gal.)	INPUT (MBH)	RECOVERATE (GPH) AT 100° RISE	SETTING	REMARKS
WH-1	TURBOMAX 109A	119	399	527	140°	-
WH-2	TURBOMAX 65	65	200	250	140°	-

SCHEDULE OF DRAWINGS

DWG#	DESCRIPTION
M1.0	MECHANICAL LEGEND
M2.0	MECHANICAL PLANS FIRST FLOOR
M2.1	MECHANICAL PLANS CONCOURSE LEVEL
M2.1A	PLUMBING PLANS CONCOURSE LEVEL
M3.0	MECHANICAL DETAILS
M4.0	MECHANICAL SPECIFICATIONS

HVAC ELECTRICAL PLUMBING FIRE PROTECTION
CSI ENGINEERING
999 BROADWAY SUITE 206
SAUGUS, MA 01906
781-233-4808

125 AVIATION AVE. SUITE 4
PORTSMOUTH, NH 03801
603-319-8244

STAMP

LOWELL, MA

LELACHEUR PARK HOT WATER UPGRADE

REVISIONS:

Date	Description

BID SET
06-30-2015

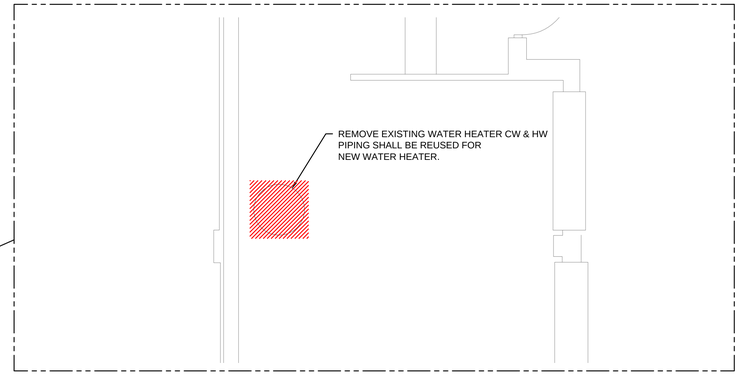
CSI Project Number:	2013-206
Scale:	NTS
Drawn By:	MR
Checked By:	DM
Date:	06-29-15

MECHANICAL LEGEND

M1.0

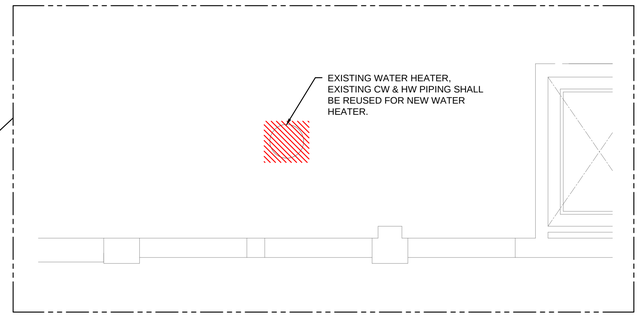
CONCOURSE LEVEL OVERALL DEMO PLAN

SCALE: 1/32"=1'-0" 0 16' 32' 64'



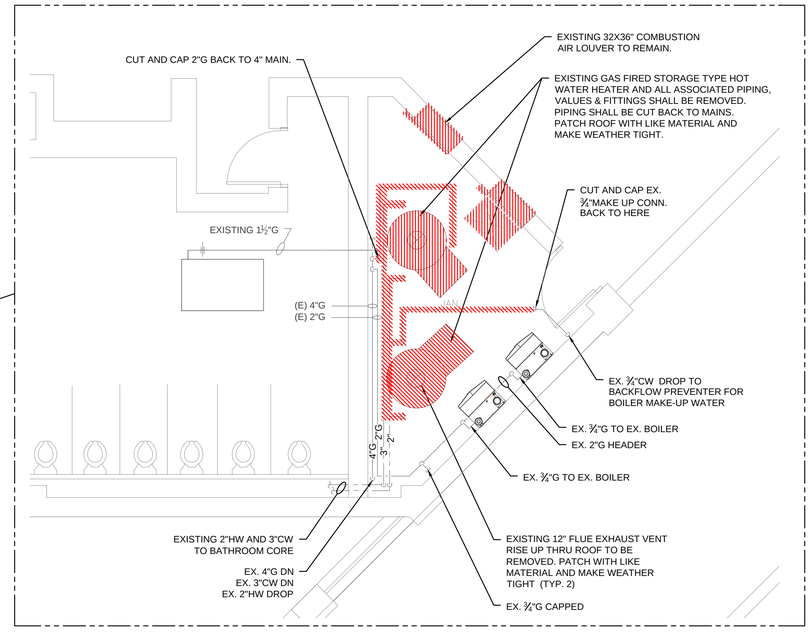
ENLARGED CONCESSION 3RD BASELINE PLUMBING PLAN

SCALE: 1/4"=1'-0" 0 2" 4' 8'



ENLARGED CONCESSION 1ST BASELINE DEMO PLAN

SCALE: 1/4"=1'-0" 0 2" 4' 8'



ENLARGED JANITOR'S CLOSET DEMO PLAN

SCALE: 1/4"=1'-0" 0 2" 4' 8'

HVAC
ELECTRICAL CSI ENGINEERING PLUMBING
FIRE PROTECTION

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LOWELL, MA

LELACHEUR PARK HOT WATER UPGRADE

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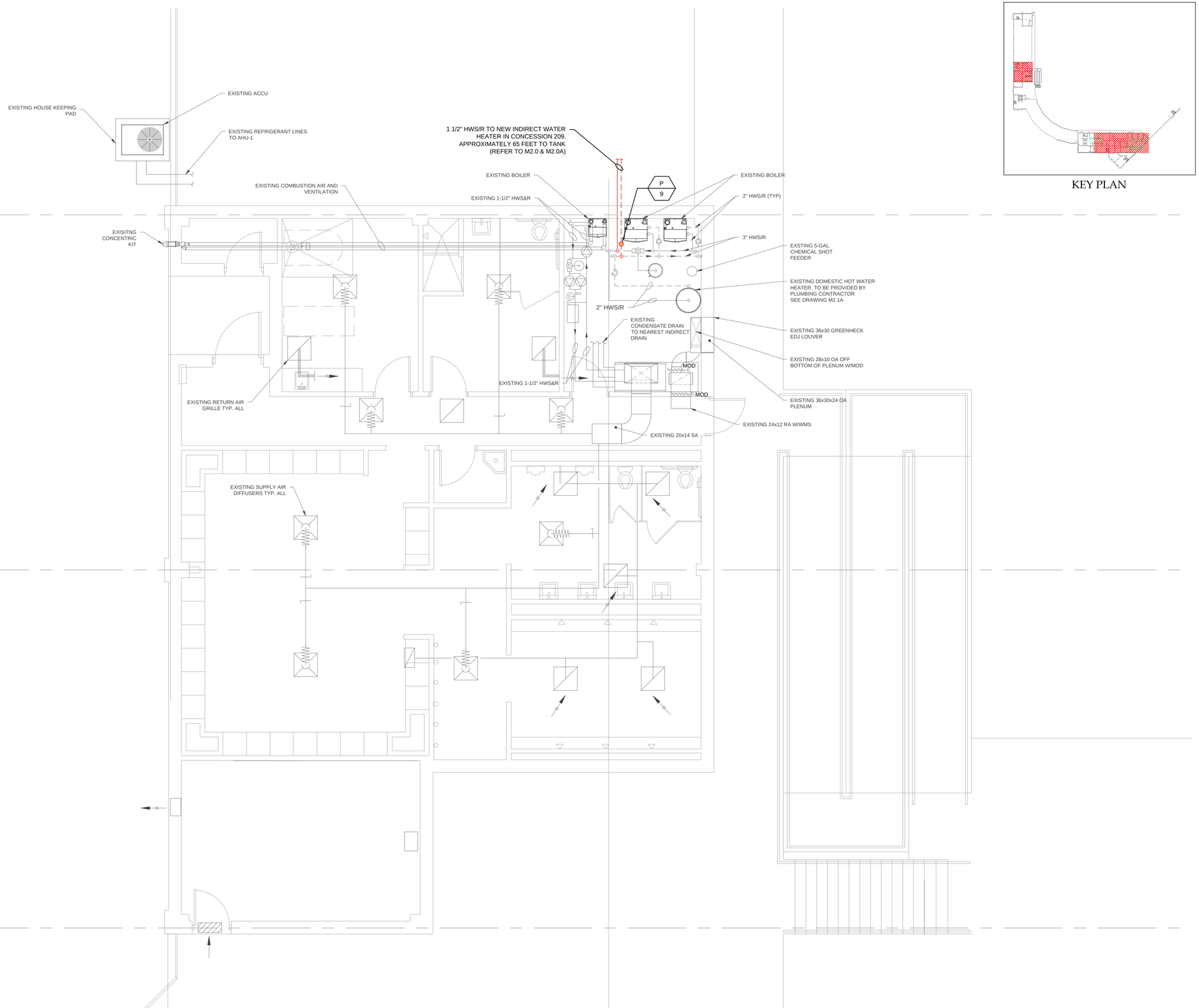
MECHANICAL CONCOURSE LEVEL DEMO PLANS

MD2.1



KEY PLAN

HVAC
ELECTRICAL
CSI ENGINEERING
PLUMBING
FIRE PROTECTION

999 BROADWAY SUITE 206
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603-319-8244

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LELACHEUR PARK
HOT WATER UPGRADE

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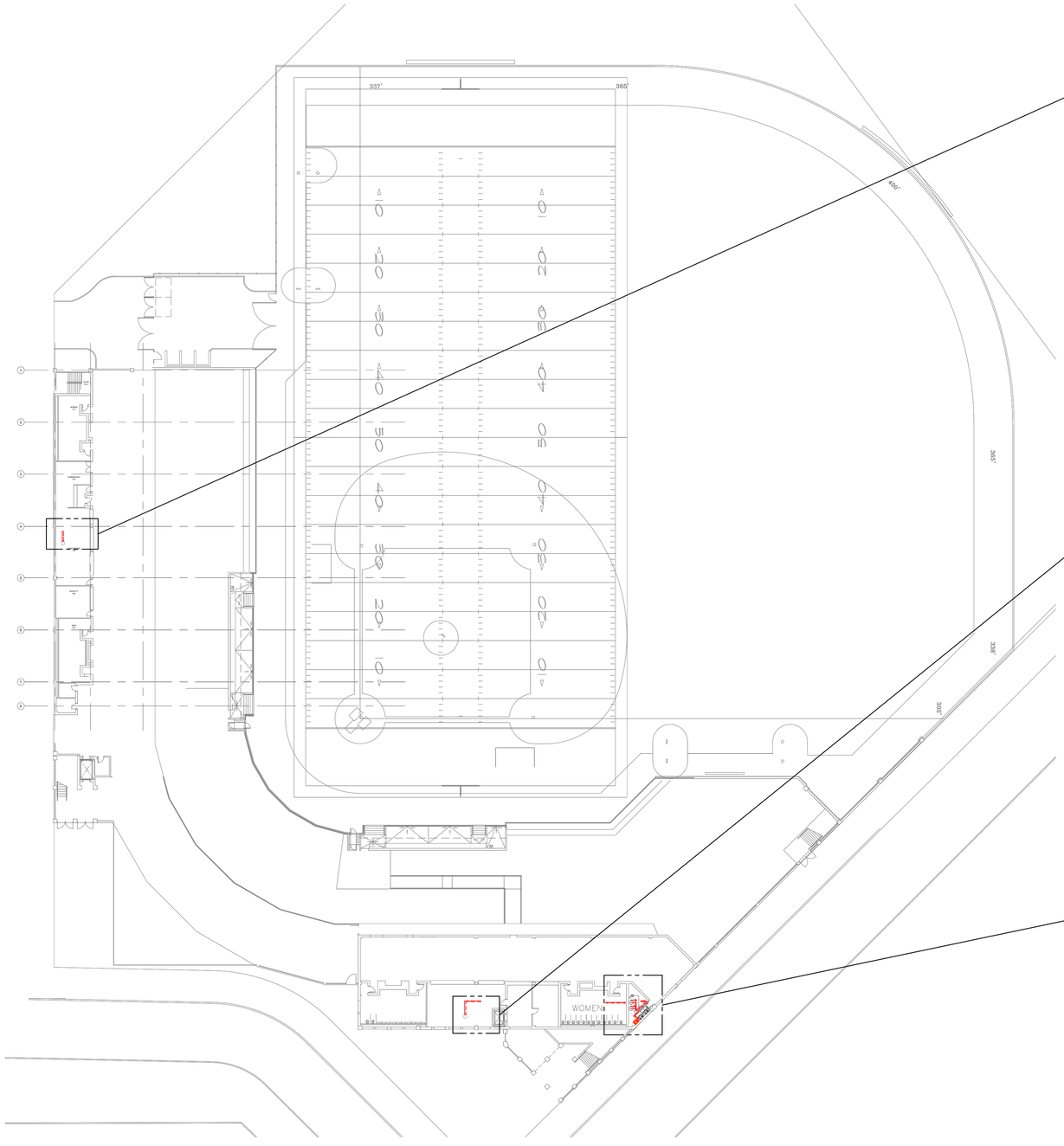
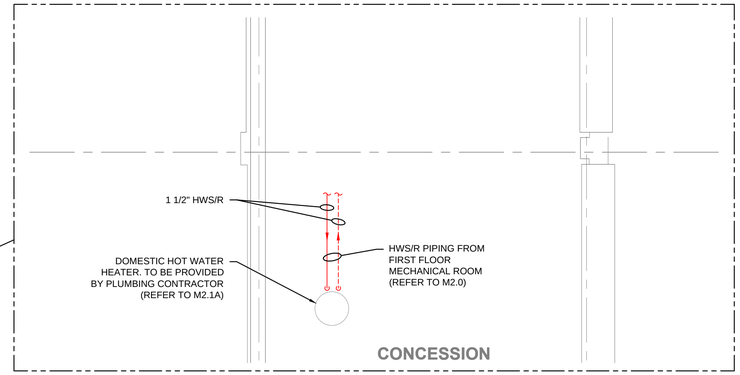
MECHANICAL PLANS
FIRST FLOOR

M2.0



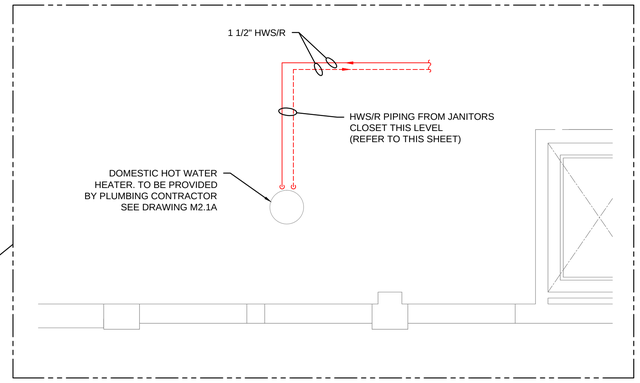
CONCOURSE LEVEL OVERALL PLAN

SCALE: 1/32"=1'-0" 0 16' 32' 64'



ENLARGED CONCESSION 3RD BASELINE PLUMBING PLAN

SCALE: 1/4"=1'-0" 0 2' 4' 8'



ENLARGED CONCESSION 1ST BASELINE PLUMBING PLAN

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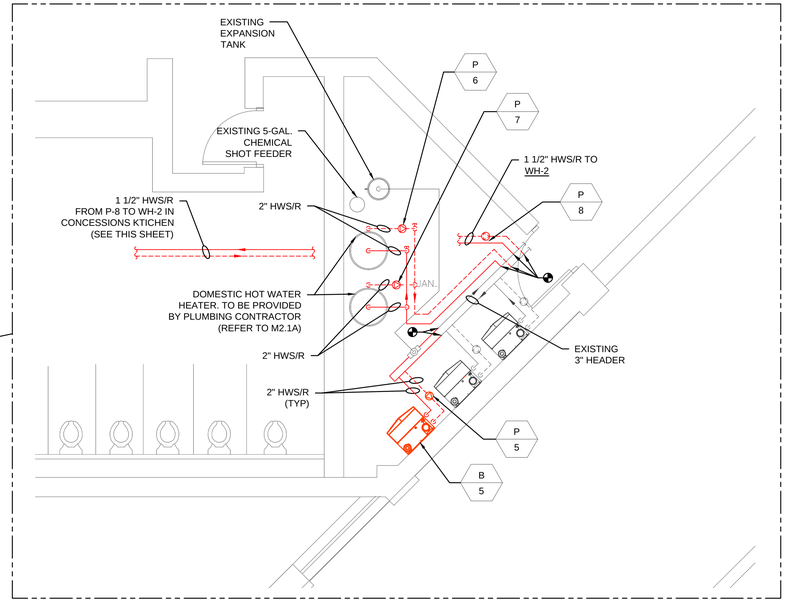

ENLARGED JANITOR'S CLOSET PLUMBING PLAN

SCALE: 1/4"=1'-0" 0 2' 4' 8'

HVAC
ELECTRICAL CSI ENGINEERING PLUMBING
FIRE PROTECTION

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LELACHEUR PARK HOT WATER UPGRADE

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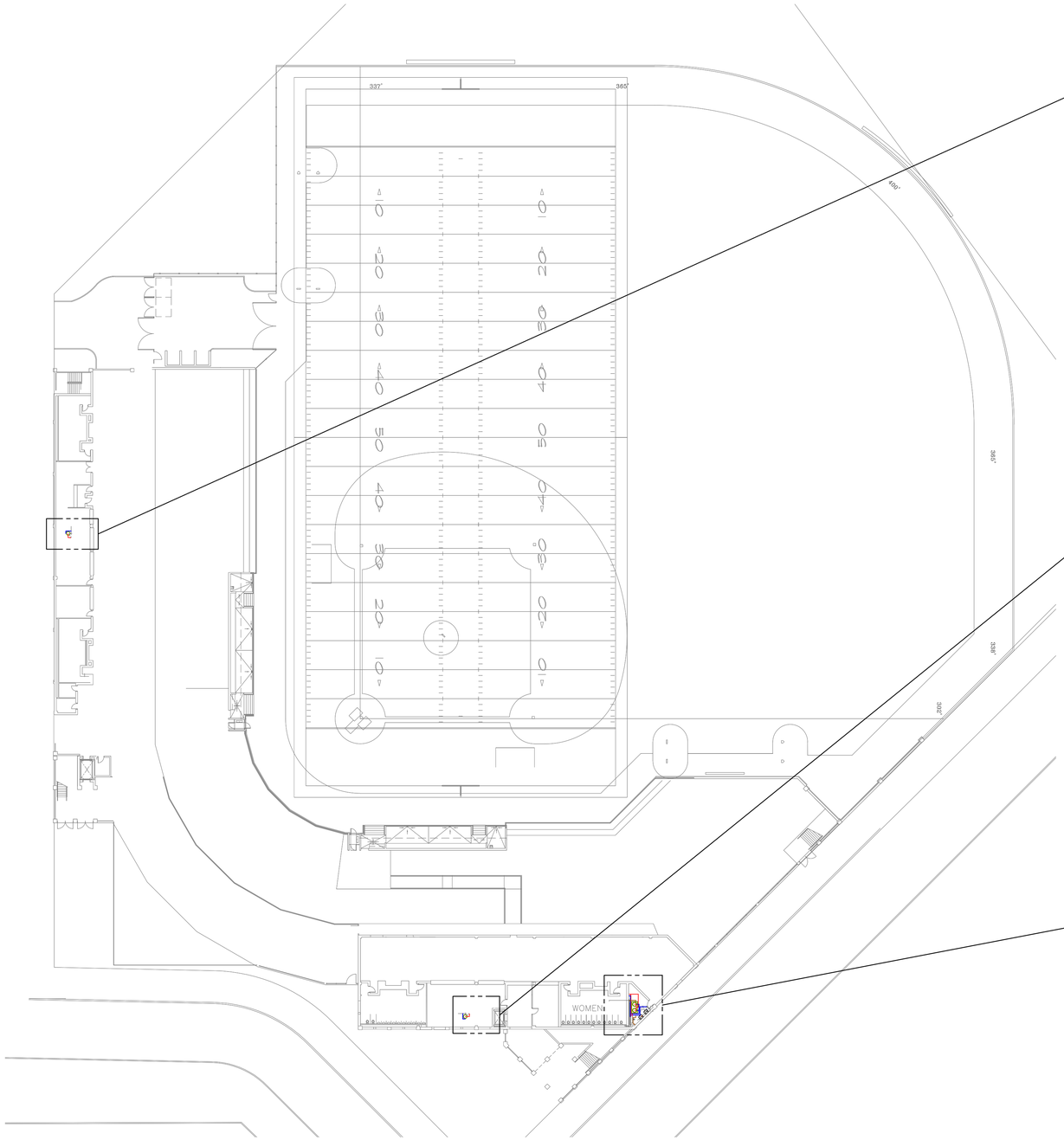
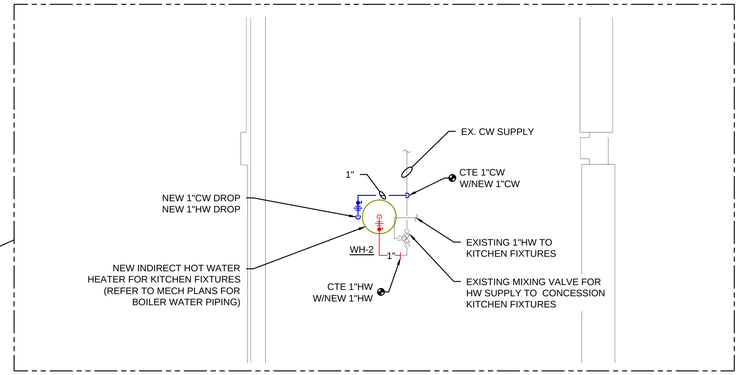
MECHANICAL PLANS
CONCOURSE LEVEL

M2.1



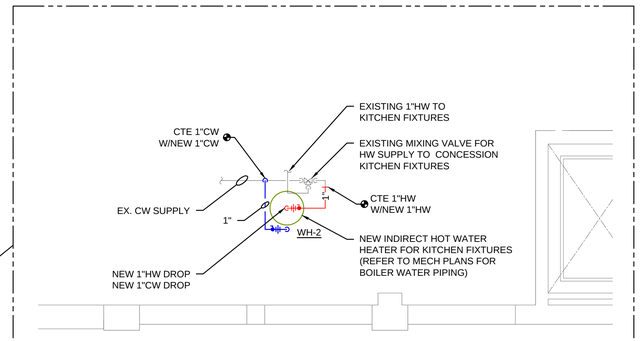
CONCOURSE LEVEL OVERALL PLAN

SCALE: 1/32"=1'-0" 0 16' 32' 64'



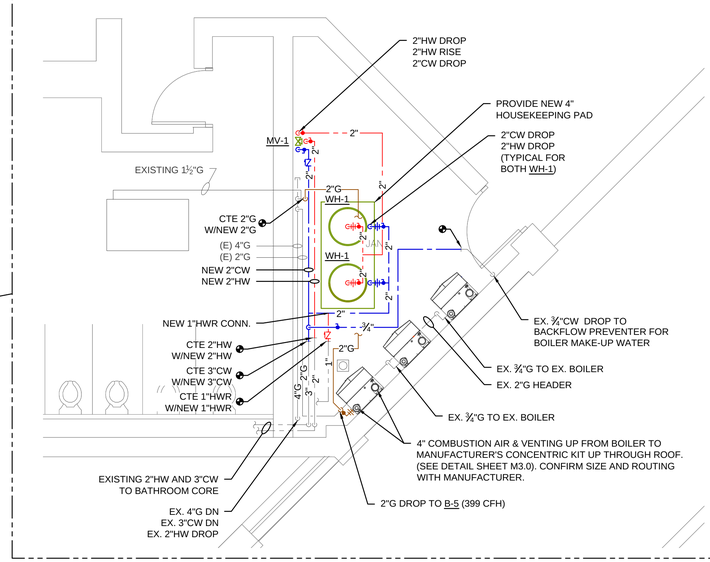
ENLARGED CONCESSION 3RD BASELINE PLUMBING PLAN

SCALE: 1/4"=1'-0" 0 2' 4' 8'



ENLARGED CONCESSION 1ST BASELINE PLUMBING PLAN

SCALE: 1/4"=1'-0" 0 2' 4' 8'



ENLARGED JANITOR'S CLOSET PLUMBING PLAN

SCALE: 1/4"=1'-0" 0 2' 4' 8'

HVAC
ELECTRICAL CSI ENGINEERING PLUMBING
FIRE PROTECTION

999 BROADWAY SUITE 206
SAUGUS, MA 01906
781-233-4808

125 AVIATION AVE, SUITE 4
PORTSMOUTH, NH 03801
603-319-8244

STAMP

LOWELL, MA

LELACHEUR PARK HOT WATER UPGRADE

REVISIONS:

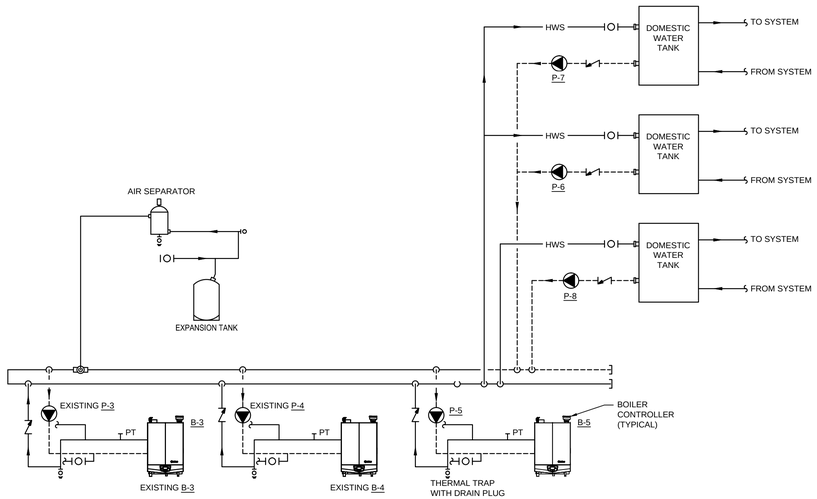
Date	Description

BID SET
06-30-2015

CSI Project Number:	2013-206
Scale:	AS NOTED
Drawn By:	AP
Checked By:	KC
Date:	06-29-15

PLUMBING PLANS
CONCOURSE LEVEL

M2.1A



THE BOILERS AND PUMPS FOR THE DOMESTIC HOT WATER SYSTEM ARE CONTROLLED AND MONITORED BY THE BOILER CONTROL PANEL. THIS SYSTEM SHALL BE CAPABLE OF PROVIDING THE SPECIFIED SEQUENCE OF OPERATION ALONG WITH THE HOT WATER RESET, LEAD/LAG CONTROL ON BOILER B-5, THE CONTROL FOR THE PRIMARY PUMP P-5, AND TOTALIZES THE RUN TIME OF EACH BOILER AND EACH PRIMARY PUMP.

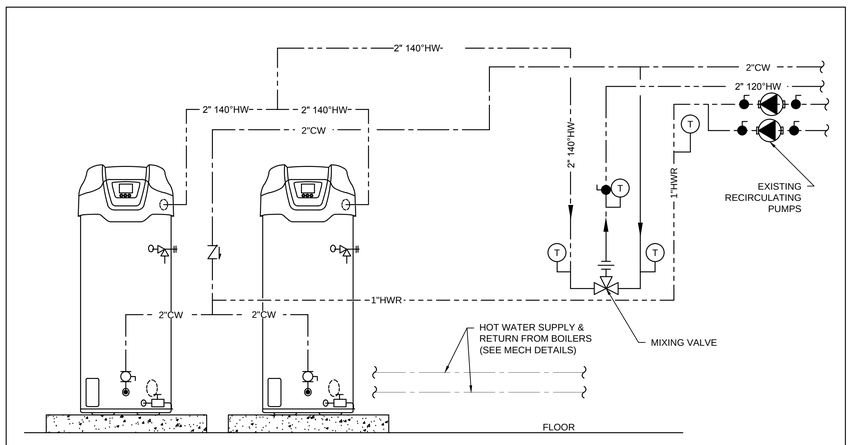
BOILER CONTROL PANEL WILL TURN ON THE MOST BOILERS POSSIBLE TO MEET THE LOAD. THE CONTROL WILL BRING ON THE FIRST PUMP AND BOILER AT MINIMUM MODULATION AND DOES NOT INCREASE ITS MODULATION. IF MORE BOILER OUTPUT IS REQUIRED, THE SECOND PUMP AND BOILER WILL TURN ON AT MINIMUM MODULATION AND DOES NOT INCREASE ITS MODULATION. IF STILL MORE BOILER OUTPUT IS REQUIRED, ALL BOILERS ARE MODULATED UP IN PARALLEL UNTIL THEY REACH THEIR MAXIMUM MODULATION SETTINGS. REVERSE SHALL OCCUR ONCE LOAD IS SATISFIED.

SECONDARY PUMP FAILURE ALARM SIGNALS TO THE BOILER CONTROL PANEL IF A NO FLOW CONDITION IS SENSED OR NO CURRENT IS SENSED AT THE DUTY PUMP. THE CONTROLLER PANEL SHALL THEN DISABLE THE DUTY PUMP AND ENABLE THE STANDBY PUMP.

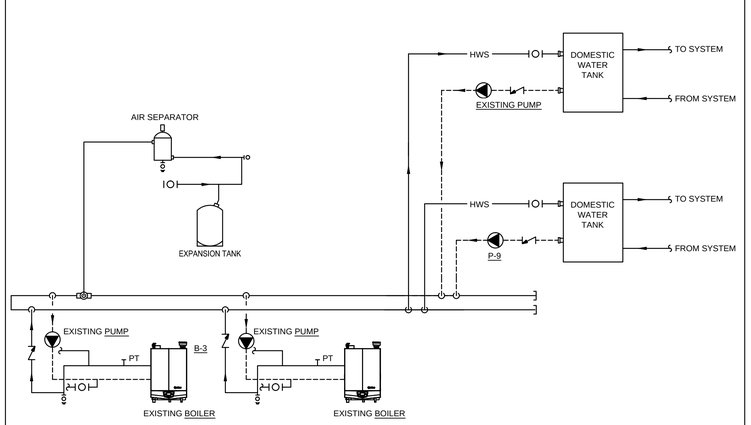
THE BOILER CONTROL PANEL ALLOWS FOR SELECTION OF LEAD BOILER AND PRIMARY PUMP BY EITHER MANUALLY (BY OPERATOR) OR AUTOMATICALLY (EVERY TWO WEEKS BOILERS AND PUMPS ROTATE POSITIONS).

ON A CALL FOR DHW, THE BOILER CONTROL WILL SUPPLY 180°F WATER TO SYSTEM. THE BOILERS WILL MAINTAIN A SUPPLY TEMPERATURE NO HIGHER THAN THE BOIL MAX SETTING.

HOT WATER BOILERS AND ASSOCIATED PUMPS FOR 1ST BASE SIDE DOMESTIC HOT WATER CONTROL SEQUENCE AND PIPING DIAGRAM



GAS FIRED WATER HEATER PIPING DIAGRAM (WH-1 & WH-2)



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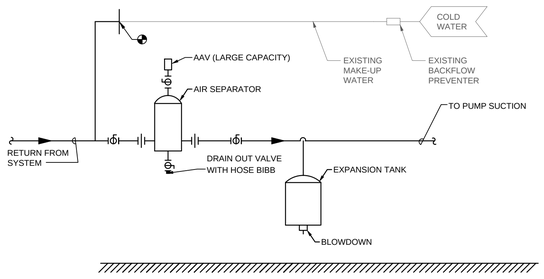
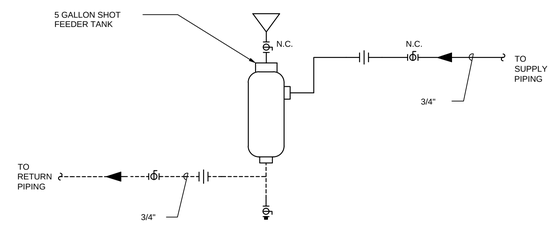
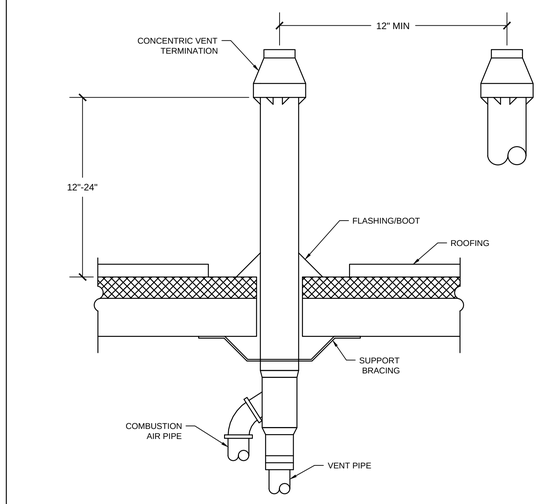
HOT WATER BOILERS AND ASSOCIATED PUMPS FOR 3RD BASE SIDE DOMESTIC HOT WATER CONTROL SEQUENCE AND PIPING DIAGRAM



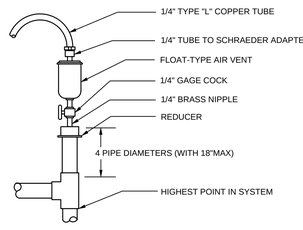
HYDRONIC SPECIALTIES FOR CLOSED LOOP WATER SYSTEMS



CHEMICAL FEED (SHOT FEEDER)



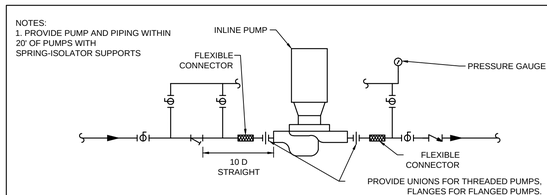
VERTICAL CONCENTRIC VENT DETAIL



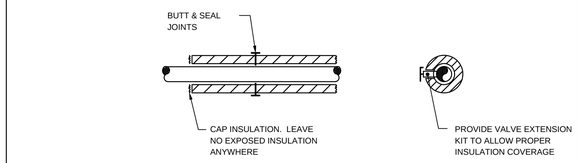
NOTE:

1. USE TFE TAPE ON ALL THREADED JOINTS.

AUTOMATIC AIR VENT ASSEMBLY



INLINE PUMP PIPING



TYPICAL PIPE INSULATION & VALVE HANDLE EXTENSION

HVAC
ELECTRICAL
CSI ENGINEERING
PLUMBING
FIRE PROTECTION
999 BROADWAY SUITE 206
SAUGUS, MA 01906
781-233-4808
125 AVIATION AVE. SUITE 4
PORTSMOUTH, NH 03801
603-319-8244

STAMP

LOWELL, MA

LELACHEUR PARK HOT WATER UPGRADE

REVISIONS:

Date	Description

BID SET
06-30-2015

CSI Project Number:	2013-206
Scale:	NTS
Drawn By:	MR
Checked By:	DM
Date:	06-29-15

MECHANICAL DETAILS

M3.0

HVAC SPECIFICATIONS

A. GENERAL NOTES

1. GENERAL PROVISIONS: DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF WORK IN CONTRACT.

2. THE CONTRACTOR SHALL PERFORM THE WORK AND PROVIDE NEW MATERIAL AND EQUIPMENT AS SHOWN ON DRAWINGS AND AS SPECIFIED IN THIS SECTION OF THE SPECIFICATIONS. PROVIDE ALL COMPONENTS AND MATERIALS, WHETHER SPECIFICALLY SHOWN OR NOT, THAT ARE NECESSARY TO MAKE THE SYSTEMS COMPLETE AND FULLY OPERATIONAL AS INTENDED IN THE CONSTRUCTION DOCUMENTS

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL WORK INCLUDED UNDER THIS SECTION UNTIL THE COMPLETION AND FINAL ACCEPTANCE OF THIS PROJECT. PROTECT ALL EQUIPMENT AND MATERIALS FROM DAMAGE FROM ALL CAUSES. ALL MATERIALS AND EQUIPMENT DAMAGED OR STOLEN SHALL BE REPAIRED OR REPLACED WITH EQUAL MATERIAL OR EQUIPMENT AT NO ADDITIONAL COST TO THE OWNER. PROTECT ALL EQUIPMENT, OUTLETS AND OPENINGS, AND ROOF PENETRATIONS. PROTECT WORK AND MATERIALS OF OTHER TRADES FROM DAMAGE THAT MIGHT BE CAUSED BY WORK OR WORKMEN UNDER THIS SECTION. DAMAGED MATERIALS ARE TO BE REMOVED FROM THE SITE; NO SITE STORAGE OF DAMAGED MATERIALS WILL BE ALLOWED. ANY DAMAGE TO EXISTING SYSTEMS AND EQUIPMENT CAUSED BY THIS CONTRACTOR DURING INSTALLATION SHALL BE REPAIRED AND/OR REPLACED AT THIS CONTRACTOR'S EXPENSE TO THE COMPLETE SATISFACTION OF THE OWNER.

4. WHERE DRAWINGS OR SPECIFICATIONS DO NOT COINCIDE WITH MANUFACTURER'S RECOMMENDATIONS, ARE UNCLEAR AS TO INTENT AND/OR REQUIRED MATERIAL QUALITY, ADVISE CSI ENGINEERING IN WRITING BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REWORK NECESSARY TO RESOLVE THESE DISCREPANCIES.

5. THE CONTRACTOR SHALL CAREFULLY EXAMINE SITE TO IDENTIFY EXISTING CONDITIONS THAT MAY IMPACT THE WORK OF THIS SECTION BEFORE SUBMITTING BID. NO EXTRA PAYMENT SHALL BE ALLOWED FOR ADDITIONAL WORK CAUSED BY THE SITE CONDITIONS THAT ARE VISIBLE OR EASILY DISCERNED BY AN THE CONTRACTOR.

6. THE FOLLOWING WORK IS NOT INCLUDED IN THIS SECTION AND WILL BE PROVIDED UNDER OTHER SECTIONS: TEMPORARY HEAT, TESTING, PAINTING, PATCHING, ELECTRICAL POWER WIRING TO ALL EQUIPMENT, AND DUCT MOUNTED SMOKE DETECTORS.

7. ALL WORK WILL BE DESIGNED PER THE MASSACHUSETTS STATE BUILDING CODE, MASSACHUSETTS NATIONAL ELECTRICAL CODE, STATE GAS CODE, SMACNA, NFPA, ANSI/ASHRAE, ASME, UL, NEMA, OSHA, ARCHITECTURAL ACCESS BOARD, AND ALL OTHER APPLICABLE FEDERAL, STATE OR LOCAL CODES. THESE DRAWINGS AND SPECIFICATIONS ILLUSTRATE THE SCOPE REQUIRED FOR THIS PROJECT, WHICH MAY EXCEED MINIMUM CODE, LAW AND STANDARDS CRITERIA.

8. THE CONTRACTOR SHALL PROVIDE SUBMITTALS THAT SPECIFY SPECIFIED ITEMS, EQUIPMENT AND THE MANUFACTURER'S PRODUCT DATA. DEVIATIONS TO SPECIFIED ITEMS SHALL BE AT THE SOLE RISK OF THE CONTRACTOR, WHO SHALL BE RESPONSIBLE FOR ALL ASSOCIATED CHANGES TO THIS AND OTHER TRADES. REVIEW OF THE SHOP DRAWINGS BY THE ENGINEER SHALL NOT ABSOLVE THE CONTRACTOR FROM MEETING THE FULL DESIGN INTENT OF THE ASSOCIATED SYSTEMS. THE CONTRACTOR SHALL HAVE PREVIOUSLY REVIEWED AND APPROVED THE SUBMITTALS BEFORE SUBMITTING TO CSI ENGINEERING.

9. SUBMIT OPERATING AND MAINTENANCE MANUALS PRIOR TO THE COMPLETION OF THE PROJECT. PROVIDE ON-SITE DEMONSTRATION OF ALL SYSTEMS TO OWNER AFTER SYSTEMS ARE FULLY OPERATIONAL. O&M MANUALS SHALL INCLUDE ALL COMPONENTS AS WELL AS SYSTEM DESCRIPTIONS OF ALL SYSTEMS WITH FLOW DIAGRAMS, WIRING DIAGRAMS, WRITTEN WARRANTEES, RECOMMENDED SPARE PARTS AND ROUTINE MAINTENANCE REQUIREMENTS WITH RECOMMENDED INTERVALS FOR ALL MOVING EQUIPMENT AND CONTROLS.

10. WARRANTY INSTALLATION IN WRITING FOR ONE YEAR FROM DATE OF OWNER'S ACCEPTANCE OF CERTIFICATE OF SUBSTANTIAL COMPLETION.

11. COORDINATE WITH ALL OTHER TRADES RELATIVE TO LOCATION OF ALL APPARATUS AND EQUIPMENT TO BE INSTALLED AND SELECT LOCATIONS SO AS NOT TO CONFLICT WITH OR HINDER THE PROGRESS OF THE WORK OF OTHER SECTIONS. WORK INSTALLED THAT CREATES INTERFERENCE OR RESTRICTS ACCESS REQUIRED BY CODE OR TO CONDUCT MAINTENANCE AND/OR ADJUSTMENTS SHALL BE MODIFIED AT NO ADDITIONAL COST TO THE OWNER.

12. INCLUDE ALL STRUCTURAL STEEL SUPPORTS, HANGER BRACKETS, ETC., REQUIRED FOR THE WORK IN THIS SECTION. HANGERS SHALL BE STEEL ANGLE IRON, CHANNEL OR STEEL ROD USED WITH APPROVED CLAMPS, INSERTS, ETC. ALL HANGERS SHALL BE GALVANIZED OR PAINTED WITH TWO COATS OF RUST PREVENTING PAINT BEFORE INSTALLATION. SUPPORTS INSTALLED IN EXTERIOR LOCATIONS SHALL BE GALVANIZED STEEL OR STAINLESS STEEL WITH STAINLESS STEEL HARDWARE.

13. IF THE GENERAL CONTRACTOR IS NOT RESPONSIBLE FOR THE CUTTING AND PATCHING REQUIRED IN THIS SECTION THEN THE CONTRACTOR SHALL INCLUDE ALL CORING, CUTTING, PATCHING AND FIREPROOFING NECESSARY FOR THE WORK OF THIS SECTION. STRUCTURAL ELEMENTS SHALL NOT BE CUT. FILL AND PATCH ALL OPENINGS OR HOLES LEFT IN THE EXISTING STRUCTURES BY THE REMOVAL OF EXISTING EQUIPMENT. PATCH, SEAL AND MAKE AIR AND WATER TIGHT ALL EXISTING OPENINGS IN DUCTWORK AND PIPING NOT USED FOR THE NEW WORK.

14. THE CONTRACTOR SHALL PROVIDE, SET-UP AND MAINTAIN THE HOISTING, CRANES, SCAFFOLDS, STAGING AND PLANKING AS REQUIRED FOR THE WORK FOR THIS SECTION.

15. THE CONTRACTOR SHALL COMPLY WITH ALL OF THE SAFETY REQUIREMENTS OF THE OWNER AND OSHA THROUGHOUT THE COURSE OF THE PROJECT.

16. THE CONTRACTOR SHALL PROVIDE A CERTIFICATE OF COMPLETION STATING THAT THE INSTALLATION IS IN COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS AND ALL APPLICABLE CODES. ALL SUBMITTALS, AS-BUILTS, O&M MANUALS, COMPLETED PUNCH LIST ITEMS AND REPORTS ARE TO BE PROVIDED PRIOR TO REQUEST FOR COMPLETION CERTIFICATES. THE CONTRACTOR SHALL VERIFY THAT ALL SYSTEMS AND EQUIPMENT ARE WORKING PER THE CONTRACT DRAWINGS.

B. PROJECT PRODUCTS

1. WATER PIPING AND VALVES: PIPING 2-1/2" AND LARGER SHALL BE WELDED SCHEDULE 40 STEEL, 2" AND SMALLER SHALL BE SCREWED SCHEDULE 40 STEEL, 95/5 SOLDERED TYPE L COPPER. CONDENSATE DRAIN PIPING SHALL BE COPPER. PROVIDE FLEX CONNECTORS AT ALL CONNECTIONS TO ROTATING EQUIPMENT. PROVIDE DIELECTRIC FITTINGS TO CONNECT DIFFERENT PIPING MATERIALS. VALVES SHALL HAVE NAME OF MANUFACTURER AND GUARANTEED WORKING PRESSURE CAST OR STAMPED ON BODIES. VALVES AND STRAINERS SHALL BE AS MANUFACTURED BY NEXUS, DANFOSS OR APOLLO. BALL VALVES SHALL BE USED ON 2" AND SMALLER WATER PIPING, BUTTERFLY USED ON 2 1/2" AND LARGER WATER PIPING. PROVIDE DRAIN VALVES AT LOW POINTS IN PIPING AND VALVED VENTS AT HIGH POINTS. STRAINERS SHALL BE "Y" TYPE, FULL SIZE OF ENTERING PIPE SIZE AND HAVE A MAXIMUM CLEAN PRESSURE DROP OF 1 PSID. STRAINERS SHALL INCLUDE BLOW DOWN VALVE.

2. PIPE INSULATION: INSULATION SHALL BE FIBROUS GLASS INSULATION WITH FACTORY-APPLIED FIRE RETARDANT VAPOR BARRIER JACKET WITH K FACTOR OF AT LEAST 0.23 AT 75 DEG. F MEAN TEMPERATURE BY CERTAIN-TEED, MANVILLE, OR KNAUF. ASTM E-84 FIRE HAZARD RATINGS SHALL BE 25 FLAME SPREAD, 50 SMOKE DEVELOPED AND 50 FUEL CONTRIBUTED. INSULATION THICKNESS SHALL BE 1-1/2" FOR HOT WATER.

3. PIPE HANGERS AND SUPPORTS: PROVIDE PIPE STANDS, SUPPORTS, HANGERS, AND OTHER SUPPORTING APPLIANCES AS NECESSARY TO SUPPORT WORK REQUIRED BY CONTRACT DOCUMENTS. SPACING OF HANGERS SHALL BE INSTRUCTED IN ACCORDANCE WITH APPLICABLE BUILDING AND MECHANICAL CODES. SIZE OF HANGERS SHALL INCLUDE THE PIPE INSULATION WITH SHIELD. WHERE HANGERS ARE USED OUTDOORS, THEY SHALL BE STAINLESS STEEL OR PVC COATED GALVANIZED STEEL.

4. INSULATION SHALL BE CERTAIN-TEED, MANVILLE OR OWENS CORNING AND SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. INSULATE THE FOLLOWING EQUIPMENT: AIR SEPARATORS, PUMPS, EXPANSION TANKS, ETC. INSULATION SHALL BE FORMED OR FABRICATED TO FIT EQUIPMENT AND HAVE REMOVABLE SECTIONS FOR SERVICING.

5. MOTORS, STARTERS, AND WIRING: PROVIDE PREMIUM EFFICIENCY MOTORS. STARTERS AND/OR VFD'S SHALL BE PROVIDED BY DIVISION 16 UNLESS PART OF PACKAGED EQUIPMENT. PROVIDE CONTROL AND OTHER RELATED WIRING INCLUDING INTERLOCKS.

6. VIBRATION ISOLATION: PROVIDE VIBRATION ISOLATION FOR EACH PIECE OF ROTATING OR PISTON DRIVEN HVAC EQUIPMENT SHOWN ON THE DRAWINGS. ISOLATION MAY BE INTERNAL OR EXTERNAL TO THE EQUIPMENT AND SHALL PROVIDE AT LEAST 90% ISOLATION EFFICIENCY. ISOLATE THE FIRST FOUR PIPE HANGER LOCATIONS FROM EQUIPMENT WITH 1" DEFLECTION COMBINATION SPRING AND NEOPRENE. INSTALLATION PRACTICES SHALL BE IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE VIBRATION ISOLATION MANUFACTURER.

7. CENTRIFUGAL PUMPS: PROVIDE WHERE SHOWN ON DRAWINGS, CENTRIFUGAL PUMPS, OF CAPACITIES, TYPES, AND CONFIGURATIONS SHOWN ON SCHEDULES. PROVIDE PREMIUM EFFICIENCY VFD COMPATIBLE MOTORS THAT ARE NON-OVERLOADING THROUGHOUT PUMP CURVE. ACCEPTABLE MANUFACTURERS SHALL BE: GRUNDFOS, PACO AND BELL AND GOSSETT. PROVIDE A NON-REDUCING SUCTION DIFFUSERS ON PUMP INLETS.

8. HYDRONIC SPECIALTIES: PROVIDE 125 PSI RATED (ASME) AIR SEPARATORS AND DIAPHRAGM EXPANSION TANKS AS SHOWN ON DRAWINGS. PROVIDE WITH AUTOMATIC AIR VENT AND DRAIN VALVES. SPECIALTIES SHALL BE AS MANUFACTURED BY SPRIOVENT, AMTROL.

9. CLOSED WATER TREATMENT: PROVIDE CLOSED LOOP SYSTEMS WITH WATER TREATMENT CONSISTING OF 5 GALLON BY-PASS SHOT FEEDER TO FEED CHEMICAL SOLUTION INTO EACH PIPING SYSTEM. FLUSH AND CLEAN ALL SYSTEMS AFTER INSTALLATION. SUBMIT WRITTEN REPORT INDICATING THAT SYSTEMS HAVE BEEN THOROUGHLY CLEANED AND CHARGED WITH CORROSION INHIBITOR. EFFLUENT FROM SYSTEMS DISCHARGED TO SEWER SHALL MEET REQUIREMENTS OF APPLICABLE LOCAL, STATE, AND NATIONAL WATER QUALITY STANDARDS. PROVIDE ONE-YEAR SERVICE INCLUDING MAINTAINING CHEMICALS AS WELL AS ANALYZING WATER SAMPLES.

10. GAS FIRED BOILERS: THE BOILERS SHALL BE A LOCHINVAR KNIGHT MODEL WHN OR APPROVED EQUAL AND SHALL BE OPERATED ON NATURAL GAS. THE BOILER SHALL BE CAPABLE OF FULL MODULATION, FIRING DOWN TO 20% OF RATED INPUT WITH A TURNDOWN RATIO OF 5:1. THE BOILER SHALL BE OF A FIRE TUBE DESIGN AND SHALL BE VERTICALLY DOWN FIRED. THE BOILER SHALL BEAR THE ASME "H" STAMP FOR 80 PSI WORKING PRESSURE AND SHALL BE NATIONAL BOARD LISTED. THE HEAT EXCHANGER ASSEMBLY SHALL BE FULLY WELDED THROUGH AN AUTOMATED PROCESS TO ENSURE WELD INTEGRITY. THE 439 STAINLESS STEEL COMBUSTION CHAMBER AND TUBES SHALL BE SELF CLEANING AND DESIGNED TO DRAIN CONDENSATION TO THE BOTTOM OF THE HEAT EXCHANGER ASSEMBLY. A BUILT-IN STAINLESS STEEL FLUE COLLECTOR SHALL ALLOW CONDENSATION TO DRAIN FROM THE HEAT EXCHANGER ASSEMBLY AND INTO THE EXTERNAL CONDENSATE TRAP. THE COMPLETE HEAT EXCHANGER ASSEMBLY SHALL CARRY A TWELVE (12) YEAR LIMITED WARRANTY. THE BOILER SHALL BE CERTIFIED AND LISTED BY C.S.A. INTERNATIONAL UNDER THE LATEST EDITION OF THE HARMONIZED ANSI Z21.13 /CSA4.9 TEST STANDARD FOR THE U.S. AND CANADA. THE BOILER SHALL COMPLY WITH THE ENERGY EFFICIENCY REQUIREMENTS OF THE LATEST EDITION OF THE ASHRAE 90.1 STANDARD AND THE MINIMUM EFFICIENCY REQUIREMENTS OF THE LATEST EDITION OF THE ASHRAE 103 STANDARD. THE BOILER SHALL MEET U.S. ENVIRONMENTAL PROTECTION AGENCY AND DEPARTMENT OF ENERGY GUIDELINES FOR “ENERGY STAR”. THE BOILER SHALL BE CERTIFIED FOR INDOOR INSTALLATION. THE BOILER’S EFFICIENCY RATINGS SHALL BE VERIFIED THROUGH THIRD PARTY TESTING BY THE HYDRONICS INSTITUTE DIVISION OF AHRI AND LISTED IN THE AHRI CERTIFICATION DIRECTORY.THE BOILER SHALL BE CONSTRUCTED WITH A HEAVY GAUGE STEEL JACKET ASSEMBLY, PRIMED AND PRE-PAINTED ON BOTH SIDES. THE COMBUSTION CHAMBER SHALL BE SEALED AND COMPLETELY ENCLOSED, INDEPENDENT OF THE OUTER JACKET ASSEMBLY, SO THAT INTEGRITY OF THE OUTER JACKET DOES NOT AFFECT A PROPER SEAL. A BURNER/FLAME OBSERVATION PORT SHALL BE PROVIDED. THE BURNER SHALL BE A PREMIX DESIGN AND CONSTRUCTED OF HIGH TEMPERATURE STAINLESS STEEL WITH A WOVEN METAL FIBER OUTER COVERING TO PROVIDE MODULATING FIRING RATES. THE BOILER SHALL BE SUPPLIED WITH A GAS VALVE DESIGNED WITH NEGATIVE PRESSURE REGULATION AND BE EQUIPPED WITH A VARIABLE SPEED BLOWER SYSTEM, TO PRECISELY CONTROL THE FUEL/AIR MIXTURE TO PROVIDE MODULATING BOILER FIRING RATES FOR MAXIMUM EFFICIENCY. THE BOILER SHALL OPERATE IN A SAFE CONDITION AT A DERATED OUTPUT WITH GAS SUPPLY PRESSURES AS LOW AS 4 INCHES OF WATER COLUMN. THE BOILER SHALL UTILIZE A 24 VAC CONTROL CIRCUIT AND COMPONENTS. THE CONTROL SYSTEM SHALL HAVE AN ELECTRONIC DISPLAY FOR BOILER SET-UP, BOILER STATUS, AND BOILER DIAGNOSTICS. ALL COMPONENTS SHALL BE EASILY ACCESSED AND SERVICEABLE FROM THE FRONT AND TOP OF THE JACKET. THE BOILER SHALL BE EQUIPPED WITH; A TEMPERATURE/PRESSURE GAUGE, HIGH LIMIT TEMPERATURE CONTROL CERTIFIED TO UL353, ASME CERTIFIED PRESSURE RELIEF VALVE, OUTLET WATER TEMPERATURE SENSOR, RETURN WATER TEMPERATURE SENSOR, A UL 353 CERTIFIED FLUE TEMPERATURE SENSOR, OUTDOOR AIR SENSOR, LOW WATER FLOW PROTECTION AND BUILT-IN ADJUSTABLE FREEZE PROTECTION. THE BOILER SHALL FEATURE THE “SMART SYSTEM” CONTROL WITH A MULTI-COLORED GRAPHIC LCD DISPLAY WITH NAVIGATION DIAL AND SOFT KEYS FOR, PASSWORD SECURITY, THREE LOOP TEMPERATURE SETPOINTS WITH INDIVIDUAL OUTDOOR AIR RESET CURVES, PUMP DELAY WITH ADJUSTABLE FREEZE PROTECTION, PUMP EXERCISE, DOMESTIC HOT WATER PRIORITIZATION WITH DHW MODULATION LIMITING AND USB PC PORT CONNECTION. THE BOILER SHALL BE CAPABLE OF CONTROLLING A VARIABLE SPEED BOILER PUMP TO KEEP A CONSTANT DELTA T AT ALL MODULATION RATES. THE BOILER SHALL HAVE THE CAPABILITY TO ACCEPT A 0-10 VDC INPUT CONNECTION FOR BMS CONTROL OF MODULATION OR SETPOINT, ENABLE DISABLE OF THE BOILER, VARIABLE SYSTEM PUMP SIGNAL AND A 0-10VDC OUTPUT OF BOILER MODULATION RATE. THE BOILER SHALL HAVE A BUILT-IN “CASCADE” WITH SEQUENCING OPTIONS FOR “LEAD LAG” OR “EFFICIENCY OPTIMIZED” MODULATION LOGIC, WITH BOTH CAPABLE OF ROTATION WHILE MAINTAINING MODULATION OF UP TO EIGHT BOILERS WITHOUT UTILIZATION OF AN EXTERNAL CONTROLLER. SUPPLY VOLTAGE SHALL BE 120 VOLT / 60 HERTZ / SINGLE PHASE. THE BOILER SHALL BE EQUIPPED WITH TWO TERMINAL STRIPS FOR ELECTRICAL CONNECTION. A LOW VOLTAGE CONNECTION BOARD WITH 42 DATA POINTS FOR SAFETY AND OPERATING CONTROLS, I.E., AUXILIARY RELAY, AUXILIARY PROVING SWITCH, ALARM CONTACTS, RUNTIME CONTACTS, MANUAL RESET LOW WATER CUTOFF, FLOW SWITCH, HIGH AND LOW GAS PRESSURE SWITCHES, TANK THERMOSTAT, THREE WALL THERMOSTAT/ZONE CONTROLS, SYSTEM SUPPLY SENSOR, OUTDOOR SENSOR, BUILDING MANAGEMENT SYSTEM SIGNAL, MODBUS CONTROL CONTACTS AND CASCADE CONTROL CIRCUIT. A HIGH VOLTAGE TERMINAL STRIP SHALL BE PROVIDED FOR SUPPLY VOLTAGE. THE HIGH VOLTAGE TERMINAL STRIP PLUS INTEGRAL RELAYS ARE PROVIDED FOR INDEPENDENT PUMP CONTROL OF THE SYSTEM PUMP, THE BOILER PUMP AND THE DOMESTIC HOT WATER PUMP. THE BOILER SHALL BE INSTALLED AND VENTED WITH A DIRECT VENT SIDEWALL SYSTEM WITH A HORIZONTAL SIDEWALL TERMINATION OF BOTH THE VENT AND COMBUSTION AIR. THE FLUE SHALL BE PVC, CPVC OR STAINLESS STEEL SEALED VENT MATERIAL TERMINATING AT THE SIDEWALL WITH THE MANUFACTURERS SPECIFIED VENT TERMINATION. A SEPARATE PIPE SHALL SUPPLY COMBUSTION AIR DIRECTLY TO THE BOILER FROM THE OUTSIDE. THE AIR INLET PIPE MAY BE PVC, CPVC, ABS, GALVANIZED, DRYER VENT, OR STAINLESS STEEL SEALED PIPE. THE AIR INLET MUST TERMINATE ON THE SAME SIDEWALL WITH THE MANUFACTURER’S SPECIFIED AIR INLET CAP. THE BOILER’S TOTAL COMBINED AIR INTAKE LENGTH SHALL NOT EXCEED 100 EQUIVALENT FEET. THE BOILER’S TOTAL COMBINED EXHAUST VENTING LENGTH SHALL NOT EXCEED 100 EQUIVALENT FEET. FOAM CORE PIPE IS NOT AN APPROVED MATERIAL FOR EXHAUST PIPING. THE BOILER SHALL HAVE AN INDEPENDENT LABORATORY RATING FOR OXIDES OF NITROGEN (NOX) OF 20 PPM OR LESS CORRECTED TO 3% O2. THE MANUFACTURER SHALL VERIFY PROPER OPERATION OF THE BURNER, ALL CONTROLS AND THE HEAT EXCHANGER BY CONNECTION TO WATER AND VENTING FOR A FACTORY FIRE TEST PRIOR TO SHIPPING.

C. EXECUTION

1. DEMOLITION: THE EXISTING FACILITY WILL CONTINUE TO OPERATE DURING ALL PHASES OF THE DEMOLITION WORK AND SUBSEQUENT CONSTRUCTION. NO INTERRUPTION OF THE SYSTEMS WILL BE PERMITTED WITHOUT PRIOR APPROVAL OF THE OWNER'S REPRESENTATIVE. SUBMIT PROPOSED METHODS AND SEQUENCE OF OPERATIONS FOR THE SELECTIVE DEMOLITION WORK TO THE OWNER'S REPRESENTATIVE FOR REVIEW PRIOR TO THE START OF THE WORK. ANY DEMOLITION SHALL BE COORDINATED WITH OWNER, AND CM/GC. PERFORM ALL DEMOLITION WHILE ENSURING MINIMUM INTERFERENCE WITH ADJACENT OCCUPIED AREAS.

2. START UP, TESTING AND BALANCING: PROVIDE QUALIFIED PERSONNEL, EQUIPMENT, APPARATUS, AND SERVICES FOR START-UP, TESTING AND BALANCING OF THE MECHANICAL SYSTEMS TO PERFORMANCE DATA SHOWN IN SCHEDULES AND ON DRAWINGS. AIR AND WATER FLOWS SHALL BE BALANCED TO +/- 5% OF DESIGN. LEAKS, DAMAGE, AND DEFECTS DISCOVERED OR RESULTING FROM START-UP AND BALANCING SHALL BE REPAIRED OR REPLACED TO LIKE-NEW CONDITION WITH ACCEPTABLE MATERIALS. TESTING SHALL CONTINUE UNTIL SYSTEM OPERATES WITHOUT ADJUSTMENTS OR REPAIRS. REPORT DATA ON INDUSTRY STANDARD NEBB OR AABC REPORTING FORMS. THE TAB CONTRACTOR WILL PRODUCE A TAB REPORT THAT HAS THE FOLLOWING: THE REPORT SHALL BE APPROPRIATELY BOUND, A COVER PAGE, A TABLE OF CONTENTS, THE CONTRACTORS CERTIFICATION INFORMATION, THE CONTRACTORS EQUIPMENT CALIBRATION INFORMATION, FLOW DIAGRAMS OF THE SYSTEM WITH MINIMUM, MAXIMUM AND DESIGN FLOWS AND PRESSURE DATA, A PAGE FOR EACH PUMP WITH ALL THE INFORMATION FILLED IN (ACTUAL AND DESIGN), PUMP CURVES WITH DESIGN AND MAXIMUM PRESSURES PLOTTED, A PAGE FOR EACH BOILER WITH ALL THE INFORMATION FILLED IN (ACTUAL AND DESIGN). THIS REPORT SHALL HELP THE OWNER DIAGNOSE ANY ISSUE WITH THE SYSTEMS SHOULD ANY ARISE IN THE FUTURE. SUBMIT COPIES OF START-UP AND BALANCING REPORTS FOR APPROVAL. PRIOR TO THE START OF ANY DEMOLITION, THE TESTING AND BALANCING CONTRACTOR SHALL TAKE CFM AND STATIC PRESSURE READINGS AT AREAS DESIGNATED ON THE DRAWINGS. READINGS SHALL BE SUBMITTED TO CSI ENGINEERING PRIOR TO THE START OF THE DESIGN.

3. INSTALL ALL EQUIPMENT ACCORDING TO THE MANUFACTURER'S REQUIREMENTS, SHOP DRAWINGS, AND DETAILS AS SHOWN ON THE DRAWINGS AND AS SPECIFIED. INSTALL ALL WORK SO THAT PARTS REQUIRING INSPECTION, REPLACEMENT, MAINTENANCE AND REPAIR SHALL BE READILY ACCESSIBLE. SMALL DEVIATIONS FROM THE DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT ANY SUBSTANTIAL CHANGE SHALL NOT BE MADE WITHOUT PRIOR WRITTEN OWNER APPROVAL.

4. ALL EQUIPMENT, PIPING, VALVES, AND DUCTWORK PROVIDED UNDER THIS SECTION OF THE SPECIFICATIONS SHALL BE MARKED FOR EASE OF IDENTIFICATION PER OWNER'S OR INDUSTRY STANDARDS.

5. PROVIDE QUALIFIED PERSONNEL, EQUIPMENT, APPARATUS, AND SERVICES FOR TESTING AND INSPECTION OF MECHANICAL SYSTEMS. WATER PIPING SHALL BE HYDROSTATICALLY TESTED AT 130% OF DESIGN PRESSURE AT A MINIMUM OF 120 PSIG. TESTS SHALL BE FOR A FIVE-HOUR DURATION, DURING WHICH TIME PIPING SHALL SHOW NO LEAKS AND NO SEALING OF LEAKS SHALL BE PERMITTED. ANY EQUIPMENT NOT CAPABLE OF WITHSTANDING TEST PRESSURES SHALL BE ISOLATED FROM THE TEST. LEAKS, DAMAGE, AND DEFECTS DISCOVERED OR RESULTING FROM TESTING SHALL BE REPAIRED OR REPLACED TO LIKE-NEW CONDITION WITH ACCEPTABLE MATERIALS. TESTS SHALL BE CONTINUED UNTIL SYSTEMS OPERATE WITHOUT LEAKS OR REPAIRS. SUBMIT COPIES OF TESTING REPORTS FOR APPROVAL. DO NOT COVER OR CONCEAL WORK BEFORE TESTING AND INSPECTION.

PLUMBING SPECIFICATIONS

A. GENERAL

1. GENERAL: ALL WORK COVERED CONSISTS OF FURNISHING ALL MATERIALS, LABOR, EQUIPMENT AND SUPPLIES NECESSARY TO PROVIDE A COMPLETE WORKING SYSTEM REQUIRED PER THE DESIGN DRAWINGS AND MASSACHUSETTS STATE CODES.

2. SHOP DRAWINGS: SHOP DRAWING SUBMITALS AND TESTING REPORTS OF ALL SPECIFIED FIXTURES, EQUIPMENT AND PIPING SHALL BE SUBMITTED TO THE ARCHITECT FOR APPROVAL.

3. CODES: ALL EQUIPMENT AND MATERIALS FURNISHED UNDER THE PLUMBING SUB-CONTRACT, LABOR, AND TESTING PERFORMED HEREIN SHALL BE IN COMPLETE ACCORDANCE WITH THE MASSACHUSETTS STATE BUILDING CODE, INTERNATIONAL FUEL GAS CODE, STATE PLUMBING CODE, LOCAL ORDINANCES AND REGULATIONS OF THE CITY OR TOWN, NATIONAL FIRE PROTECTION ASSOCIATION AND INSURANCE REGULATIONS AND REQUIREMENTS GOVERNING SUCH WORK.

4. PRIOR TO BID: THE PLUMBING SUBCONTRACTOR SHALL VISIT THE SITE AND FAMILIARIZE HIMSELF WITH ALL TRADE DRAWINGS AND ASPECTS OF THE SCOPE AND EXISTING CONDITIONS TO WHICH THE WORK WILL BE INSTALLED. ANY DISCREPANCIES BETWEEN THE SCOPE OF WORK SHOWN ON THE DRAWINGS AND ANY CONDITIONS SHALL BE SUBMITTED TO THE ARCHITECT IN WRITING. FAILURE OF THE CONTRACTOR TO DO SO SHALL NOT CONSTITUTE AN EXTRA TO THE CONTRACT.

5. PERMITS: ALL PERMITS, FEES OR EXPENSES INCURRED THAT ARE REQUIRED FOR INSTALLATION OF ANY MATERIAL SHALL BE OBTAINED AS PART OF THE WORK OF THIS SPECIFICATION INCLUDING.

6. INSTRUCTIONS: ALL INSTRUCTION SHALL BE PROVIDED AFTER COMPLETION OF PROJECT TO THE OWNER'S OPERATING PERSONNEL REGARDING ALL SYSTEMS AND EQUIPMENT OPERATION AND MAINTENANCE. OPERATION AND MAINTENANCE MANUALS SHALL BE PROVIDED TO THE OWNER.

7. GUARANTEE: ALL MATERIALS, EQUIPMENT AND WORK FURNISHED UNDER THIS SECTION SHALL BE GUARANTEED AGAINST ALL DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR CO0MMENCING WITH THE DATE OF THE SUBSTANTIAL COMPLETION.

8. RECORD DRAWINGS: THE PLUMBING SUBCONTRACTOR SHALL MAINTAIN AT THE JOB, AT ALL TIMES, A COMPLETE AND SEPARATE SET OF BLACKLINE PRINTS OF THE PLUMBING DRAWINGS OF HIS TRADE ON WHICH HE SHALL MARK CLEARLY, NEATLY, ACCURATELY, AND PROMPTLY AS THE WORK PROGRESSES. TWO CADD DISKS, AUTOCAD RELEASE 2000 MINIMUM OR COMPATIBLE SYSTEM AS WELL AS MYLAR REPRODUCIBLE, AS-BUILTS, SHALL BE FURNISHED BY THE PLUMBING SUBCONTRACTOR AT THE JOB COMPLETION.

9. COORDINATION: CONTRACTOR TO CAREFULLY COORDINATE ALL WORK INSTALLED WITH THAT OF ALL OTHER TRADES.

10. PROTECTION OF PROPERTY: PROTECT ALL NEW AND EXISTING WORK BEFORE, DURING AND AFTER INSTALLATION.

11. DISINFECTION: ALL DOMESTIC WATER SYSTEMS SHALL BE DISINFECTED IN ACCORDANCE WITH THE LOCAL PUBLIC HEALTH AND MASSACHUSETTS PLUMBING CODE REQUIREMENTS SECTION 10.14.

12. TESTS: THE PLUMBING SUBCONTRACTOR SHALL PERFORM ALL TESTS AT THE COMPLETION OF THE WORK, AND THE RESULTS FURNISHED TO THE OWNER AND ARCHITECT IN WRITING.

13. CERTIFICATES OF APPROVAL: UPON COMPLETION OF ALL WORK, THE PLUMBING SUBCONTRACTOR SHALL FURNISH, IN DUPLICATE, CERTIFICATES OF INSPECTIONS FROM ALL INSPECTORS AND AUTHORITIES HAVING JURISDICTION, NOTARIZED LETTERS FROM THE MANUFACTURERS STATING THAT AUTHORIZED FACTORY ENGINEERS HAVE INSPECTED AND TESTED THE INSTALLATION OF THEIR RESPECTIVE SYSTEMS AND FOUND SAME TO BE IN PERFECT OPERATING CONDITION.

14. DRAWING INTERPRETATION: THE CONTRACT DRAWINGS ARE GENERALLY DIAGRAMMATIC AND INDICATE ONLY THE GENERAL ARRANGEMENTS OF WORK. IT IS NOT THE INTENT OF THESE DRAWINGS TO SHOW EVERY PIPE, RISE, DROP, ELBOW, ETC. ANY ADDITIONAL WORK NOT SHOWN AND REQUIRED TO INSTALL THE PLUMBING SYSTEMS SHALL BE INCLUDED AS PART OF THIS CONTRACT.

15. DEMOLITION WORK: PARTICULAR CARE SHALL BE TAKEN TO AVOID CREATING HAZARDS ON THE SITE OR CAUSING DISRUPTION OF SERVICE IN THE BUILDING. ALL EXISTING EQUIPMENT TO BE REMOVED SHALL BE DONE IN A NEAT AND WORKMANLIKE MANNER. ALL EXISTING EQUIPMENT TO BE TURNED OVER TO THE OWNER SHALL BE PRESENTED TO THE OWNER IN GOOD CONDITION AT A LOCATION DESIGNATED BY THE OWNER. ALL OTHER EQUIPMENT SHALL BE REMOVED FROM THE PREMISES. REMOVE ALL ABANDONED PIPING AND EQUIPMENT NOT BUILT INTO BUILDING CONSTRUCTION. WHERE CEILING OR WALLS ARE REMOVED, ALL ABANDONED PIPING SHALL BE REMOVED AND ENDS OF LIVE SERVICES CAPPED. ABANDONED ELEMENTS BUILT INTO WALLS OR LOCATED ABOVE EXISTING INACCESSIBLE CEILINGS SHALL REMAIN AND ENDS CAPPED AND MARKED ABANDONED.

16. CONTINUITY OF SERVICES: SERVICES SHALL NOT BE INTERUPTED WITHOUT OWNER'S APPROVAL. WHEN AN INTERRUPTION OF SERVICE BECOMES NECESSARY, CONTRACTOR SHALL CONSULT WITH THE OWNER AND SCHEDULE THE PROPER TIME TO DO THE SHUT-DOWN. SCHEDULE MUST NOT DELAY NOR INTERFERE WITH THE PROGRESS OF THE PROJECT.

17. SEISMIC RESTRAINTS: PROVIDE SEISMIC RESTRAINTS IN ACCORDANCE WITH THE SEISMIC REQUIREMENTS IDENTIFIED IN THE MASSACHUSETTS STATE BUILDING CODE, EIGHTH (8TH) EDITION.

B. SCOPE

1. THE WORK OF THIS SECTION CONSISTS OF ALL LABOR, MATERIALS AND EQUIPMENT REQUIRED TO PROVIDE ALL PLUMBING WORK COMPLETE, IN PLACE, AS SHOWN ON THE DRAWINGS, SPECIFIED HEREIN AND AS NECESSARY FOR A PROPER INSTALLATION.

2. THE EXTENT OF THE PLUMBING WORK SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING:

   a. DOMESTIC COLD WATER SYSTEM.
   b. DOMESTIC HOT WATER SUPPLY AND HOT WATER RECIRCULATION SYSTEM.
   c. CORE DRILLING
   d. INSULATION OF ALL EXISTING COLD WATER, HOT WATER, HOT WATER RECIRCULATION AND CONDUCTORS SYSTEMS PIPING, VALVES AND FITTINGS MADE BARE AS A RESULT OF ASBESTOS ABATEMENT. WHEN CONNECTING TO EXISTING INSULATED SYSTEM PROVIDE NEW INSULATION FOR THREE FEET ON EITHER SIDE OF THE NEW CONNECTION.
   e. FURNISHING OF ACCESS PANELS.

C. RELATED WORK

1. THE FOLLOWING EQUIPMENT ITEMS AND WORK SHALL BE THE RESPONSIBILITY OF OTHERS:

   a. CUTTING AND PATCHING
   b. TEMPORARY WATER, HEAT, FIRE PROTECTION AND TOILET FACILITIES
   c. TEMPORARY POWER AND LIGHTING
   d. CONCRETE AND MASONRY SUPPORTS AND EQUIPMENT BASES
   e. FLASHING AND CAULKING
   f. FINISH PAINTING
   g. HEATING, VENTILATING AND AIR CONDITIONING
   h. FIRE PROTECTION
   i. ELECTRICAL POWER AND WIRING
   j. FURNISHING OF TOILET ROOM ACCESSORIES
   k. INSTALLATION OF ACCESS PANELS

D. PIPING MATERIALS & FITTINGS

1. COLD & HOT WATER:
TYPE K HARD DRAWN COPPER TUBING WITH WROUGHT COPPER SWEAT FITTINGS JOINED WITH APPROVED 95/ 5 LEAD FREE TIN ANTIMONY SOLDER.

2. COLD & HOT WATER:
TYPE L HARD DRAWN COPPER TUBING WITH WROUGHT COPPER SWEAT FITTINGS JOINED WITH APPROVED 95/ 5 LEAD FREE TIN ANTIMONY SOLDER.

3. GAS 2" AND SMALLER:
SCHEDULE 40 BLACK STEEL PIPE WITH STANDARD WEIGHT MALLEABLE IRON FITTINGS JOINED WITH THREADED CONNECTIONS.

4. GAS LARGER THAN 2":
SCHEDULE 40 BLACK STEEL PIPE WITH BEVELED ENDS WITH STANDARD WEIGHT CARBON STEEL BEVELED END FITTINGS JOINED BY WELDING IN ACCORDANCE WITH LOCAL CODES.

E. INSULATION

1. ALL DOMESTIC COLD AND HOT WATER SUPPLY AND RECIRCULATION PIPE, FITTINGS AND VALVES SHALL BE INSULATED WITH HEAVY DENSITY RIGID FIBERGLASS WITH A VAPOR BARRIER AND ALL PURPOSE JACKET WITH SELF-SEALING LAP JOINT. VALVES AND FITTINGS SHALL BE INSULATED WITH ZESTON HI-LO INSULATION AND COVERED WITH 25/50 RATED PVC COVERS SECURED WITH VAPOR RETARDER MASTIC.

2. INSULATION THICKNESS SHALL BE AS FOLLOWS:

COLD WATER = ½"
HOT WATER SUPPLY AND RECIRCULATION UP TO 4" = 1"
HOT WATER SUPPLY AND RECIRCULATION LARGER THAN 4" = 1-1/2"

F. PIPE SLEEVES, HANGERS AND SUPPORTS

1. ALL PIPING SHALL BE PROPERLY SUPPORTED FROM THE BUILDING STRUCTURE IN ACCORDANCE WITH LOCAL CODES AND MANUFACTURER'S RECOMMENDATIONS. HANGERS FOR INSULATED PIPING SHALL BE OVERSIZED AND FURNISHED WITH A SHEETMETAL INSULATION SHIELD TO ALLOW THE INSULATION TO PASS THROUGH UNCUT. PROVIDE SCHEDULE 40 PIPE SLEEVES, EXTEND 1 INCH ABOVE FLOOR, MAKE WATERTIGHT AND PACK WITH MATERIAL THAT SHALL MAINTAIN FIRE RATING. PROVIDE CORE DRILLING WHERE REQUIRED AND PROVIDE FIRE RATED LINK SEAL PENETRATION CLOSURES.

G. VALVES

1. SHUT OFF VALVES ON COLD WATER, HOT WATER, AND HOT WATER RECIRCULATION PIPING FROM UP TO AND INCLUDING 2 1/2" SHALL BE APOLLO SERIES 77C, THREADED OR SOLDER END, BRONZE BODY BALL VALVE, FULL PORT STAINLESS STEEL BALL AND STEM, 600 PSI WOG.

2. SHUT OFF VALVES ON COLD WATER AND HOT WATER PIPING 3" AND LARGER SHALL BE APOLLO SERIES 143 BUTTERFLY VALVE, LUG TYPE DUCTILE IRON BODY, EPDM OR BUNA-N SEAT, 10 POSITION LEVER HANDLE

3. SHUT OFF VALVES ON COLD WATER AND HOT WATER PIPING UP TO 3" SHALL BE BRONZE BODY GATE VALVE WITH RISING STEM, SOLID WEDGE DESIGN, 300 PSI WOG WITH THREADED OR SOLDERED ENDS.

4. ALL CHECK VALVES ON COLD WATER, HOT WATER AND HOT WATER RECIRCULATION PIPING THREE INCHES AND LESS IN SIZE SHALL BE APOLLO SERIES 61, BRONZE BODY, RTFE BALL CHECK, S.S. SPRING.

5. ALL DRAIN VALVES SHALL BE 1/2 INCH APOLLO MODEL 78-103 WITH WATTS NO. 8A HOSE CONNECTION VACUUM BREAKER, CAP WITH CHAIN OF LENGTH AS REQUIRED.

6. ALL BALANCING VALVES FOR HOT WATER RECIRCULATION SHALL BE THE SAME AS SPECIFIED FOR SHUT OFF VALVES AND SHALL BE MODIFIED TO INCLUDE BALANCING STOP PLATE.

7. ALL SHUT-OFF VALVES ON NATURAL GAS SYSTEM 2 INCHES AND SMALLER SHALL BE APOLLO SERIES 80-100 SERIES MASSACHUSETTS APPROVED, THREADED END T HANDLE BRONZE BODY BALL VALVE, RATED FOR 250 PSIG

8. ALL SHUTOFF VALVES ON NATURAL GAS SYSTEMS 2-1/2 INCHES AND LARGER SHALL BE WALWORTH 1797F IRON BODY PLUG VALVE WITH FLANGED ENDS,

9. ALL BALL VALVES FOR INSTALLATION IN INSULATED PIPING SHALL HAVE VALVE EXTENSIONS TO SUIT INSULATION THICKNESS.

H. WATER HEATER: SEE WATER HEATER SCHEDULE ON DRAWINGS FOR SPECIFICATION

I. PIPE IDENTIFICATION AND VALVE TAGS:

1. ALL PLUMBING SYSTEMS SHALL BE LABELED AT EACH VALVE, AT EACH BRANCH, AT EACH PIPE PASSAGE THROUGH WALL AND AT INTERVALS OF NOT MORE THAN 20 FEET WITH COLOR CODED SEMI-RIGID SETMARK PIPE MARKERS WITH ARROWS INDICATING THE DIRECTION OF FLOW. ALL VALVES SHALL BE TAGGED WITH 1-1/2 INCH DIAMETER BRASS TAGS AND NUMBERED IN SEQUENCE FROM POINT OF ORIGIN. VALVE CHARTS SHALL BE PLACED UNDER GLASS, FRAMED AND PRESENTED TO THE OWNER.

HVAC
ELECTRICAL
CSI ENGINEERING
PLUMBING
FIRE PROTECTION

999 BROADWAY SUITE 206
SAUGUS, MA 01906
781-233-4808

125 AVIATION AVE, SUITE 4
PORTSMOUTH, NH 03801
603-319-8244

STAMP

LOWELL, MA

LELACHEUR
PARK
HOT WATER
UPGRADE

REVISIONS:

Date	Description

BID SET
06-30-2015

CSI Project Number:	2013-206
Scale:	NTS
Drawn By:	MR
Checked By:	DM
Date:	06-29-15

MECHANICAL
SPECIFICATIONS

M4.0