ADDENDUM NO.: 3 DATE OF ADDENDUM: February 20, 2015

NEW DINING FACILITY
CENTRAL CONNECTICUT STATE UNIVERSITY
NEW BRITAIN, CT
CF-RC-382

Original Bid Due Date / Time: February 25, 2015 1:00 PM

Previous Addendums: Addendum No. 2 dated February 12, 2015
Addendum No. 1 dated February 3, 2015

TO: **Prospective Bid Proposers:**
This Addendum forms part of the "Contract Documents" and modifies or clarifies the original "Contract Documents" for this Project dated 12/1/2014. Prospective Bid Proposers shall acknowledge receipt of the total number the Addenda issued for this Project on the space provided on Section 00 41 00 Bid Proposal Form. Failure to do may subject Bid Proposers to disqualification.

The following clarifications are applicable to drawings and specifications for the project referenced above.

Item 1

Clarification: Subcontractor Pre-Qualification

Each subcontractor, *named* trade whose amount of work exceeds $500,000 must be prequalified at the time of the bid.

Item 2

DRAWING LL-1 – SITE LAYOUT

Item 2.1

The attached sketch SK-L.01 SITE LAYOUT REVISIONS, dated 18 February, 2015, modifies Drawing LL.1.

Item 2.2

The attached sketch SK-L.02 SITE LAYOUT REVISIONS, dated 18 February, 2015, modifies Drawing LL.1.

Item 3

DRAWING LD-1 – SITE DETAILS

Item 3.1

The attached sketch SK-L.03 SITE LAYOUT REVISIONS, dated 18 February, 2015, modifies Drawing LD.1.

Item 3.2

Detail #4 on LD.1 UNIT MASONRY WALL W/ SAFETY RAIL:

Delete note "SAFETY RAILING (ORN. ALUMINUM FENCE) SEE DETAIL 7/L4",

ADDENDUM NO.: 3 **DATE OF ADDENDUM: February 19, 2015**

Delete note "SAFETY RAILING (ORN. ALUMINUM FENCE) SEE DETAIL 7/L4", and substitute the following note "PROVIDE 42" HIGH, 16' LONG GUARDRAIL (LOCATED WHERE WALL IS GREATER THAN 30" ABOVE GRADE). REFERENCE DETAIL 3/SKA.2 (Addendum #3) FOR MATERIAL AND DIMENSIONAL REQUIREMENTS. NOTE THAT THE HANDRAILS ARE NOT REQUIRED AT THIS LOCATION.

Item 4

DRAWING A1.11 – FIRST FLOOR PLAN

Clarification: The east wall of Storage Room 1090000, tagged C6, is a one-hour fire rated wall. Provide 6" CMU full height to the bottom of the structure above.

Item 5

DRAWING A6.06 – ELEVATOR PLANS & SECTIONS, RAMP PLANS & SECTIONS

The attached sketch SKA-2 LOADING DOCK STAIR & RAMP REVISED GUARDRAIL DETAIL, dated 02/19/15, modifies Drawing A6.06

Item 6

DRAWING M1.2 – SECOND FLOOR PLAN-MECHANICAL

Clarification: Piping shown between column lines 6.5 and 7, from Column line B to MAU-1, is a graphical error, and pertains to piping indicated on M1.1.

Item 7

DRAWING M4.2 – DETAILS-MECHANICAL

Clarification: Detail #4 on M4.2 is in reference to the hot air curtain.
Delete Detail 2 on M4.2.

Item 8

DRAWING M3.0 – SCHEDULES-MECHANICAL

The attached sketch SKM-01 HVAC PIPING/TUBING INSULATION SCHEDULE CLARIFICATION, dated 02/18/15, modifies Drawing M3.0.

Item 9

SEC SERIES DRAWINGS –SECURITY

Item 9.1

CLARIFICATION: Existing VMS and storage to be used for new CCTV cameras. Contractor to furnish and install only cameras, mounting hardware, licenses, and any required programming / configuration on existing VMS.

Item 9.2

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Category-6 cabling to all camera locations is furnished and installed by tel/data contractor per the T-Series drawings. Cat-6 cable will be terminated with RJ-45 male connector for connection to CCTV camera by security contractor.

Item 9.3

Campus map assignment of CCTV camera locations is outside the scope of this project and is Not in Contract (NIC).

Item 9.4

Request to Exit motion sensors to be provided on all Access Control equipped doors indicated with Proximity Card Readers.

Item 10

SPECIFICATION SECTION 01 11 00 – SUMMARY OF WORK

In Section 01 11 00 Summary of Work, Section 1.3 A.1:

ADD: "The Gas Utility shall be responsible for the complete installation of the connection to the project site, terminated at and including, the meter at the building. The work includes, trenching, base/bedding, piping and backfilling as well as repair of surfaces to original quality/status. The Contractor shall be responsible for coordinating the work with the utility and making available the work area for the installation by the utility. Every effort shall be made to sequence the work to avoid re-trenching or disruption and repair of new work. "

Item 11

SPECIFICATION SECTION 051200 – STRUCTURAL STEEL

Paragraph 1.2 QUALITY ASSURANCE

CLARIFICATION: A certified AISC Erector is not required.

Item 12

SPECIFICATION SECTION 064219– METAL WALL PANELS

Delete Paragraph 2.1 B.2 and substitute the following:

1. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed surfaces complying with the following requirements:

    a. Three color selection equal to the following:

        1) Panolam W156 Grand Cherry Satin Texture. (Designated on the Food Service Drawings as "PL-1").
        2) Panolam W173 Walk on the Beech Satin Texture. (Designated on the Food Service Drawings as "PL-2", and on the Architectural Drawings as "PLASTIC-LAMINATED PANEL-2").
        3) Panolam S551 Fog Grey Satin Texture. (Designated on the Architectural Drawings as "PLASTIC-LAMINATED PANEL-3").

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Item 13

SPECIFICATION SECTION 074213 – METAL WALL PANELS

ADD the following Paragraph 2.1 A.7:

7. Available Manufacturers include but are not limited to:

   a. IMETCO.
   b. Firestone Metal Products.

Item 14

SPECIFICATION SECTION 115000– MISCELLANEOUS EQUIPMENT

Delete Paragraph 3.4 C.2b and substitute the following:

b. Hanging Mechanism and Height: Provide housing and hanging rod assembly designed for sloped ceiling installation. Provide extension rods to achieve overall fan length of 28" in all locations.

Item 15

SPECIFICATION SECTION 122413– ROLLER WINDOW SHADES

Item 15.1

Delete Paragraph 2.1 B.1 and substitute the following:

1. Color: Equal to MechoSystems ThermoVeil White 1501.

Item 15.2

Delete Paragraph 2.1 G.1 and substitute the following:

1. Color: Equal to MechoSystems Equinox Blackout Winter 0118.

Item 16

SPECIFICATION SECTION 232113.13– UNDERGROUND HYDRONIC PIPING

Delete Specification Section 232113.13 and substitute the attached Section 232113.13 UNDERGROUND HYDRONIC PIPING.

ADDENDUM NO.: 3 **DATE OF ADDENDUM: February 19, 2015**

END OF ADDENDUM #3

Attachments:

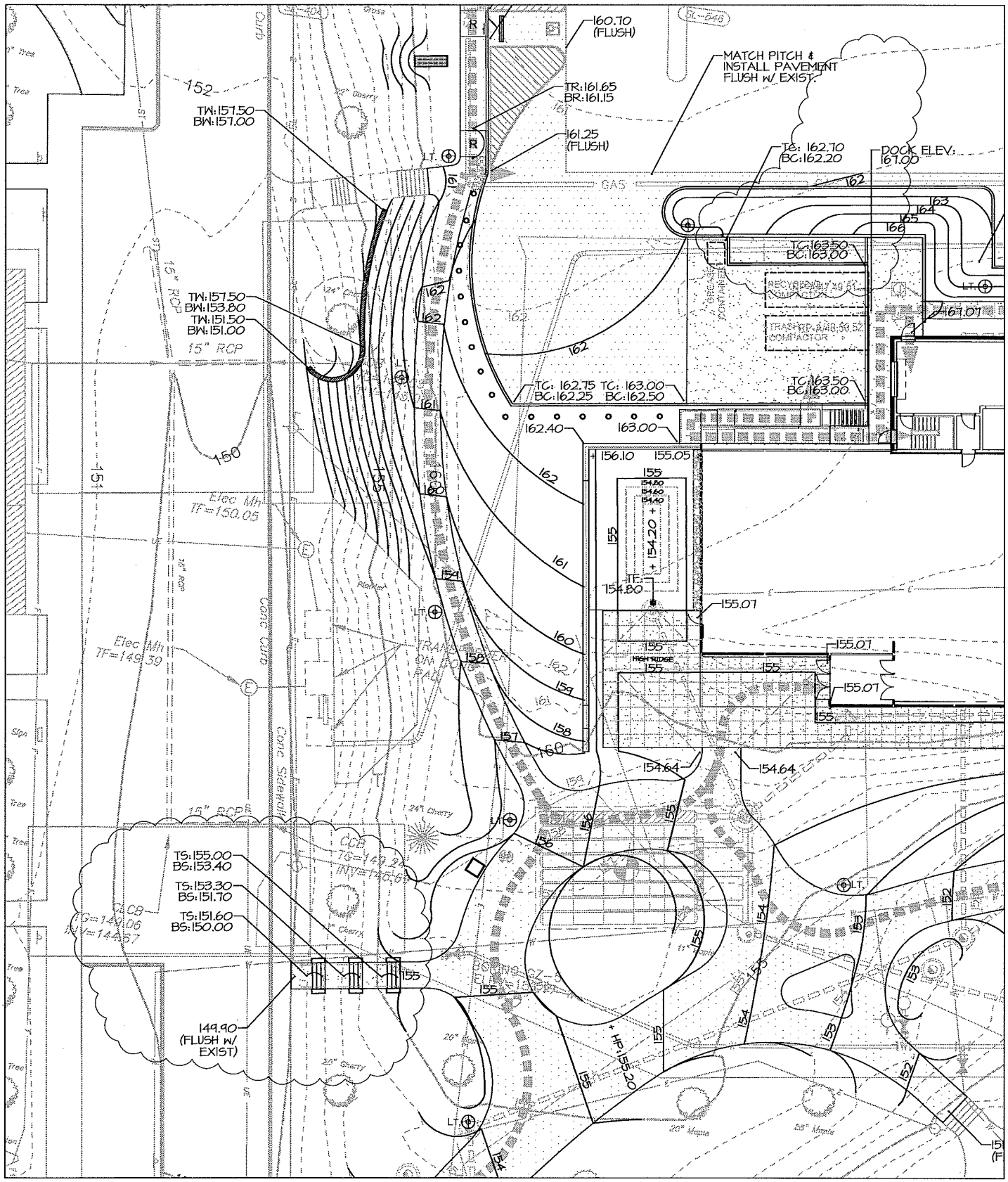
SK-L.01 SITE LAYOUT REVISIONS.
SK-L.02 SITE LAYOUT REVISIONS.
SK-L.03 SITE LAYOUT REVISIONS.
SK-A02
SKM-01 HVAC PIPING/TUBING INSULATION SCHEDULE CLARIFICATION
Specification Section 232113.13 UNDERGROUND HYDRONIC PIPING.

All questions must be in writing (not phone or e-mail) and must be forwarded to the consulting Architect/Engineer (Tai Soo Kim Partners 860-249-0695) with copies sent to the CT DCS Project Manager (Todd Lukas 860-713-7261) and Construction Administrator (Strategic Building Solutions 860-395-1795)

End of Addendum 3

Mellanee Walton

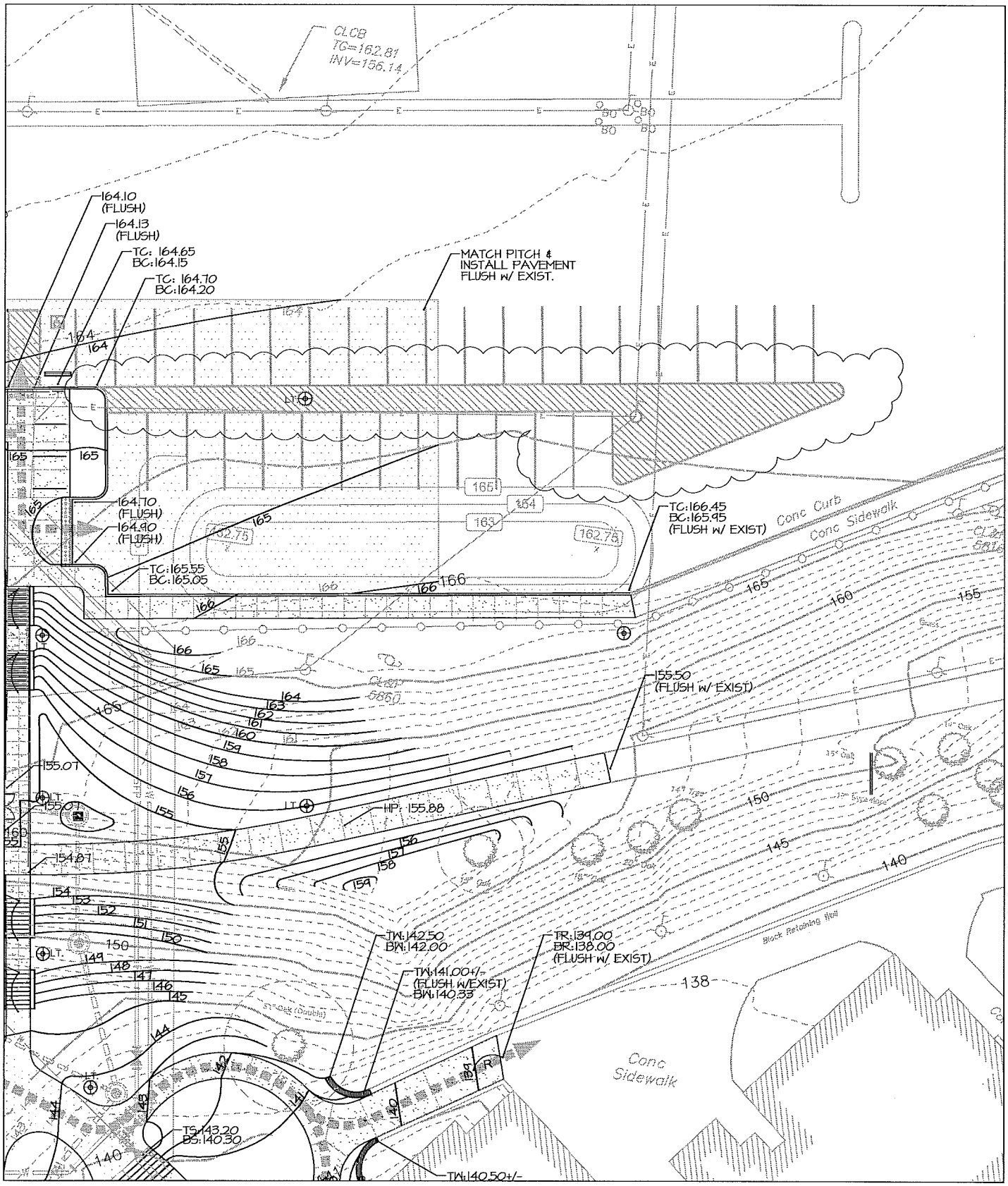
Mellanee Walton, Associate Fiscal Administrative Officer
Department of Administrative Services
On Behalf of the Division of Construction Services



REFERENCE SHEET: LL.1

REFERENCE ADDENDUM: **Addendum #3**

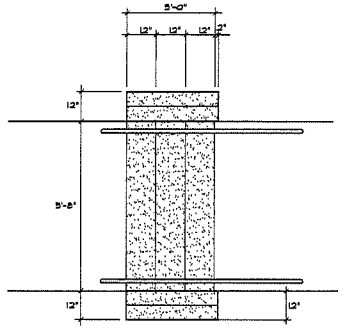
TAI SOO KIM PARTNERS TAI SOO KIM 146 Wyllys St Hartford, Connecticut Tel: (860) 547-1970 Fax: (860) 249-0695	JOB NAME / NUMBER: **CCSU DINING HALL / CF-RC-382**		TITLE: **SITE LAYOUT**	DRAWING NO: SK-L.01
	SCALE: **1"=30'-0"**		**REVISIONS**	
	DATE: **18 FEBRUARY 2015**	ISSUED BY: **CR3, LLP**		



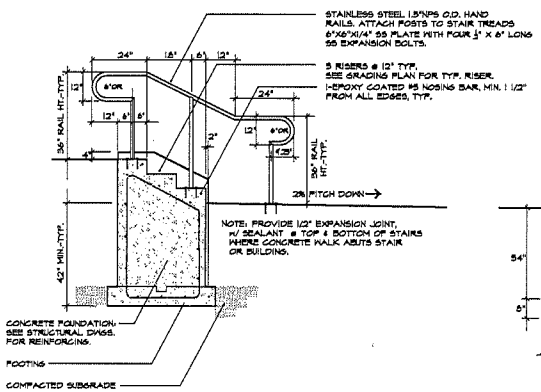
REFERENCE SHEET: LL.1

REFERENCE ADDENDUM: Addendum #3

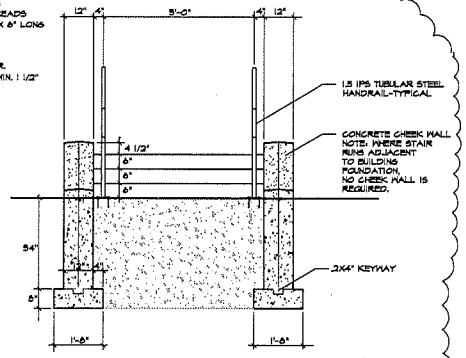
TAI SOO KIM PARTNERS 146 Wyllys St Hartford, Connecticut Tel: (860) 547-1970 Fax: (860) 249-0695	JOB NAME / NUMBER: CCSU DINING HALL / CF-RC-382		TITLE: SITE LAYOUT REVISIONS	DRAWING NO: SK-L.02
	SCALE: 1"=30'-0"			
	DATE: 18 FEBRUARY 2015	ISSUED BY: CR3, LLP		



PLAN – CONCRETE STAIR



SECTION – CONCRETE STAIR



ELEVATION VIEW – LOWER STAIR

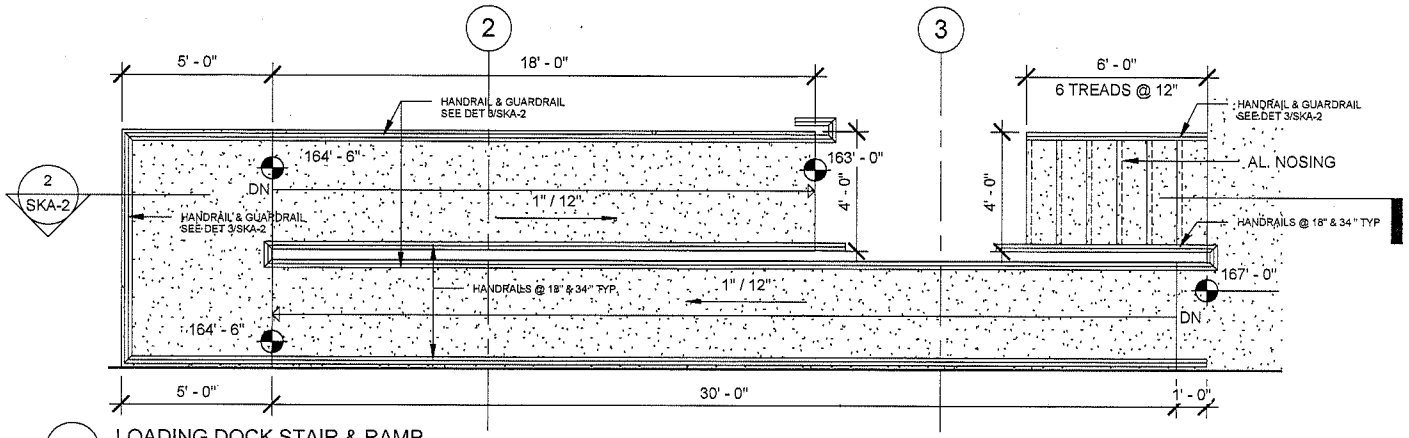
1a / LD.2 Concrete Stairs w/ Handrails & Cheek Walls

Not to Scale

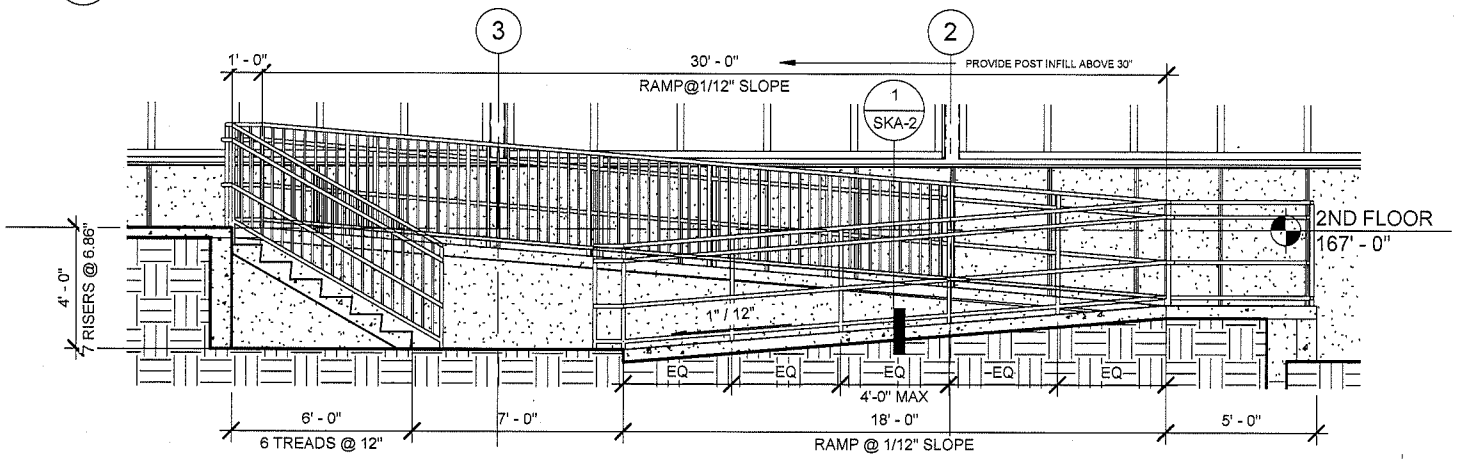
REFERENCE SHEET: LD.2

REFERENCE ADDENDUM: Addendum #3

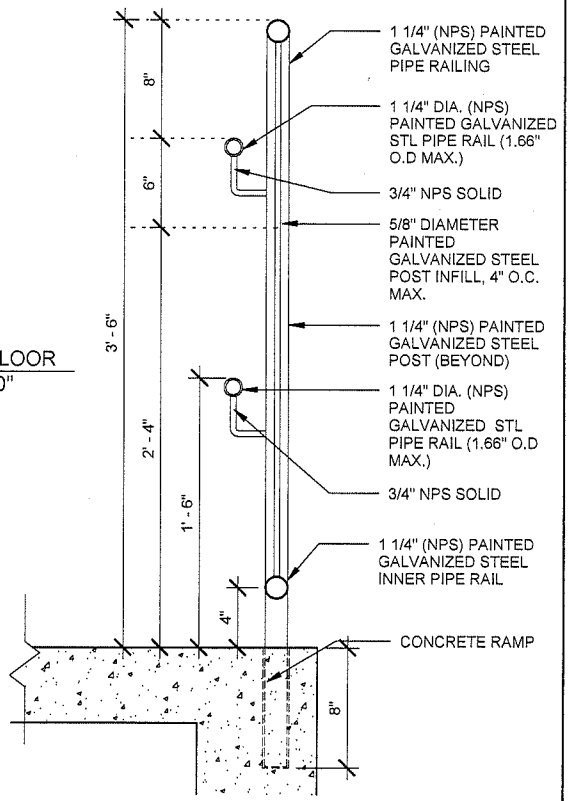
TAI SOO KIM PARTNERS 146 Wyllys St Hartford, Connecticut Tel: (860) 547-1970 Fax: (860) 249-0695	JOB NAME / NUMBER: CCSU DINING HALL / CF-RC-382		TITLE: SITE LAYOUT REVISIONS	DRAWING NO: SK-L.03
	SCALE: NOT TO SCALE			
	DATE: 18 FEBRUARY 2015	ISSUED BY: CR3, LLP		



1 LOADING DOCK STAIR & RAMP
1/4" = 1'-0"



2 LOADING DOCK STAIR & RAMP SECTION
1/4" = 1'-0"



3 GUARDRAIL DETAIL @ RAMP
1 1/2" = 1'-0"

REFERENCE SHEET:
REFERENCE ADDENDUM:
REFERENCE RFI:
REFERENCE SUPPLEMENTAL INFORMATION:
REFERENCE CHANGE ORDER PROPOSAL REQUEST:
REFERENCE SUBMITTAL:

TAI SOO KIM PARTNERS TAI SOO KIM 146 Wyllys St Hartford, Connecticut Tel: (860) 547-1970 Fax: (860) 249-0595	JOB NAME / NUMBER: DINING HALL SCALE: As indicated DATE: 02/19/15 ISSUED BY: Author	TITLE: LOADING DOCK STAIR & RAMP REVISED GUARDRAIL DETAIL	DRAWING NO: SKA-2

HVAC PIPING/TUBING INSULATION

SYSTEM	LOCATION	PIPE SIZE	CELLULAR GLASS	FLEXIBLE ELASTOMERIC	MINERAL-FIBER TYPE I	CALCIUM SILICATE
CONDENSATE & EQUIPMENT DRAIN, BELOW 60°F	INDOOR	ALL	1-1/2"	-	1-1/2"	-
	OUTDOOR ABOVE GRADE	ALL	1-1/2"	-	-	-
HEATING HOT WATER AND GLYCOL	INDOOR	1-1/2" & SMALLER	1-1/2"	-	1-1/2"	-
		2" & LARGER	2"	-	2"	-
	OUTDOOR ABOVE GRADE	ALL	3"	-	-	3"
REFRIGERANT (ALL) SUCTION, HOT GAS, VAPOR, & LIQUID PIPING	INDOOR	ALL	2"	2"	2"	-
	OUTDOOR ABOVE GRADE	ALL	2"	2"	-	-
REFRIGERANT (ALL) SUCTION, HOT GAS, VAPOR, & LIQUID FLEXIBLE TUBING	INDOOR	ALL	-	2"	-	-
	OUTDOOR ABOVE GRADE	ALL	-	2"	-	-

BLANKS (-) INDICATE INSULATION TYPE SHALL NOT BE USED.
THICKNESS BASED ON INSULATION HAVING A CONDUCTIVITY (K) NOT EXCEEDING 0.27 BTU PER INCH/HBFT²B°F

1. ALL EXPOSED INDOOR PIPING/TUBING AND FITTINGS WITHIN OCCUPIED SPACES, CORRIDORS, MECHANICAL ROOMS AND OTHER NON-CONCEALED LOCATIONS SHALL BE FITTED WITH PVC FITTING COVERS AND PVC PIPE COVERS FROM THE FLOOR LEVEL TO 12' ABOVE THE FINISHED FLOOR. PVC FITTING AND PIPE COVERS SHALL BE 25/50 FLAME AND SMOKE SPREAD RATED. COVERS AND JACKETING COLOR TO BE SELECTED BY ARCHITECT. PROVIDE TEMPLATE OF JACKET COLORS FOR THE ARCHITECT'S REVIEW.

2. ALL ELBOWS; CONCEALED OR EXPOSED, SHALL BE INSULATED WITH PRE-MOLDED, FACTORY FORMED FIBROUS GLASS WITH 3.5 PCF MINIMUM DENSITY AS MANUFACTURED BY HAMFAB OR APPROVED EQUAL. ALL ELBOWS; CONCEALED OR EXPOSED, SHALL BE COVERED WITH PVC FITTING COVERS. PVC FITTING COVERS SHALL BE 25/50 FLAME AND SMOKE SPREAD RATED. COVER COLOR TO BE SELECTED BY ARCHITECT. PROVIDE TEMPLATE OF JACKET COLORS FOR THE ARCHITECT'S REVIEW.

3. DIAPER AND LOOSE FILL STYLE INSULATION ON PIPE FITTINGS IS NOT ACCEPTABLE. ELBOWS WITHOUT PVC COVERS ARE NOT ACCEPTABLE.

4. INSULATE ALL COILS MOUNTED IN DUCTWORK OR TERMINAL BOXES. INSULATION THICKNESS SHALL BE EQUAL TO THE ASSOCIATED DUCT INSULATION THICKNESS.

5. ALL OUTDOOR PIPING/TUBING SHALL BE FITTED WITH A PRE-MANUFACTURED ALUMINUM JACKET PRODUCT. 0.024" ALUMINUM JACKET LOCK-ON OR SLIP-ON TYPE JACKETING TO BE COVERED WITH ACRYLIC COATING ON THE OUTER SURFACE AND A BAKED EPOXY MOISTURE BARRIER ON THE INNER SURFACE. MANUFACTURER SHALL BE SIMILAR TO CHILDERS PRODUCTS, DIVISION OF ITW; METAL JACKETING SYSTEMS. ALL EXPOSED JOINTS IN THE JACKET PRODUCT SHALL BE INSTALLED IN SUCH A WAY AS TO PREVENT THE INFILTRATION OF MOISTURE AND WATER.

6. ALL BURIED PIPING/TUBING SHALL BE A PRE-MANUFACTURERED PIPE/INSULATION SYSTEM. REFER TO SPECIFICATIONS FOR REQUIREMENTS.

REFERENCE SHEET: M3.0
REFERENCE ADDENDUM: N/A
REFERENCE RFI: N/A
REFERENCE SUPPLEMENTAL INFORMATION: N/A
REFERENCE CHANGE ORDER PROPOSAL REQUEST: N/A
REFERENCE SUBMITTAL: N/A

KOHLER KOHAN, LLC
30 Lake Avenue, Danbury, CT 06810
203.778.1017 F 203.778.1018
1372 Broadway, New York, NY 10018
212.695.2422 F 212.695.2423
www.kohlerkohan.com
E-mail kmc@kohlerkohan.com

JOB NAME / NUMBER:	TITLE:	DRAWING NO:
DINING HALL	HVAC PIPING/TUBING INSULATION SCHEDULE CLARIFICATION	SKM-01
SCALE: NOT TO SCALE		
DATE: 02/18/15	ISSUED BY: KR	

SECTION 232113.13 - UNDERGROUND HYDRONIC PIPING ADDENDUM #3

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 019113 – General Commissioning Requirements.

1.2 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Steel pipes and fittings.
3. Ductile-iron pipe and fittings.
4. Cased piping system.

1.3 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing hydronic piping systems with the following minimum working-pressure ratings:

1. Hot-Water Piping: 150 psig at 250 deg F.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cased piping.
2. Loose-fill insulation.

B. Shop Drawings: For underground hydronic piping. Signed and sealed by a professional engineer.

1. Calculate requirements for expansion compensation for underground piping.
2. Show expansion compensators, offsets, and loops with appropriate materials to allow piping movement in the required locations. Show anchors and guides that restrain piping movement with calculated loads, and show concrete thrust block dimensions.
3. Show pipe sizes, locations, and elevations. Show piping in trench, conduit, and cased pipe with details showing clearances between piping, and show insulation thickness.

1.5 INFORMATIONAL SUBMITTALS

A. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and at vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing hydronic piping.

B. Qualification Data: For qualified Installer.

C. Welding certificates.

D. Material Test Reports: For conduit and cased piping.

E. Source quality-control reports.

F. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Fiberglass Pipe and Fitting Installers: Installers of RTRF and RTRP shall be certified by manufacturer of pipes and fittings as having been trained and qualified to join fiberglass piping with manufacturer-recommended adhesive.

B. Welding Qualifications: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.

1. Comply with provisions in ASME B31.9, "Building Services Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.

~~2.2 STEEL PIPES AND FITTINGS~~

~~A. Steel Pipe: ASTM A 53/A 53M, Type E, Grade B, Standard Weight; with plain ends.~~

~~B. Cast-Iron, Threaded Fittings: ASME B16.4, Classes 125 and 250, standard pattern, with threads according to ASME B1.20.1.~~

~~C. Malleable-Iron, Threaded Fittings: ASME B16.3, Classes 150 and 300, with threads according to ASME B1.20.1.~~

~~D. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Class 125 and Class 250; raised ground face, and bolt holes spot faced.~~

~~E. Wrought Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.~~

~~F. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:~~

~~1. Material Group: 1.1.~~
~~2. End Connections: Butt welding.~~
~~3. Facings: Raised face.~~

~~G. Steel Welding Fittings: ASME B16.9 and ASTM A 234/A 234M, seamless.~~

~~1. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.~~

~~H. Nipples: ASTM A 733, made of same materials and wall thicknesses as pipe in which they are installed.~~

~~I. Pipe Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.~~

~~1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.~~

~~a. Full-Face Type: For flat-face, Class 125, cast-iron and bronze flanges.~~
~~b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.~~

~~J. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.~~

2.3 CASED PIPING SYSTEM

A. Description: Factory-fabricated piping with carrier pipe, insulation, and casing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Insul-Tek Piping Systems, Inc.
    b. Perma-Pipe, Inc.
    c. Rovanco Piping Systems, Inc.

B. Carrier Pipe: ~~Schedule 40, steel pipe and fittings.~~ **Refer to Piping Application Schedule below.**

C. Carrier Pipe Insulation:

1. Polyurethane Foam Pipe Insulation: Rigid, cellular, high-pressure injected between carrier pipe and jacket.

    a. Comply with ASTM C 591; thermal conductivity (k-value) shall not exceed 0.14 Btu x in./h x sq. ft. x deg F at 75 deg F after 180 days of aging.

D. Casing: HDPE.

E. Casing accessories include the following:

1. Joint Kit: Half-shell, pourable or split insulation, casing sleeve, and shrink-wrap sleeve.
2. Expansion Blanket: Elastomeric foam, formed to fit over piping.
3. End Seals: Shrink wrap the casing material to seal watertight around casing and carrier pipe.

F. Manholes: Black steel with lifting eyes.

1. Finish: Spray-applied urethane, minimum 30 mils thick.
2. Access: 30-inch- diameter waterproof cover with gasket, ladder, and two 6-inch vents, one high and one low, extending above grade with rain caps.
3. Conduit Stub-Outs and Seals: Welded steel with drain and vent openings.
4. Sump: 12 inches in diameter, 12 inches deep.
5. Floatation Anchor: Oversized bottom keyed into concrete base.

G. Source Quality Control: Factory test the carrier pipe to 150 percent of the operating pressure of system. Furnish test certificates.

PART 3 - EXECUTION

3.1 EARTHWORK

A. See Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATION

A. Hot Water Heating Piping to all finned tube radiation:

1. NPS 2 and smaller shall be the following:

a. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

2. Cased piping with polyurethane carrier-pipe insulation.

a. Piping Insulation Thickness: 2 inches.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Remove standing water in the bottom of trench.

C. Do not backfill piping trench until field quality-control testing has been completed and results approved.

D. Install piping at uniform grade of 0.2 percent. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points and elsewhere as required for system drainage. Install manual air vents at high points.

E. In conduits, install drain valves at low points and manual air vents at high points.

F. Install components with pressure rating equal to or greater than system operating pressure.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. See Section 230517 "Sleeves and Sleeve Seals for HVAC Piping" for sleeves and mechanical sleeve seals through exterior building walls.

J. Secure anchors with concrete thrust blocks. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

G. Cased Piping Joints: Assemble sections and finish joints with pourable or split insulation and exterior jacket sleeve, and apply shrink-wrap seals.

3.5 IDENTIFICATION

A. Install continuous plastic underground warning tapes during back filling of trenches for underground hydronic piping. Locate tapes 6 to 8 inches below finished grade, directly over piping. See Section 312000 "Earth Moving" for warning-tape materials and devices and their installation.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:

1. Prepare hydronic piping for testing according to ASME B31.9 and as follows:

   a. Leave joints, including welds, uninsulated and exposed for examination during test.
   b. Fill system with water. Where there is risk of freezing, air or a safe, compatible liquid may be used.
   c. Use vents installed at high points to release trapped air while filling system.

2. Test hydronic piping as follows:

   a. Subject hydronic piping to hydrostatic test pressure that is not less than 1.5 times the design pressure.
   b. After hydrostatic test pressure has been applied for 4 hours, examine joints for leakage. Remake leaking joints using new materials and repeat hydrostatic test until no leaks exist.

3. Test conduit as follows:

   a. Seal vents and drains and subject conduit to 15 psig for four hours with no loss of pressure. Repair leaks and retest as required.

E. Prepare test and inspection reports.

3.7 COMMISSIONING

A. Where indicated in the equipment or commissioning specifications, engage a factory-authorized service representative, to perform startup service as per functional test sheets and requirements of Section 019113 – General Commissioning Requirements.

B. Complete installation and startup checks and functional tests according to Section 019113 – General Commissioning Requirements and manufacturers written instructions.

C. Operational Test: After electrical system has been energized, start units to confirm proper unit operation. Rectify malfunctions, replace defective parts with new one and repeat the start up procedure.

D. Verify that equipment is installed and commissioned as per requirements of section 019113 and manufacturers written instructions/requirements.

END OF SECTION 232113.13