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ADDENDUM 2

date:	May 6, 2025
project:	MCJA - BUILDING C LIMITED RENOVATIONS (2023-0070)
from:	Patrick Barendt, Simons Architects
to:	John Kenney, BGS; Jack Peck, MCJA
cc:	Ryan Kanteres, Simons Architects; Noah Jacques, Simons Architects

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This Addendum forms a part of and modifies the original Issued for Bid Documents for MCJA Building C; Drawings and Project Manual dated April 8, 2025. Refer also to Addendum 1 issued on April 30, 2025.

This Addendum consists of the following:

Bid Questions:	Responses to bid questions from April 30, 2025 through May 5, 2025 are attached. Previous responses are provided for reference in black text, responses added in this addendum are shown in red text.
Project Manual:	Revisions to project manual and specification sections as noted below.
Drawings:	Revisions to Electrical discipline as noted below. Not all sheets are revised and reissued in this addendum; a conformed set may be provided for convenience at a later date.

See list of changes on the following pages:

SPECIFICATIONS:

Changes to Project Manual

1. Section 062023 – Interior Finish Carpentry: Page 2, Add paragraph 2.4 as follows:

   2.4.1 " SOLID SURFACE CABINET DOORS IN MILLWORK FRAMES

   A. Solid Surface Cabinet Doors and Apron: Basis of Design: Futrus Solutions F-Series Corian Door Systems with removable hinges connected to a field installed or existing cabinet frame (exterior grade plywood or marine grade MDF). Seamless construction cabinet doors, Greengard Certified.

      1. Doors: ¾ inch Standard profile doors with square edges.
      2. Solid polymer components: Cast, nonporous, filled 100 percent acrylic polymer construction with through body colors.
         Color: As selected from manufacturer's full range.
      3. Finish: Manufacturer's standard matte finish.
      4. Hinges: Stainless steel, soft close. Removable from frame.
      5. Pulls: Brushed steel C pulls, integral.
      6. Coordinate sizes with Drawing A111. "

2. Section 081400 – Wood Doors:

   Page 1, Item 1.1, Paragraph A, add the following subparagraph:

   "3. Fit new wood doors and hardware to existing frames as specified in Section 012100."

3. Section 091116 – Non Structural Metal Framing, Page 4, Item 3.1, add the following paragraph:

   L. "Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, wall-mounted accessories, and similar items that cannot be supported directly by shaft wall assembly framing."

4. Document 004113 – Bid Form: Reissued with this Addendum.
    a. Item 6 added: Bidder acknowledgement of addenda.

5. Section 224000 – Plumbing Fixtures: Reissued with this Addendum.
    a. 2.4 C revised to modify P-3 lever handle.

6. Section 232113 – Hydronic HVAC Piping
    a. 3.6 G and H stricken out to remove reference to glycol.

7. Section 280513 – Conductors and Cables for Electronic Safety and Security
    a. 1.3 A revised to reference State of Maine Wiring Specifications.

DRAWINGS:

D1 Revisions to sheets EL102, EL103, EL104
Revision to emergency lighting and exit sign types.
Replace sheet in its entirety.

D2 Revisions to sheets EP103, EP104
Revision to coordinate with owner wireless access points.
Replace sheet in its entirety.

D3 Revisions to sheet E400
Revision to delete data outlets from dorm rooms.
Replace sheet in its entirety.

END OF CD ADDENDUM 2

MCJA - BUILDING C LIMITED RENOVATIONS

ADDENDUM 2 - 05.06.2025

COMMENTS: 04.15.2025 through 04.29.2025

COMMENTS: 04.30.2025 through 05.05.2025

ORIGINAL BID DOCUMENTS: ISSUED FOR BID - 04.08.2025

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	BID QUESTION	Action / Response
1	Seems that division 011000 is listed in the index but isn't included in the spec book?	This specification section is omitted from the project; TOC will be revised to remove reference.
2A	What sizes are the existing windows we are to put roller shade window treatments in.	Existing window types with dimensions are added in Addendum 1.
2B	Is it possible to get a window schedule so our Roller Shade and Millwork subcontractors can have accurate dimensions to bid from?	Existing window types with dimensions are added in Addendum 1.
3	Joint Firestopping section missing from project manual.	Section added in Addendum 1.
4A	Is there a planholder's list that accompanies this project? If so, may I please get a copy?	Sign in sheet from 04.23 Pre-Bid walkthrough is included in Addendum 1.
4B	Can you include the pre-bid meeting sign-in sheet in Addendum 1?	Sign in sheet from 04.23 Pre-Bid walkthrough is included in Addendum 1.
5	Is there an estimated value or budget?	BGS is not planning to share a cost estimate or budget at this time.
6	Has a start date been determined for the work? Is there an approximate date of completion?	Start date is as soon as possible; completion date is targeted for winter 2026.
7	The 2nd floor plan shows several rooms with new sheetrock ceilings but the existing aren't indicated to be removed on the demolition drawings.	Scope of ceiling demolition is clarified in Addendum 1.
8	Design team open to alternative insulation materials for wall type W6?	Yes, please submit substitution request prior to bid.
9	Travel path for materials into and out of building?	Elevator can be protected and used. Potential to remove a window on floors 2, 3, and 4.
10	Firestopping - by each trade or by single installer?	All firestopping to be installed by single installer.
11	The Bid Form has lots of "insert " information that isn't filled in.	Bid Form is revised in Addendum 1.
12	The Alternates are not listed on the Bid Form	Bid Form is revised in Addendum 1.
13	How will impacts from tariffs be handled if imposed after the bid date.	Contractor to bid the project as they see fit considering potential tariff impacts.
15	Is the existing flooring in the hallways to be removed? If so, can you verify what the existing material is?	Yes, 3/8" thick terrazzo floor tile.
16	What are the expectations for floor prep? Would it be different for areas that are to receive new LVT than it is at the areas to receive carpet?	Comply with the most stringent manufacturer's requirements for flooring prep for each flooring type. Level as required to meet at minimum ACI FF 25, FL 20. Flash patch as required to meet ADA requirements at thresholds and transitions.
17	What should we assume for concrete thickness for coring holes in the floor for MEP?	Structural penetration detail is added in Addendum 1.
18	Will it be required to x-ray for rebar at floor cores prior to coring?	Structural penetration detail is added in Addendum 1.
19	We are removing concrete at the existing steel beams to expose for new welding of steel. Will we be required to infill these areas back to original condition? If so, please provide patching detail requirements.	Not required.
20	Keynote 7 on the floor plans says to patch floor @ existing duct penetrations. Does this mean to infill the existing slab openings at these locations? If so, please provide patching detail requirements.	Correct; follow detail 2 on S500.

21	What is the construction of the existing walls that we will be coring through for MEP work. CMU? Metal Stud? Mainly concerned with the 2nd Floor.	Primary existing walls are 4" hollow terracotta tile with approximately 1" of plaster on each side. Light gauge metal stud walls may also be encountered at the bathrooms from the 1999 renovation.
22	Where we penetrate the existing walls, are we to patch to match the existing finish with plaster? Or can we use regular sheetrock?	Light gauge metal framing and gypsum is acceptable, provided that proper fire ratings are maintained. Provide reinforced mesh at transitions. In areas where patching is visible, provide skim coat at entire wall for consistent finish.
23	It clear the 3rd & 4th floor flooring is all coming out. The 2nd floor demo plan has Demo Note 7 to remove flooring. Is this to be only in the rooms with the note 7 and not include the rooms that don't have the note (Ex: Restroom 209, Hall 210, etc..)?	This is a typical note; existing flooring is to be removed from all spaces within the scope of work that will recieve new floor finishes.
24	Hydronic Piping Spec 232113-14 is not clear on glycol. Do not see the 30% referenced on M-600 schedule. Does this system require glycol? Is there glycol in the existing system?	This system does not require glycol, and there is not glycol in the hot water system in Building C. Hydronic Piping specification section 232113-14 has been clarified in **Addendum 2**.
25	There are no General Conditions in the specification manual.	Section added in Addendum 1.
26	Please clarify whether the closed cell spray foam within the concrete flutes at the building perimeter(detail 3 on A400) on floors 3 and 4 is part of the deduct alternate.	This scope of work is part of the deduct alternate.
27	The graphic representations on Life Safety Plan G002 don't match the associated rating notes. The 2 HR symbol has a note that says 1 HR. & the 2 Hour note has a 3-hour symbol.	There are no 3 HR rated elements in this project. We have confirmed the ratings on G002 are correct. 1 HR ratings are shown with red lines with a single dot; 2 HR ratings are shown with thicker red lines with two dots.
28	There is no indication of the spacing for the 1-5/8" metal studs at the W6 partition type. Same question for Wall Type 4.	Partition type W4 studs to be spaced 24" O.C. Partition type W6 studs to be spaced 24" O.C.
29	Remove analog phone & data jacks, show wifi access point locations.	Analog phone & data jacks have been removed and wifi access points hava been added to the drawings in **Addendum 2**.
30	Wall mounted exit sign at Stair 2A, 3A, 4A.	Wall-mounted exit signs in lieu of ceiling-mounted have been revised in the drawings in **Addendum 2**.
31	Upon reviewing the Project Manual for MCJA – BUILDING C LIMITED RENOVATIONS I noticed Section 280513 Part 1 – General 1.3 states "Network cabling shall comply with Division 27". As there is no Division 27 Section in the Project Manual, I would recommend that this statement be revised to reference the State of Maine Wiring Specifications.	Specification section 280513 has been updated to reference the State of Maine Wiring Specifications in **Addendum 2**.
32	Is this project Tax Exempt?	Yes, the project will be tax exempt. Refer to General Conditions section 6 for additional tax exemption information.
33	There is a Roof Construction Note C. on A105 to saying carry an allowance for roof patching to alleviate standing water for 15% of the roof area. The work requested needs to be defined.	Hold allowance of $10,000 for this work. Scope of work to be defined following pending envelope report.
34	There is a Key Note #5 on the floor plans. I only see it show up in room Dorm 412. The note is for a shelf & rod at a framed closet. There is no closet at this location or any other location.	This note is erroneous and will be removed from the drawings. There are no built-in closets in the project.
35	Can you clarify the direction of plank flooring and carpet tile please.	Plank flooring to be installed parallel to corridor walls w/ ashlar installation method (long direction). At 2nd floor, plank flooring pattern to be continuous and oriented to primary corridor. Carpet tile in dorm rooms to be installed parallel to long wall w/ ashlar random installation method (long direction).
36	There is no place to acknowledge receipt of Addendums on the Bid Form.	Revised Bid Form is included in **Addendum 2**. Item 1 of the Bid Form addresses this by requiring that the contractor has carefully examined any addenda. Receipt of addenda by number do not need to be acknowledged on the Bid Form.
37	There is no specification for the base cabinets at the bathrooms.	Refer to specification section 062023. Cabinets under sinks are to be exterior grade veneer core plywood or marine grade medium density fiberboard. Cabinet door to be Futrus F-Series Corian door system or equal.

END OF BID QUESTIONS

00 41 13
Contractor Bid Form

MCJA - BUILDING C LIMITED RENOVATIONS BGS project 3695

Bid Form submitted by: *email only to email address below*

Bid Administrator:

John Kenney PE, DPDC Director BGS.Architect@Maine.gov
Bureau of General Services
111 Sewall Street, Cross State Office Building, 4th floor
77 State House Station
Augusta, Maine 04333-0077

Bidder:

Signature: _____

Printed name and title: _____

Company name: _____

Mailing address: _____

City, state, zip code: _____

Phone number: _____

Email address: _____

State of incorporation, if a corporation: _____

List of all partners, if a partnership: _____

The Bidder agrees, if the Owner offers to award the contract, to provide any and all bonds and certificates of insurance, as well as Schedule of Values, Project Schedule, and List of Subcontractors and Suppliers if required by the Owner, and to sign the designated Construction Contract within twelve calendar days after the date of notification of such acceptance, except if the twelfth day falls on a State of Maine government holiday or other closure day, or a Saturday, or a Sunday, in which case the aforementioned documents must be received before 12:00 noon on the first available business day following the holiday, other closure day, Saturday, or Sunday.

As a guarantee thereof, the Bidder submits, together with this bid, a bid bond or other acceptable instrument as and if required by the Bid Documents.

00 41 13
Contractor Bid Form

1. The Bidder, having carefully examined the *MCJA - Building C Limited Renovations* Project Manual dated *April 8, 2025*, prepared by *Simons Architects*, as well as Specifications, Drawings, and any Addenda, the form of contract, and the premises and conditions relating to the work, proposes to furnish all labor, equipment and materials necessary for and reasonably incidental to the construction and completion of this project for the **Base Bid** amount of:

   $ _____ .00

2. Allowances *are included* on this project.
   Bid amount above includes the following Allowances

1	*Roof Patching*	$ *10,000*.00
2	*Not Used*	$ *0*.00
3	*Not Used*	$ *0*.00
4	*Not Used*	$ *0*.00

3. Alternate Bids *are included* on this project.
   Alternate Bids are as shown below
   Any dollar amount line below that is left blank by the Bidder shall be read as a bid of **$0.00**.

1	*Deduct Alternate 1 (see sheet G001)*	$ _____ .00
2	*Deduct Alternate 2 (see sheet G001)*	$ _____ .00
3	*Not Used*	$ _____ .00
4	*Not Used*	$ _____ .00

4. Bid security *is required* on this project.
   If noted above as required, or if the Base Bid amount exceeds $125,000.00, the Bidder shall include with this bid form a satisfactory Bid Bond (section 00 43 13) or a certified or cashier's check for 5% of the bid amount with this completed bid form submitted to the Owner.

5. Filed Sub-bids *are not required* on this project.
   If noted above as required, the Bidder shall include with this bid form a list of each Filed Sub-bidder selected by the Bidder on the form provided (section 00 41 13F).

SECTION 224000 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1. Division 23 Section "Common Work Results"
2. Division 22 Plumbing Sections

1.2 SUMMARY

A. This Section includes Plumbing Fixtures.

1.3 SUBMITTALS

A. Product Data: Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports and indicate materials and finishes, dimensions, construction details, and flow-control rates for each type of fixture indicated.

B. Maintenance Data: For plumbing fixtures to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. Comply with the local building and plumbing codes.

C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; about plumbing fixtures for people with disabilities.

D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

E. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for fixture materials that will be in contact with potable water.

F. Coordinate roughing-in and final plumbing fixture locations and verify that fixtures can be installed to comply with original design and referenced standards.

PART 2 - PRODUCTS

2.1 GENERAL

A. Common Plumbing Fixture Requirements

1. Vitreous china, nonabsorbent, hard-burned, and vitrified throughout the body shall be provided. Porcelain enameled ware shall have specially selected, acid-resisting enamel coating evenly applied on surfaces. No fixture will be accepted that shows cracks, crazes, blisters, thin spots, or other flaws. Fixture color shall be white except as specified herein.
2. Provide combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
3. Fixtures shall be provided appurtenances such as traps, supplies, faucets, stop valves, and drain fittings – for a complete, finished, code-compliant installation.
4. Coordinate fixture rough in dimensions for conflicts with surrounding structure, prior to submitting.
5. Each fixture and piece of equipment requiring connections to the drainage system shall be equipped with a trap.
6. Brass expansion or toggle bolts capped with acorn nuts shall be provided for supports, and polished chromium-plated pipe, valves, and fittings shall be provided where exposed to view.
7. Fixture supports for off-the-floor fixtures shall be of the chair-carrier type. The carrier shall provide the necessary means of mounting the fixture, with a foot or feet to anchor the assembly to the floor slab. Adjustability shall be provided to locate the fixture at the desired height and in proper relation to the wall. Support plates, in lieu of chair carrier, shall be fastened to the wall structure only where it is not possible to anchor a floor-mounted chair carrier to the floor slab. Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture.
8. Provide access panels to concealed valves and components. All components shall have proper access in accordance with manufactures' recommendations.
9. Mounting heights: Refer to Architectural Plans.
10. Water line components shall be lead-free.

2.2 FLUSH VALVE WATER CLOSETS

A. Manufacturers:

1. American Standard
2. Kohler

3. Toto
4. Sloan

B. Water Closets - Common Requirements:

1. Comply with ASME A112.19.2 – Ceramic Plumbing Fixtures; Comply with ADA
2. Material: Vitreous china.
3. Type: Siphon jet.
4. Style: Flushometer valve.
5. Rim Contour: Elongated.
6. Support: Water-closet carrier
7. Water Consumption: 1.28 GPF.
8. Spud Size and Location: NPS 1-1/2; top.
9. Toilet Seats: Standard: IAPMO/ANSI Z124.5; solid polypropylene with special surface that inhibits the growth of stain and odor causing bacteria, mold and mildew on the surface; commercial heavy duty; Shape: Elongated rim, open front; Seat Cover: Not required. Color: White.

C. **P-1**: Wall mounted, top spud. American Standard Afwall; Water Closet Carrier: Standard: ASME A112.6.1M. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement; with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture. Mounting Height: See Architectural plan.

1. Flushometer: Lever-Handle, Exposed, Piston Flushometer Valves: Sloan Crowne
   a. Comply with ASSE 1037 and ASME A112.19.5, and ADA. Include integral check stop and backflow-prevention device.
   b. Material: Brass body with corrosion-resistant components. Flushometer Finish: Chrome plated.

2.3 VITREOUS-CHINA LAVATORIES

A. Lavatory Manufacturers:

1. Zurn
2. American Standard
3. Kohler
4. Toto
5. Duravit

B. Lavatories – Common Requirements:

1. Standard: ASME A112.19.2/CSA B45.1; ADA.
2. Faucet-Hole Punching: Match faucet, coordinate hole locations.

3. Provide a permanent surface that inhibits the growth of stain and odor causing bacteria, mold and mildew on the surface
4. Provide overflow.
5. Provide 304 stainless steel grid drain unless noted otherwise.
6. Risers: Supply line: supplied by fixture manufacturer, or by McGuire or Brasscraft. Shall be lead-free, loose key standard stop lavatory supply kit, two polished chrome, solid brass angle stops with wheel handles, two 12" flexible chrome-plated lavatory risers complete with two forged brass with set screw flanges; connections: 1/2" sweat x 3/8" OD.
7. Waste Fittings: Standard: ASME A112.18.2
8. Drain: Stainless steel grid type with NPS 1-1/4 offset and straight tailpiece.
9. Trap: NPS 1-1/2 by NPS 1-1/4; Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch- thick brass tube to wall; and chrome-plated, brass or steel wall flange.
10. Provide ADA trim kits for exposed piping.
    a. Pipe covering kit equal to Dearborn Safety Series by Oatey; Cover opens 180° for easy installation, EVA foam material, sized for 1 ¼” and 1 ½” cast traps, IAPMOPS-94.
11. Faucets: See LAVATORY & SINK FAUCETS paragraph below.

C. **P-3**: Drop-in Counter-Mounted, self-rimming. Provide mounting sealant and cutout template.

1. American Standard Aqualyn Model 0476. Bowl Size: 16”W, 10” front to back, 5-5/8”D. Overall size: 20-38” x 17-3/8”.

D. Lavatory Faucets:

1. See faucet specifications in paragraphs hereinafter.
2. Wrist blade
3. ADA lever handles
4. Sensor – battery
5. Sensor – hard wired.

2.4 LAVATORY & SINK FAUCETS

A. Faucet Manufacturers

1. Moen
2. Symmons
3. Delta Commercial
4. Chicago
5. Gerber

6. Zurn
7. Kohler
8. American Standard

B. Faucets - Common Requirements:
1. Comply with ASME A112.18.1M, NSF372-2011, ADA; UL 1951
2. Body Material: Commercial, solid cast brass.
3. Lead Free: Faucet contains ≤ 0.25% total lead content by weighted average
4. Thermostatic mixing valves (TMV), as indicated: 20" flexible stainless steel inlet hoses with 3/8" compression fittings. ASSE 1070 certified down to 0.35 GPM
5. Provide antimicrobial handles: Chicago Sureshield® Technology, or equal; In a 28-day dried film fungal test (ASTM G 21-96), the untreated sample shows significant fungal growth, while the Sureshield sample remains virtually unchanged.

C. Manual Type:
1. ~~**P-3**: ADA lever handle: American Standard **Colony Pro** Centerset Single Handle Bathroom Faucet; 4" centerset; ceramic disc valve; hot limit safety stop.~~
1. P-3: ADA lever handle: American Standard 6114120.002 - Monterrey Single Control Centerset Single Handle Bathroom Faucet; 4" centerset; ceramic disc valve; hot limit safety stop.
2. Provide ASSE-1070 thermostatic mixing valve.
3. Cast brass body.
4. Less pop-up drain, rod & hole.
5. 0.5 gpm vandal-resistant, pressure compensating multi-laminar spray.

2.5 SHOWERS

A. Shower Manufacturers

a. Clarion Bathware
b. Aqua Bath Co., Inc.
c. Aquarius.
d. Aquatic
e. Fiat Products
f. LASCO Bathware

B. Faucet Manufacturers

1. Symmons
2. Moen
3. Powers
4. Leonard
5. Grohe

C. **P-2** Standard Shower (Double Threshold)

1. Basis of Design: Fiat MFTD – Monterey Double Threshold shower base; 32” x 32” x 4” outside dimensions.

2. Precast terrazzo one piece products are made of black and white marble chips cast in white portland cement to produce a compressive strength of not less than 3000 P.S.I., seven days after casting.
3. Offset drain location; The stainless-steel drain body is cast integrally into the shower floor and sized for a gasket connection.
   a. Provide Quick Connect gasket.
   b. Drain location shall be 6.5" from front edge, and 6.5" from wall edge. Coordinate with drawings and architect.
4. The terrazzo surface is ground and polished with all air holes and/or pits grouted and the excess removed.
5. Tiling flange, cast integral, is of stainless steel and shall extend not less than 1" above the shoulder and not less than 1-1/4" wide.
6. Removable type stainless steel strainer plate.
7. UPC listed.

D. **P-4** Transfer Shower (ADA Accessible)

1. Basis of Design: Clarion Model SP3838BF34; 38" x 38" x 4.5" outside dimensions. Inside dimensions: 36" x 36".
2. Color: White.
3. Code compliant when fully equipped and installed according to guidelines; Barrier-free design, meets ADA 2010 standards and requirements.
   a. Certified to meet CSA B45.5/IAPMO Z124 Standard.
   b. When properly accessorized and installed, product will meet requirements of ADA (2010 Std), ICC/ANSI A 117.1-2009, ABA or UFAS.
4. Center drain location; provide a brass chrome plated drain.
5. Slip resistant, textured bottom; ASTM F-462.
6. Material: AcrylX
7. Water migration channel.
8. Floor nailing flange.
9. 0.75" threshold.
10. Provide drain body and strainer.

E. **P-5** Transfer Shower (ADA Accessible)

1. Basis of Design: Aquarius MPB 5436 BF 1.0 - WHT, the unit shall have dimensions of 54" x 37" x 4.25".
2. Shape: Rectangular
3. Finished surface shall be AcrylX solid-surface with gelcoat finish.
4. Code compliant with IPC, UPC, and ANSI Z 124.2.
5. Barrier free threshold. Change of level threshold has a manageable 0.25" vertical rise to easily coordinate with minimum finished flooring.
6. Self-supporting and pre-levelled shower base is standard.
7. Thirty-year limited warranty.
8. The unit shall meet ADA, ICC-ANSI A117.1, Ansi Z124.1.2, and CSA B45.5.
9. Color: White
10. Provide drain body and strainer.

F. Shower Faucet

1. Symmons Model BP-56-300-B30-V Temptrol II ™ Shower System with Hand Spray
2. Pressure-balancing mixing valve with adjustable stop screw to limit handle turn.
3. ADA compliant.
4. Wall/hand shower with 5’ flexible metal hose, in-line vacuum breaker, wall connection and flange. 30” slide bar for hand shower mounting.
5. Provide modifications:
   a. Suffix X: Integral service stops—allows water shut-off at valve for service
   b. Suffix 1.5: 1.5 GPM flow rate

G. Floor Drain: Zurn Z415SH-18 floor and shower drain, Dura-Coated cast iron body with bottom outlet, combination invertible membrane clamp and adjustable collar with seepage slots and "TYPE SH" polished nickel bronze, 6”X6” square hinged, light-duty strainer, leveling ring.

2.6 ELECTRIC WATER COOLERS

A. Manufacturers

1. Halsey Taylor.
2. Elkay Manufacturing Co.
3. Haws Corporation.
4. Oasis Corporation.
5. Sunroc Corp.

B. General

1. Adjust fixture flow regulators for proper flow and stream height. Adjust water-cooler temperature settings.
2. Waterways shall be 100% lead-free.
3. Laminar flow shall produce an even flow and eliminate splashing
4. Barrier free for full ADA access

C. **P-6** Electric Water Cooler (Mechanically Cooled, Wall Hung, Wheelchair, with Glass Filler) bubbler style, air cooled compressor, 15 gph minimum capacity. Top shall be one piece type 304 CRS anti-splash design. Cabinet, CRS satin finish, approximately 18 inches by 18 inches by 25 inches high with mounting plate. Unit shall be push bar operated with front and side bars, automatic stream regulator, and heavy chrome plated brass push down glass filler with adjustable flow control, and all trim chrome plated. Set bubbler 36 inches above finished floor. Provide with bottle filler option.

2.7 MOP SERVICE BASIN - **P-7**

A. Manufacturers:

1. Zurn
2. Fiat
3. Mustee
4. Fiat

B. Provide check valves at HW and CW connections.

C. 24 x 24 x 10” H Mop Service Basin: Zurn Z1996-24. Molded high density molded stone basin; PVC drain body, stainless steel strainer, and 3” gasketed outlet connection. Certifications: Meets ANSI Z124.6, CSA listed, and IAPMO listed under file # 3561.

1. Wall Guard (-WG) Provide 20 gage type 304 stainless steel bumpers used to protect walls adjacent to mop basin. Two panels shall be supplied for corner installation
2. Mop holder (-MH): Stainless steel 24" long x 3" wide with three rubber tool grips
3. Bumper Guards (-BS) Provide 20 gage type 304 stainless steel bumper guards to protect top edge of basin.

D. Chicago Faucets No. 540-LD897SWXFABCP, wall mounted. 8" fixed centers, Hot and cold water sink faucet, chrome plated solid brass construction. 5 3/4" center to center rigid vacuum breaker spout with 3/4" male hose thread and pail hook. 2 3/8" metal lever handles with eight point tapered broach and secured blue and red buttons. Quarter-turn re-buildable compression cartridge, opens and closes 90°, closes with water pressure, features square tapered stem. Straight 2" inlet supply arm with wall flange with 1/2" NPT female thread inlet. Provide atmospheric vacuum breaker. ECAST® construction with less than 0.25% lead content by weighted average. Provide per ADA ANSI/ICC A117.1 requirements and shall be tested and certified to industry standards: ASME A112.18.1/CSA B125.1, California Health and Safety Code 116875 (AB1953-2006), Vermont Bill S.152, and NSF/ANSI 372 Low Lead Content.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation. Use manufacturer's roughing-in data if roughing-in data are not indicated.

B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FIXTURE INSTALLATION - GENERAL

A. Assemble and support fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Provide fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.

C. Provide water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Provide stops in locations where they can be easily reached for operation.

D. Provide traps on fixture outlets as required.

E. Provide level and plumb according to roughing-in drawings.

F. Provide supports and connections to fixtures per manufacturer's instructions.

G. Provide escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings.

H. Set floor mounted fixtures in a leveling bed of cement grout as per fixture manufacturer's instructions.

I. Joint Sealing: Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to water-closet color. Comply with sealant requirements specified in Division 9.

J. Wall Flange and Escutcheon Installation: Provide wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork. Provide deep-pattern escutcheons if required to conceal protruding fittings.

3.3 WATER CLOSET INSTALLATION

A. Provide flush handle mounted on open (approach) side of fixture. Provide actuators in locations that are easy for people with disabilities to reach.

B. Attach supply piping to supports or substrate within pipe spaces behind fixtures.

C. Provide toilet seats on water closets.

3.4 SINKS AND LAVATORIES

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls. Adjust water pressure at faucets to produce proper flow.

3.5 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Use chrome-plated brass or copper tube, fittings, and valves in locations exposed to view. Plain copper tube, fittings, and valves may be used in concealed locations.

C. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.

3.6 FIELD QUALITY CONTROL

A. Verify that installed fixtures are categories and types specified for locations where installed. Check that fixtures are complete with trim, faucets, fittings, and other specified components. Inspect installed fixtures for damage. Replace damaged fixtures and components.

B. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

C. Set field-adjustable temperature set points of temperature-actuated water mixing valves. Adjust set point within allowable temperature range.

D. Operate and adjust fixtures. Replace damaged and malfunctioning fixtures, fittings, and controls.

E. Adjust water pressure to produce proper flow and stream.

F. Replace washers and seals of leaking and dripping faucets and stops.

3.7 CLEANING

A. After completing fixture installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures and other fittings with manufacturers' recommended cleaning methods and materials. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts. Remove sediment and debris from drains.

C. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

3.8 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of fixtures for temporary facilities unless allowed in Division 1.

END OF SECTION 224000

SECTION 232113 – HYDRONIC HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1. Division 23 Section "Common Work Results"
2. Division 23 controls section for temperature-control valves and sensors.

1.2 SUMMARY

A. This Section includes piping and specialties for hydronic HVAC piping.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Piping
2. Hydronic specialties
3. Chemical treatment.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air-control devices, hydronic specialties, and special-duty valves to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. Qualify soldering processes, procedures, and solderers for copper and copper alloy pipe and tube in accordance with ASTM B 828.

C. Qualify brazing processes for copper and copper alloy pipe and tube according to ANSI/AWS C3.4.

D. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

E. HVAC Water-Treatment Service Provider Qualifications: An experienced HVAC water-treatment service provider capable of analyzing water qualities, installing water-treatment equipment, and applying water treatment as specified in this Section.

1.6 COORDINATION

A. Drawings show the general layout of piping and accessories but do not show all required fittings and offsets that may be necessary to connect piping to equipment and to coordinate with other trades. Fabricate piping based on field measurements. Provide all necessary fittings and offsets.

B. Coordinate layout and installation of hydronic piping and suspension system components with other construction.

C. Coordinate pipe sleeve installations and penetrations with other trades.

D. Coordinate pipe fitting pressure classes with products specified in related Sections.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Balancing Valves:

    a. Griswold Controls.
    b. ITT Bell & Gossett
    c. Taco, Inc.
    d. Tour & Anderson
    e. IMI Flow Design
    f. Griswold Controls
    g. Watts Industries Inc.
    h. Caleffi
    i. Nexus

2. Hydronic Pressure-Reducing Valves:

    a. Amtrol, Inc.
    b. Armstrong Pumps, Inc.
    c. Conbraco Industries, Inc.

d. ITT Bell & Gossett
e. Spence Engineering Company, Inc.
f. Caleffi
g. Watts Industries, Inc.

3. Safety Valves:

a. Amtrol, Inc.
b. Armstrong Pumps, Inc.
c. Conbraco Industries, Inc.
d. ITT McDonnell & Miller.
e. Kunkle Valve Division.
f. Spence Engineering Company, Inc.
g. Caleffi
h. Watts Industries Inc.

4. Air Vents and Vacuum Breakers:

a. Armstrong International, Inc.
b. Barnes & Jones, Inc.
c. ITT Hoffman
d. Caleffi
e. Spirotherm
f. Spirax Sarco, Inc.

2.2 PIPING MATERIALS

A. General: Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

2.3 COPPER TUBE AND FITTINGS

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

B. DWV Copper Tubing: ASTM B 306, Type DWV.

C. Fitting Standard: Copper fittings shall conform to ASME B16.18, ASME B16.22 or ASME B16.26.

D. Press Fitting: Viega Pro Press - Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press ends shall have SC (Smart Connect) feature design (leakage path). Provide a smart connect feature to assure leakage of liquids and/or gases from inside the system past the sealing element of an un-pressed connection. The function of this feature shall be to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.

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

F. Solder Filler Metals: ASTM B 32, 95-5 tin antimony.

G. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (silver).

2.4 STEEL PIPE AND FITTINGS

A. Steel Pipe, NPS 2 and Smaller: ASTM A-53, Type S (seamless) or Type F (furnace-butt welded), Grade B, Schedule 40 and 80, black steel, plain ends.

B. Steel Pipe, NPS 2-1/2 and larger: ASTM A-53, Type E (electric-resistance welded), Grade B, Schedule 40 and 80, black steel, plain ends.

C. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300.

D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300.

E. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced.

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

G. 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: Material Group: 1.1. End Connections: Butt-welding. Facings: Raised face.

H. Mechanically formed copper or steel tee connections are not acceptable.

I. Welded Branch and Tap Connections: Forged steel weldolets, or branchlets and threadolets may be used for branch connections up to one pipe size smaller than the main. Forged steel half-couplings, ANSI B16.11 may be used for drain, vent and gage connections.

J. Welding Materials: Comply with Section II, Part C, of the ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.

K. Gasket Material: Thickness, material, and type suitable for fluid to be handled; and design temperatures and pressures.

2.5 POLYPROPYLENE PIPING

A. Pipe shall be Nupi Niron or Aquatherm.

B. Pipe and fittings shall be covered by a factory warranty for 30 years to be free of defects in materials or manufacturing.

C. Pipe shall be Niron Clima Pipe manufactured from a PP-RCT resin meeting the short-term properties and long-term strength requirements of ASTM F 2389 and CSA B137.11. The pipe shall not contain rework or recycled materials. All pipe is made in an extrusion process and is pigmented as solid steel grey in color. The piping shall be extruded with a middle layer that has glass fiber content to restrict thermal expansion. All pipe complies with the rated pressure requirements of ASTM F 2389 and CSA B137.11. Pipe shall be Niron PP- RCT piping as manufactured by Nupi Americas of Houston, TX.

D. Fittings shall be manufactured from a PP-RCT resin meeting the short-term properties and long-term strength requirements of ASTM F 2389. The fittings shall contain no rework or recycled. All fittings shall be as complying with NSF 14, ASTM F 2389 and CSA B137.11. Fittings shall be Niron PP-RCT piping as manufactured by Nupi Americas of Houston, TX.

E. Fittings may be either socket fusion through nominal 5-inch, electrofusion style through 8 inch or butt fusion style in nominal 2 inch through 24-inch sizes. Electrofusion may also be performed in nominal sizes 10 inch through 24 inch by means of the use of electrofusion couplings.

2.6 PEX PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following. PEX-a manufacturer system warranty shall cover tubing for a duration of 30 years from the date of installation.

1. Uponor Wirsbo hePEX (Basis of Design)
2. Rehau
3. Watts Radiant
4. Viega

B. Manufacturer's Warranty for Hydronic Piping: Provide a 25 year warranty for PEX-a piping and ASTM F 1960 fittings. Performance Requirements: PEX-a piping and fittings shall meet the following pressure and temperature ratings:

1. 200°F at 80 psi.
2. 180°F at 100 psi.
3. 73.4°F at 160 psi.

C. Plastic Pipe and Fittings:

1. PEX-a (Engle-method Crosslinked Polyethylene) Piping: Uponor Wirsbo hePEX, ASTM 876 with oxygen-diffusion barrier that meets DIN 4726.
2. PEX-a Fittings, Elbows and Tees (1/2 inch through 3 inch nominal pipe size): ASTM F1960 cold-expansion fitting manufactured from the following material types:
3. UNS No. C69300 Lead-free (LF) Brass.
4. 20 percent glass-filled polysulfone as specified in ASTM D6394.
5. Unreinforced polysulfone (group 01, class 1, grade 2) as specified in ASTM D6394.
6. Polyphenylsulfone (group 03, class 1, grade 2) as specified in ASTM D6394

7. Blend of polyphenylsulfone (55-80%) and unreinforced polysulfone (rem.) as specified in ASTM D6394.
8. Reinforcing cold-expansion rings shall be manufactured from the same source as PEX-a piping manufacturer and marked "F1960".

D. Plastic-to-Metal Transition Fittings:

1. Manufacturer: Provide fittings from the same manufacturer of the piping.
2. Threaded Brass to PEX-a Transition: One-piece brass fitting with male or female threaded adapter and F1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring. Typically used for PEX sizes 3 inch and below.
3. Brass Sweat to PEX-a Transition: One-piece brass fitting with sweat adapter and F1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring. Typically used for PEX sizes 3 inch and below.
4. Dezincification-resistant (DZR) Brass to PEX-a Transition: Male NPT thread and PEX compression fitting. Editor: Typically used for PEX sizes 1 inch through 4 inch.

E. Plastic-to-Metal Transition Unions:

1. Manufacturer: Provide unions from the same manufacturer of the piping.
2. Threaded Brass to PEX-a Union: One-piece brass fitting with male or female threaded adapter and F1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring. Typically used for PEX sizes 3 inch and below.
3. Brass Sweat to PEX-a Union: One-piece brass fitting with sweat adapter and F1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring. Typically used for PEX sizes 3 inch and below.

2.7 HYDRONIC VALVES

A. Ball Valves
1. Soldered Ends 3" and Smaller: 150 psi WP and 600psi non-shock CWP, full-port cast bronze or forged brass two piece body, hard chrome plated forged brass ball, true adjustable packing nut ("O"-ring only type stem seal not acceptable), blow-out proof stem: Watts FBVS-3C series/B6081 series, Hammond 8511, Nibco S-585-70, Milwaukee BA150, Apollo 70-Series, approved or equal.
2. Comply with MSS SP-110.

B. Bronze Globe Valves, Class 125:

1. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron.

C. Swing check valves:

1. Construct pressure containing parts of Valves as follows: Bronze Valves: 125 or 150 psi: ANSI/ASTM B 62; Iron Body Valves: ANSI/ASTM A-126, Grade B. Comply with the following standards for design, workmanship, material and testing: Bronze Valves: MSS SP – 80; Cast Iron Valves: MSS SP – 71.
2. Construct valves of pressure casting free of any impregnating materials. Construct disc and hanger as one piece. Support hanger pins by removable side plug.
3. Threaded Ends 2" and Smaller: Class 125, bronze body, screwed cap, Teflon disc: Hammond IB904, Nibco T-413Y, Stockham B320T, Milwaukee 509 or approved equal.
4. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed cap, Teflon disc: Hammond IB912, Nibco S-413-Y, Stockham B310T, Milwaukee 511 or approved equal.
5. Flanged Ends 2-1/2" and Larger: Class 125, iron body, bronze mounted, horizontal swing, cast-iron disc: Hammond IR1124, Nibco F918-B, Stockham G931, Milwaukee F2974 or approved equal.

D. ASME Safety Relief Valves: Bell & Gossett A-434D, or equal; diaphragm-operated, bronze or brass body with brass and rubber, wetted, internal working parts; shall suit system pressure and heat capacity and shall comply with the ASME Boiler and Pressure Vessel Code, Section IV. The fluid shall not discharge into the spring chamber. The valve shall have a low blow-down differential. The valve seat and all moving parts exposed to the fluid shall be of non-ferrous material.

2.8 HOOKUPS AND BALANCING

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

1. Nexus (Basis of Design)
2. IMI Flow Design
3. HCI
4. Hays
5. Griswold
6. Victaulic
7. Taco
8. Bell & Gossett

B. Minimum Requirements Per Coil Installation:
1. Manual Flow Control Valve (MFCV)
2. Y-strainer.
3. Temperature Control Valve (TCV) – see 230900.
4. Union connections at coil and TCV.
5. Air vent on return side.
6. Blowdown/drain valve on supply side.
7. Pressure/temperature test plugs across coil and TCV.
8. Full port, union end ball valves or butterfly valve for shutoff.

C. Materials Of Construction:

1. Brass or stainless steel metals.
2. Teflon, EPDM or FKM seals.

D. Installation

1. Installation shall conform to basic piping methods specifications.
2. All components shall be isolated by shutoff valves.
3. Flexible hoses shall be installed at coil connections as shown in the plans or at the option of the mechanical contractor.
4. Union tailpieces may be used to reduce pipe sizes to match coil and TCV valve sizes.
5. Pressure/Temperature test plugs shall be installed across coil.
6. A Y-strainer or combination strainer and valve shall be installed on the supply side.
7. Unions shall be used to isolate the coil, AFCV and TCV.

E. Shutoff Valves shall be forged brass ball valves, Nexus Model UX:

1. A one-piece body rated at 250 psi WP, 325° F.
2. Interchangeable union ends with FKM O-ring seal (ground joint is not acceptable).
3. Multiple ¼" tapped ports for test plugs, vent, and/or drain.
4. Blowout-proof stem with dual KFM O-ring seals.
5. Hard chrome plated stainless steel ball with Teflon seats.

F. Manual Flow Control Valves shall be a combination of metering/balance type of forged brass construction, Nexus Model XB:

1. A modified venturi equipped with (2) pressure/temperature ports and an ID tag.
2. A combination shutoff and memory stop device-indicating degree of opening.
3. A rating of 250 WOG, 325°F.
4. An interchangeable union ends with FKM O-ring type seal.
5. Blowout proof stem with dual FKM O-ring seals.
6. Hard chrome plated stainless steel ball with Teflon seats.

G. Temperature Control Valves, ref. Section 230900 & 230993.

H. Combination Strainer/Ball Valves used for supply side shutoff and strainer requirements shall be forged brass construction, Nexus Model UY:

1. A minimum rating of 250 WOG, 325° F.
2. Interchangeable union end with FKM O-ring seal.
3. Multiple ¼" tapped ports for test plugs, vent, or other accessories.
4. Blowout proof stem with dual FKM O-ring seals.
5. Hard chrome plated stainless steel ball with Teflon seats.
6. A 20 mesh 304 stainless steel filter screen, accessible without affecting the valve piping.
7. A port in the filter cap for a blowdown/drain valve.

I. Y-Strainers shall be forged brass body, Nexus Model UYX:

1. ¼" tapped accessory ports.
2. A rating of 250 WOG, 325° F.
3. A 20 mesh 304 stainless steel filter screen, removable without affecting the strainer piping.
4. A port in the filter cap for a blowdown/drain valve.

J. Blowdown/Drain Valves shall be forged brass ball valve construction, Nexus Model BD:

1. A minimum rating of 250 WOG, 325° F.
2. Blowout proof stem with dual FKM O-ring seals.
3. Hard chrome plated brass ball with Teflon seats.
4. A ¾" hose end and nylon / brass cap with retainer to protect threads.

K. Unions (2" and smaller) shall be forged brass, Nexus Model UU:

1. A minimum of 250 psi WP, 325° F.
2. Multiple ¼" tapped ports for test plugs, vent and/or drain valves.
3. FKM O-ring seal.

L. Accessories to coil piping components shall conform to the following:

1. Nexus PT Pressure/Temperature test plugs shall be rated for 1000 psi, 325° F, with brass body, Nordel check plugs, and sealed cap.
2. Flexible hoses shall be designed for water, and fire retarding conform to ASTM codes E84-00, with stainless steel outer braid.
3. Hoses (½" thru 1"), Nexus UFHF.

    a. Shall have a Kevlar reinforced EPDM tube core, brass end fittings, and designed for a working pressure of 400 psi, 248°F.
    b. Provide dual union or swivel end fittings.

4. Hoses (1¼" thru 2"), Nexus UFHM:

    a. Shall have Rayon reinforced EPDM tube core, brass end fittings, and designed for a working pressure of 300 psi, 248° F. The (2½") hose shall have stainless steel outer braid and carbon steel Sch. 40 fittings, and designed for a working pressure of 400 psi, 70º F.
    b. Provide least one union or swivel end fitting

5. Nexus MV Manual air vents shall be of brass construction and rated at 250 psi, 450° F.
6. Shaft extensions (2" and smaller) for insulated pipe shall be at least 2¼" tall and constructed of brass

2.9 HYDRONIC SPECIALTIES

A. Automatic Air Vent: Spirotherm Spirotop, or equal; maintenance-free, designed to vent automatically with float principle; solid-brass body and nonferrous internal parts; 150-psig working pressure; 270°F maximum temperature; NPS 1/2 inlet connection; ½" male thread at vent point for pressure-testing or remote venting of unwanted gases. The Spirotop has a unique "dry" vent design that helps prevent the system fluid from reaching the spring actuated Viton seat and seal assembly, which is the cause of most conventional air vent failures. Air vent shall be dry: release air, not water.

1. The unique valve mechanism is guaranteed not to leak and cannot be shut off.
2. Specially constructed air chamber to protect the valve mechanism from dirt.
3. Sufficient volume to handle pressure fluctuations.
4. A reliable vacuum breaker for system draining.
5. Leak and dirt resistant.

B. Y-Pattern Strainers: Strainers shall be Y-type with removable basket. Body shall have cast-in arrows to indicate direction of flow. Strainer screens shall have finished ends fitted to machined screen chamber surfaces to preclude bypass flow. Strainer element material shall be AISI Type 304 corrosion-resistant steel. Provide fine-mesh start-up strainers. Strainers in sizes 3-inch and smaller shall have screwed ends; Hammond 3010, or approved equal. Body material shall be cast bronze conforming to ASTM B584-C84400. Strainer bodies fitted with screwed screen retainers shall have straight threads and shall be gasketed with nonferrous metal. Strainer screens shall have perforations not to exceed 1/32". In sizes 4 and larger, strainers shall have flanged ends; Hammond 3030, or approved equal. Body material shall be cast iron conforming to ASTM A126 Class B. Strainer bodies fitted with bolted-on screen retainers shall have offset blowdown holes. Strainer screens shall have perforations not to exceed 1/16" (4" size); 1/8" (5" size and larger).

2.10 WATER TREATMENT FOR CLOSED LOOP HYDRONIC SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Sentinel
2. Anderson Chemical Company.
3. Aqua-Chem, Inc.
4. Barclay Water Management, Inc.
5. General Electric Company; GE Water & Process Technologies.
6. H-O-H Water Technology, Inc.
7. Metro Group, Inc. (The); Metropolitan Refining Div.
8. Nalco; an Ecolab company.
9. Watcon, Inc.

B. Performance Requirements

1. Provide water treatment for closed-loop hydronic systems.
2. Water quality for hydronic systems shall minimize corrosion, scale buildup, and biological growth for optimum efficiency of hydronic equipment without creating a hazard to operating personnel or the environment.
3. Base HVAC water treatment on quality of water available at Project site, hydronic system equipment material characteristics and functional performance characteristics, operating personnel capabilities, and requirements and guidelines of authorities having jurisdiction.
4. Closed hydronic systems, including shall have the following water qualities:

    a. pH: Maintain a value within 8.2 to 9.5.
    b. "P" Alkalinity: Maintain a value within 100 to 500 ppm.
    c. Total Hardness : <150 ppm as $caCO_3$.
    d. Chemical Oxygen Demand: Maintain a maximum value of 100 ppm.
    e. Soluble Copper: Maintain a maximum value of 0.20 ppm.
    f. TSS: Maintain a maximum value of 10 ppm.
    g. Ammonia: Maintain a maximum value of 20 ppm.
    h. Free Caustic Alkalinity: Maintain a maximum value of 20 ppm.
    i. Microbiological Limits:

        1) Total Aerobic Plate Count: Maintain a maximum value of 1000 organisms/mL.
        2) Total Anaerobic Plate Count: Maintain a maximum value of 100 organisms/mL.
        3) Nitrate Reducers: Maintain a maximum value of 100 organisms/mL.
        4) Sulfate Reducers: Maintain a maximum value of zero organisms/mL.
        5) Iron Bacteria: Maintain a maximum value of zero organisms/mL.

C. Chemicals: Specially formulated, based on analysis of makeup water, to prevent accumulation of scale and corrosion in piping and connected equipment.

PART 3 - EXECUTION

3.1 HYDRONIC PIPING APPLICATIONS – ABOVE GROUND

A. Hot Water, NPS 3 and Smaller: Type L drawn-temper copper tubing with pressed or soldered joints; Schedule 40 steel pipe with threaded joints; polypropylene; PEX-a piping.

3.2 VALVE APPLICATIONS

A. Hydronic Valve Applications: Shutoff Duty: Ball valves.

B. Provide shutoff duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, unless only one piece of equipment is connected in the branch line.

C. Provide calibrated balancing valves in the return water line of terminal units, as indicated, and ass required to facilitate system balancing.

3.3 HYDRONIC PIPING INSTALLATIONS

A. Refer to Division 23 Section "Common Work Results" for installation of:

1. Basic piping requirements.
2. Joint construction requirements.
3. Hanger, support, and anchor devices.
4. Firestopping
5. Sleeves and Escutcheons
6. Dielectric fittings
7. Valves
8. Mechanical Identification

B. Hydronic piping systems shall be provided to permit the system to be drained. Provide drains, consisting of a tee fitting, NPS 3/4 ball valve, and hose-end fitting with cap, at low points in piping system mains and elsewhere as required for system drainage.

C. Provide piping at a uniform grade of 0.2 percent upward in direction of flow. Pipe size at connections to equipment shall be distribution main size, not connection size. Reduce pipe sizes using eccentric reducer fitting installed with level side up. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe, with the takeoff coming out the bottom of the main pipe. For up-feed risers, install the takeoff coming out the top of the main pipe.

D. Provide safety valves on hot-water generators and elsewhere as required by the ASME Boiler and Pressure Vessel Code. Provide safety-valve discharge piping, without valves, to floor. Comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, for installation requirements. Check the settings and operation of each safety valve, including valves furnished by heater manufacturer. Record settings.

E. Swing Connections for Expansion: Connect risers and branch connections to mains with at least five pipe fittings, including tee in main. Connect mains and branch connections to terminal units with flexible hoses at least four pipe fittings, including tee in main.

F. Terminal Equipment Connections
1. Size for supply and return piping connections shall be same as for equipment connections.
2. Provide control valves in accessible locations close to connected equipment.
3. Arrange piping with offsets to allow for expansion, as well as terminal unit removal.

3.4 HYDRONIC SPECIALTIES INSTALLATION

A. Provide air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.

3.5 CONTROL VALVE INSTALLATION

A. Perform the following as directed by the BAS contractor:

1. Provide modulating control valves with minimum of 10 pipe diameters straight pipe at inlet and 5 pipe diameters straight pipe at outlet.
2. Installation of immersion wells and pressure tappings, along with associated shut-off cocks.
3. Installation of flow switches.
4. Setting of automatic control valves or other control devices.

B. Valve submittals shall be coordinated for type, quantity, size, and piping configuration to ensure compatibility with pipe design.

C. Slip-stem control valves shall be installed so that the stem position is not more than 60 degrees from the vertical up position. Ball type control valves shall be installed with the stem in the horizontal position.

3.6 CHEMICAL TREATMENT

A. Perform an analysis of makeup water to determine type and quantities of chemical treatment needed to keep system free of scale, corrosion, and fouling, and to sustain the water characteristics described in Part 2.

B. Provide bypass chemical feeders in each hydronic system.

1. Provide in upright position with top of funnel not more than 48 inches above the floor.
2. Provide feeder in minimum NPS 3/4 bypass line, from main with full-size, full-port, ball valve in the main between bypass connections.
3. Provide NPS 3/4 pipe from chemical feeder drain to nearest equipment drain and include a full-size, full-port, ball valve.

C. Initial flushing: Remove loose dirt, mill scale, metal chips, weld beads, rust, and like deleterious substances without damage to any system component. Provide temporary piping or hose to bypass coils, control valves, exchangers and other factory cleaned equipment unless acceptable means of protection are provided and subsequent inspection of hide-out areas takes place. Isolate or protect clean system components, including pumps and pressure vessels, and remove any component which may be damaged. Open all valves, drains, vents and strainers at all system levels. Remove plugs, caps, spool pieces, and components to facilitate early debris discharge from system. Sectionalize system to obtain debris carrying velocity of 6 feet per second, if possible. Connect dead-end supply and return headers as necessary. Flush bottoms of

risers. Provide temporary strainers where necessary to protect down-stream equipment. Supply and remove flushing water and drainage by various type hose, temporary and permanent piping and Contractor's booster pumps. Flush until clean as approved by the commissioning agent.

D. Fill system with fresh water and add liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products from piping. Circulate solution for a minimum of 24 hours, drain, clean strainer screens, and refill with fresh water. Circulate systems at normal temperature to remove adherent organic soil, hydrocarbons, flux, pipe mill varnish, pipe joint compounds, iron oxide, and like deleterious substances not removed by flushing, without chemical or mechanical damage to any system component. Removal of tightly adherent mill scale is not required. Keep isolated equipment which is "clean" and where dead-end debris accumulation cannot occur. Sectionalize system if possible, to circulate at velocities not less than 6 feet per second. Circulate each section for not less than four hours. Blow-down all strainers, or remove and clean as frequently as necessary. Drain and prepare for final flushing.

E. Final Flushing: Return systems to conditions required by initial flushing after all cleaning solution has been displaced by clean make-up. Flush all dead ends and isolated clean equipment. Gently operate all valves to dislodge any debris in valve body by throttling velocity. Flush for not less than one hour.

F. Close and fill system as soon as possible after final flushing to minimize corrosion. Add initial chemical treatment and maintain water quality in ranges noted above for the first year of operation.

~~**G. Fill systems that glycol solutions to the concentrations indicated in the equipment schedules.**~~

~~**H. ADD GLYCOL SPEC HERE? DOAS SCHEDULE HAS 30% PG**~~

3.7 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Provide blinds in flanged joints to isolate equipment.
5. Provide safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

C. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment to specified values.
7. Verify lubrication of motors and bearings.

END OF SECTION 232113

SECTION 280513 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. RS-232 cabling.
2. RS-485 cabling.
3. Low-voltage control cabling.
4. Control-circuit conductors.
5. Fire alarm wire and cable.
6. Identification products.

B. Clarification:

1. Network cabling shall be by owner.

1.3 RELATED SECTIONS

A. Network cabling shall comply with ~~Division 27~~ **State of Maine Wiring Specifications**.

1.4 DEFINITIONS

A. EMI: Electromagnetic interference.

B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

C. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For coaxial cable, include the following installation data for each type used:

    a. Nominal OD.
    b. Minimum bending radius.
    c. Maximum pulling tension.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

B. Source quality-control reports.

C. Field quality-control reports.

1.7 FIELD CONDITIONS

A. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.

1. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches. Comply with requirements for plywood backing panels in Section 061000 "Rough Carpentry."

2.3 RS-232 CABLE

A. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.

2. Plastic insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. Plastic jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

2.4 RS-485 CABLE

A. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.5 LOW-VOLTAGE CONTROL CABLE

A. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 16 AWG, stranded (19x29) and No. 18 AWG, stranded (19x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with NFPA 262.

2.6 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Copper, Type THHN-THWN, complying with UL 83, in raceway or MC cable as specified in Part 3.

B. Class 2 Control Circuits: Stranded copper, power-limited cable, complying with UL 83, concealed in building finishes. Install cable in metal raceways where specified in Part 3.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83. Install cable in metal raceways where specified in Part 3.

2.7 FIRE ALARM WIRE AND CABLE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Comtran Corporation.
2. Draka Cableteq USA.
3. Genesis Cable Products; Honeywell International, Inc.
4. West Penn Wire.

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

C. Signaling Line Circuits:

1. Twisted, shielded pair in metal raceway, size as recommended by system manufacturer but not less than No. 18 AWG.
2. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with red identifier stripe, NTRL listed for fire alarm and cable tray installation, plenum rated..

D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.

1. Low-Voltage Circuits: No. 16 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.
3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with red identifier stripe, NTRL listed for fire alarm and cable tray installation, plenum rated.

2.8 IDENTIFICATION PRODUCTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Brady Worldwide, Inc.
2. Kroy LLC.
3. Panduit Corp.

B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

C. Comply with requirements in Section 260553 "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for installation of supports for cables.

3.2 WIRING METHOD

A. Install cable, concealed in accessible ceilings, and walls in finished areas.

B. Install wiring in metal pathways and wireways where exposed in mechanical rooms and at exposed structural ceilings.

1. Minimum conduit size shall be ½-inch. Control and data transmission wiring shall not share conduit with other building wiring systems.

C. Wiring within Enclosures:

1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
2. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer.
3. Install conductors parallel with or at right angles to sides and back of enclosure.
4. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks.
5. Mark each terminal according to system's wiring diagrams.
6. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.

C. General Requirements for Cabling:

1. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
2. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.

3. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
4. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.

D. Open-Cable Installation:

1. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

3.4 FIRE ALARM WIRING INSTALLATION

A. Comply with NECA 1 and NFPA 72.

B. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.

C. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.

D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

G. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.

H. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the fire alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.5 POWER AND CONTROL-CIRCUIT CONDUCTORS

A. 120-V Power Wiring: Install according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.

B. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No. 14 AWG.
2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.6 CONNECTIONS

A. Comply with requirements in Section 283111 "Digital, Addressable Fire-Alarm System for connecting, terminating, and identifying wires and cables.

3.7 FIRESTOPPING

A. Comply with requirements in Division 07.

3.8 GROUNDING

A. For low-voltage wiring and cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.9 IDENTIFICATION

A. Identify system components, wiring, and cabling. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.10 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

B. Prepare test and inspection reports.

END OF SECTION 280513