

BERNARDON

ARCHITECTURE
INTERIOR DESIGN
LANDSCAPE ARCHITECTURE

ADDENDUM No.: 01

Project Name: EXTERIOR ENVELOPE & MEP IMPROVEMENTS
Old Brick Church
State of Delaware Contract Number: MC2006000145

Bernardon Proj. No.: 8347.08-16

Date of Issue: August 10, 2018

Notice No. 1: Attach this addendum to the Project Manual for this project. It modifies and becomes part of the Bidding Documents. Work or material not specifically mentioned herein is to be as described in the main body of the specification and as shown on the drawings.

Bids Due: Thursday, August 23, 2018 by 1:00PM
Division of Facilities Management
Thomas Collins Building
540 South DuPont Highway, Suite 1,
Dover, DE 19901

Location: Old Brick Church, Dover, DE

Date of Meeting: August 7, 2018, 1:30 PM

Present for: State of Delaware
Lynn Riley – Dept. of Historical and Cultural Affairs (DHCA)
Courtney Lynahan – Dept. of Historical and Cultural Affairs (DHCA)
Larry Schrock – Office of Management and Budget (OMB)

Contractors
Michael J. Rosaio – Commonwealth Construction Co.
Barry Joseph – Delmarva Construction Services
Rob Galloway – Kent Construction
Lou Deldeo – Deldeo Builders Inc.
Anthony Smith – BRS Consulting Inc.
Mark Rinehart – GFP Cement Contractors
Tyrone Marckese – Amakor
Keith Long – John L. Briggs Company

DEDC, LLC
Matt Lano

Bernardon
Douglas A. Eriksen, AIA

The following items were discussed:



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- 1.01 It was stated that bids are due Thursday, August 23, 2018 at 1:00pm at Division of Facilities Management, Thomas Collins Building, Suite 1, 540 South DuPont Highway, Dover, DE 19901.
- 1.02 Doug requested that all present please complete the sign-in sheet. He reminded Contractors that this was a mandatory meeting and that if you are not on the sign-in sheet you will not be eligible to bid this project.
- 1.03 Doug reviewed the following items:
 - a. The Work consists of the following:
 1. Installation of a new roof diaphragm (roof sheathing) over existing 1x sheathing.
 2. Installation of new architectural asphalt shingles (with a diamond pattern).
 3. Installation of new roof vents.
 4. Installation of a new chimney cricket and flashing.
 5. Installation of new gutters and downspouts.
 6. Repair/replacement of damaged/rotted existing trim or other wood components of the roof system.
 7. Painting of any replaced or repaired wood trim.
 - b. Project will be constructed under a general construction contract.
 - c. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is to be performed.
 1. Driveways and Entrances: Keep entrances serving premises clear and available to Owner, and Owner's employees.
 2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 3. The Owner will not sign for any deliveries at any time.
 4. Contractor vehicles shall not be left at the site after working hours.
 5. The Contractor will have limited use of the adjacent parking lot. Contractors were informed that they need to share the parking lot with the Johnson Victrola Museum, Reith Hall, and Old Brick Church.
 - d. Use of Existing Building: Maintain existing building in a weather tight condition throughout construction period. Repair damage caused by construction operations. Protect building during construction period.
 1. The Owner will provide the Contractor with a security code and keys for use during the project.
 2. Use of the Owner's telephones will not be allowed.
 3. Flammable materials shall not be stored in the building.



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4. The **WINDOWS AND SURROUNDING CEMETERY HEADSTONES** shall be protected during the construction period. Use and/or closure of the entrances must be coordinated with the Owner's representative in advance. One accessible entrance must be maintained at all times.
5. At no times shall equipment be left operating in or around the building after hours or when no one is present in the building.
6. The water service to the building is presently turned off. Therefore, the use of the toilets by the Contractor will not be allowed. Contractor shall provide temporary facilities for use by their work force and that of their sub-contractors.
7. Dogs or other animals shall not be brought onto the property at any time.
8. Children shall not be brought onto the site at any time.
9. The property around the Old Brick Church is open to the public and those working at the site shall not use abusive language.
10. The Old Brick Church is a State owned property; no tobacco use is allowed on State property.
11. Radios or other music-playing devices shall not be loud or abusive. If they are found to be so in the Owner's opinion, then they will be required to be removed.
12. Use of the Owner's sinks for cleaning tools and equipment shall not be allowed at any time.
13. The fire detection system shall remain active at all time. The Contractor shall protect the detection devices accordingly.
14. Any work taking place on the site by the Contractor or their subs shall be monitored by the contractor's project superintendent at all times.
- e. Owner Occupancy: The owner and their tenant may occupy a portion of the building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage of the site. Maintain existing exits, unless otherwise indicated.
 1. On-Site Work Hours: Work shall be generally performed during the Contractor's normal working hours, Monday through Friday, except otherwise indicated. The City of Dover allows construction activities from 7:00AM to 7:00PM (or sundown)
 2. Weekend hours: Work on weekends is not allowed.
- f. Contractor Daily Parking: Parking is available in the adjacent parking lot. Bidders were informed that the parking lot is shared by two other buildings and the cemetery so other parking arrangements may need to be made.
- g. Dumpster: Coordinate location with Owner. Debris shall be removed from the site on a daily basis.
- h. Protect existing trees, shrubbery, windows, and grave headstones.



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- i. The following is the required schedule for this work:
 - 1. Bids Due: 1:00 p.m. on Thursday, August 23, 2018.
 - 2. Award Building Contract: Within thirty (30) days of receipt and acceptance of qualified low bid. The issuance of a State of Delaware purchase order is contingent upon the successful Contractor submitting bonds, signed contract, drug testing affidavit, and insurances to the State of Delaware within two (2) weeks of bid acceptance.
 - 3. On-Site Mobilization: Upon receipt of State of Delaware purchase order.
 - 4. Refer to the General Requirements for additional details.
 - j. SUBCONTRACTOR'S LIST – The following subcontractor's will be listed on the Bid Form.
 - 1. Mechanical
 - 2. Electrician
 - 3. Plumber
 - 4. Carpenter
 - 5. Painter
 - 6. Mason
-
- 1.04 Addendum No.1 will be issued by close of business Friday, August 10, 2018.
 - 1.05 Addenda will be issued via email. Make sure email address is included on sign-in sheet and is legible.
 - 1.06 Any questions must be submitted to Bernardon via email by midnight Wednesday, August 15, 2018. Questions should be emailed to Doug Eriksen at deriksen@bernardon.com. A final Addendum, if needed, will be issued by close of business Thursday August 16, 2018.
 - 1.07 It was stated that there is a \$10,000.00 allowance listed in the specs that is to be included in the base bid price for unforeseen conditions. Contractors will be required to submit a proposal and get approval from the State before proceeding with any additional work covered by the allowance. Any proposed work exceeding the allowance will require a change order.
 - 1.08 Contractors were invited to walk around the property.
 - 1.09 HCA stated that when work begins there will be a roof project wrapping up at the adjacent Reith Hall and work at Old Brick Church will need to be coordinated with that Contractor since they will be sharing the parking lot.
 - 1.10 Bernardon reiterated the fact that the adjacent cemetery is privately owned by the Presbyterian Church and that the contractor(s) shall take all precautions to protect the



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existing headstones and will be responsible for any damage that may occur. It was mentioned that protection may include boxing of certain headstones.

- 1.11 Bernardon and HCA both stated that the gas line excavation must be coordinated with the state appointed archeologist. Coordination will take place even if it adversely affects the construction schedule. No ground disturbance (digging) shall take place without first being coordinated and approved by the state archeologist.

- 1.12 Pre-Bid Meeting sign-in sheet is attached.

The meeting was adjourned at 2:30.

Anyone taking exception to or noting omissions from these meeting minutes shall notify the Architect in writing following receipt of the minutes. Otherwise, it is assumed all parties accept these minutes as recorded.

Respectfully submitted,

Douglas A. Eriksen, AIA
Project Director
Bernardon
A Delaware LLC

DAE/man

Enclosures

cc: Attendees
Mr. William E. Holloway, AIA, LEED AP – Bernardon LLC
Ms. Natalie Curran – Office of Management and Budget

General Clarifications:

Q: Will a second walk-thru be scheduled for sub-contractors.

A: A second walk-thru will be held TBD.

Q: What is the duration of construction?

A: HCA stated that they need the work accomplished As Soon As Possible because the tenant will start play rehearsals after Labor Day and will want to use the building as soon thereafter as they can.



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Q: Do to the possibility of undocumented graves adjacent to the building, can a mobile high reach be used around the perimeter of the building?

A: Any undocumented graves would be unforeseen conditions. A mobile high reach may be used if reasonable precautions are taken i.e. planks and plywood to protect the ground.

Clarifications to the Drawings:

Replace AD-100 in its entirety with that attached.

Replace A-100 in its entirety with that attached.

Replace MD-100 in its entirety with that attached.

Replace M-100 in its entirety with that attached.

Replace M-101 in its entirety with that attached.

Replace M-400 in its entirety with that attached.

Replace M-501 in its entirety with that attached.

Replace M-502 in its entirety with that attached.

Replace M-600 in its entirety with that attached.

Clarifications to the Project Manual:

Replace Section 00 41 13 "BID FORM" in its entirety with that attached.

Revise Section 09 91 13 "EXTERIOR PAINTING", paragraph 1.2, B to read:

B. Related Sections include the following:

1. Division 06 Section 06 40 13 - "Exterior Architectural Woodwork," for shop priming of new exterior architectural woodwork.
2. Division 08 Section 08 80 00 - "Wood Window Restoration," for coordination with window restoration.
3. Abatement and/or containment of asbestos-containing materials is completed under separate contract with Owner.
4. Abatement of lead-containing materials has not been performed. Contractor(s) shall consider any existing painted surfaces to contain lead and shall be handled as hazardous material. Contractor(s) shall be RRP certified to handle those portions of the work.

Insert Section 09 91 23 "INTERIOR PAINTING" in its entirety with that attached.

Replace Section 23 25 00 "HVAC WATER TREATMENT" in its entirety with that attached.

Replace Section 23 21 13 "HYDRONIC PIPING" in its entirety with that attached.

Replace Section 23 82 00 "CONVECTION HEATING AND COOLING" in its entirety with that attached.

ATTENDANCE SHEET
PRE-BID CONFERENCE – CONTRACT # MC2006000145
EXTERIOR ENVELOPE & MEP IMPROVEMENTS
Old Brick Church
DATE: August 7, 2018

NAME	AGENCY/COMPANY	TELEPHONE	EMAIL
Doug Eriksen	Bernardon	302-498-6071	deriksen@bernardon.com
MICHAEL J. ROSARIO	COMMONWEALTH CONST. CO.	302-654-6611	BBooth@itscommonwealth.com
Barry Joseph	Delmarva Const Service	302-462-8700	delseru66@Gmail.com
Rob Toller	Kew-Forest	302-653-6469	estmaga2@kewforestco.com
Lou Deldeo	Deldeo Builders Inc	302-291-0243	loudeldeo@COMCAST.NET
ANTHONY SMITH	BR5 CONTRACTORS	302 786-2326	rob@br5coninc.com
MARK RINEHART	GFP CEMENT CONTRACTORS	302-993-7687	MARK.RINEHART@GFPCEMENT.COM
Tyrone Marckese	Amakon	302 834 8664	Amakon@Ach.com
KEITH LONG	John L Briggs Company	302-858-7033	contact@jlbriggsco.com
Matt Lano	DEDC, LLC		mlano@dedc-eng.com
LYNN RILEY	HCA	302-577-5170	lynn.riley@state.de.us
LARRY SCHROCK	OMB/OFM	739-5641	larry.schrock@state.de.us

BID FORM

To: State of Delaware
Office of Management and Budget, Division of Facilities Management
Thomas Collins Building
540 S. DuPont Highway, Suite 1 (Third Floor)
Dover, DE 19901

Delaware Business License No.: _____ **Taxpayer ID No.:** _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

Phone No.: () _____ - _____ **Fax No.:** () _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

\$ _____
(\$ _____)

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed out part that does not apply.

ALTERNATE No. 1: Architectural Repairs – brick masonry repointing and replacement, wood trim and window repair

Add/Deduct: _____
(\$ _____)

ALTERNATE No. 2: Wood window sash replication and installation

Add/Deduct: _____
(\$ _____)

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BID FORM

UNIT PRICES

Unit prices conform to applicable project specification section. Refer to the specifications for a complete description of the following Unit Prices:

	<u>ADD</u>	<u>DEDUCT</u>
UNIT PRICE No. 1: Custom color/size brick	\$ _____	\$ _____
UNIT PRICE No. 2: Brick masonry repointing	\$ _____	\$ _____

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BID FORM

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for thirty (30) days from the date of opening of bids (60 days for School Districts and Department of Education), and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid.

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within _____ calendar days of the Notice to Proceed.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am / We are an Individual / a Partnership / a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

(State of Corporation)

Business Address: _____

Witness: _____ By: _____
(SEAL) (Authorized Signature)

(Title)
Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Affidavit of Employee Drug Testing Program
Bid Security
(Others as Required by Project Manuals)

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BID FORM

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 6962 (d)(10)b Delaware Code, the following sub-contractor listing must accompany the bid submittal. The name and address of the sub-contractor **must be listed for each category** where the bidder intends to use a sub-contractor to perform that category of work. In order to provide full disclosure and acceptance of the bid by the *Owner*, **it is required that bidders list themselves as being the sub-contractor for all categories where he/she is qualified and intends to perform such work.** This form must be filled out completely with no additions or deletions.

<u>Subcontractor Category</u>	<u>Subcontractor</u>	<u>Address (City & State)</u>	<u>Subcontractors tax payer ID # or Delaware Business license #</u>
1. Mechanical	<hr/>	<hr/>	<hr/>
2. Plumbing	<hr/>	<hr/>	<hr/>
3. Electrical	<hr/>	<hr/>	<hr/>
4. Carpentry	<hr/>	<hr/>	<hr/>
5. Painting	<hr/>	<hr/>	<hr/>
6. Masonry	<hr/>	<hr/>	<hr/>

EXTERIOR ENVELOPE & MEP IMPROVEMENTS
Old Brick Church
OMB/DFM Project No.: MC2006000145

BID FORM

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date (*to the Office of Management and Budget, Division of Facilities Management*).

All the terms and conditions of (*Project or Contract Number*) have been thoroughly examined and are understood.

NAME OF BIDDER:

**AUTHORIZED REPRESENTATIVE
(TYPED):**

**AUTHORIZED REPRESENTATIVE
(SIGNATURE):**

TITLE:

ADDRESS OF BIDDER:

E-MAIL:

PHONE NUMBER:

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

**AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

**SECTION 09 91 23
INTERIOR PAINTING**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates which include but are not limited to the following:
 - 1. Steel and iron.
 - 2. Galvanized metal.
 - 3. Aluminum (not anodized or otherwise coated).
 - 4. Wood.
 - 5. Gypsum board.
 - 6. Plaster.
- B. Related Sections include the following:
 - 1. Division 08 Section 08 80 00 - "Wood Window Restoration," for coordination with window restoration.
 - 2. Abatement and/or containment of asbestos-containing materials is completed under separate contract with Owner.
 - 3. Abatement of lead-containing materials has not been performed. Contractor(s) shall consider any existing painted surfaces to contain lead and shall be handled as hazardous material. Contractor(s) shall be RRP certified to handle those portions of the work.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 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. Benjamin Moore & Co.
 - 2. Dulux (formerly ICI Paints); a brand of AkzoNobel.
 - 3. PPG Paints.
 - 4. Sherwin-Williams Company (The).
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. Colors: As selected by Architect from manufacturer's full range.

1. Ten percent of surface area will be painted with deep tones.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Wood: 15 percent.
 2. Gypsum Board: 12 percent.
 3. Plaster: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:

- a. Prime Coat: Primer, , quick dry anti-corrosive, for metal
 - 1) Sherwin Williams- Pro- Industrial Pro- Cryl-Universal Primer.
- b. Prime Coat: Shop primer specified in Section where substrate is specified.
- c. Intermediate: Water based , Alkyd Urethane
- d. Topcoat: Latex, interior,
 - 1) Sherwin Williams- Pro-Industrial WB Alkyd Urethane Enamel, B53 series Semi-gloss.

B. Galvanized-Metal Substrates:

1. Latex System

- a. Prime Coat: Primer, galvanized, water based.
 - 1) Sherwin Williams- Pro-Industrial Pro-Cryl Universal Primer.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, Semi-Gloss
 - 1) Sherwin Williams- Pro-Industrial WB Alkyd Urethane Enamel, B53 Series.

C. Wood Substrates: Exposed framing.

1. Latex over Latex Primer System

- a. Prime Coat: Primer, latex, for interior wood
 - 1) Sherwin Williams - Pro Mar 200 Zero VOC Primer.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, Semi-Gloss 1
 - 1) Sherwin Williams - Solo Latex 100 Acrylic.

D. Wood Substrates: Wood trim, Architectural woodwork, Doors, and Windows.

1. Latex over Latex Primer System
 - a. Prime Coat: Primer, latex, for interior wood
 - 1) Sherwin Williams - Pro Mar 200 Zero VOC Primer.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, Semi-Gloss 1
 - 1) Sherwin Williams - Solo Latex 100 Acrylic.
- E. Gypsum Board and Plaster Substrates:
 1. Latex over Latex Sealer System
 - a. Prime Coat: Primer sealer, latex, interior
 - 1) Sherwin Williams- Pro Mar 200 Zero VOC Primer.
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Latex, interior, Ceilings and Soffits
 - 1) Sherwin Williams- Pro Mar Ceiling Paint Flat.
 - e. Topcoat: Latex, interior Wall
 - 1) Sherwin Williams- Pro Mar 200 Zero VOC Eggshell.

END OF SECTION

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SECTION 23 25 00
HVAC WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Materials.
 - 1. System cleaner.
 - 2. Closed system treatment (water).
- B. By-pass (pot) feeder.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: State of Delaware - Department of State furnished treatment equipment.
- B. Section 01 60 00 - Product Requirements: State of Delaware - Department of State furnished treatment equipment.
- C. Section 23 21 13 - Hydronic Piping.
- D. Section 23 21 14 - Hydronic Specialties.
- E. Section 26 27 17 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.
- D. Manufacturer's Installation Instructions: Indicate placement of equipment in systems, piping configuration, and connection requirements.
- E. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.
- F. Certificate: Submit certificate of compliance from Authority Having Jurisdiction indicating approval of chemicals and their proposed disposal.
- G. Project Record Documents: Record actual locations of equipment and piping, including sampling points and location of chemical injectors.
- H. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.
- I. Maintenance Materials: Furnish the following for State of Delaware - Department of State's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.04 QUALITY ASSURANCE

- A. The State of Delaware has an agreement (CONTRACT NO. GSS-17235-WATER_TREATV0#) with Willard Limbach LLC (215 488 9700), Klenzoid Inc (800-825-9495), and Syntec Corporation (302 421 8394) to provide and maintain water quality in their buildings. Contact Willard to provide costs associated with water quality of this project.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems and to public sewage systems.
- B. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. AmSolv-Amrep, Inc: www.amsolv.com.
- B. GE Water & Process Technologies: www.gewater.com.
- C. Nalco, an Ecolab Company: www.nalco.com.
- D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. System Cleaner:
 - 1. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodiumtripoly phosphate and sodium molybdate.
- B. Closed System Treatment (Water):
 - 1. Sequestering agent to reduce deposits and adjust pH; polyphosphate.
 - 2. Corrosion inhibitors; boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.
 - 3. Conductivity enhancers; phosphates or phosphonates.

2.03 BY-PASS (POT) FEEDER

- A. Manufacturers:
 - 1. Griswold Controls: www.griswoldcontrols.com.
 - 2. J. L. Wingert Company: www.jlwingert.com.
 - 3. Neptune, a brand of the Dover Company: www.neptune1.com.

PART 3 EXECUTION

3.01 PREPARATION

- A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.
- B. Place terminal control valves in open position during cleaning.
- C. Verify that electric power is available and of the correct characteristics.

3.02 CLEANING SEQUENCE

- A. Concentration:
 - 1. As recommended by manufacturer.
- B. Use neutralizer agents on recommendation of system cleaner supplier and approval of DEDC, LLC.
- C. Flush open systems with clean water for one hour minimum. Drain completely and refill.
- D. Remove, clean, and replace strainer screens.
- E. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.04 CLOSED SYSTEM TREATMENT

- A. Provide one bypass feeder on each system. Install isolating and drain valves and necessary piping. Install around balancing valve downstream of circulating pumps unless indicated otherwise.
- B. Introduce closed system treatment through bypass feeder when required or indicated by test.
- C. Provide 3/4 inch water coupon rack around circulating pumps with space for 4 test specimens.

3.05 CLOSEOUT ACTIVITIES

- A. Training: Train State of Delaware - Department of State's personnel on operation and maintenance of chemical treatment system.
 - 1. Provide minimum of two hours of instruction for two people.
 - 2. Have operation and maintenance data prepared and available for review during training.
 - 3. Conduct training using actual equipment after treated system has been put into full operation.

END OF SECTION

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SECTION 23 21 13
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Heating water piping, above grade.
- C. Equipment drains and overflows.
- D. Pipe and pipe fittings for:
 - 1. Heating water piping system.
 - 2. Equipment drains and overflows.
- E. Pipe hangers and supports.
- F. Unions, flanges, mechanical couplings, and dielectric connections.
- G. Valves:
 - 1. Gate valves.
 - 2. Globe or angle valves.
 - 3. Ball valves.
 - 4. Manual Calibrated Balancing Valves
 - 5. Butterfly valves.
 - 6. Check valves.

1.02 RELATED REQUIREMENTS

- A. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- B. Section 23 05 53 - Identification for HVAC Piping and Equipment.
- C. Section 23 07 19 - HVAC Piping Insulation.
- D. Section 23 21 14 - Hydronic Specialties.
- E. Section 23 25 00 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

- A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2011.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- E. ASME B31.9 - Building Services Piping; 2014.
- F. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005).
- G. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2008 (ANSI/ASME B31.9).
- H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
- J. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- K. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
- M. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

- N. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.
- O. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2011 and errata.
- P. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2004 and errata.
- Q. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- R. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.04 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.
- B. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- C. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Welder Qualifications: Certify in accordance with ASME BPVC-IX.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:
 - 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
 - 2. Use non-conducting dielectric connections whenever jointing dissimilar metals. Provide shut off valve to allow for replacement of the fitting without draining the entire system. The shut off valve shall be constructed of the material matching the pipe it's on.
 - 3. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
 - 4. Provide pipe hangers and supports in accordance with ASME B31.9 unless indicated otherwise.
- C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
- D. Valves: Provide valves where indicated:
 - 1. Provide drain valves where indicated, and if not indicated provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.

2. Isolate equipment using butterfly valves with lug end flanges or grooved mechanical couplings.
3. For throttling, bypass, or manual flow control services, use globe valves.
4. For throttling and isolation service in chilled and condenser water systems, use only butterfly valves.
5. In heating water or chilled water systems, butterfly valves may be used interchangeably with gate and globe valves.
6. For shut-off and to isolate parts of systems or vertical risers, use gate, ball, or butterfly valves.

E. Welding Materials and Procedures: Conform to ASME BPVC-IX.

2.02 HEATING WATER PIPING, ABOVE GRADE

- A. The intent is to provide Copper Tube up to 2" and Steel piping for larger than 2". However we would like to minimize the change in materials therefore, should a condition be found that maintaining one piping material for a short length in a size not listed for that material would reduce the amount of dielectric fittings, this condition shall be presented to the engineer for review.
- B. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
 1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
 2. Threaded Joints: ASME B16.3, malleable iron fittings.
- C. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn, using one of the following joint types:
 1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
 - a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
 - b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
 - c. Braze: 1 BCuP copper/silver alloy.
 2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
 3. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.22, utilizing EPDM, nontoxic synthetic rubber sealing elements.
 - a. Manufacturers:
 - 1) Grinnell Products, a Tyco Business: www.grinnell.com.
 - 2) Viega LLC: www.viega.com.
 - 3) Substitutions: See Section 01 60 00 - Product Requirements.

2.03 EQUIPMENT DRAINS AND OVERFLOWS

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn; using one of the following joint types:
 1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

2.04 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
- B. Conform to ASME B31.9.
- C. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
- D. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
- E. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
- F. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.
- G. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

- H. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- I. Wall Support for Pipe Sizes 4 Inches and Greater: Welded steel bracket and wrought steel clamp.
- J. Vertical Support: Steel riser clamp.
- K. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- L. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.05 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe 2 Inches and Less:
 - 1. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe 2 Inches and Greater:
 - 1. Gaskets: 1/16 inch thick preformed neoprene.
- C. Dielectric Connections:
 - 1. Waterways:
 - a. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
 - b. Dry insulation barrier able to withstand 600 volt breakdown test.
 - c. Construct of galvanized steel with threaded end connections to match connecting piping.
 - d. Suitable for the required operating pressures and temperatures.
 - 2. Flanges:
 - a. Dielectric flanges with same pressure ratings as standard flanges.
 - b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
 - c. Dry insulation barrier able to withstand 600 volt breakdown test.
 - d. Construct of galvanized steel with threaded end connections to match connecting piping.
 - e. Suitable for the required operating pressures and temperatures.

2.06 GATE VALVES

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. Conbraco Industries: www.apollovalves.com.
 - 3. Nibco, Inc: www.nibco.com.
 - 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Up To and Including 2 Inches:
 - 1. Bronze body, bronze trim, screwed bonnet, non-rising stem, lockshield stem, inside screw with backseating stem, solid wedge disc, alloy seat rings, solder ends.
- C. Over 2 Inches:
 - 1. Iron body, bronze trim, bolted bonnet, rising stem, handwheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends.

2.07 GLOBE OR ANGLE VALVES

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. Conbraco Industries: www.apollovalves.com.
 - 3. Nibco, Inc: www.nibco.com.
 - 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Up To and Including 2 Inches:
 - 1. Bronze body, bronze trim, screwed bonnet, rising stem and handwheel, inside screw with backseating stem, renewable composition disc and bronze seat, solder ends.

2. Balancing ports and caps must be provided with globe or angle valves used for balancing.
- C. Over 2 Inches:
 1. Iron body, bronze trim, bolted bonnet, rising stem, handwheel, outside screw and yoke, rotating plug-type disc with renewable seat ring and disc, flanged ends.
 2. Balancing ports and caps must be provided with globe or angle valves used for balancing.

2.08 BALL VALVES

- A. Manufacturers:
 1. Tyco Flow Control: www.tycoflowcontrol.com.
 2. Conbraco Industries: www.apollovalves.com.
 3. Nibco, Inc: www.nibco.com.
 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Up To and Including 2 Inches:
 1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.

2.09 MANUAL CALIBRATED BALANCING VALVES

- A. Valve Characteristics ½" to 2" "Y" Pattern Globe
 1. 300 psi/2065 kPa, y-pattern, globe type with soldered or threaded ends, non-ferrous Ametal® brass copper alloy body, EPDM o-ring seals. 4-turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting, and connections for portable differential meter. Tour and Andersson TA Series 786-STAS or 787-STAD or equal by Armstrong or Wheatley.
- B. Valve Characteristics 2 ½ to 16" "Y" Pattern Globe
 1. 300 psi/2065 kPa, y-pattern, globe type with flanged or grooved ends, ASTM A536 ductile iron body, all other metal parts of Ametal® brass copper alloy, EPDM O-ring seals. 8, 12, 16, 20 or 22 turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting, and connections for portable differential meter. Tour and Andersson TA Series 788-STAF or 789-STAG or equal by Armstrong or Wheatley.
- C. Balancing Meter
 1. A balancing meter is required to be left with the owner after commissioning, the balancing meter shall be from the same provider as the balancing valves, Victaulic. The Series 734 TA-Scope, or TA Series 73M CMI Pressure Differential Meter are acceptable and are manufactured by Tour and Andersson and provided by Victaulic. Needle gauge type meters will not be allowed.

2.10 BUTTERFLY VALVES

- A. Manufacturers:
 1. Tyco Flow Control: www.tycoflowcontrol.com.
 2. Hammond Valve: www.hammondvalve.com.
 3. Crane Co.: www.craneco.com.
 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck.
- C. Disc: Construct of aluminum bronze, chrome plated ductile iron, stainless steel, ductile iron with EPDM encapsulation, or Buna-N encapsulation.
- D. Operator: Infinite position lever handle with memory stop.

2.11 SPRING LOADED CHECK VALVES

- A. Manufacturers:
 1. Tyco Flow Control: www.tycoflowcontrol.com.
 2. Hammond Valve: www.hammondvalve.com.
 3. Crane Co.: www.craneco.com.
 4. Milwaukee Valve Company: www.milwaukeevalve.com.

- B. Iron body, bronze trim, split plate, hinged with stainless steel spring, resilient seal bonded to body, wafer or threaded lug ends.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment using jointing system specified.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems. Refer to Section 23 25 00 for additional requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and to avoid interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Sleeve pipe passing through partitions, walls and floors.
- F. Slope piping and arrange to drain at low points.
- G. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Prime coat exposed steel hangers and supports. Refer to Section 09 91 23. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- H. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 07 19.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- J. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
 - 1. 1/2 inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 - 2. 1 inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 - 3. 1-1/2 inch and 2 inch: Maximum span, 8 feet; minimum rod size, 3/8 inch.
- B. Hanger Spacing for Steel Piping.
 - 1. 2-1/2 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
 - 2. 3 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
 - 3. 4 inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
 - 4. 6 inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.

5. 8 inches: Maximum span, 19 feet; minimum rod size, 5/8 inch.
6. 10 inches: Maximum span, 20 feet; minimum rod size, 3/4 inch.
7. 12 inches: Maximum span, 23 feet; minimum rod size, 7/8 inch.

END OF SECTION

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SECTION 23 82 00
CONVECTION HEATING AND COOLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Baseboard radiation.
- B. Air coils.

1.02 RELATED REQUIREMENTS

- A. Section 23 21 13 - Hydronic Piping.
- B. Section 23 21 14 - Hydronic Specialties.

1.03 REFERENCE STANDARDS

- A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); current edition at www.ahrinet.org.
- B. AHRI 410 - Standard for Forced-Circulation Air-Cooling and Air-Heating Coils; 2001 (R2011).
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

1.04 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
 - 2. Indicate air coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.
 - 3. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.
 - 4. Indicate mechanical and electrical service locations and requirements.
- C. Certificates: Certify that coils are tested and rated in accordance with AHRI 410.
- D. Warranty: Submit manufacturer's warranty and ensure forms have been completed in State of Delaware - Department of State's name and registered with manufacturer.
- E. Maintenance Materials: Furnish the following for State of Delaware - Department of State's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

PART 2 PRODUCTS

2.01 HYDRONIC BASEBOARD RADIATION

- A. Manufacturers:
 - 1. Haydon Corporation: www.haydoncorp.com.
 - 2. Slant/Fin Corporation: www.slantfin.com.
 - 3. Sterling Hydronics, a Mestek Company: www.sterlingheat.com.
 - 4. Sigma Corporation: www.sigmaproducts.com
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Perform factory run test under normal operating conditions, water, and steam flow rates.
- C. Heating Elements: Copper tubing mechanically expanded into flanged collars of evenly spaced aluminum or aluminum/copper fins.
- D. Enclosure:
 - 1. Steel material with high back and top, of one piece construction.
 - 2. Removable front panel, end panel, end caps, corners, and joiner pieces.
 - 3. Full length control damper.
 - 4. Provisions for return piping.

- E. Finish:
 - 1. Factory applied, baked enamel finish.
 - 2. Color: As chosen by Architect.
- F. Element Brackets: Galvanized or pre-painted steel supported from panel with non-metal element cradles or shoes, that allow for noise free expansion and contraction.

2.02 AIR COILS

- A. Manufacturers:
 - 1. Water Coils:
 - a. Aerofin Corporation: www.aerofin.com.
 - b. USA Coil & Air: www.usacoil.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Water Coils:
 - 1. Coils rated and tested in accordance with AHRI 410.
 - 2. Tubes: Material to consist of seamless copper or brass, mechanically expanded or tension wound to fins; appropriate tube joining methods based on tube material.
 - 3. Fins: Material to consist of aluminum or copper, continuous plate type with full fin collars or individual helical finned tube type wound under tension.
 - 4. Casing: Heavy gage galvanized steel with mounting holes, including intermediate tube supports if required by coil design and length.
 - 5. Headers (Manifolds): Construct of seamless copper pipe, cast iron, or nonferrous material with tube connection appropriate to header material provided.
 - 6. Acceptable Factory Testing Methods:
 - a. Proof test at 1.5 times the maximum operating pressure and leak test at the maximum operating temperature.
 - b. Leak test at minimum 300 psig air pressure under water.
 - c. Perform hydrostatic testing for coils with removable headers in accordance with approved shop drawings and normally accepted means and methods.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are suitable for installation.
- B. Verify that field measurements are as shown on the drawings.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Do not damage equipment or finishes.
- C. Baseboard Radiation:
 - 1. Locate on outside walls and run cover continuously wall-to-wall unless otherwise indicated.
 - 2. Center elements under window with elements of equal length centered under each window for multiple windows.
 - 3. Install wall angles and end caps where units butt against walls.
- D. Air Coils:
 - 1. Install in ducts and casings in accordance with SMACNA (DCS).
 - a. Support coil sections independent of piping on steel channel or double angle frames and secure to casing.
 - 2. Hydronic (Drainable) Coils:
 - a. Connect water supply to leaving air side of coil (counterflow arrangement).
 - b. Provide with shut-off valve on supply piping and tamper-proof, balancing valve with memory stop on return piping.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

3.04 CLEANING

- A. Vacuum clean coils and inside of units.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 01 77 00 - Close Out Procedures, for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.

END OF SECTION

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