March 9. 2016

TO ALL CONTRACT BIDDERS:

RE: ADDENDUM NO. 1
New Castle County Fire School Training Center Addition
MC1002000282

The work herein shall be considered part of the bid documents for the referenced project and carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Acknowledge receipt of addendum on the bid form as indicated.

This Addendum is generally separated into sections for convenience; however, all General Contractors, Sub Contractors, Material Men and other parties shall be responsible for reading the entire Addendum. The failure to list an item or items in all affected sections of this Addendum does not relieve any party affected from performing as per instructions; provided the information is set forth one time in the Addendum.

These documents shall become attached to and become a part of the construction contract for this project.

PRE-BID MEETING MINUTES:

1. A copy of the Pre-Bid sign-in sheet is included herein.

2. Sub-contractor walk thrus are identified for:
   Wednesday 3/9 from 8:00 - 10:00 A.M.
   Thursday 3/10 from 8:00 - 10:00 A.M.

3. Only One (1) Original Bid Form will be required to be submitted

4. A revised Bid Form has been included herein and includes the addition of the Building Automation System Subcontractor identification.

5. A revised Bid Form has been included herein and includes the addition of Alternate #4 as indicated on Sheet A3.4. to provide additional flooring scope of work in Exist Corridor 109A, Exist. Vest 100A, and Exist Vending 101A

6. The existing BAS system is to be extended to the new work as necessary for a complete operational system. The existing web-based building automation system is WebCTRL.

7. The existing sprinkler system is to be extended to the new work as necessary for a complete operational system. The existing sprinkler system is contract is held by Wayman Fire Protection.

8. The existing Fire Alarm system is to be extended to the new work as necessary for a complete operational system. The existing fire alarm system is FCI Fire Control Instruments.

9. Although the building will be occupied, there is no anticipated Off-Hours Work.

10. Contractor to apply and pay for all necessary building permits.

11. Contractor to pay for all construction layout.

12. Contractor to pay for all CCR reporting.

13. Contractor to pay for all Land Use As-Builts required.

14. Warrantee on all workmanship shall extend to two years.

15. Anticipated completion date is December 30, 2016. No Liquidated Damages are applicable.

16. The Affidavit of Employee Drug Testing Program (page 6 of the Bid Form) **MUST** be completed accordingly and submitted with the Bid for the Prime Contractor and **ALL** identified sub-contractors. Failure to provide Affidavit of Employee Drug Testing Program (page 6 of the Bid Form) for the Prime Contractor and **ALL** identified sub-contractors will result in the Bid not being considered.
    a. Affidavit is not project specific. See revised form included in Addendum #1 with no project specific header.
    b. Prime contractor shall maintain all original copies of the subcontractor affidavits. Only COPIES of subcontractor affidavits shall be provided with the bid.

17. Alternate #2 is to include the demolition of the existing ramp and the construction of a new ramp as indicated on Sheet A6.3

18. Corridor walls will **NOT** be ground face but rather common load bearing CMU.

19. Contractor to furnish and install all devices, components, and wiring necessary to install fully functional ADA automatic opener as indicated at door to Existing Women's Toilet 111

20. Last day for questions is Thursday, March 10, 2016.

21. Addendum #2 to be issued Friday, March 11, 2016

RFI RESPONSES:

1. **QUESTION:** Detail 7 on sheet S511 shows the exterior masonry wall, the wall above door 006 and a third wall in 2'-5 7/8'' inside of that in corridor 6. Is this third wall shown a mistake on the drawing?
   ANSWER: See attached Structural Sketch and SK-A.3

2. **QUESTION:** Detail 1 & 2 on sheet A2.1 show the existing exterior walls being demolished at the side entry of corridor 109A, and the exterior wall of classroom 108A for the new operable partition. Please provide details for the heads and jambs at these two locations so that we can quantify the amount of patching required and what the finishes will be.
   ANSWER: See attached Sketch SK-A.1, SK-A.4, and SK-A.5

3. **QUESTION:** Detail 3 on sheet A4.3 shows the existing window in break room 101B being removed from the exterior wall. Detail 5 on sheet A4.3 shows the masonry opening not being in filled, but it appears that sheet S102 has masonry at this location. Will this opening be required to be in filled with masonry?
   ANSWER: This opening will NOT be infilled with masonry.

4. **QUESTION:** Sheet CE-01 is listed in the drawing schedule but was not included in the plan set. Please advise or provide the sheet.
   ANSWER: See attached.

5. **QUESTION:** There is No detail for the retaining wall shown adjacent to the sidewalk on Sheets CC-04. Please provide.
   ANSWER: See attached.

6. **QUESTION:** The aluminum window specified is a “Kawneer” 8225TL 2 1/4" Deep window. The details on 6.1 show a window that is over 4” Deep and it is not a 8225T. Please verify.
   ANSWER: Basis of design is Kawneer 8225TL. Contractor to furnish and install all necessary strap anchors, receptors, sub sills, snap trim, and closure components as necessary to install window accordingly in a finished opening.

7. **QUESTION:** Do you want screens with the operable windows ?
   ANSWER: Yes

8. **QUESTION:** The 08800 glazing spec does not have any insulated glass types. Please Provide.
   ANSWER: See attached.

9. **QUESTION:** Can you provide a detail for the new masonry / existing masonry intersection. Is there an expansion joint required? Please provide details.
   ANSWER: See attached Sketch SK-A.2

SUBSTITUTIONS:

1. Substitution request by Penn lighting for fixtures A, B, C, D, EX/EM, is accepted provided warrantee is extended to 10 years for fixtures A and B. Fixture EM not accepted due to insufficient lumens.

REVISIONS TO SPECIFICATIONS MANUAL:

1. Specification Section 23 81 29 – Variable Refrigerant Volume (VRV, VRF) – Add Samsung to the list of approved manufacturers for the project.
2. Specification Section 22 10 05 - Plumbing Piping – Section revised and attached.
3. Specification Section 23 31 00 - HVAC Ducts And Casings – Section revised and attached.
4. Specification Section 08 80 00 - Glazing – Section revised and attached.
5. Specification Section 08 39 00 – Watertight Doors – Section revised and attached.

REVISIONS TO DRAWINGS:

1. Sheet CE-01 – New Sheet attached
2. Sheet CE-04 – Sheet to be eliminated
3. Sheet CC-01 – New Sheet attached - Removed Filter Strip
4. Sheet CC-02 – New Sheet attached - Removed Filter Strip Detail and added detail for Retaining Wall
5. Sheet CC-03 – New Sheet attached - Removed Filter Strip and reference to mill and overlay of access drive
6. Sheet CC-04 – New Sheet attached - Removed Filter Strip and grading in access drive

END OF ADDENDUM #1

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 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.

STUDIO JAED

HEADQUARTERS
2500 WRANGLE HILL ROAD
FOX RUN OFFICE PLAZA, SUITE 110
BEAR, DE 19701

302.832.1652 PHONE
302.832.1423 FAX

ARCHITECTS ENGINEERS FACILITIES SOLUTIONS

Project: State of Delaware – MC1002000282
NCC Fire School Training Center Addition
Project No.: 14063

Pre-Bid Meeting
March 1, 2016

SIGN IN SHEET

ATTACH BUSINESS CARD *or* WRITE: Name, Firm, Phone, Email

ModernControls
Mechanical and Control Systems

Chase Lockard
Sales Engineer

Cell (302) 723-5826
clockard@moderncontrols.com

7 Bellecor Drive
New Castle, DE 19720
Phone (302) 325 6800
www.moderncontrols.com

Mason Building Group Inc.
Interior Construction
35 Albe Drive
Newark, DE 19702

WAYNE M. BELLAMY

Office (302) 292-0600
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Mobile (302) 293-8514
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Name: Larry Bathon
Firm: L C Batton Builders
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WBE Certified

WAYNE BELLAMY

Thomas BUILDING GROUP, INC.

35 Albe Drive • Newark, Delaware 19702

Office (302) 283-0600
Fax (302) 283-0610

Cell (302) 293-8514
wbellamy@tbgde.com

Name:
Firm:
Phone:
Fax:
Email:
Name:
Firm:
Phone:
Fax:
Email:
Name: Brian Smith
Firm: BSS Contractors
Phone: (610) 345-1316
Fax: (610) 345-1318
Email: bsmith@bsscontractor.com

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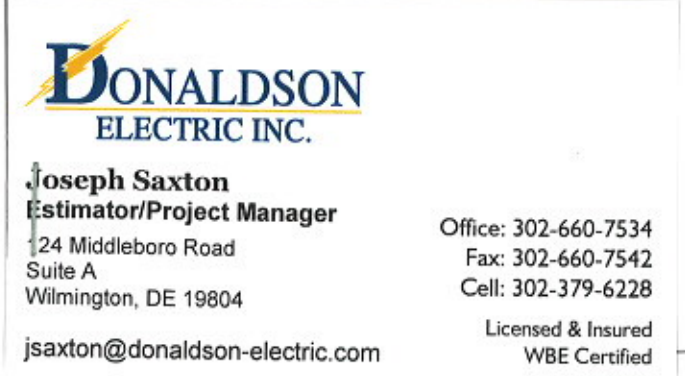

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danny@phb-inc.com cell 302-420-7004

DANNY BURRIS
PRESIDENT

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302-378-9693

157 E main st
elkton, MD 21297

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georgetown, DE 19947
302-855-1034

www.ventrescabros.com

Phone (302) 658-6436
FAX (302) 658-2360

VENTRESCA BROS. INC.

GENERAL CONTRACTORS AND BUILDERS

2300 N. DuPont Highway • New Castle, DE 19720

JOANNA VENTRESCA
Financial Controller

302-275-0122 Cell
joanna@ventrescabros.com

COMMONWEALTH CONSTRUCTION COMPANY

DAVE McCARTHY

Post Office Box 918
Wilmington, Delaware 19899
(302) 654-6611 Fax (302) 654-2604
E-Mail: dmccarthy@itscommonwealth.com

Name:	
Firm:	
Phone:	
Fax:	
Email:	
Name:	
Firm:	
Phone:	
Fax:	
Email:	
Name:	DAVE MCCARTHY
Firm:	COMMONWEALTH CONST. CO.
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DELCOLLO ELECTRIC INC.
226 Brookside Drive
Boxwood Industrial Park
Wilmington Del 19804

Expert Electrical and Electronic Security Systems
Since 1975

Wayne D. Comegys
Estimator
Project Manager

994-3400 ext. 105
wayne@delcollo.com
www.delcollo.com
Fax 995-1023

Name: Matt Bailey
Firm: Power Plus Electrical Contracting, Inc.
Phone: 302 736-5070
Fax: 302 736-5120
Email: Matt b337@gmail.com

Name: WAYNE COMEGYS
Firm: DELCOLLO ELECT
Phone: 302-994-3400
Fax: 302-995-1023
Email: WWAYNE@DELCOLLO.COM

Name: Greg Baffone Baffone
Firm: Murphy Steel Inc
Phone: 302-366-8676
Fax: 302 366-0984
Email: GREG@Murphy Steel.com

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Name: Tony Orgo
Firm: Deldeo Builders
Phone: 302-791-0243
Fax: 302-791-0245
Email: loudeldeo@comcast.net

Name: Ryan Kelly
Firm: Advantech
Phone: 302-674-8405
Fax: 302-674-3698
Email: RyanK@advantechsecurity.net

Name: GREGORY RITTER
Firm: WHITING-TURNER
Phone: (302) 292-0676
Fax:
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	Name: Mark DeVore - OMB Firm: 302-739-5644 Phone: mark.devore@state.de.us Fax: Email:
	Name: John Dunham - OMB Firm: 302-744-1185 Phone: John.dunham@state.de.us Fax: Email:
Architects • Engineers • Facilities Solutions STUDIO JAED **Philip R. Conte**, AIA, NCARB *Principal / Project Manager* Delaware: 302-832-1652 Maryland: 410-928-5000 Rhode Island: 401-648-0884 Cell: 302-353-0653 contep@studiojaed.com www.studiojaed.com	Name: Firm: Phone: Fax: Email:

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John Hiott
Refrigeration & Air Conditioning, Inc.
"Better Business Though Better Service"

Lisa Hiott Case
Vice President

9166 Willow Grove Rd.
Wyoming, DE 19934
Phone: 302-697-3050
LisaHiott@HiottHVACR.com

Office of Minority & Women Business Enterprise
OMWBE
State of Delaware OMWBE Vendor

Name:	Stacey Bush
Firm:	Amakor, Inc
Phone:	302 834-8664
Fax:	8681
Email:	Amakor@aol.com
Name:	Michael Helm
Firm:	Radius Systems
Phone:	610 388 9940
Fax:	610 388 9945
Email:	MHelm@RadiusSystemsLLC.com
Name:	
Firm:	
Phone:	
Fax:	
Email:	

New Castle County Fire School Training Center Addition
New Castle,
Delaware
CONTRACT # MC 1002000282

BID FORM

For Bids Due: (DATE) **To:** State of Delaware
Office of Management and Budget / DFM

Name of Bidder: _____

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

(Other License Nos.): _____

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:

$_____
($)

ALTERNATES

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.

ADD ALTERNATE #1 All labor and material to completely furnish and install modifications and renovations to the Break Room as indicated on the drawings and in the specifications.

$_____
($)

ADD ALTERNATE #2 All labor and material to completely furnish and install renovations to the Handicap Ramp as indicated on the drawings and in the specifications.

$_____
($)

ADD ALTERNATE #3 All labor and material to provide an arc flash assessment of the facility.

$_____
($)

ADD ALTERNATE #4 All labor and material to provide additional flooring scope of work in Exist Corridor 109A, Exist. Vest 100A, and Exist Vending 101A

$_____
($)

New Castle County Fire School Training Center Addition
New Castle,
Delaware
CONTRACT # MC 1002000282

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:

	ADD	**DEDUCT**
UNIT PRICE No. 1: None	$ _____	$ _____

ALLOWANCES

The following allowance is set aside for unpredicted scope on the project, to be verified and billed as the project conditions dictate:

ALLOWANCE #1: $10,000

New Castle County Fire School Training Center Addition
New Castle,
Delaware
CONTRACT # MC 1002000282

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:** _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

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

New Castle County Fire School Training Center Addition
New Castle,
Delaware
CONTRACT # MC 1002000282

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.**

Subcontractor Category	Subcontractor	Address (City & State)	Subcontractors tax payer ID # or Delaware Business license #
1. DEMOLITION			
2. SITE WORK			
3. MASONRY			
4. CONCRETE			
5. ROOFING			
6. STRUCTURAL STEEL			
7. PAINTING			
8. FLOORING			
9. ELECTRICAL			
10. MECHANICAL			
11. PLUMBING			
12. SPRINKLER			
13. BUILDING AUTOMATION SYSTEMS			

New Castle County Fire School Training Center Addition
New Castle,
Delaware
CONTRACT # MC 1002000282

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.

New Castle County Fire School Training Center Addition
New Castle,
Delaware
CONTRACT # MC 1002000282

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 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 23 31 00
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Nonmetal ductwork.

C. Duct cleaning.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 09 90 00 - Painting and Coating: Weld priming, weather resistant, paint or coating.

C. Section 11 40 00 - Foodservice Equipment: Supply of kitchen range hoods for placement by this Section.

D. Section 23 07 13 - Duct Insulation: External insulation and duct liner.

E. Section 23 33 00 - Air Duct Accessories.

F. Section 23 36 00 - Air Terminal Units.

G. Section 23 37 00 - Air Outlets and Inlets.

H. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low-Alloy With Improved Formability, and Ultra-High Strength

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

G. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric].

H. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.

I. ASTM C14M - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe [Metric].

J. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

K. ASTM C443M - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).

L. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association.

M. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems; National Fire Protection Association.

N. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; National Fire Protection Association.

O. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association.

P. SMACNA (DCS) - HVAC Duct Construction Standards.

Q. SMACNA (FGD) - Fibrous Glass Duct Construction Standards; Sheet Metal and Air Conditioning Contractors' National Association.

R. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Underwriters Laboratories Inc..

1.04 PERFORMANCE REQUIREMENTS

A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for duct materials and duct connections.

C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for all systems.

D. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.

E. Manufacturer's Certificate: Certify that installation of glass fiber ductwork meet or exceed recommended fabrication and installation requirements.

F. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum five years of documented experience.

1.07 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96 standards.

1.08 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.

B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.

C. Insulated Flexible Ducts:
   1. Two ply vinyl film supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.
      a. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
      b. Maximum Velocity: 4000 fpm.
      c. Temperature Range: -10 degrees F to 160 degrees F.

D. All Concealed Ducts: Galvanized steel, unless otherwise indicated.

E. Low Pressure Supply (Heating Systems): 1/2 inch w.g. pressure class, galvanized steel.

F. Low Pressure Supply (System with Cooling Coils): 1/2 inch w.g. pressure class, galvanized steel.

G. Return and Relief: 1/2 inch w.g. pressure class, galvanized steel.

H. General Exhaust: 1/2 inch w.g. pressure class, galvanized steel.

I. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
   1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
   2. VOC Content: Not more than 250 g/L, excluding water.

J. Outside Air Intake: 1/2 inch w.g. pressure class, galvanized steel.

K. Hanger Rod: ASTM A 36/A 36M; steel; threaded both ends, threaded one end, or continuously threaded.

2.03 METAL DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards, International Energy Conservation Code 2012 sealing requirements, and as indicated.

B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide turning vanes. .

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

E. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA HVAC Duct Construction Standards.

F. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.

G. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

H. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.04 MANUFACTURED DUCTWORK AND FITTINGS

A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages,reinforcing, and sealing for operating pressures indicated.

B. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
   1. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
   2. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
   3. Maximum Velocity: 4000 fpm.
   4. Temperature Range: -10 degrees F to 160 degrees F.

C. Transverse Duct Connection System: SMACNA "J" rated rigidly class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips.
   1. Manufacturers:

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA HVAC Duct Construction Standards.

B. Install in accordance with manufacturer's instructions.

C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

E. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

F. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

H. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.

I. Use double nuts and lock washers on threaded rod supports.

J. Tape joints of PVC coated metal ductwork with PVC tape.

K. Connect terminal units to supply ducts with one foot maximum length of flexible duct. Do not use flexible duct to change direction.

L. Connect diffusers or light troffer boots to low pressure ducts with 5 feet maximum length of flexible duct held in place with strap or clamp.

M. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

N. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.

O. Use stainless steel for ductwork exposed to view and stainless steel or carbon steel for ducts where concealed.

P. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

Q. At exterior wall louvers, seal duct to louver frame and install blank-out panels as required.

3.02 CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

3.03 SCHEDULES

A. Ductwork Material:
   1. Low Pressure Supply (Heating Systems): Steel, Aluminum
   2. Low Pressure Supply (System with Cooling Coils): Steel, Aluminum
   3. Return and Relief: Steel, Aluminum.
   4. General Exhaust: Steel, Aluminum.
   5. Outside Air Intake: Steel, Aluminum.
   6. Exposed round ductwork in all areas: Double-walled spiral, unless otherwise noted on drawings.

B. Ductwork Pressure Class:
   1. Supply (Heating Systems): 1 inch
   2. Supply (System with Cooling Coils): 2 inch.
   3. Return and Relief: 1 inch.
   4. General Exhaust: 1 inch.
   5. Outside Air Intake: 1 inch.

END OF SECTION

SECTION 22 10 05
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, valves, and connections for piping systems.
   1. Sanitary sewer.
   2. Domestic water.
   3. Storm water.
   4. Gas.
   5. Flanges, unions, and couplings.
   6. Pipe hangers and supports.
   7. Valves.
   8. Strainers.
   9. Equipment Drains and Overflows

1.02 RELATED REQUIREMENTS

A. Section 31 23 16 - Excavation.

B. Section 31 23 23 - Fill.

C. Section 31 23 16.13 - Trenching.

D. Section 33 13 00 - Disinfecting of Water Utility Distribution.

E. Section 07 84 00 - Firestopping.

F. Section 08 31 00 - Access Doors and Panels.

G. Section 09 90 00 - Painting and Coating.221005

H. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping.

I. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

J. Section 22 07 19 - Plumbing Piping Insulation.

K. Section 26 27 17 - Equipment Wiring: Electrical characteristics and wiring connections.

L. Section 33 13 00 - Disinfecting of Water Utility Distribution.

1.03 REFERENCE STANDARDS

A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.

B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; The American Society of Mechanical Engineers.

C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; The American Society of Mechanical Engineers.

D. ASME B16.4 - Gray Iron Threaded Fittings; The American Society of Mechanical Engineers.

E. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers (ANSI B16.18).

F. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers.

G. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV; The American Society of Mechanical Engineers.

H. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; The American Society of Mechanical Engineers.

I. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV; The American Society of Mechanical Engineers.

J. ASME B31.1 - Power Piping; The American Society of Mechanical Engineers (ANSI/ASME B31.1).

K. ASME B31.2 - Fuel Gas Piping; The American Society of Mechanical Engineers.

L. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers (ANSI/ASME B31.9).

M. ASME (BPV IV) - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; The American Society of Mechanical Engineers.

N. ASME (BPV IX) - Boiler and Pressure Vessel Code, Section IX - Welding and Brazing Qualifications; The American Society of Mechanical Engineers.

O. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.

P. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

Q. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.

R. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

S. ASTM B32 - Standard Specification for Solder Metal.

T. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.

U. ASTM B43 - Standard Specification for Seamless Red Brass Pipe, Standard Sizes.

V. ASTM B68/B68M - Standard Specification for Seamless Copper Tube, Bright Annealed.

W. ASTM B68M - Standard Specification for Seamless Copper Tube, Bright Annealed (Metric).

X. ASTM B75/B75M - Standard Specification for Seamless Copper Tube.

Y. ASTM B75M - Standard Specification for Seamless Copper Tube (Metric).

Z. ASTM B88 - Standard Specification for Seamless Copper Water Tube.

AA. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric).

AB. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

AC. ASTM B302 - Standard Specification for Threadless Copper Pipe, Standard Sizes.

AD. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV).

AE. ASTM C4 - Standard Specification for Clay Drain Tile and Perforated Clay Drain Tile.

AF. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.

AG. ASTM C14M - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe [Metric].

AH. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

AI. ASTM C76M - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric).

AJ. ASTM C425 - Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.

AK. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

AL. ASTM C443M - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).

AM. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

AN. ASTM C700 - Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.

AO. ASTM C1053 - Standard Specification for Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications.

AP. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

AQ. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.

AR. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.

AS. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

AT. ASTM D2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter; 2003.

AU. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

AV. ASTM D2513 - Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings.

AW. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.

AX. ASTM D2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.

AY. ASTM D2661 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.

AZ. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

BA. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping.

BB. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.

BC. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

BD. ASTM D2751 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.

BE. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems.

BF. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.

BG. ASTM D2996 - Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.

BH. ASTM D2997 - Standard Specification for Centrifugally Cast "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.

BI. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

BJ. ASTM D3262 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.

BK. ASTM D3517 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe.

BL. ASTM D3754 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer and Industrial Pressure Pipe.

BM. ASTM D3840 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Fittings for Nonpressure Applications.

BN. ASTM F437 - Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

BO. ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.

BP. ASTM F439 - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

BQ. ASTM F441/F441M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.

BR. ASTM F442/F442M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR).

BS. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

BT. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.

BU. ASTM F628 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe with a Cellular Core.

BV. ASTM F679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.

BW. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

BX. ASTM F1281 - Standard Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe.

BY. ASTM F1282 - Standard Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe.

BZ. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society.

CA. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association (ANSI/AWWA C105/A21.5).

CB. AWWA C110/A21.10 - American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (75 mm Through 1200 mm), for Water and Other Liquids; American Water Works Association.

CC. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association (ANSI/AWWA C111/A21.11).

CD. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association (ANSI/AWWA C151/A21.51).

CE. AWWA C651 - Disinfecting Water Mains; American Water Works Association (ANSI/AWWA C651).

CF. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution; American Water Works Association (ANSI/AWWA C900).

CG. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service; American Water Works Association.

CH. AWWA C950 - Fiberglass Pressure Pipe; American Water Works Association (ANSI/AWWA C950).

CI. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; Cast Iron Soil Pipe Institute.

CJ. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; Cast Iron Soil Pipe Institute

CK. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..

CL. MSS SP-67 - Butterfly Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..

CM. MSS SP-69 - Pipe Hangers and Supports - Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..

CN. MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..

CO. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..

CP. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..

CQ. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..

CR. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..

CS. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..

CT. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..

CU. NFPA 54 - National Fuel Gas Code; National Fire Protection Association.

CV. NFPA 58 - Liquefied Petroleum Gas Code; National Fire Protection Association.

1.04 SUBMITTALS

A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

B. Project Record Documents: Record actual locations of valves.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with local standards.
   1. Maintain one copy on project site.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.

D. Welder Qualifications: Certified in accordance with ASME (BPV IX).

E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 REGULATORY REQUIREMENTS

A. Perform Work in accordance with local plumbing code.

B. Conform to applicable code for installation of backflow prevention devices.

C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.07 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.

1.08 FIELD CONDITIONS

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

1.09 EXTRA MATERIALS

A. Provide two repacking kits for each size valve.

PART 2 PRODUCTS

2.01 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

B. PVC Pipe: ASTM D 3034 SDR 35. As permitted by code.
   1. Fittings: PVC.
   2. Joints: Push-on, using ASTM F477 elastomeric gaskets.

C. PVC Pipe: ASTM D 2665 or ASTM D 3034. As permitted by code.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.
   1. Fittings: Cast iron.
   2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hubless.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.

2.03 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.

1. Fittings: Cast iron.
2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. PVC Pipe: ASTM D1785 Schedule 40, or ASTM D2241 SDR 26 for not less than 150 psi pressure rating.
1. Fittings: ASTM D2466, PVC.
2. Joints: Solvent welded, with ASTM D2564 Solvent cement. Low VOC compliant (LEED).

2.04 WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
2. Viega, ProPress Fittings: Bronze or copper shall conform to ASME B16.51, IAPMO PS117, ICC LC1002 and NSF 61, NSF 61-G and NSF 372.
a. ProPress fittings 1/2-inch thru 4-inch for use with ASTM B88 copper tube type K, L, or M and 1/2-inch up to include 1-1/4-inch annealed copper tube. ProPress fittings shall have an EPDM sealing element and Smart Connect (SC) feature. 2-1/2-inch thru 4-inch shall have a 420 stainless steel grip ring, PBT separator ring, EPDM sealing element and Smart Connect (SC) feature.
3. Joints: ASTM B32, alloy Sn95 solder.

2.05 STORM WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.
1. Fittings: Cast iron.
2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

B. Concrete Pipe: Nonreinforced, ASTM C14 (ASTM C14M) Class 1.
1. Fittings: Concrete, as specified for pipe.
2. Joints: Elastomeric gaskets; ASTM C443 (ASTM C443M).

C. PVC Pipe: ASTM D2665 or ASTM D3034.
1. Fittings: PVC.
2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.06 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.
1. Fittings: Cast iron.
2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.
1. Fittings: Cast iron.
2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. PVC Pipe: ASTM D2665 or ASTM D3034.
1. Fittings: PVC.
2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.07 STORM WATER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74 service weight.
1. Fittings: Cast iron.
2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.
1. Fittings: Cast iron.
2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. PVC Pipe: ASTM D2665 or ASTM D3034.
1. Fittings: PVC.
2. Joints: Solvent welded, with ASTM D2564 solvent cement. Low VOC compliant (LEED).

2.08 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
   2. Joints: NFPA 54, threaded or welded to ASME B31.1 or ASME B31.9.

2.09 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches and Under:
   1. Ferrous pipe: Class 150 malleable iron threaded unions.
   2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Flanges for Pipe Size Over 1 Inch:
   1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
   2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Grooved and Shouldered Pipe End Couplings:
   1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
   2. Sealing gasket: "C" shape composition sealing gasket.

D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.10 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.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.

B. Plumbing Piping - Drain, Waste, and Vent:
   1. Conform to ASME B31.9.
   2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
   7. Vertical Support: Steel riser clamp.
   8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:
   1. Conform to ASME B31.9.
   2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
   5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.

6. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
11. Vertical Support: Steel riser clamp.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.11 BALL VALVES

A. Manufacturers:
   1. Conbraco Industries: www.conbraco.com.
   2. Nibco, Inc: www.nibco.com.
   3. Milwaukee Valve Company: www.milwaukeevalve.com.

B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder ends with union.

2.12 STRAINERS

A. Manufacturers:
   1. Armstrong International, Inc: www.armstronginternational.com.
   2. Green Country Filter Manufacturing: www.greencountryfilter.com.
   3. WEAMCO: www.weamco.com.

B. Size 2 inch and Under:
   1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
   2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

C. Size 1-1/2 inch to 4 inch:
   1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

D. Size 5 inch and Larger:
   1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

2.13 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. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

B. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.

1. Fittings: ASTM D2466 or D2467, PVC.
2. Joints: Solvent welded in accordance with ASTM D2855.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 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 with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 16.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 19.

H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 31 00.

I. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover.

J. Install vent piping penetrating roofed areas to maintain integrity of roof assembly .

K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

L. Provide support for utility meters in accordance with requirements of utility companies.

M. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 90 00.

N. Excavate in accordance with Section 31 23 16.

O. Backfill in accordance with Section 31 23 23.

P. Install bell and spigot pipe with bell end upstream.

Q. Install valves with stems upright or horizontal, not inverted.

R. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.

S. Install water piping to ASME B31.9.

T. Install fuel oil piping to ASME B31.9.

U. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

V. Sleeve pipes passing through partitions, walls and floors.

W. In all kitchen/cooking areas, any piping that is run exposed along walls shall maintain at least a 1" gap to the walls to allow for cleaning per codes.

X. Inserts:
   1. Provide inserts for placement in concrete formwork.

2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

Y. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.9.
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 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. Provide copper plated hangers and supports for copper piping.
9. Prime coat exposed steel hangers and supports. Refer to Section 09 90 00. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
10. Provide hangers adjacent to motor driven equipment with vibration isolation; refer to Section 22 05 48.
11. Support cast iron drainage piping at every joint.

Z. Viega, ProPress Fittings:
1. Viega, ProPress bronze, or copper fittings: Tube ends shall be cut on a right angle (square) to the tube. Tube ends shall be reamed and chamfered, all grease, oil or dirt shall be removed from the tube end with a clean rag. Visually examine the fitting sealing element to insure there is no damage, and it is properly seated into the fitting. Insert tube fully into the fitting. Make a mark with a felt tip pen on the tube wall at the face of the fitting. Always examine the tube to insure it is fully inserted into the fitting prioer to pressing the joint. ProPress fittings 1/2-inch thru 4-inch shall be joined using Ridgid ProPress Tools. 2-1/2-inch thru 4-inch ProPress copper fittings shall utilize Ridgid ProPress XLC Rings. ProPress fittings shall be installed according to the most current edition of the Viega installation guidelines. Installers shall attend a Viega ProPress installation training class. Sealing elements shall be verified for the intended use.
2. Testing: After ProPress fittings have been installed a "step test" shall be followed. Pressurize the system with air, or dry nitrogen between 0.5 psi and 45 psi, or with water between 15 psi and 85 psi. Check the pressure gauge for pressure loss. If the system does not hold pressure, walk the system and check for un-pressed fittings. When you identify the un-pressed fitting/s insure the pipe is fully inserted into the fitting and press the fitting. After appropriate repairs have been made, retest the system per local code or specification requirements.

3.04 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.

B. Install unions downstream of valves and at equipment or apparatus connections.

C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

D. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

E. Install globe valves for throttling, bypass, or manual flow control services.

F. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.

G. Provide spring loaded check valves on discharge of water pumps.

H. Provide plug valves in natural gas systems for shut-off service.

I. Provide flow controls in water recirculating systems where indicated.

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfect water distribution system in accordance with Section 33 13 00.

B. Prior to starting work, verify system is complete, flushed and clean.

C. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

F. Maintain disinfectant in system for 24 hours.

G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.07 SERVICE CONNECTIONS

A. Provide new sanitary and storm sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve .
   1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.
   2. Provide 18 gage galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

C. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 7 inch wg. Provide regulators on each line serving gravity type appliances, sized in accordance with equipment.

3.08 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe size: 1/2 inches to 1-1/4 inches:
         1) Maximum hanger spacing: 6.5 ft.

2) Hanger rod diameter: 3/8 inches.

b. Pipe size: 1-1/2 inches to 2 inches:
   1) Maximum hanger spacing: 10 ft.
   2) Hanger rod diameter: 3/8 inch.
c. Pipe size: 2-1/2 inches to 3 inches:
   1) Maximum hanger spacing: 10 ft.
   2) Hanger rod diameter: 1/2 inch.
d. Pipe size: 4 inches to 6 inches:
   1) Maximum hanger spacing: 10 ft.
   2) Hanger rod diameter: 5/8 inch.
e. Pipe size: 8 inches to 12 inches:
   1) Maximum hanger spacing: 14 ft.
   2) Hanger rod diameter: 7/8 inch.
f. Pipe size: 14 inches and Over:
   1) Maximum hanger spacing: 20 ft.
   2) Hanger rod diameter: 1 inch.

2. Plastic Piping:
   a. Pipe Size 1" to 6":
      1) Maximum hanger spacing: 6 ft.
      2) Hanger rod diameter: 3/8 inch.
   b. Pipe Size 8" and Over:
      1) Maximum hanger spacing: 6 ft.
      2) Hanger rod diameter: 7/8 inch.

END OF SECTION

SECTION 08 39 00
WATERTIGHT DOORS

Part 1. GENERAL

1.1 SECTION INCLUDES

A. Lift-out Flood Barrier with frame and hardware.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-In-Place Concrete.

B. Section 04 81 00 - Unit Masonry Assemblies.

1.3 REFERENCES

A. ASTM A 36 - Standard Specification for Carbon Structural Steel.

B. ASTM A 167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

C. ASTM A 276 - Standard Specification for Stainless Steel Bars and Shapes.

D. ASTM B 26 - Standard Specification for Aluminum-Alloy Sand Castings.

E. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

F. ASTM B 211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.

G. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

H. AISI CL 304 - American Iron and Steel Institute.

I. Aluminum Association - Specification for Aluminum Structures, 7th Edition.

J. ASME Structural Welding Code Section IX.

K. FEMA #114 - Engineering Principles and Practices of Retrofitting Flood-Prone Residential Structures.

L. FEMA Technical Bulletin 3-93 - Non-Residential Flood Proofing.

M. SEI/ASCE 7-02 - Minimum Design Loads for Buildings and Other Structures.

N. AWS D1.1 - Structural Welding Code - Steel.

O. AWS D1.2 - Structural Welding Code - Aluminum.

P. Aluminum Structures - A Guide to Their Specifications and Design.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Design watertight doors to perform under hydrostatic loads (and hydrodynamic or other loads as specified) to control short-term load pressures indicated. All water pressure loads and operating loads are transferred to the building structure.

B. Standard loading: Standard Flood Barriers are designed for hydrostatic loading, and have no additional allowances included for hydrodynamic loads, wave loads or debris impact loads.

C. Special loading: Design Flood Barriers for hydrodynamic loads, wave loads, debris impact loads, or other uniform loads as indicated.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   (1) Preparation instructions and recommendations.
   (2) Storage and handling requirements and recommendations.
   (3) Installation instructions.

C. Shop Drawings: Provide shop drawings showing layout, profiles, and product components, including anchorage, hardware, and finishes. Include dimensional plans, applicable material specifications, elevations and sections detailing mounting and connections, and load diagrams.

D. Calculations: Submit calculations approved by a qualified engineer, to verify the flood barrier's ability to withstand the design loading.

E. Closeout Submittals: Provide Operation and Maintenance data to include methods for maintaining installed products, precautions against cleaning materials and methods detrimental to finishes and performance.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer must demonstrate a minimum of five years successful experience in design and manufacture of similar flood related closures. Upon request, provide supporting evidence including list of installations, descriptions, name and method of contact.

B. Welder Qualifications: Welders Certified in accordance with American Welding Society Procedures: AWS-1-GMAW-S, WPS No. B2.004.90 for applicable material used in production of specified product.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging container with identification labels intact until ready for installation.

B. Protect materials from exposure to moisture.

C. Store materials in a dry, warm, ventilated weathertight location. If outdoor storage is required, block materials to store at an incline, to prevent pooling of any moisture and promote runoff. Tarp materials in a tent-like arrangement, elevated above the product with open sides to allow airflow. Store all other hardware in a dry controlled environment.

D. Use caution when unloading and handling product to avoid bending, denting, crushing, or other damage to the product.

E. When using forklifts, use forks of proper length to fully support product being moved. Consult shop drawings or consult with factory for proper lift points.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 COORDINATION

A. Coordinate Work with other operations and installation of adjacent materials to avoid damage.

Part 2. PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: PS DOORS, which is located at: 1150 S. 48th Street, Grand Forks, ND 58201; Toll Free Tel: 877-446-1519; Tel: 701-746-4519; Fax: 701-746-8340; Email: 4info@psdoors.com; Web: www.flooddoors.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

D. Obtain all watertight doors and flood barriers assemblies from single manufacturer.

2.2 EQUIPMENT

A. Watertight Doors: Provide the following doors:
   (1) Lift-Out Flood Barrier: PS Doors Model LO-510.
B. Products Details:
   (1) Sealing Requirements: Flood Barrier and gasket design shall provide an effective barrier against short-term high water situations, to the protection level indicated on Drawings.
   (2) Operation: Provide with latching operable from one side only (typical).
   (3) Mounting/Load Transfer: Anchor to existing structure. Flood Barrier designed for specified hydrostatic pressure (and other loads as specified) and will transfer loads to adjacent structure.
   (4) Frames to be cast-in-place or anchored utilizing mechanical, chemical or other anchor types as designed. Manufacturer to include all anchors, water-stop, and sealants, as designed.
   (5) Loading Direction Selection:

a) Standard: Positive Pressure Loading: (Direction of loading against flood barrier so as to further compress gaskets against flood barrier frame- "seating").

(6) Provide rectangular door opening with square corners to facilitate easy passage.

(7) Provide compression gasket which requires no inflation.

2.3 MATERIALS

A. Flood Barrier:

(1) Steel: Structural or formed steel shapes conforming to ASTM A 36; tubing conforming to ASTM A 500 Grade B, ASTM A 513; bars conforming to ASTM A 36, M1020; of appropriate size and strength with welded construction.

B. Panel Sheeting: Flood Barrier to be sheeted with steel sheeting or plate, Commercial Quality-Low Carbon ASTM-A-569, ASTM-A-366, ASTM-A-36 welded in place. Optional

(1) Steel: Commercial Quality-Low Carbon steel conforming to ASTM A 569, ASTM A 366, ASTM A 36; of appropriate size and strength with welded construction.

C. Gaskets to be factory mounted to flood barrier assembly. Gaskets to be compressible rubber type, typically EPDM unless otherwise noted, and to be field replaceable.

D. Frame to include jamb, and sill members for field locating and installation on structure. Jamb members to be designed and fabricated with appropriate material as required for the loading.

(1) Steel: Structural or formed steel shapes conforming to ASTM A 36 of appropriate size and strength with welded construction.

E. Threshold:

(1) Aluminum: 6063 alloy conforming to ASTM B 26.

F. Frame Mounting Hardware: Provide anchors, sealant, and water stop, as required.

G. Operating Hardware: Provide hardware sized for the size and weight of the flood barrier and loads. Hardware to be factory located on jambs and barrier panels, as practical. All loads are transferred to building structure. Latching hardware to be as indicated on Drawings. Flood barrier panel to be factory prepared for applicable latching devices.

H. Steel Shop Finish: Apply in accordance with manufacturer recommendations and instructions.

(1) Primer: One shop coat of manufacturer's standard shop primer (S-W Kemflash Primer E61-R-26).

(2) Finish: Two shop coats of Standard Industrial Enamel (S-W Industrial and Marine Coatings B54 Series)

I. Labeling. Each watertight door and frame will be individually identified for matched installation.

J. Instruction Placard: Provide pictorial and written operation instruction placards on flood barrier.

2.4 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

Part 3. EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's installations instructions, approved shop drawings, shipping, handling, and storage instructions, and product carton instructions for installation.

B. Frames shall be installed level, square, plumb, and rigid.

C. Sealants, water-stop, and grouting to be applied per product application directions and in accordance with manufacturer's instructions.

D. Field Grouting to be completed by appropriate personnel, and in accordance with product application directions and manufacturer's instructions.

E. Tolerances: All dimensional requirements must be in accordance with manufacturer's installation instructions and shop drawings.

F. Field Testing:
   (1) Perform visual dry test for gasket alignment, continuity contact and pre-compression.
   (2) Construct temporary water barrier and test installed flood barrier.

3.4 FIELD QUALITY CONTROL

A. Products to be operated and field verified including the sealing surfaces to assure that they maintain contact at the correct sealing points.

B. Verify that hinging and latching assemblies operate freely and correctly.

C. Verify all anchorage is in accordance with manufacture's installation instructions and applicable data sheets.

3.5 CLEANING

A. Repair or replace damaged installed products or components.

B. Clean all sealing surfaces.

C. Touch up damaged finish.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass.

B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 90 05 - Joint Sealers: Sealant and back-up material.

B. Section 08 12 13 - Hollow Metal Frames: Glazed borrowed lites.

C. Section 08 51 13 - Aluminum Windows: Glazed windows.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.

C. ASTM C1036 - Standard Specification for Flat Glass.

D. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass.

E. ASTM C1193 - Standard Guide for Use of Joint Sealants.

F. ASTM E 773 - Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units.

G. ASTM E 774 - Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units; 1997.

H. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.

I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.

J. GANA (GM) - GANA Glazing Manual; Glass Association of North America.

K. GANA (SM) - GANA Sealant Manual; Glass Association of North America.

L. GANA (LGDG) - Laminated Glazing Reference Manual; Glass Association of North America.

M. SIGMA TM-3000 - Glazing Guidelines for Sealed Insulating Glass Units; Sealed Insulating Glass Manufacturers Association.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Samples: Submit two samples 12 x12 inch in size of glass and plastic units, showing coloration and design.

E. Certificates: Certify that products meet or exceed specified requirements.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Insulating Glass Units: One of each glass size and each glass type.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 10 years documented experience.

1.07 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

A. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

1.09 PERFORMANCE REQUIREMENTS

A. General: Provide glass capable of withstanding thermal movement and wind and impact loads (where applicable) as specified in paragraph B following.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
   1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
      a. Basic Wind Speed: 120 mph.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from ambient and surface temperatures changes acting on glass framing members and glazing components.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
   1. For monolithic-glass lites, properties are based on units with lites 1/4 inch (6.0 mm) thick.
   2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   3. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
      a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. per h per degree F.
      b. Solar Heat Gain Coefficient: NFRC 200.
      c. Solar Optical Properties: NFRC 300.

PART 2 PRODUCTS

2.01 GLAZING TYPES

2.02 BASIS OF DESIGN - INSULATING GLASS UNITS

A. Type G-1 - Sealed Insulating Glass Units: Vision glazing, low-E.
   1. Application(s): All exterior glazing unless otherwise indicated.
   2. Substitutions: Refer to Section 01 60 00 - Product Requirements.
   3. Tint: None.

4. Basis of Design: Guardian Industries Corp: www.sunguardglass.com.
5. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
   a. Coating: SunGuard SNX 62/27 on #2 surface.
   b. Tint: None (clear).
6. Inboard Lite: Fully tempered float glass, 1/4 inch thick.

B. Type G-4 - Single Vision Glazing:
1. Applications: All interior glazing unless otherwise indicated.
2. Type: Fully tempered float glass.
3. Tint: Clear.
4. Thickness: 1/4 inch.

2.03 GLASS MATERIALS

A. Float Glass Manufacturers:
1. AGC Glass Company North America, Inc: www.us.agc.com.

B. Float Glass: All glazing is to be float glass unless otherwise indicated.
1. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
2. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.

2.04 SEALED INSULATING GLASS UNITS

A. Manufacturers:
1. Any of the manufacturers specified for float glass.
2. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
3. Substitutions: Refer to Section 01 60 00 - Product Requirements.

B. Sealed Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Edge Spacers: Aluminum, bent and soldered corners.
3. Edge Seal: Glass to elastomer with supplementary silicone sealant.
4. Purge interpane space with dry hermetic air.

2.05 GLAZING COMPOUNDS

A. Manufacturers:
1. Pecora Corporation: www.pecora.com.
2. Substitutions: Refer to Section 01 60 00 - Product Requirements.

B. Glazing Putty : Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; grey color.

C. Butyl Sealant : Single component; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; Shore A hardness of 10 to 20; black color; non-skinning.

D. Acrylic Sealant : Single component, solvent curing, non-bleeding; ASTM C 920, Type S, Grade NS, Class 12-1/2, Uses M and A; cured Shore A hardness of 15 to 25; color as selected.

E. Polysulfide Sealant : Two component; chemical curing, non-sagging type; ASTM C 920, Type M, Grade NS, Class 25, Uses M, A, and G; cured Shore A hardness of 15 to 25; color as selected.

F. Polyurethane Sealant : Single component, chemical curing, non-staining, non-bleeding; Shore A Hardness Range 20 to 35; color as selected.

G. Silicone Sealant : Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C 920, Type S, Grade NS, Class 25, Uses M, A, and G; cured Shore A hardness of 15 to 25; color as selected.

2.06 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness, ASTM C 864 Option I. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.
   1. Manufacturers:
      a. Pecora Corporation: www.pecora.com.
      b. Substitutions: Refer to Section 01 60 00 - Product Requirements.

D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; black color.

E. Glazing Clips: Manufacturer's standard type.

2.07 SOURCE QUALITY CONTROL AND TESTS

A. Provide shop inspection and testing for all glass.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

E. Install sealant in accordance with manufacturer's instructions.

3.03 INSTALLATION - EXTERIOR DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Trim protruding tape edge.

3.04 MANUFACTURER'S FIELD SERVICES

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.05 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.06 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION