SECTION 01000

SCOPE OF WORK

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish all labor, tools, material, equipment, transportation, and other necessary items to satisfactorily complete this project in accordance with the specifications and drawings.

B. Contractor shall be responsible for all permits, inspections, and testing required by this contract. Work shall comply with the NFPA, local and all other federal and jurisdictional safety requirements and codes.

C. Contractor shall be required to provide a "One-for-One" replacement of the existing carbon steel fire protection pipeline sections unless otherwise indicated, with hot dipped galvanized schedule 40 steel material (See Appendix C of Section 2- Special Conditions for list of drawings) with exceptions for additional demolition and new work as indicated on contract drawings. The initial sections of piping are in Vent Shafts VG-1 and VG-4, in Fan Shafts FG-1 thru FG-4, in the Portal PG-1 at the Addison Road Metro Rail Station, adjoining inbound and outbound tunnel sections, and also dry standpipe risers associated with standpipe systems of Benning Road and Capitol Heights Metro Rail Stations as shown on drawings M-1 through M-24 and identified in terms of the chain markers on the “G” route. In addition, the tunnels, vent shafts, fan shafts, and emergency exit shafts along the lower F-Route between Gallery Place - Chinatown Metrorail station lower level platform and the Archives - Navy Memorial Metrorail station, including VF-1 and FF-1, also along the F-Route between the Anacostia Metrorail station and the Congress Heights Metrorail station, including VF-11-A and FF-6, excluding suppression systems placed in operation after 1999 located between VF-12 and Congress Heights Station. The dry standpipe system associated with Vent Shaft VC-10. The dry standpipe connected to the wet fire line system associated with Rosslyn Station routed through Vent Shaft VC-10. The L-Route sections of pipeline are between the L'Enfant Plaza Metrorail station upper level platform and the fan shaft FL-1 including the standpipe system supplied from the fan shaft and routed through tunnels up to station 85+50. The standpipe system serving the portal that is north of the Potomac River Bridge PL-1 including the associated fire department connection, underground standpipe at PL-1 and standpipe system at Ohio Drive is not included in the contract. The Potomac River Bridge fireline system is not included in the contract. Missing standpipe markers shall be furnished.
1.2 EXECUTION

D. Contractor shall be allowed to actively perform work on a maximum combination of two (2) dry standpipe branches within the tunnel sections, and/or dry standpipe risers, at the same time; with the following conditions:

1. All dry standpipe branches within the tunnel sections shall be associated with the same train rail track (inbound or outbound)

2. Dry standpipe branches within the tunnel sections cannot be adjacent to each other.

3. Dry standpipe risers cannot be associated with any dry standpipe branches within the tunnel sections where work is being performed; unless the new replacement dry standpipe riser of the shaft is being installed in a different location so that the existing riser within that particular shaft remains intact and operational during the work.

Note: A dry standpipe branch shall be defined as a continuous pipeline from an outside stem and yoke (OS&Y) gate valve at the bottom of a particular shaft that extends through a tunnel section in one direction.

4. It is the intent of the Authority to have as much of the fire dry standpipe systems as possible to remain operational while work is being performed under this contract, in order to provide a safe and reliable environment to the public. Therefore, the work being performed shall be planned, scheduled and accomplished by the contractor so that adjacent dry standpipe branches within the tunnel sections (same shaft or adjacent shafts) are operational while a specific dry standpipe branch or riser is being replaced. Whenever possible, the Contractor shall install the new replacement dry standpipe riser of a shaft (including station dry standpipe risers) in a different location than the existing riser. This will allow the fire dry standpipe branches within the tunnel sections of the shafts to remain operational while the work associated with the shaft riser is being performed. The new standpipe routing of the risers shall be approved by the Authority’s Representative (AR). The Contractor shall perform the required demolition of the existing dry standpipe riser after satisfactory results of the required hydrostatic and flow testing of the complete fire dry standpipe system of the associated shaft.

5. Under the direction of WMATA’s Office of Safety (SAFE) and the AR, the Contractor shall be permitted to remove from service an existing dry standpipe riser and branch within the tunnel sections at each shaft location where work is being performed provided all approved new materials are at
hand for installation at that particular shaft. Each dry riser and standpipe branch will remain out of service until all work associated with that particular standpipe riser and branch is completed and the Contractor proves to the satisfaction of the AR that the new dry standpipe riser and branch is operational. Method to prove that a new dry standpipe riser and branch is operational shall be developed by the Contractor and approved by the AR. The Contractor shall provide all necessary labor, material, tools, equipment, and other items to prove the operational capabilities as part of this contract. The new dry standpipe riser and branch shall be placed back into service before commencing work at another dry standpipe branch, dry standpipe riser, or station dry standpipe riser. Hydrostatic and flow testing shall be performed when an entire dry standpipe system, consisting of the dry standpipe riser and all associated dry standpipe branch, is completely replaced by the Contractor.

6. The Contractor shall take all precautions and organize work plans to minimize the time in which the entire standpipe riser will be removed from service. Work plans shall be submitted for approval by the AR and shall identify the projected time periods that the entire standpipe riser or portions will be removed from service.

E. AR or assigned escort will notify Metro Operation Control Center (M.O.C.C.) of any system taken out of service or being restored to service.

F. Particulars include, but are not limited to, the following:

1. The contractor shall submit a demolition plan for review to the AR as required:
   
a. Demolish and dispose of the fire line at the locations specified above. Use of the WMATA work trains for the disposal of demolished lines should be scheduled with the AR.
   
b. Dry-pack holes after removing concrete anchor bolts and clean area free from debris such as old fire line and associated material.
   
c. The Contractor shall be responsible for restoration of areas disturbed during construction, to the satisfaction of the AR.

2. The piping replacement starts at street level at the siamese connection for fire department access and extends down into the tunnels to the distribution system. The replacement will include hot dipped galvanized steel 6", 4" and 2-1/2" diameter schedule 40 piping in standard 21 foot lengths; Victaulic fittings or approved equal; Victaulic Style 77 couplings or approved equal; and several types of piping supports (PS) including rigid bracket, rod and clevis hanger, pipe roll guide, welded structural
anchor and "Z-bar" type with anchor bolts (see Contract Drawings). A walk-thru shall be conducted with AR to determine the location of support bars, supports, brackets to be replaced and/or relocated. All brackets, support bars, Z-bars, pipe rolls, pipe anchors and associated accessories shall be hot dipped galvanized. The Contractor shall also provide and install four inch (4") resilient wedge, epoxy coated inside out, OS&Y gate valves, 2-1/2" bronze angle hose valves (AHV), Fire Department siamese connections, and 2" kinetic slow closing cast iron automatic air valves with surge check, and 1" drain valves (gate and/or ball valves).

3. Hot dipped galvanization shall be performed after the pipe ends are cut grooved or roll grooved (to accommodate the Victaulic Style 77 or approved equal steel couplings) and after brackets (including Z-bars) are fabricated.

4. All low points shall have bronze ball drain valves assembly including ball drip valves and high points shall have automatic air valves.

5. On each horizontal run, 2-1/2" diameter angle hose valves shall be installed at 200 feet maximum intervals. Vertical runs will not have angle hose valves. One or two angle hose valves (as shown on contract drawings) shall be installed in each shaft in the vicinity of the OS&Y gate valves.

6. New piping supports shall be installed at every 10'-0", on center, on the straight runs. Anchor supports shall be used at each AHV while guide supports shall be used at other locations in the horizontal run. Anchors upon aerial spans shall be installed at expansion joints as shown with pipe roller guides supporting horizontal pipe. Rigid bracket, hanger rings and rods, and piping supports shall be replaced with same configurations as existing at the shafts, tunnels, aerial span abutments, approach ramps and support piers unless otherwise shown on the contract drawings. Concrete anchor bolts shall be made of Type 316 stainless steel material.

7. Ends of standard 21 feet lengths of pipe shall be either cut grooved or roll grooved at shop or at manufacturer's plant. Field cut grooving shall be minimized and limited to locations where piping has to be field fitted to an odd shape or turn in the vent and fan shafts.

8. All material, unless otherwise noted or shown, including pipe, nuts, bolts, pipe support brackets and hardware shall be hot dipped galvanized steel, and Siamese fire department connection shall be bronze. Thermite welding and bonding shall be provided at mechanical joint couplings. Bonding
conductor shall be #2 AWG standard copper wire with XHHW insulation.

9. Contractor shall refer to contract drawings for construction details. Specific details applicable to each and every site shall be verified by the Contractor. Contractor shall be responsible for all deviations or construction varying from the existing configuration.

10. Where required by AR, the contractor shall replace additional existing pipe supports based on unit price provided in unit price schedule.

1.3 SITE CONDITIONS

A. To avoid interference with normal rail operation, it is the responsibility of the Contractor to verify any and all pertinent site conditions, but not limited to the subject unit, including the train right-of-way and hours of operation. For work on train right-of-way, Contractor shall adhere to Section 2, article 2.15.

B. A power source is available for Contractor provided temporary lighting.

C. Unless otherwise directed by the AR due to special alternative operating train schedules (e.g.: single tracking at XX), the Contractor shall perform the work within the tunnels during the Authority's non-revenue hours and in accordance with Section 2, Article 2.1.1. Working hours in the shafts can be flexible if the work activities are a minimum of 25 feet from the right-of-way or if a permanent structure separates the work activities from the right-of-way.

1.4 GENERAL CONDITION AND PROCEDURES

A. The Contractor shall be responsible for the following:

1. Submit plans for the demolition and replacement of fire pipelines at shaft, aerial sections, surface sections and tunnel sections along “C”, “F”, “G” & “L” routes between the Tunnel Portal west of Benning Road Station and the Tunnel Portal west of Addison Road Station, also between Gallery Place - Chinatown Station and Archives - Navy Memorial Station, also between Anacostia Station and vent shaft VF-12, also between L’Enfant Plaza Station and the standpipe system at L- Route Portal north of the Potomac River Bridge and all related accessories, also included are the dry standpipe system serving metro tunnels supplied at the fire department connection at vent shaft VC-10 and the dry standpipe riser connection to the wet fireline system serving the Rosslyn Station and supplied at the fire department connection at vent shaft VC-10. Existing concrete structures shall not be modified by removing any material. When embedded channels or plates cannot be removed, they should be left in place. New anchoring devices shall be substituted to facilitate the installation of the
new supports. Caution: wet fire lines and associated accessories SHALL NOT BE REMOVED.

2. Install new piping, valves, supports and electrical bonding in accordance with contract drawings and specifications to complete the project on schedule.

3. Perform work described in Sections 13905 and 15280 of the specifications in compliance with NFPA (or UL/FM approved), ASME and applicable national and local codes.

4. Perform pipe welding with qualified welders in accordance with 05030, on aerial span structural pipe anchors as specified on drawings and where directed by AR for a specific application or situation. No other pipe welding is allowed. Thermite welding of bond straps can be performed according to the manufacturer’s directions.

5. Pressure test each completed dry standpipe system and tunnel piping in accordance with NFPA-14A at 200 psi and ensure that pressure will hold for a minimum of two hours. Flow test each completed dry standpipe system including tunnel piping in accordance with NFPA-14A at a rate of 500 gpm and 200 psi, maintain 100 psi residual pressure, with a pumper connected to the Fire Department siamese connection. The Authority reserves the right to direct the contractor to test at a later date if new dry standpipe system riser is completed during winter freezing conditions; however, the contractor shall test the new dry standpipe system riser after completion in accordance with NFPA cold weather air testing provisions.

6. Schedule work to prevent disruption of the WMATA rail system and, if required, work around WMATA rail operation.

7. Provide a training program, including a walk-through during non-revenue hours, of no less than 8 hours for maintaining the new dry standpipe systems and tunnel piping installed by the Contractor.

8. Cleanup and dispose-of job related materials and debris at the end of each working day. Obtain a written permit and releases from the owners of the property where the job related materials and debris will be dumped. WMATA shall not be responsible for the disposal of debris and all other material removed from job sites. Owners shall reserve the right of safekeeping of any and all material from the removed fire line.

9. A one year warranty from date of acceptance of pressure test for the complete dry standpipe system and tunnel piping on all labor and equipment shall be provided by the Contractor. Contractor shall be
responsible for failure of his work in accordance with the contract documents.

10. The drawings and specifications cover the extent and general arrangement of the piping system throughout shafts and track areas with regard to piping sizes and locations of valves and other specialties. The drawings do not indicate every fitting, elbow, offset, hanger, support, etc., which is necessary to complete the job. Contractor shall prepare field erection drawings as required for the use of his mechanic to ensure proper installation.

11. Clearance of the Right Of Way shall be provided by the contractors work as indicated by the Dynamic Outline Detail, Notes and Dimension Schedule in the contract documents up on the return of the Right Of Way to Non-Revenue or Revenue service. The contractor shall notify the AR of any obstruction to the Right Of Way prior to the return of the Right Of Way to service. The contractor shall accommodate WMATA “Clearance Car” ROHR where AR elects to determine Right Of Way Clearance prior to the Right Of Way return to service. The contractor shall modify any Right Of Way obstructions identified by AR prior to the Right Of Way return to service.

* * *
SECTION 02220

DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies demolition work.

B. Definitions:

1. Demolition: Complete removal and disposal of existing fire protection pipe and associated appurtenances from areas shown and specified in Scope of Work.

1.2 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications:

1. Codes and regulations of the jurisdictional authorities.

1.3 SUBMITTALS:

Submit the following for approval in accordance with the General Conditions Section 1000 and with the additional requirements as specified for each:

A. Certifications:

1. Submit copy of request to agency controlling services and appurtenances affected by demolition work for discontinuance of services.

2. Certificates of severance.

B. Documentation:

1. Demolition permit from the jurisdictional agency.

2. Permits and releases from each owner of property where demolition debris will be deposited absolving the Authority of responsibility in connection with such disposal.

1.4 JOB CONDITIONS:

A. Furnish and maintain temporary signs, barricades, required by the work and remove same upon completion of work.
B. Protection and Restoration:

1. Prevent damage to equipment, pipes, conduits, wires, cables and systems which are not designated for removal. Repair or replace damaged items.

C. Sequence:

1. Demolition work shall commence only after approved new materials are available for replacement.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 PRESERVATION OF REFERENCES:

A. Prior to removal of equipment, record location and designation of existing equipment located within project area.

3.2 EQUIPMENT DEMOLITION:

A. Coordinate scheduling of work areas and phasing of work with AR.

B. Take possession of materials and equipment indicated to be demolished.

C. Proceed with demolition of designated equipment and appurtenances.

3.3 DISPOSAL:

A. Remove debris resulting from demolition work to location outside of project site.

B. Dispose of debris off site only with permission of property owner where such debris is to be deposited and in accordance with codes and regulations of the jurisdictional authorities.

C. Do not burn debris at demolition site.

*   *   *
PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies providing miscellaneous metal.

1.2 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications:

1. Codes and regulations of the jurisdictional authorities
2. AWS: D1.1.
3. MS: MIL-C-450, MIL-P-21035.
6. AHDGA: The Design and Fabrication of Galvanized Products.

B. Qualifications of Welding Personnel:

1. Employ welders whose qualification is certified in accordance with AWS Standard D1.1. Such certification is to remain in force for the duration of the welding operations under this Contract.

1.3 SUBMITTALS:

Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:

A. Shop Drawings:

1. Include fabricated work showing details of construction and placement including hardware fittings and fastenings.
2. Manufacturer's standard drawings may be submitted in lieu of Contractor-prepared shop drawings if manufacturer's standard drawings show required details.
B. Certification:

1. Certification that welding personnel are currently qualified in accordance with AWS D1.1.

1.4. PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver products undamaged.

B. Store products so as to prevent rust.

C. Handle products so as to prevent damage.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. General Requirements:

1. Insofar as practicable, furnish similar products of a single manufacturer.

B. Steel:


2. Bolts:

   b. Stainless steel: Type 316.


C. Coatings:

1. Shop paint: FS TT-P-86, Type II, or compatible with finish coat.

2. Galvanizing (zinc coating by hot-dip process): ASTM A90, ASTM A123, ASTM A143, ASTM A153, ASTM A384 or ASTM A386, as applicable.


4. Electrodeposited zinc coating: ASTM A614, Type G3.

5. Galvanizing repair compound: Stick form, melting point 600F to 650F, GALVABAR or equal.


D. Fasteners:
1. Nails: Steel, type and size to suit the purpose.
2. Screws: Material, type and size to suit the purpose; steel, except stainless, cadmium-plated.

E. Anchoring Devices:

1. Expansion shield: FS FF-S-325 Group I, Type 2. Class 2, Style 1; Group II, Type 3, Class 1; Group IV, Type 1; best suited to the purpose.
2. Screw anchors: Lead or plastic for wood or metal screws.
3. Anchor-bolt sleeve: Corrugated high-density polyethylene plastic.

2.2 FABRICATION:

A. General Requirements:

1. Provide material that is free from mill scale, flake rust and mill pitting.
2. Items formed and finished to shapes and sizes with sharp angles and lines.
3. Metalwork bent by shearing or punching may be straightened and used if approved.
4. Fabricate and prepare products required to be galvanized in accordance with recommendations of AHDGA.
5. Exposed edges of work ground smooth. Joints exposed to weather constructed to exclude water.
6. Brackets, lugs and similar accessories, required for installation, included as a part of metal item.
7. Where miscellaneous access openings, with exception of gratings, occur in finished floor areas, include stainless-steel edge rims of depth to accommodate floor-finishing material.
8. Welding:
   a. Perform welding in accordance with AWS D1. 1.
   b. Grind welds smooth.
   c. Finish flush and grind smooth welds exposed after installation.

2.3 COATINGS:
A. General Requirements:

1. Galvanize ferrous metal unless other finish is shown or specified.

B. Galvanizing:

1. Clean ferrous metal thoroughly before applying zinc coating.
2. Apply zinc coating to products after fabrication, by hot-dip method, using coating weighing not less than 2.0 ounces per square foot.

C. Shop Paint:

1. Ferrous metal thoroughly cleaned as recommended by primer manufacturer and in accordance with SSPC and, except for items to be encased in concrete, given prime coat of paint.
2. Zinc yellow iron-oxide primer applied so as to thoroughly cover surfaces without leaving runs or sags.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Remove foreign substances from surfaces to receive metal items.

3.2 INSTALLATION:

A. Coordinate placement of metalwork with the work of other trades.

B. Provide anchors and inserts in sufficient numbers for proper fastening of metal items.

C. Provide bar anchors with turned ends extending six inches minimum into concrete and 12 inches minimum into masonry. Lay anchors flat in masonry joints.

D. Embed anchors accurately in concrete to permit aligning metalwork in proper position.

E. Set metalwork accurately, level, plumb and in true alignment with related work.
F. Drill holes in supports and in metalwork for bolts and screws as necessary. Conceal fasteners where possible.

G. For fabricated items, use fastenings and anchors of size and type shown on approved shop drawings or manufacturer's standard drawings.

H. Powder-actuated fasteners may be used for installing miscellaneous-metal products.

I. Provide lead caulking as necessary to set, seal and secure metal items.

3.3 PAINTING AND REPAIRING COATED SURFACES:

A. Where shop coat is abraded or burned by welding, clean and touch-up.

B. Touch-up primed surfaces with same material as coating.

C. Where aluminum parts come in contact with concrete or steel, coat contact surfaces of aluminum with bituminous coating.

D. Coat field welds and repair damage to zinc-coated surfaces as follows:

1. Wire-brush areas to be coated to bright metal.
2. Apply galvanizing repair compound at rate of two ounces per square foot.

* * *
SECTION 07841

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section perimeter fire containment systems and specifies through-penetration firestop systems for penetration through the following fire-resistance assemblies.
   1. Floors.
   2. Roofs.
   3. Walls and partitions.
   4. Construction enclosing compartmentalized areas.
   5. Smoke Barriers.

B. Related Work Specified Elsewhere:
   1. Division 1 Sections specifying piping penetrations.

1.2 PERFORMANCE REQUIREMENTS:

A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistant rating of assembly penetrated.
   1. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
   2. Fire-resistance-rated floor assemblies.
   3. Fire-resistance-rated floor assemblies.

B. F-Rated-Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

C. T-Rated Systems: For the following conditions, provide through-penetration firestops systems with T-ratings indicated, as well as F-ratings, as determined per ASTME 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas.
   1. Penetrations located outside cavities.
   2. Penetrations located outside fire-resistive shaft enclosures.
   3. Penetrations located in construction containing fire-protection-rated openings.
   4. Penetrating items larger than 4-inch diameter normal pipe of 16 sq. in. in overall cross-sectional area.

D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provides products that after curing do not deteriorate when exposed to these conditions both during and after construction.
1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetrations firestop system.

2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor places or by other means.

3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

E. For through-penetration firestop systems exposed to view, provide products with flam-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.3 INFORMATIONAL SUBMITTALS

A. Submit the following for approval in accordance with the Special Conditions and with the additional requirements as specified for each.

B. Product Data: For each type of through-penetration firestop system product indicated.

C. Shop Drawings” For each type of through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustration, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.

D. Qualification Data: For firms and persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Certification: Signed by manufacturer’s through-penetration firestop system products certifying that products furnished comply with requirements.

1.4 QUALITY ASSURANCE:

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

B. Codes, Regulations, Reference Standards and Specifications:

1. Comply with codes and regulations of the jurisdictional authorities.
2. ASTM E 84, E 814
3. UL - 1479
C. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.

E. Fire-Test Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in “Performance Requirements” Article:

1. Through Penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements.
   a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
   b. Through-penetration firestop systems correspond to UL in Fire Resistance

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers labels identifying product and manufacturer, date of manufacturer, lot number, shelf life, if applicable; qualified testing and inspecting agency’s classification marking applicable to Project: curing time, and mixing causes.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, containments, or other causes.

1.6 PROJECT CONDITIONS:

A. Environmental Limitations: Do not install penetration firestop systems when ambient or substrate temperatures are outside limits permitted by penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.7 COORDINATION:

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestop systems.
PART 2 - PRODUCTS

2.1 FIRESTOPPING, GENERAL:

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop systems manufacturer based on testing field experience.

B. Accessories: Provide components for each through-penetration firestop systems that are needed to install fill materials and to comply with “Performance Requirements” Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to the following items:

1. Permanent forming/damming/backing materials, including the following:
   a. Slag-rock-wool-fiber insulation.
   b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
   c. Fire-rated form board.
   d. Fillers for sealants.

2. Temporary forming materials.
5. Steel sleeves.

2.2 FILL MATERIALS:

A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials in this Article. Fill materials are those referred to in directions of the referenced testing and inspecting agencies as fill, void, or cavity materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
G. **Intumescent Wrap Strips:** Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. **Mortars:** Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

I. **Pillows/Bags:** Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.

J. **Silicone Foams:** Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

K. **Silicone Sealants:** Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
   1. **Grade for Horizontal Surfaces:** Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces,
   2. **Grade for Vertical Surfaces:** Nonsag formulation for openings in vertical and other surfaces.

**PART 3 - EXECUTION**

3.1 **EXAMINATION:**

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

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

3.2 **PREPARATION:**

A. **Surface Cleaning:** Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
   1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
   2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. **Priming:** Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. **Masking Tape:** Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of the Work and that
would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestop system’s seal with substrates.

3.3 THROUGH-INSTALLATION FIRESTOP SYSTEM INSTALLATION:

A. General: Install through-penetration firestop systems to comply with “Performance Requirements” Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. Install fill materials for firestop system’s by proven techniques to produce the following results:
   1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
   2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
   3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Where deficiencies are found, repair, or replace through-penetration firestop systems so they comply with requirements.

3.5 IDENTIFICATION

A. In areas not exposed to public view, identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop system. Include the following information on labels:
   1. The words "Warning – Through-Penetration Firestop System - Do Not Disturb."

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop systems manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated through-penetration firestop systems complying with specified requirements.
3.7  THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to the alpha-alpha-numberic designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Firestop Systems for Metallic and Non-metallic Conduit, Tubing Sleeves, Cable Trays, and Cable’s:
   1. UL- 1479: Fire rated for 3 hours.
   2. Type of Fill Materials: One or more of the following:
      a. Silicone sealant.
      b. Intumescent putty.
      c. Silicone foam.

C. Firestop systems for Miscellaneous Mechanical Penetrations: Comply with the following:
   1. UL- 1479: CAS 8083.
   2. Type of Fill Materials: Mortar.

END OF SECTION 07841
PART 1 GENERAL

1.1 DESCRIPTION

A. This section specifies furnishing and applying paint at the site. Specific surfaces and areas which require field painting are listed in the schedule of painting.

B. Definitions:

1. Paint: Includes primers and undercoaters, sealers, stains, paint, varnish, enamel and coatings.

C. Items Not Included In Field Painting:

1. Stainless steel, glass, resilient tile, ceramic tile, paving, acoustical tile, plastic laminate and similar items which are prefinished.
3. Galvanized-metal surfaces, unless exposed to public view.

D. Related Work Specified Elsewhere:

1. Mill-, factory- and shop-applied prime and finish coats: Specified with the product.

1.2 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications:

1. Codes and regulations of the jurisdictional authorities.
2. FS:TT-P-645B
3. MS: MIL-P-21035.

1.3 SUBMITTALS:

A. Submit the following for approval in accordance with the Special Conditions and with the additional requirements as specified for each:

B. Samples:
1. Three samples of each color and texture, with identification of materials keyed to those specified and application methods.
2. Samples of paint schedules for application to smooth finishes applied to 12-inch square hardboard or metal panels.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver products to the jobsite in their original unopened containers clearly labeled with the manufacturer's name and brand designation, referenced specification number and type, as applicable.

B. Store products in an approved ventilated dry area, protect from contact with soil and from exposure to the elements. Keep products dry at all times. Do not allow paint to freeze.

C. Handle products in a manner that will prevent breakage of containers and damage to products.

1.5 JOB CONDITIONS:

A. Environmental Requirements:

1. Do not apply paint to surfaces on which water or dampness is visible.
2. Do not apply exterior paint when the temperature is below 40F or expected to fall below this temperature.
3. Avoid painting steel which is at a temperature which can cause blistering, porosity, or otherwise be detrimental to the life of the paint. When paint is applied in hot weather or thinned in cold weather ensure that the specified thickness of paint coating is obtained.
4. Do not apply paint when the steel surface temperature is below the dew point, resulting in condensation of moisture.
5. Do not apply interior paint when, in the AR's opinion, satisfactory results cannot be obtained due to high humidity and excessive temperature; however, failure of the AR to notify the Contractor of the condition will not relieve the Contractor of responsibility to produce satisfactory results.

PART 2 PRODUCTS

2.1 MATERIALS:

A. To the maximum extent practicable, use the materials of one manufacturer throughout the project.

B. Use primer of suitable type for each surface and compatible in each case with the finish paint, fast curing, lead and chromate free, and Volatile organic compounds.
(VOC) compliant.

C. Provide VOC compliance certificate signed by manufacturers certifying compliance of their products with regulations of authorities having jurisdiction over VOCs.

D. The following materials are listed as a guide to quality intended. Other materials equal, or superior, to the listed materials and approved by the AR will be accepted.

1. Metal primer for structural steel:
   a. Inorganic epoxy zinc-rich. 2.5-3.5 mils dry-film thickness (Tnemec #90E-75 or approved equal).

2. Metal primer for metals other than structural steel:

3. Galvanized metal primer:

4. Enamel undercoat:
   a. No.853 Dulux Ovalite Enamel Undercoat, Dupont.
   b. Vitralite Enamel Undercoat, Pratt & Lambert.

5. Enamel:
   a. Dulux Interior Gloss Enamel, Dupont.
   c. Effecto Enamel, Pratt & Lambert.

6. Enamel, eggshell:
   a. No.299 Dulux Enamel Eggshell-Sheen, Dupont.
7. Primer and sealer, vinyl emulsion:
   a. No.865 Sealer-Coater, Dupont.
   b. No.8014 Vinyl Primer & Sealer, Devoe & Raynolds.
   c. Vapex Wall Primer, Pratt & Lambert.

8. Primer and sealer, alkyd resin:
   a. No.860 Primer Sealer, Dupont.
   b. Lyt-All Double-Duty Primer, Pratt & Lambert.
   c. Wall Primer & Sealer, Sherwin-Williams.

9. Provide miscellaneous materials and accessories, not listed above, as necessary to complete the work in an approved manner.
   a. Caulk: Single-component, chemically curing, synthetic rubber, non-sag, FS TT-S-230, Type II.

10. Epoxy primer:
    a. Epoxy Primer No. 520-WAS, M.A. Bruder & Sons.


12. Epoxy paint:
    b. Tile Clad II Epoxy 862 Series, Sherwin-Williams.

13. Epoxy floor paint (with silica sand for non-skid additive):
    b. Phillyclade 1000 Epoxy Non-Skid Coating, Sherwin-Williams.

14. Enamel, semi-gloss:

E. Thinner: As recommended by paint manufacturer.
F. Colors:

1. Prior to beginning work the Contractor will be furnished sample color chips and a Color and Material Schedule for all surfaces to be painted.
2. Items specified to be OSHA red color to be equal to Sherwin-Williams OSHA Red.
3. Match the colors of the chips and submit samples before proceeding. Label samples for surface finishes such as satin, flat or gloss as listed in the Color and Material Schedule.
4. Tint each coat of paint slightly lighter or darker than the preceding coat or the finish coat.
5. Final approval of colors will be made by the AR on samples applied on the job.

PART 3 EXECUTION

3.1 PREPARATORY WORK:

A. Inspect all surfaces for their suitability to receive a finish. In the event that imperfections due to materials or workmanship appear on any surfaces, make the appropriate corrections at no additional cost to the Authority. Correct damage to any painted or decorated finish due to carelessness or negligence of other crafts.

B. Protect hardware, hardware accessories, plates, lighting fixtures and similar items installed prior to painting; remove protection upon completion of each space. Where necessary to remove installed products to ensure their protection, arrange for removal and re-installation by mechanics of the trade involved. Disconnect equipment adjacent to walls; where necessary, move to permit painting of wall surfaces and following completion of painting replace and reconnect.

C. Clean all surfaces to be painted as necessary to remove dust and dirt. Sand as necessary to properly prepare surfaces to receive paint or varnish.

D. Wash all metal surfaces with benzine or mineral spirits to remove any dirt, oil or grease before applying paint. Where rust or scale is present, wire brush or sandpaper clean before painting. Apply galvanized metal primer to all degreased galvanized metal before applying finish coats.

E. Sand, clean and touch up all scratches, abrasions or disfigurements and remove all foreign matter from prime coats before proceeding with the following coat. Spot prime or coat and featheredge into adjacent surface to produce a smooth and level surface.

3.2 APPLICATION:
A. Coordinate the work of this section with the work of other trades.

B. Touch-up painting of structural steel and all other materials which have been prime coated as may be required where the shop coat has been damaged by welding or abrasion during the handling and erection operations; also rivets, bolts and welds which are unpainted after assembly and erection.

C. Apply paint by brush, roller or spray in accordance with the manufacturer's directions. Use brushes as best suited for material being applied. For covers on rollers use carpet with velvet back and high-pile sheep's wool or use short-hair covers, as best suited for material and texture specified. Apply spray paint uniformly. Apply paint to a minimum dry-film thickness (DFT) of five mils using no less than the number of coats specified in Article 3.5.

D. Apply material evenly and smoothly without runs, sags or other defects with edges of paint adjoining other materials or color sharp and clean, without overlapping.

E. Do not paint and finish while surfaces are damp. Allow sufficient time between coats to allow pumice stoning where required, in accordance with manufacturer's directions to produce an even smooth finish.

F. Do not apply final coats until after other trades, whose operations would be detrimental to finish painting, have finished their work in the areas to be painted and the areas have been approved for painting.

3.3 PROTECTION:

A. Dispose of soiled cleaning rags and waste at the close of each day's work or store such soiled rags and waste in metal containers with tight-fitting covers. Provide buckets of sand at all times for use in the event of fire. Post NO SMOKING signs as necessary and as directed.

B. Protect the work of all other trades against damage or injury by use of suitable covering during the progress of the painting and finishing work. Repair damage.

3.4 CLEANING:

A. Upon completion of work, remove all staging, scaffolding and containers from the site. Remove all paint spots, oil or stains from glass, floors and other surfaces not to be painted, and leave job clean and acceptable to the AR.

3.5 SCHEDULE OF PAINTING:
A. Primed Surfaces:

1. If surfaces have been primed at the mill, factory or shop, omit specified first coats, except for touch-up.
2. For touch-up, use primer of the same composition as the mill, factory or shop primer.

B. Interior and exterior surfaces, except as otherwise shown or as explicitly specified elsewhere:

1. All metal surfaces except those in areas scheduled to receive epoxy paint:
   a. First coat: Metal primer.
   b. Second coat: Enamel, semi-gloss
   c. Third coat: Enamel, semi-gloss.

2. All metal surfaces.

   a. First coat: Metal primer-epoxy.
   b. Second coat: Epoxy paint.
   c. Third coat: Epoxy paint.

3. All metal surfaces at floor level in areas scheduled to receive epoxy paint:

   a. First coat: Metal primer-epoxy.
   b. Second coat: Epoxy floor paint with non-skid additive.

4. All piping in areas scheduled to receive epoxy paint:

   a. First coat: Metal primer, epoxy.
   b. Second coat: Epoxy paint.
   c. Third coat: Epoxy paint.

3.6 COLOR CODING OF PIPING AND EQUIPMENT:

A. General Requirements:

1. Color coding required for accessible piping systems and related equipment except associated supports, brackets hangers and similar accessories.

2. Identify piping systems and related equipment which are to be color coded as follows:

   a. Apply color to entire length of piping.
   b. Letter legends indicating the name of the contents of the system as specified.
B. Location of Legends and Bands:

1. Stencil lettered legends on the piping at the horizontal or vertical centerline. Where pipe lines are too close together and where located above the operator's normal line of vision, place the lettering below the horizontal centerline at a point which will be easily visible.

2. Locate lettered legends and bands at points where pipes enter and leave rooms or spaces, at junction points and points of distribution, close to valves and equipment, at changes in direction, and at intervals along piping where necessary for identification.

3. Stencil piping to show service and direction of flow, space within sight of each other and not more than 40 feet apart on long runs.

C. Schedule of Colors and Legends:

<table>
<thead>
<tr>
<th>Line</th>
<th>Pipe Color</th>
<th>Black Stencil Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire</td>
<td>Red</td>
<td>F</td>
</tr>
</tbody>
</table>

D. Size of Stencil Letters for Piping Identification:

<table>
<thead>
<tr>
<th>Outside Diameter of Pipe Covering in Inches</th>
<th>Size of Letter in Inches</th>
<th>Width of Color Band in Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4 to 1-1/4</td>
<td>* * * ½</td>
<td>4</td>
</tr>
<tr>
<td>1-1/2 to 2-1/2</td>
<td>3/4</td>
<td>6</td>
</tr>
<tr>
<td>3 to 6</td>
<td>1-1/4</td>
<td>8</td>
</tr>
<tr>
<td>7 to 10</td>
<td>2-1/2</td>
<td>12</td>
</tr>
<tr>
<td>Over 10</td>
<td>3-1/2</td>
<td>12</td>
</tr>
</tbody>
</table>
SECTION 13905
FIRE PROTECTION, SUPPRESSION AND ALARM

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies providing dry standpipe, system.

B. Related Work Specified Elsewhere:
   1. Miscellaneous metal - 05500
   2. Field painting - 09920
   3. Identification of mechanical equipment and piping - 15280
   4. Grounding and Bonding - 16060

C. Description of System:
   1. Dry standpipe system: Consists of siamese fire-department connection, dry fire line, check valves, automatic air vents, drain valves, and angle hose valves.

1.2 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications:
   1. Comply with codes and regulations of the jurisdictional authorities.
   2. AWS: A5.13, D1.1
   3. FM Approval Guide.
   4. NFPA: 14 and 130.
   9. MSS: SP-58, MS-MIL-P-23236.
B. Design Criteria:

1. NFPA 14 and 130 as applicable.

1.3 SUBMITTALS:

Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:

A. Shop Drawings:

1. Methods of joining, welding, fastenings, and anchoring.
2. Materials and locations for dry standpipe systems.
3. Pipes and piping layout, including pipe hangers and supports.
4. Pipe hangers and supports.
5. Valves.
7. Gauges.
8. Automatic air vents.
10. Mechanical couplings.
11. Reports covering test materials.

B. Certification:

1. Fire line test results.
2. Manufacturer's certification that pipe-joint gaskets and lubricants are satisfactory for use with pipe and fittings specified and that couplings are designed and tested as specified.
3. Welders certification as required in section 05030.

C. Operation and Maintenance Manuals.

1.4 JOB CONDITIONS:

D. The only welding allowed on this project will be limited to the following:

1. Thermite welding of bonding conductor straps.
2. Pipe anchors and anchor base plate assemblies as indicated on drawings.
3. Welding approved by the AR, prior to commencement of welding operations, for a specific application or situation.

   a. Do not perform welding when the temperature of the base metal is
less than zero degrees F.
b. Do not perform welding when surfaces are wet or during periods of high winds unless operator and work are properly protected.

E. Environmental Requirements: Paint, Section 09920.

1.5 OPERATION AND MAINTENANCE TRAINING:

A. Upon completion of installation and in accordance with the General Requirements furnish for a period of not less than two consecutive man-days services of a manufacturer's field engineer with specialized experience in the components of the system to instruct Authority personnel in the proper operation and maintenance of the systems.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. General Requirements:

1. In design and purchase of equipment, provide for interchangeability of items of piping.
2. Manufacturers of all materials shall be ISO 9001 certified.
3. Materials to be UL/FM approved for use on fire protection system.

B. Pipe and Fittings:

1. Exterior fire-protection system/sections:

   a. Ductile-iron pipe:

      1) Piping buried or otherwise inaccessible: FS WW-P-421, Type III, 250-pound pressure class.

         a) Flange or Mechanical joint restraint coupling gaskets: Approved gasket supplied by the pipe manufacture and conforming to ANSI/AWWA C111/A21.11. EPDM (ethylene propylene diene monomer) gaskets furnished for joints.
b) Gasket Lubricant: For mechanical joints restraint: Approved gasket lubricant supplied by the pipe manufacturer and conforming to ANSI/AWWA C111/A21.11.

c) Pipe coated on outside with bituminous coating and lined with cement mortar of twice standard thickness specified for pipe size used.

d) Cement-mortar lining having seal coat of nontoxic, tasteless and odor-free bituminous material.

e) Piping shall be bonded in accordance with Section 16050 and contract drawings.

3) Fittings:

a) ANSI/AWWA C110/A21.10 Suitable for use with ductile-iron pipe; designed for 250 psi working pressure.

b) Furnished with coating and lining as for ductile iron pipe, with mechanical joint.

4) Thrust Block Fitting Restrains:

a) Concrete thrust blocks developing compressive strength of 4000 PSI.

b) Stainless steel anchoring bolts with minimum of 6 inches of threaded and 90 Degree leg, 1/3 of anchor bolt length.

b) Stainless steel restraining clamp.

2. Exterior fire-protection system:

a. Fire lines, exposed or otherwise accessible:

1) Pipe:

a) Galvanized steel: One of the following:

i. ASTM A53: One of the following:

ii. Type E, Grade A.

iii. Type F, Grade A

b) Welded or seamless.

c) Standard weight, Schedule 40, with rolled-grooved
ends, hot dipped galvanized, 21 foot standard length. Random length piping is prohibited. Use of Schedule 10 pipe is not allowed.

2) Fittings:

a) Steel Pipe Grooved Couplings: Victaulic Style 77 Conforming to ISO 9001, manufacturing standards.

i. Coupling housing: Ductile iron in accordance with ASTM A-536, Grade 65-45-12, fabricated in two parts enclosing resilient gasket seal with keys to fit grooves on pipe ends, rated at 1000 PSI and factory finished hot dipped galvanized.

ii. Coupling gasket: Grade “E” EPDM, ANSI/NSF61. Pressure responsive seal, integrity increasing with pressure.

iii. Coupling bolts and nuts: Oval-neck hexagonal nuts conforming to ASTM A183 having minimum tensile strength of 11000 PSI, plated to ASTM B-633.

b) Flange to Grooved Adapter Couplings: Victaulic Style 743 Conforming to ISO 9001, manufacturing standards.

i. Coupling housing: Ductile iron in accordance with ASTM A-536, Grade 65-45-12, fabricated in two parts with hinge bushing, enclosing resilient gasket seal with keys to fit grooves on pipe ends, factory finished hot dipped galvanized.

ii. Coupling gasket: Grade E, EPDM, ANSI/NSF61. Pressure responsive seal, integrity increasing with pressure.

iii. Coupling bolts and nuts: Oval-neck hexagonal nuts conforming to ASTM A183 having minimum tensile strength of 11000 PSI, plated to ASTM B-633.

c) Grooved-end, fabricated of ductile-iron casting in
accordance with ASTM A-536, ASTM A 153 hot
dipped galvanized.

d) Mechanical branch outlets:

i. Victaulic 920 or equal.

ii. Victaulic Style 72 or equal.

e) Threaded pipe fittings: FS WW-P-501, Type 1,
Class B up to a maximum pipe size of 2-1/2 inch.

f) All fittings shall be manufactured to ISO 9001
standards.

3) Unions: WP 175 psig.

a) 1-1/2 inches and smaller: Threaded, FS WW-U-
531, type A or B to match piping.

b) Two inches and larger: Flanged using Victaulic
style 741 grooved joint flange adapter or equal; with
hot dipped galvanized finish.

4) Valves:

a) Fire-line valves, outside stem and yoke (OS&Y),
UL Fire Protection Directory listed or FM Approval
Guide listed for 175-psig minimum, meeting
requirements of listed NFPA Standards, with UL or
FM symbol cast or stamped on valve body. Epoxy
coated inside and out with resilient wedge.

b) Gate valves: UL 262 or FM Approval Guide listed,
175-psig WP, epoxy coated inside and out with
resilient wedge.

c) Check valves: UL 312 or FM Approval Guide
listed, 175-psig WP, flanged-end connections,
swing-type, rubber-faced clapper or valve seat 15
degrees from perpendicular to direction of flow.

5) Air and vacuum valves: Air / vacuum release valve with
associated surge check valve for release of air / vacuum
during piping system filling or draining.

a) Kinetic slow-closing, anti-slam automatic
air/vacuum valves with surge check.

b) Valve body shall be cast iron, ASTM A-126.
c) Float ball shall be spherical, type 316 stainless steel.

d) Valve seat shall be replacable Buna-N-Rubber or equal elastomer material.

e) High-capacity; minimum flow, 3.0 cfs; pressure differential, 5.0-psig maximum.

f) Designed for maximum system working pressure; 175-psig minimum; suitable for working pressures from zero psig to maximum capacity.

g) Minimum 2 inch NPT inlet.

6) Surge check valves: Surge check valve with associated air / vacuum release valve, for slowing of water flow upon reaching air / vacuum release valve during filling of piping system.

a) Valve body shall be ductile iron, ASTM A-536.

b) Bronze plug confoming to ASTM B62.

c) Spring shall be type 304 stainless steel.

d) O-Ring seat shall be Buna-N-Rubber.

e) Valve body rated to 300 psi; tested to 450 psi.

f) Minimum 2 inch NPT inlet.

7) Ball drip valves:

a) 1", threaded both ends and rated at 175-psig minimum, bronze.

8) Angle hose valves:

a) Cast bronze, with 2 ½" NHT male outlet, replaceable rubber disc and rising stem.

b) Rough-bronze body, polished-finish bonnet, nut and stem, complete with cap and chain.

c) Cast-iron hand wheel, red-enameled.

d) Working pressure: 200 psig.

e) UL Fire Protection Directory listed with symbol cast or stamped on valve body.

f) American National Standard Fire Hose threads outlet.

g) Rated to flow 500 gpm at 65 psi, residual pressure.

9) In-line cut-off valves:
a) Flanged gate valve, with outside stem and yoke, epoxy coated with resilient wedge.

b) Comply with UL 262, UL Fire Protection Directory listed or FM Approval Guide listed with symbol cast or stamped on valve body.

c) Working pressure, 175 psig.

d) Cast-iron hand wheel, red-enameled.

10) Manual Drain Valves:

a) Bronze gate or ball valve 1 inch NPT.
   i. Pressure rating: 300 psig.

11) Fire Department Siamese Connection:

a) Free standing:
   i. Paved areas: Double clapper or triple clapper, as indicated, with sidewalk sleeve, sidewalk plate, rocker-lug plugs and chains, polished brass, female inlets with 2-1/2 inch American National Standard Fire Hose Threads, 4" or 6" FIP outlet, UL Fire Protection Directory listed or FM Approval Guide listed, working pressure of 200 psig and with cast recessed Type B Metro logo and inscription, as shown, Elkhart model EHB15-4-2 METRO-STDP or EHB15-6-3 METRO-STDP.
   ii. Landscaped areas: As specified for paved areas, except no sidewalk sleeve or plate.

b) Wall-mounted:
   i. Double clapper or triple clapper, as indicated, rectangular wall plate for flush mounting, rocker log plugs and chains, polished brass, female inlets with 2-1/2 inch American National Standard Fire Hose Threads, 4" or 6" FIP outlet, UL Fire Protection Directory listed or FM Approval Guide listed, working pressure of 200 psig, and with cast raised Type B Metro logo and
inscription as shown. Provide sill cock where necessary for drainage.

12) Supporting Devices: All hangers and supports shall be hot dip galvanized after fabrication.

13) Pipe hangers and supports:
   a) Adjustable, clevis-type, threaded full length, with diameter consistent with pipe size and the load imposed: MSS SP-58.
   b) Hanger rods, 5/8-inch minimum diameter, hot dipped galvanized steel, with diameter consistent with pipe size and the load imposed.
   c) Hanger rods and washers: Galvanized steel.
   d) Supported from stainless steel inserts in concrete slab: MSS SP-58.

14) Adjustable U-bolt type:
   a) U-Bolt: Fabricated from 5/8 rod, hot dip galvanized.
   b) Nuts and washers: Steel or galvanized in accordance with ASTM A325.
   c) Chair: Cast iron or fabricated steel, hot dip galvanized after fabrication.


16) Roller support (MSS SP 58 Type 44):
   a) Pipe roller, axil and support, galvanized steel for NSP 4 and NSP 6 horizontal standpipe.
   b) Axil: Solid galvanized steel axil 3/4 inch diameter.
   c) Nuts and washers: Galvanized steel in accordance with ASTM A325.
   d) Support: Galvanized steel axil and roller support arms and mounting plate with 4 factory drilled / punched anchor holes.
   e) Support Anchor Bolts: Expansion-bolt anchors minimum 5/8 inch diameter.
17) Roller guide support: Roller guide pipe support with upper and lower roller and axles attached in roller carrier chair with assembly anchored to base plate as detailed in drawings.

   a) Pipe roller, axil and support, galvanized steel for NSP 4 and NSP 6 horizontal standpipe.
   b) Axil: Solid galvanized steel axil 3/4 inch diameter.
   c) Nuts and washers: Galvanized steel in accordance with ASTM A325.
   d) Support: Galvanized steel axil and roller support arms and mounting plate with 4 factory drilled / punched anchor holes.
   e) Support Anchor Bolts: Expansion-bolt anchors minimum 5/8 inch diameter.

18) Pipe anchors:

   a) Designed to withstand a minimum of five times anchor load.
   b) Vertical pipes anchored by means of clamps around pipes and secured to wall or floor construction.

19) Pipe anchors: Structural tee welded to pipe and base plate with assembly anchored to deck as detailed in drawings.

   a) Structural steel tee, ASTM A36, hot dipped galvanized A-136.
   b) American Standard steel beam ASTM A36, hotdipped galvanized, field split.
   c) Steel base plate, ASTM A-36, hot dipped galvanized.
   d) Shop fabricated shapes, cut, punched anchoring holes and bent to drawing detail dimensions with shop applied hot galvanized coating upon completion.
   e) Designed to withstand a minimum of five times anchor load.
   f) Horizontal pipes anchored by means of welding around pipes and secured to deck construction.
   g) Field cutting, welding, fabrication work cleaned and patching of galvanized coating as per specification
20) Angle Iron Bracket: Heavy duty welded steel angle iron brackets MSS SP-58 Type 33.
   a) Steel angle iron brackets ASTM A36 steel angle and plate.
   b) Shop fabricated angle iron steel bracket with cutting, welding and punched anchoring holes galvanized coating as specified in 05500.

21) Expansion-bolt anchors:
   a) Consisting of bolt, expander, lock washer and nut.
   b) Fabricated of stainless steel, Alloy S30300 in accordance with ASTM E527, including expander and lock washer 5/8x6 - 31655
   c) Anchor assemblies: FS FF-S-325, Group II, Type 4, Class 1.
   d) The use of self drilling anchors are prohibited.

3. Interior fire-protection system:
   a. Fire lines, exposed or otherwise accessible:
      1) Pipe:
         a) Galvanized steel: One of the following:
            i. ASTM A53: One of the following:
               ii. Type E, Grade A.
               iii. Type F, Grade A
            b) Welded or seamless.
            c) Standard weight, Schedule 40, with rolled-grooved ends, hot dipped galvanized, 21 foot standard length. Random length piping is prohibited. Use of Schedule 10 pipe is not allowed.
      2) Steel Pipe Grooved Couplings: Victaulic Style 77 Conforming to ISO 9001, manufacturing standards.
         a) Coupling housing: Ductile iron in accordance with ASTM A-536, Grade 65-45-12, fabricated in two
parts enclosing resilient gasket seal with keys to fit grooves on pipe ends, rated at 1000 PSI and factory finished hot dipped galvanized.

b) Coupling gasket: Grade “E” EPDM, ANSI/NSF61. Pressure responsive seal, integrity increasing with pressure.
c) Coupling bolts and nuts: Oval-neck hexagonal nuts conforming to ASTM A183 having minimum tensile strength of 11000 PSI, plated to ASTM B-633.

3) Flange to Grooved Adapter Couplings: Victaulic Style 743 Conforming to ISO 9001, manufacturing standards.

a) Coupling housing: Ductile iron in accordance with ASTM A-536, Grade 65-45-12, fabricated in two parts with hinge bushing, enclosing resilient gasket seal with keys to fit grooves on pipe ends, factory finished hot dipped galvanized.
b) Coupling gasket: Grade E, EPDM, ANSI/NSF61. Pressure responsive seal, integrity increasing with pressure.
c) Coupling bolts and nuts: Oval-neck hexagonal nuts conforming to ASTM A183 having minimum tensile strength of 11000 PSI, plated to ASTM B-633.

4) Fittings:

a) Grooved-end, fabricated of ductile-iron casting in accordance with ASTM A-536, ASTM A 153 hot dipped galvanized.
b) Mechanical branch outlets:
   i. Victaulic 920 or equal.
   ii. Victaulic Style 72 or equal.

c) Threaded pipe fittings: FS WW-P-501, Type 1, Class B up to a maximum pipe size of 2-1/2 inch.
d) All fittings shall be manufactured to ISO 9001 standards.

5) Unions: WP 175 psig.
6)  1-1/2 inches and smaller: Threaded, FS WW-U-531, type A or B to match piping.

7)  Two inches and larger: Flanged using Victaulic style 741 grooved joint flange adapter or equal; with hot dipped galvanized finish.

8)  Valves:
   a)  Fire-line valves, outside stem and yoke (OS&Y), UL Fire Protection Directory listed or FM Approval Guide listed for 175-psig minimum, meeting requirements of listed NFPA Standards, with UL or FM symbol cast or stamped on valve body. Epoxy coated inside and out with resilient wedge.
   b)  Gate valves: UL 262 or FM Approval Guide listed, 175-psig WP, epoxy coated inside and out with resilient wedge.
   c)  Check valves: UL 312 or FM Approval Guide listed, 175-psig WP, flanged-end connections, swing-type, rubber-faced clapper or valve seat 15 degrees from perpendicular to direction of flow.

9)  Air and vacuum valves:
   a)  Kinetic slow-closing automatic air/vacuum valves with surge check.
   b)  High-capacity; minimum flow, 3.0 cfs; pressure differential, 5.0-psig maximum.
   c)  Designed for maximum system working pressure; 175-psig minimum; suitable for working pressures from zero psig to maximum capacity.

10) Ball drip valves: 1", threaded both ends and rated at 175-psig minimum, bronze.

11) Angle hose valves:
   a)  Cast bronze, with 2 ½" NHT male outlet, replaceable rubber disc and rising stem.
   b)  Rough-bronze body, polished-finish bonnet, nut and stem, complete with cap and chain.
c) Cast-iron hand wheel, red-enameled.
d) Working pressure: 200 psig.
e) UL Fire Protection Directory listed with symbol cast or stamped on valve body.
f) American National Standard Fire Hose threads outlet.
g) Rated to flow 500 gpm at 65 psi, residual pressure.

12) In-line cut-off valves:
   a) Flanged gate valve, with outside stem and yoke, epoxy coated with resilient wedge.
b) Comply with UL 262, UL Fire Protection Directory listed or FM Approval Guide listed with symbol cast or stamped on valve body.
c) Working pressure, 175 psig.
d) Cast-iron hand wheel, red-enameled.

13) Manual Drain Valves: Bronze globe type, 200 WOG rated, 2 inch NPT or smaller, minimum 1 inch NPT.

14) Fire Department Siamese Connection:
   a) Free standing:
      i. Paved areas: Double clapper or triple clapper, as indicated, with sidewalk sleeve, sidewalk plate, two rocker-lug plugs and chains, polished brass, two female inlets with 2-1/2 inch American National Standard Fire Hose Threads, 4" FIP outlet, UL Fire Protection Directory listed or FM Approval Guide listed, working pressure of 200 psig and with cast recessed Type B Metro logo and inscription, as shown, Elkhart model EHB15-4-2 METRO-STDP.
      ii. Landscaped areas: As specified for paved areas, except no sidewalk sleeve or plate.
   b) Wall-mounted:
      i. Double clapper or triple clapper, as indicated, rectangular wall plate for flush
mounting, two rocker log plugs and chains, polished brass, two female inlets with 2-1/2 inch American National Standard Fire Hose Threads, UL Fire Protection Directory listed or FM Approval Guide listed, working pressure of 200 psig, and with cast raised Type B Metro logo and inscription as shown. Provide sill cock where necessary for drainage.

15) Supporting Devices: All hangers and supports shall be hot dip galvanized after fabrication.

16) Pipe hangers and supports:
   a) Adjustable, clevis-type, threaded full length, with diameter consistent with pipe size and the load imposed: MSS SP-58.
   b) Hanger rods, 5/8-inch minimum diameter, hot dipped galvanized steel, with diameter consistent with pipe size and the load imposed.
   c) Hanger rods and washers: Galvanized steel.
   d) Supported from stainless steel inserts in concrete slab: MSS SP-58.

17) Adjustable U-bolt type:
   a) U-Bolt: Fabricated from 5/8 rod, hot dip galvanized.
   b) Nuts and washers: Steel or galvanized in accordance with ASTM A325.
   c) Chair: Cast iron or fabricated steel, hot dip galvanized after fabrication.


19) Roller support (MSS SP 58 Type 44):
   a) Pipe roller, axil and support, galvanized steel for NSP 4 and NSP 6 horizontal standpipe.
   b) Axil: Solid galvanized steel axil 3/4 inch diameter.
c) Nuts and washers: Galvanized steel in accordance with ASTM A325.
d) Support: Galvanized steel axil and roller support arms and mounting plate with 4 factory drilled / punched anchor holes.
e) Support Anchor Bolts: Expansion-bolt anchors minimum 5/8 inch diameter.

20) Pipe anchors:
   a) Designed to withstand a minimum of five times anchor load.
   b) Vertical pipes anchored by means of clamps around pipes and secured to wall or floor construction.

21) Expansion-bolt anchors:
   a) Consisting of bolt, expander, lock washer and nut.
   b) Fabricated of stainless steel, Alloy S30300 in accordance with ASTM E527, including expander and lock washer 5/8x6 - 31655
   c) Anchor assemblies: FS FF-S-325, Group II, Type 4, Class 1.
   d) The use of self drilling anchors are prohibited.

22) Pipe sleeves:
   a) Through interior masonry-unit walls: Galvanized steel large enough to accommodate pipe but minimum two sizes larger than pipe size.
   b) Through cast-in-place concrete interior walls and concrete ceilings: Factory-made cast iron with anchor flange and cast-iron plate collar screw-fastened to slab and pipe.
   c) Sleeves minimum two sizes larger than pipe; for floors and ceilings projecting four inches above finish floor.
   d) Through exterior structural elements: Minimize two sizes larger than pipe.
   e) Through underground, exterior structural element: Mechanical link-type sleeve for waterproof seal. Minimum two sizes larger than pipe.
   f) Sleeve designed for pipe-movement allowance due
to expansion and contraction.

23) Escutcheon plates:
   a) Stainless-steel screw fasteners.
   b) Plate collars.

24) Mastic: FS SS-C-153, Type 1.

25) Pressure Gauges: Spring pressure-type, 3-1/2 inch dial, in accordance with NFPA.

26) Bonding strap: Refer to Section 16061.


28) Coal-Tar Epoxy: Two component, chemically cured, conforming to MS MIL-P-23236 (ships), Type I, Class 2.
   a) Thinner of type recommended by manufacturer of coating and used only when approved.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Fit equipment and appurtenances to space provided and make serviceable.

B. Install complete fire-protection systems as shown and as specified. During installation, protect work, equipment, and materials. Plug or cap pipe openings.

C. Fasten escutcheon plates to wall or ceiling. Seal plate collars watertight with mastic.
D. Threaded Joint Procedure:

1. Cut ends of screw-jointed pipes squarely to seat in fittings. Ream after cutting so waterway is not reduced in size.
2. Apply thread sealant or compound to male thread only.

E. Ductile-Iron Pipe Installation:

1. Excavation:
   a. Perform excavation to line and grade in compliance with OSHA safety requirements.

2. Subgrade:
   a. Prepare subgrade so that pipe will rest solidly throughout its length. Excavate recesses to accommodate joints and fittings.

3. Laying Underground Pipes:
   a. Take proper measures to keep pipe clean. Immediately prior to placing, clean inside and ends of outside surfaces of pipe. Keep interior surfaces clean throughout construction.
   b. Prior to placing pipe in trench, have interior and exterior inspected. Where there is damage that the Engineer determines repairable, make repairs as directed. Replace pipe damaged beyond acceptable repair.
   c. Complete excavation and placing of subgrade before pipe is placed. Place pipe solidly true to line and grade shown. Do not subject pipe to blows or shocks to achieve solid bedding or proper line and grade.
   d. Make change in line with fittings. Do not spring joints to effect change of direction.
   e. Do not field cut pipe unless necessary. Make such necessary cuts by means of equipment designed for purpose, ensuring smooth square end.
   f. Install underground piping with restrained joints at vertical or horizontal changes in directions that are anchored to concrete thrust blocks as directed.
   g. Install continuous underground utility warning tape, red background and black lettering identifying fire piping, during backfilling of trench. Locate utility tape 2 feet directly over piping.
F. Steel-Pipe Installation:

1. Maintain OSHA required head clearance.
   a. Install horizontal piping with minimum pitch of one inch in 40 feet.
   b. Provide drains at low points and as required by NFPA 14 & 130, with a minimum of 1" valves with hose connection.
   c. Install vertical pipes near wall from which they are supported.
   d. Provide high capacity automatic air vent(s) at opposite end(s) of drystandpipe system from fire department siamese where indicated and as per NFPA 14. Pipe air vent outlet to a maximum height of six (6) feet above grade.

2. Make connections to equipment without placing strain on piping and equipment.

3. Tunnel, vent and fan-shaft piping:
   a. Joints of the following types:
      1) Use mechanical grooved couplings for remainder of joints in horizontal and vertical mains unless otherwise shown.
      2) Use threaded joints in branch lines 2-1/2 inches or smaller.
   b. Provide number of mechanical couplings necessary to allow minimum 1-1/4 inch expansion per 100 feet of main.
   c. Use reducing tee for mechanical couplings or mechanical branch outlet at main-to-branch connections.
   d. Make in-line cut-off valves at a maximum of 72 inches above floor or walkway level.

4. Other station piping: Joints in balance of station fireline piping of mechanical-type, grooved couplings for lines three inches and larger and threaded for lines under three inches, except that mechanical-type groove couplings must be accessible.

G. Steel Pipe Groove Couplings: Install couplings according to manufacturer's instructions and as follows:

1. After grooving, remove indentations, projections and roll warps as necessary. Cut pipe ends square to tolerance of plus-or-minus 0.03 inch.
Provide zinc coating on exposed surface.
2. Lightly coat pipe ends and coupling gasket with non-petroleum-based lubricant.
3. Center gasket, install housing and ensure that keys are securely located in pipe grooves.
4. Install bolts and nuts tightened uniformly to manufacturer's recommended limits using torque wrench, without pinching gaskets.
5. Provide bonding across couplings for stray-current protection.

H. In-Line Valves: Install flanged in-line valves by bolting fitting to valve fitting to pipe with groove joint flange adapters, Victaulic #741.

I. Pipe Anchors: Securely anchor piping as specified, where shown and where necessary for proper installation to force pipe expansion in proper direction.

J. Expansion-Bolt Anchors: Drill holes and install expansion-bolt anchors in manner recommended by anchor-bolt manufacturer. Do not install less than eight inches from concrete edge.

K. Pipe Sleeves: Fill annular space between pipe and sleeves with preformed joint filler, tightly placed to form effective seal against groundwater.

L. Bonding: Section 16050, with the following additional requirements:

1. Bond mechanical joints and fittings, including valves, by exothermic-welding method.
2. Make welds in accordance with manufacturer's recommendations. Clean and coat with coal-tar epoxy.
3. Bond pipe using bonding strap welded to each side of joint not less than six inches from joint. Allow sufficient slack in conductor for expansion of pipe.
3.2 PROTECTION OF PIPING AND EQUIPMENT:

A. Protect pipe, openings and valves from dirt, foreign objects and damage during construction.

B. Replace damaged piping, valves and other appurtenances, should damage occur prior to final acceptance of the work. If replacement or repair is found necessary, it shall be approved by the AR prior to action.

3.3 FIELD QUALITY CONTROL:

A. Field Tests:

1. Flush piping with water until clean and free of scale, slag, dirt, oil, grease and other foreign material.
2. Perform final testing, acceptance, and certification in accordance with NFPA 14 and 130, as applicable.
3. Test electrical continuity of bonded joints by measuring resistance. Total resistance value of joint not to exceed calculated resistance of bond cable plus 10 percent.

B. Water-Pressure Testing:

1. In the presence of the AR test piping, prior to burial or concealment, using specified procedures.
2. In the presence of the AR, completely test piping system for leaks until approved.
3. Notify the AR at least 36 hours prior to tests.
4. Test piping at the following pressures:

   a. Fire-protection piping, inaccessible: 400 psi-minimum.
   b. Ductile-iron pipe: At lowest point in system, 150 psi or 1-1/2 times maximum working pressure, whichever is greater.
   c. Fire-protection piping, exposed and accessible: At lowest point in system 200 psi for two hours or at 50 psi in excess of maximum pressure where the maximum pressure is in excess of 150 psi, in accordance with NFPA 14.

C. Test Procedures:

   a. Test fire-protection piping in accordance with NFPA.
   b. Fire-protection piping, inaccessible:
1) Avoid excessive pressure on safety devices and mechanical seals.
2) Fill entire system with water and vent air from system at least 24 hours before test pressure is applied.
3) Apply test pressure when water and average ambient temperature are approximately equal and constant.
4) Maintain test pressure for six hours minimum without drop after force pump has been disconnected. Avoid excessive pressure on safety devices and mechanical seals.

c. Water-test entire system with pressure at highest point of 250 psig (Maximum working pressure is 200 psig).
d. After filling system, shut off water supply and allow it to stand for two hours under test without loss or leakage.
e. Coordinate with and assist local fire department in performing flow tests. After performing hydrostatic test, drain water from firelines. Perform flow test at rate of 500 gpm, 100 psi residual pressure with pumper connected to siamese connection, starting testing with sudden full flow into empty firelines.
f. Drain system immediately after hydrostatic and flow testing.

2. Repair of Leaks:
   a. The following are prohibited:
      1) Repair of leaks by mechanical caulking.
      2) Introduction of material inside piping system to stop leakage.
   b. Repair leaks in threaded piping by breaking joint, cutting new threads on pipe and installing new pipe fitting.
   c. Replace defective coupling assembly as necessary.
   d. Remove defective welds by chipping or gouging.
      1) Reweld the chipped-out places.
      2) When base metals of fillet welds are cut back or throat of welds are less than specified, repair defect by adding additional weld metal.
   e. Water test entire system after repair of leaks according to test procedures specified above.

3.4 CLEANING:

A. Flush firelines with water to remove sediment after completion of tests, repairs or replacements.
3.5 FIELD PAINTING:

A. Prepare piping, apply prime and finish coats in accordance with Section 09920 and as follows:

1. Pipe exposed above ground at siamese fire-department connections in landscaped areas: Federal Standard 595, Color 20040.

3.6 IDENTIFICATION OF PIPING AND VALVES: According to Section 15075.

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SECTION 15075
IDENTIFICATION OF MECHANICAL EQUIPMENT AND PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies providing nameplates and tags on mechanical equipment and apparatus and necessary identification graphics on the fireline piping.

1.2 SUBMITTALS

Submit the following for approval in accordance with the General Requirements Special Conditions and with the additional requirements as specified for each:

A. Samples:

1. Labels and tags in each size.
2. Paint: Includes primer and undercoaters, paint, enamel and coatings.
   
a. Three each of each color and texture, with identification of materials keyed to those specified and application methods.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MATERIALS

A. Nameplates: Laminated plastic.

B. Tags: Reflective 18-gauge polyester-coated steel.

C. Street Level FDC Identification Plates: Bronze, Authority-furnished.

D. Identification labels with graphics on Fireline Piping:

1. To the maximum extent practicable, use the materials of one manufacturer throughout the project.
2. Plastic wrap-around pipe sleeves with pre-printed graphics shall be used in lieu of painting the identification graphics on the fireline piping. The plastic identification sleeves shall be permanently secured to the fireline piping with plastic tie cables. Materials shall be non-flammable, and shall
be approved by the Office of Safety for its intended use.

PART 3 - EXECUTION

3.1 IDENTIFICATION

A. Equipment and Apparatus:

1. The labels on the new galvanized steel should be reflective 2 inch high white letters applied over a reflective 3 inch high red background 18-gauge steel polyester-coated applied with adhesive directly to the pipe and metal panel. Clean new pipe thoroughly to ensure adhesion.

B. Piping:

1. Plastic sleeve label with legends and bands on piping showing service and direction of flow.
2. Color code exposed piping and terminations of piping.

3.2 INSTALLATION

A. Cement nameplates with permanent adhesive on equipment and apparatus.

B. Fire-Protection and Suppression System:

1. Install plastic pipe sleeve labels to identify service and direction of flow.
2. Install plastic pipe sleeve labels with vent-shaft and fan-shaft identification on piping adjacent to angle hose valves in tunnels.
3. Stamp information on Authority-furnished identification plates as shown and fasten to sleeve on siamese fire-department connections for tunnel systems as shown.
4. Paint Application Schedule:

   a. First coat: Metal primer, epoxy.
   b. Second coat: Epoxy paint.
   c. Third coat: Epoxy paint.

5. Clean all surfaces to be painted as necessary to remove dust and dirt. Sand as necessary to properly prepare surfaces to receive paint.
6. Wash all metal surfaces with benzine or mineral spirits to remove any dirt, oil or grease before applying paint. Apply galvanized metal primer to all de-greased galvanized metal before applying finish coats.
7. Apply material evenly and smoothly without runs, sags or other defects.
with edges of paint adjoining other materials or color sharp and clean, without overlapping.

8. Do not paint and finish while surfaces are damp. Allow sufficient time between coats to assure pumice stoning where required, in accordance with manufacturer's directions to produce an even smooth finish.

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SECTION 16060
GROUNDING AND BONDING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies fire dry standpipe joint bonding for stray current protection and electrical continuity.

1.2 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications:

   1. Codes and regulations of the jurisdictional authorities.
   2. NEC.
   3. UL: 467.

B. Source Quality Control:

   1. Each item UL-listed.

1.3 SUBMITTALS:

A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each.

B. Shop Drawings.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Mark each item in accordance with applicable reference standard.

B. Ship each unit securely packaged and labeled for safe handling and to avoid damage.

C. Store equipment in secure and dry storage facility.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MATERIALS:

A. Bonding conductor strap for stray current and electrical continuity:

   1. #2 AWG, XHHW, length as indicated on contract drawings.
B. Lug bond plate:

1. As indicated on contract drawings. Cadweld part number B163C1VCEA18 or equal.

C. Thermite (exothermic) weld materials and tools shall be supplied by a single manufacturer.

1. Exothermic process using powdered metals contained in a mold to form a molecular bond between materials to be connected without application of an external source of heat or power.
2. Molds, weld metal and associated accessories designed for making electrical connections between copper and copper, copper and steel, copper and cast iron, and steel and ductile iron as required. Weld material shall be appropriate for the materials to be welded.
3. Welding system designed for making connections suitable for the application as follows:
   a. Connections made indoors, outdoors or in confined spaces for grounding using a low-smoke, low-emission process and not containing phosphorous or any caustic, toxic or explosive materials

PART 3 - EXECUTION

3.1 BONDING FOR STRAY CURRENT:

A. Refer to joint bond and lug bond details on contract documents.
B. Bonding shall be required across all mechanical joint couplings, valves, and pipe appurtenances, except those joints which are welded.
C. Contact surfaces at weld locations shall be cleaned to bare metal to insure proper bonding.
D. Contact surfaces of lug plate and pipe joint shall be cleaned to insure electrical continuity.
E. Thermite welding shall be performed in accordance with the welding manufacturer’s instructions and recommendations.
F. Bonding conductor shall be isometrically welded by the thermite process to the lug bond plate.
G. Coat all pipe welds with coal tar epoxy to prevent moisture intrusion to the weld.

3.2 FIELD QUALITY CONTROL:
A. Inspect and test exothermic welds as follows:

1. Inspect finished exothermic welds for visual characteristics that are consistent with a properly made connection in accordance with the manufacturer's instructions and recommendations. Remove welds that do not meet minimum visual requirements as acknowledged by the AR, and reweld after cleaning the area to be welded.

2. Test mechanical strength of exothermic weld by applying three sharp blows to the weld with a two-pound hammer using 15-inch strokes. Acceptable welds to sustain the blows without cracking the weld metal or the bond between the two connecting materials. Remove defective welds and reweld after cleaning the area to be welded.

B. Test fire standpipe joint bonds for continuity. Tests shall be conducted in the presence of AR.

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