

**OCTOBER 16, 2020**

**PUTNAM REPAIR FACILITY AND MAINTENANCE FACILITY**

**FEDERAL AID PROJECT NO. N/A**  
**STATE PROJECT NO. 0115-0121**  
**TOWN OF PUTNAM**

**ADDENDUM NO. 2**

This Addendum addresses the following questions and answers contained on the “CT DOT QUESTIONS AND ANSWERS WEBSITE FOR ADVERTISED CONSTRUCTION PROJECTS”:

Question and Answer Nos. 33, 35, 39, 46, 50, 53 and 54.

**SPECIAL PROVISIONS**  
**REVISED SPECIAL PROVISIONS**

The following Special Provisions are hereby deleted in their entirety and replaced with the attached like-named Special Provisions:

- SECTION 095123 - ACOUSTICAL TILE CEILINGS
- SECTION 111000 - VEHICLE SERVICE EQUIPMENT
- SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES
- SECTION 302000 – GENERAL SITE WORK

**PLANS**  
**REVISED PLANS**

The following Plan Sheets are hereby deleted and replaced with the like-numbered Plan Sheets:

- 02.01.A2
- 04.04.A2, 04.06.A2, 04.15.A2
- 06A.14.A2

The Bid Proposal Form is not affected by these changes.

There will be no change in the number of calendar days due to this Addendum.

The foregoing is hereby made a part of the contract.

## SECTION 095123 - ACOUSTICAL TILE CEILINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY:

- A. This Section includes acoustical tiles for ceilings.

#### 1.2 DEFINITIONS:

- A. AC: Articulation Class.
- B. CAC: Ceiling Attenuation Class.
- C. LR: Light-Reflectance coefficient.
- D. NRC: Noise Reduction Coefficient.

#### 1.3 SUBMITTALS:

- A. Submit the following in accordance with Form 818 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.
- B. Product Data: For each type of product indicated.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
  - 1. Acoustical Tile: Set of full-size Samples of each type, color, pattern, and texture.
- D. Quality Assurance Submittals:
  - 1. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

#### 1.4 QUALITY ASSURANCE:

- A. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system through one source from a single manufacturer in accordance with Form 818 Article 1.20-1.06.01.
- B. Fire-Test-Response Characteristics: Provide acoustical tile ceilings that comply with the following requirements:

1. Surface-Burning Characteristics: Provide acoustical tiles with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
- C. Seismic Standard: Provide acoustical tile ceilings designed and installed to withstand the effects of earthquake motions according to the following:
  1. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

#### 1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver acoustical tiles, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

#### 1.6 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

#### 1.7 COORDINATION:

- A. Coordinate layout and installation of acoustical tiles and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and partition assemblies.

#### 1.8 SPARE PARTS:

- A. Furnish to the Engineer spare parts described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Acoustical Ceiling Units: Full-size tiles equal to 2% of quantity installed.

## PART 2 - PRODUCTS

### 2.1 ACOUSTICAL TILES, GENERAL:

- A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
  - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.
- B. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.
  - 1. Where appearance characteristics of acoustical tiles are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Designer from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

### 2.2 MOISTURE RESISTANT ACOUSTICAL TILES:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide CLEAN ROOM ClimaPlus Class 10M-100M as manufactured by USG Interiors Inc.; or an approved equal.
- B. Classification: Provide tiles complying with ASTM E 1264 for type, form, and pattern as follows:
  - 1. Type and Form: Type X, Form 1
  - 2. Pattern: CGI (smooth).
- C. Color: White.
- D. LR: Not less than .79.
- E. NRC: Not less than 0.55
- F. CAC: Not less than 35.
- G. AC: Not less than 180.
- H. Edge/Joint Detail: Square.
- I. Thickness: 5/8 inch.
- J. Modular Size: 24" x 24".

K. Where Used: Women's Room, Men's Room, Men's Locker, and Janitor's.

### 2.3 ACOUSTICAL TILES:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Glacier #707 as manufactured by USG Interior Inc., or an approved equal.
- B. Classification: Provide tiles complying with ASTM E 1264 for type, form, and pattern as follows:
  - 1. Type and Form: Type III, Form 4
  - 2. Pattern: F (heavily textured).
- C. Color: White.
- D. LR: Not less than 0.65.
- E. NRC: Not less than 0.65.
- F. CAC: Not less than 35.
- G. AC: Not less than 170.
- H. Edge/Joint Detail: Shadowline.
- I. Thickness: 3/4 inch.
- J. Modular Size: 24" x 24".
- K. Where Used: All applicable rooms, Excluding: Women's Room, Men's Room, Men's Locker, and Janitor's.

### 2.4 METAL SUSPENSION SYSTEMS, GENERAL:

- A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
  - 1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated (Women's Room, Men's Room, Men's Locker, and Janitor's).

- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
  - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
  - 2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
  - 3. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch diameter wire.
- E. Hanger Rods, Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch diameter bolts.
- G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.
- H. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical tiles in-place.

2.5 METAL SUSPENSION SYSTEM FOR MOISTURE RESISTANT ACOUSTICAL TILES:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Model DONN ZXLA as manufactured by USG Interiors, Inc., or an approved equal.
- B. Wide-Face, Capped, Double-Web, Fire-Rated Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with prefinished 15/16-inch wide metal caps on flanges.
  - 1. Structural Classification: Heavy-duty system.
  - 2. End Condition of Cross Runners: Override (stepped) type.
  - 3. Face Design: Flat, flush.
  - 4. Cap Material: Aluminum cold-rolled sheet.
  - 5. Cap Finish: Painted white.
- C. Where Used: Women's Room, Men's Room, Men's Locker, and Janitor's.

## 2.6 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILES:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Model DONN DX/DXL as manufactured by USG Interiors, Inc., or an approved equal.
- B. Wide-Face, Capped, Double-Web, Fire-Rated Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with prefinished 15/16-inchwide metal caps on flanges.
  - 1. Structural Classification: Heavy-duty system.
  - 2. End Condition of Cross Runners: Override (stepped) type.
  - 3. Face Design: Flat, flush.
  - 4. Cap Material: Aluminum cold-rolled sheet.
  - 5. Cap Finish: Painted white.
- C. Where Used: All applicable rooms, Excluding: Women's Room, Men's Room, Men's Locker, and Janitor's.

## 2.7 METAL EDGE MOLDINGS AND TRIM:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide as manufactured by USC Interior, Inc. or an approved equal.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
  - 1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
  - 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

## 2.8 ACOUSTICAL SEALANT:

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Acoustical Sealant for Concealed Joints:
    - a. OSI Sealants, Inc.; Pro-Series SC-175 Rubber Base Sound Sealant.
    - b. Pecora Corporation; BA-98.
    - c. Tremco, Inc.; Tremco Acoustical Sealant.

- B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

## PART 3 - EXECUTION

### 3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical tile ceilings.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION:

- A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

### 3.3 INSTALLATION:

- A. General: Install acoustical tile ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
  - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to

inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
8. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Arrange directionally patterned acoustical tiles as follows:

1. Install tiles with pattern running in one direction parallel to long or short axis of space.

F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

### 3.4 CLEANING:

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

## SECTION 111000 - VEHICLE SERVICE EQUIPMENT

### PART 1 - GENERAL

#### 1.1 SUMMARY:

##### A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping and tubing joining materials.
3. Compressed air powered linear reciprocating lube pumps.
4. Pump accessories.
5. Safety valves.
6. Spring driven open hose reel.
7. Hose reel accessories.
8. Dispensing valves.
9. Horizontal Steel Aboveground Storage Tank.
10. Fluid Disposal Pump System.

#### 1.2 SUBMITTALS:

- A. Submit the following in accordance with Form 818 Article 1.20-105.02 and NOTICE TO CONTRACTOR-SUBMITTALS.
- B. Product Data: For each type of product indicated. Include construction details, material descriptions, and dimensions of individual components and profiles. Also include, where applicable, rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
  1. Spare Parts: Include name, address, and telephone number of in-state supplier of spare parts. No out-of-state suppliers shall be permitted.
- C. Shop Drawings: For AST's, include details of supports. Indicate all critical dimensions, locations of all fittings, connections, and accessories.
- D. Operation and Maintenance Data: Include in the operation and maintenance manuals specified in Form 818 Article 1.20-1.08.14 subsection 4 and described in NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.
- E. Quality Assurance Submittals:
  1. Field quality-control reports.
- F. Welding certificates.

1.5 QUALITY ASSURANCE:

- A. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel code.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Lift and support AST's only at designated lifting or supporting points, as shown on Shop Drawings. Do not move or lift tanks unless empty.
- B. Other Tank Materials: Store material in a clean dry area protected from damage. Materials may be stored outside only with the written approval of the Engineer.
- C. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.7 COORDINATION:

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.8 WARRANTY:

- A. Refer to Form 818 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of waste-oil storage tanks that fail in materials or workmanship within specified warranty period.
  - 1. All pumps shall carry a minimum two-year warranty covering parts and on-site labor against defects in material or workmanship.
  - 2. Storage Tanks:
    - a. Failures include, but are not limited to, the following when used for storage of waste-oil and waste anti-freeze at temperatures not exceeding 150 deg F:
      - i. Structural failures including cracking, breakup, and collapse.
      - ii. Corrosion failure including internal corrosion of steel tanks.

- b. Warranty Period: 1 year from the issuance of the Certificate of Compliance.

## PART 2 - PRODUCTS

### 2.1 PIPES, TUBES, AND FITTINGS:

#### A. Steel Pipe:

1. ASTM A 106, seamless carbon steel pressure pipe, Schedule 40, Grade B.
  - a. Forged-Steel Threaded Fittings: ASTM A 182, Class 2000.
  - b. Forged-Steel Welding Fittings: ASTM A 182, Class 3000 for socket welding.
2. ASTM A 106, seamless carbon steel pressure pipe, Schedule 80, Grade B.
  - a. Forged-Steel Threaded Fittings: ASTM A 182, Class 6000.
  - b. Forged-Steel Welding Fittings: ASTM A 182, Class 6000 for socket welding.

#### B. Copper Tube: ASTM B 88, Type K seamless, drawn-temper, water tube.

1. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type.

### 2.2 JOINING MATERIALS:

- A. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

### 2.3 LINEAR RECIPROCATING COMPRESSED AIR POWERED LUBE PUMP:

#### A. General pump specification:

1. All lubricant pumps shall be designed to pump grease or oil to within one inch of the bottom of the product container to ensure maximum use of purchased material.
2. All pumps shall be designed to stand free of the bottom of the container to allow unobstructed flow of product to the pumping tube.
3. All pumps shall be of the self priming design. Pumps so designated for use in bulk supply tanks shall be equipped with a low oil shut off device to prevent free cycling of the pump in the event the product supply is exhausted.
4. All pumps shall have an air motor design with no metal to metal seals to prevent air leakage in the stalled condition. The air motor cylinder shall be of aluminum construction to prevent corrosion in the presence of a contaminated air supply.

The air piston shall be of one piece molded NBR construction to give a long trouble free service life. The air valve shall be of simplified construction with no more than three moving parts. The piston rod shall be finished to a surface tolerance of .25µm and hard electroless nickel coated for maximum seal life and low friction. Oil pumps shall be of the centerline design, for even wear distribution and minimal repair costs.

5. All pumps shall be equipped with bronze non wearing, non fouling, non corroding and non icing mufflers to meet and exceed OSHA recommendations for noise generation. Grease pumps shall be equipped with one muffler and oil pumps equipped with two.
6. All pumps shall be double acting to provide continuous even flow and pressure and maximum utilization of the compressed air supply.
7. All pumps shall have primary and secondary self-lubricating throat seals constructed of copper impregnated PTFE number 46 with Nitrile back up rings.
8. All pumps shall have case hardened seats and ball checks for maximum service life and resistance to damage from contaminated product.
9. All pumps shall be easily serviceable with no special tools required.
10. All pumps shall be individually factory tested and verified for proper function. This test shall consist of a minimum of one-hour intermittent operation pumping product against full operating pressure.

B. 55:1 Ratio Pump for use in High Pressure Grease Distribution Systems, which include Pipe Lines, Hose Reels, and Control Handles:

1. This pump shall be a 55:1 ratio pump for use in high pressure grease distribution systems which include pipe lines, hose reels, and control handles. In addition to meeting all of the general pump specifications, this pump shall also have the following features. Construction of corrosion resistant parts including aluminum, alloy steel, and Nitrile seals. This pump shall be compatible with all types of mineral and synthetic greases. Also able to pump non-corrosive high viscosity products that are compatible with the materials listed above.
2. This pump shall have an air motor diameter of 3 inches.
3. This pump shall have an air inlet of 1/4" NPTF and product outlet of 1/4" NPTF.
4. This pump shall be equipped with an intake filter screen, shovel valve, and 1/4" NPTM by 1/2-27M connection adapter. This pump shall be available in three configurations for the three product containers commercially available for grease.
5. This pump shall be rated for and capable of operating at a minimum air pressure of 40psi and maximum air pressure of 140psi. The maximum outlet pressure will be 8,100psi.
6. This pump shall be capable of producing a maximum free flow rate of 32 fluid ounces per minute.
7. This pump shall have an average air consumption no greater than 5 CFM @ 100psi.
8. This pump shall include a 2" die cast metal sliding bung mounting adapter to allow infinite adjustment of the depth of the pump in the product container.

C. 5:1 Ratio Stub Type Pump for use in High Volume Fluid Distribution Systems, which include Pipe Lines, Hose Reels, and Metered Control Handles:

1. This pump shall be a 5:1 ratio stub type pump for use in high volume fluid distribution systems which include pipe lines, hose reels, and metered control handles. This pump shall be capable of servicing multiple outlets simultaneously. In addition to meeting all of the general pump specifications, this pump shall also have the following features. Construction of corrosion resistant parts including aluminum and alloy steel, with polyurethane and Nitrile seals. This pump shall be compatible with all types of mineral and most synthetic oils, high viscosity gear oils, diesel and kerosene. Also able to pump non-corrosive liquids of high viscosity that are compatible with the materials listed above.
2. This pump shall have an air motor diameter of 3 1/2 inches and a minimum 4-inch pumping stroke.
3. This pump shall have an air inlet of 3/8" NPTF and fluid outlet of 1" NPTF.
4. This pump shall have a 1" NPTF fluid inlet connection threads for wall mounting or custom suction tube lengths, as well as outside O ring sealed machine threads for optional standard length suction tubes available for all standard dispensing containers.
5. This pump shall be rated for and capable of operating at a minimum air pressure of 40psi and maximum air pressure of 140psi. The maximum fluid pressure will be 700psi.
6. This pump shall be capable of producing a maximum free flow rate of 10 gallons per minute, with a maximum discharge head @140psi of 1,795 feet.
7. This pump shall have an average air consumption no greater than 7 CFM @ 100psi.
8. This pump shall include a 2" die cast metal sliding bung mounting adapter to allow infinite adjustment of the depth of the pump in the product container.

2.4 PUMP ACCESSORIES:

A. Service shut off valve:

1. All pumps shall be equipped with a service shut off valve to isolate the pump from the system for testing or service. This valve shall be rated for a working pressure greater than the maximum output pressure of the pump for which it is intended.
2. Service valves include medium-pressure 1/2", 3/4" and 1" valves, and high-pressure 1/2", 3/4" and 1" valves.

B. Follower plate:

1. All grease pumps shall be equipped with follower plates constructed of steel with flexible seals and a handle for easy transfer.
2. This follower plate shall be for 120 lb. Containers and 400 lb. Containers.

C. Filters regulators and lubricators:

1. Each compressed air powered linear reciprocating lube pump shall have incorporated into its supply line a filter, regulator and lubricator assembly. This assembly shall be securely mounted to the wall. The filter shall be equipped with an automatic drain and the regulator shall be equipped with an air gauge.
2. Each compressed air powered diaphragm pump shall have incorporated into its supply line a filter regulator assembly. This assembly shall be securely mounted to the wall. The filter shall be equipped with an automatic drain and the regulator shall be equipped with an air gauge.

2.5 SAFETY VALVES:

A. Air Safety Valves: Compliant with FM Global 7-32, FM Approved Firesafe Valve.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Series B219VS Ball Valve as manufactured by Belimo or an approved equal.
2. Rating: 600 psig minimum.
3. Ends: SAE NPT
4. Stem Packing: Reinforced PTFE
5. Ball: Stainless Steel
6. Body: Bronze

B. Lubricant Safety Valves (Grease): Compliant with FM Global 7-32, FM Approved Firesafe Valve.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Series H71 Valve as manufactured by Worcestor Controls or an approved equal.
2. Rating: 5000 psi minimum.
3. Size: 3/4"
4. Ends: NPT

C. Lubricant Safety Valves (Oil): Compliant with FM Global 7-32, FM Approved Firesafe Valve.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Series 4 Valve as manufactured by Worcestor Controls or an approved equal.
2. Rating: 2000 psi minimum.
3. Size: 3/4"
4. Ends: NPT

D. Safety Valves Actuators: Compliant with FM Global 7-32.

5. Basis-of-Design Product: Subject to compliance with requirements, provide Series NFB24 Actuator as manufactured by Belimo or an approved equal.

6. Power Supply: 24V D/C
7. Torque: 90 in-lb minimum
8. Action: Power open, normally close spring return.
9. Actuator shall be compatible with all safety valves listed in this section.

## 2.6 SPRING DRIVEN OPEN HOSE REELS:

### A. General specification:

1. All reels shall be constructed of powder coated carbon steel for maximum durability.
2. All reels shall have double pedestal side supports and dual hose guide arms, adjustable for wall, ceiling, or floor mounting.
3. All reels shall have a powder coated welded carbon steel reinforced base to resist deformation from operator induced side loading.
4. All reels shall have heavy duty hubs constructed of brass for maximum durability, product compatibility, interchangeability, and corrosion resistance. Hubs shall be full flow ported and rated for a maximum pressure of 9,000psi.
5. All reels shall have a heavy-duty four-piece roller outlet assembly for maximum hose life.
6. All reels shall have a safety wound and riveted steel spring rated for a minimum of 50,000 cycles. This spring to be mounted in a steel canister for safe removal during service operations. This spring shall have a free float mounting to prevent damage from uncontrolled hose flyback.
7. All reels shall have a conical hose stopper for operator safety when retracting the hose.
8. All reels shall have a minimum of nine possible locking positions on the positive latching mechanism. The latch pawl shall be constructed of nickel plated steel for maximum durability. Latch mechanism shall be of the non-sparking design.
9. All reels shall be have a hub mounted spring tension adjuster for simplified adjustments that do not require removal of the control handle or relief of the system pressure.
10. Swivels for the reels shall be as follows. High pressure swivels shall be constructed entirely of alloy steel and have a full circumference polyurethane lip seal. Medium and Low pressure swivels shall be constructed of alloy steel and brass for maximum corrosion resistance and have a full circumference Nitrile lip seal.
11. Hoses for the reels shall be as follows. Low-pressure hoses shall be fabric reinforced with permanent hose ends. Medium pressure hoses shall be wire reinforced and flame resistant with permanent hose ends. High pressure hoses shall be multiple wire reinforced and flame resistant with permanent hose ends. All hoses shall have a swivel fitting on one end to facilitate installation and service.

### B. Heavy duty large capacity hose reels:

1. In addition to meeting all of the general specifications, reel shall have a maximum capacity of up to 60' of 1/2" hose.
2. Reel shall have a welded powder coated carbon steel base and constructed of 50% thicker gauge steel than a standard duty reel.
3. Reel shall be equipped with an extended wrap free-floating retraction spring for longer hose length capacities.
4. Reel shall have a separate mounting base constructed of three plates of steel for the previously specified hose roller outlet.
5. Reel shall be equipped with a solid steel reinforcing tie bar connecting the dual outlet arms.

## 2.7 HOSE REEL ACCESSORIES:

### A. Reel mounting channels and brackets:

1. Reel banks shall be mounted on a predrilled, powder coated carbon steel mounting channel. Attach reel mounting channel to reel system support structure using manufacturer approved methods.

### B. Inlet connection hose:

1. All reels shall be furnished with an inlet connection hose of identical construction as the previously specified outlet hoses to isolate the reel from the supply piping. The inlet connection hose shall be two feet in length and the same diameter as the outlet hose.

### C. Service shut off valve:

1. All hose reels shall be equipped with a service shut off valve to isolate the reel from the system for testing or service. This valve shall be rated for a working pressure greater than the maximum output pressure of the pump which is supplying it.

## 2.8 DISPENSING VALVE:

### A. Low pressure control handles:

1. Water control valves shall be constructed of corrosion resistant metal with a positive sealing valve.

### B. Medium pressure control handles:

1. All mechanical pistol grip or inline style metering control valves shall be constructed primarily of aluminum alloy for lightweight, corrosion resistance, and re-

duced operator fatigue. The body of the valve shall be ergonomically designed for operator comfort. The face of the meter shall feature a pointer with adequate markings to easily read the quantity of product being dispensed. The face of the meter shall also contain a non-resettable totalizing register. The valve shall be full flow ported and positive sealing. These control handles shall be available with a minimum of four different styles of outlet tube assemblies that are easily interchangeable for maximum versatility. These outlet tube assemblies shall feature semi automatic positive sealing anti drip tips to maintain a safe and clean work environment.

2. All electronic pistol grip or inline style metering control valves shall be constructed primarily of aluminum alloy for lightweight, corrosion resistance, and reduced operator fatigue. The body of the valve shall be ergonomically designed for operator comfort. The face of the meter shall feature a large LCD display with adequate markings to easily read the quantity of product being dispensed. The display of the meter shall also contain an easily accessible totalizing register. The valve shall be full flow ported and positive sealing. These control handles shall be available with a minimum of four different styles of outlet tube assemblies that are easily interchangeable for maximum versatility. These outlet tube assemblies shall feature semiautomatic positive sealing anti drip tips to maintain a safe and clean work environment.
3. Non metered style control valves shall be constructed primarily of aluminum alloy for light weight, corrosion resistance, and reduced operator fatigue. The body of the valve shall be ergonomically designed for operator comfort. The valve shall be full flow ported and positive sealing. These control handles shall be available with a minimum of four different styles of outlet tube assemblies that are easily interchangeable for maximum versatility. These outlet tube assemblies shall feature semi automatic positive sealing anti drip tips to maintain a safe and clean work environment.
4. All medium pressure control valves shall be rated for a maximum working pressure of 1,500psi. All medium pressure control handles shall feature inlet filter screens. Unitized pistol grip style control handles shall feature an infinite rotation swivel sealed with a Nitrile O ring and a PTFE back up washer. All other medium pressure metered and non metered control valve assemblies shall feature a ball bearing infinite rotation swivel sealed with a Nitrile O ring and a PTFE back up washer. All medium pressure swivels shall have 1/2" NPTF inlet threads.

C. Medium pressure high volume control handles:

1. Medium pressure high volume control valves shall be constructed primarily of alloy steel with an aluminum alloy housing for light weight, corrosion resistance, and reduced operator fatigue. The housing of the valve shall be ergonomically designed for operator comfort. The valve shall be full flow ported and positive sealing, with a dual valve for both high and low flow dispensing. The handle shall be equipped with a spring loaded retention mechanism for hands free dispensing and a semi automatic positive sealing anti drip tip to maintain a safe and clean work environment.

2. All medium pressure high volume control valves shall be rated for a maximum working pressure of 1,800psi.
3. All medium pressure high volume control valve assemblies shall feature on the inlet a ball bearing infinite rotation swivel sealed with a Nitrile O ring and a PTFE back up washer and have 1/2" NPTF inlet threads.

D. Y Strainer inline filter:

1. This inline filter shall be constructed of cast iron for durability. It shall have 1/2" NPTF ports for simplified installation. This filter shall be of the inline 'Y' design to allow cleaning of the filter screen without removal of the housing from the line.

2.9 CONCEALED FLOOR ANCHOR:

A. Factory formed with a cover, cast-in-place designed system to be used as a full-functioning tie down for automotive and frame correction.

1. Basis-of-Design Product: Subject to compliance with requirements, provide concealed floor anchor system Model # B525 as manufactured by Buske L.L.C., or an approved equal.
2. Anchor Rod Diameter: 1".
3. Opening Size: Approximately 8-1/2" by 5".
4. Cover: Flush with finished grade.
5. Allowable Tensile Load: Tested to a minimum of 50,000 lbs.

2.10 HORIZONTAL, STEEL, ABOVEGROUND STORAGE TANK:

A. Basis-of-Design Product: Subject to compliance with requirements, provide Lube Cube as manufactured by Containment Solutions, Inc., or an approved equal. Quantity (4) four for this project.

B. Description: UL 142, double-wall, horizontal, steel tank; with primary- and secondary-containment walls and interstitial space.

C. Construction: Fabricated with welded, carbon steel; suitable for operation at atmospheric pressure and for storing oil with specific gravity up to 1.1 and with maintained temperature up to 150 deg F.

D. Supports: Manufacturer's standard structural steel welded to tank.

E. Capacities and Characteristics:

1. Capacity:
  - a. Waste Oil: 500 gallons.
  - b. Waste Antifreeze: 500 gallons.
  - c. Motor Oil and Hydraulic Oil: 330 gallons.

2. Connection Sizes:

- a. Fill: 2-inch NPS.
- b. Primary Vent Line: 2-inch NPS.
- c. Mechanical Gage: 2-inch NPS.
- d. Emergency Vent: 4-inch NPS.
- e. Secondary Vent: 2-inch NPS.
- f. Secondary Monitoring Port: 2-inch NPS.
- g. Secondary Emergency Vent: 4-inch NPS.
- h. Pump-out Port: 2-inch NPS.

2.11 ABOVEGROUND STORAGE TANK ACCESSORIES:

- A. Threaded pipe connection fittings on top of tank, for fill, vent, outlet, sounding, and gaging. Include cast-iron plugs for shipping.
- B. Lifting Lugs: For handling and installation.
- C. Pump-Out Assembly: Piping fitting with end cap with locking cam arms.
- D. Pump-Out Tube: Extension of pump-out piping fitting into tank, terminating 6 inches above tank bottom.
- E. Mechanical Level Gauge: 2" NPT, molded float, impervious to petroleum products, break resistant vile with UV inhibitors, to fit depth of tank required.
- F. Weatherproof Vent Cap: Open, atmospheric type, corrosion-resistant, internal wire screen designed to protect vent lines from water, debris, and insects.
- G. Emergency Response Identification: Hazard sign that meets the requirements of NFPA 704. Hazard rating numerals shall be a minimum of 3 inches high. Sign shall be vinyl with self adhesive backing, intended for outdoor use.

2.12 TANK INSTALLATION MATERIALS:

- A. Concrete Pads: Comply with the requirements in CSI Division 03 Section 033000, "Cast-in-Place Concrete."

2.13 SOURCE QUALITY CONTROL:

- A. Pressure test and inspect fuel-oil storage tanks, after fabrication and before shipment, according to ASME and the following:
  - 1. Horizontal, Double-Wall Steel ASTs: UL 142, STI F921, and STI R931.
- B. Affix standards organization's code stamp.

## PART 3 - EXECUTION

### 3.1 INSTALLATION:

- A. Install lubrication pumps and systems equipment level and plumb, and in accordance with manufacturer's written installation instructions.
- B. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- C. Install piping adjacent to equipment and machines to allow service and maintenance.
- D. Install piping free of sags and bends.
- E. Install fittings for changes in direction and branch connections.
- F. Coordinate location and installation of concealed floor anchors with concrete slab pour.

### 3.2 JOINT CONSTRUCTION:

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Welded Joints for Steel Piping: Join according to AWS D10.12/D10.12M.

### 3.3 ABOVEGROUND STORAGE TANK INSTALLATION:

- A. Set tank on concrete pad.
- B. Install tank bases and supports.
- C. Connect piping and vent fittings.
- D. Install ground connections.

- E. Install steel ASTs according to STI R912.
- F. Apply Hazard Sign directly to tank in a visible location. Hazard ratings shall be the following:
  - 1. Waste Oil:
    - a. Health (Blue): 0
    - b. Fire (Red): 2
    - c. Instability (Yellow): 0
    - d. Special Hazard (White): None
  - 2. Waste Antifreeze:
    - a. Health (Blue): 1
    - b. Fire (Red): 1
    - c. Instability (Yellow): 0
    - d. Special Hazard (White): None
  - 3. Motor Oil:
    - a. Health (Blue): 0
    - b. Fire (Red): 1
    - c. Instability (Yellow): 0
    - d. Special Hazard (White): None
  - 4. Hydraulic Oil:
    - a. Health (Blue): 0
    - b. Fire (Red): 1
    - c. Instability (Yellow): 0
    - d. Special Hazard (White): None

### 3.4 FLUID DISPOSAL PUMP SYSTEM INSTALLATION:

- A. Install system components as per Manufacturer's instructions.
- B. Install piping and pipe connections as per Manufacturer's instructions and applicable sections of this Specification.
- C. Install suction piping with minimum fittings and change of direction.

### 3.5 HANGER AND SUPPORT INSTALLATION:

- A. Comply with requirements in CSI Division 22 Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

- B. Vertical Piping: MSS Type 8 or 42, clamps.
- C. Individual, Straight, Horizontal Piping Runs:
  - 1. 100 Feet or Less: MSS Type 1, adjustable, steel clevis hangers.
  - 2. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
- D. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
- E. Base of Vertical Piping: MSS Type 52, spring hangers.
- F. Support horizontal piping within 12 inches of each fitting and coupling.
- G. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1/4 to NPS 1/2: 96 inches with 3/8-inch rod.
  - 2. NPS 3/4 to NPS 1-1/4: 84 inches with 3/8-inch rod.
- I. Install supports for vertical steel piping every 15 feet.

### 3.6 CONCRETE BASES:

- A. Concrete and reinforcement as specified in CSI Division 03 Section 033000, "Cast-in-Place Concrete." Concrete bases shall be installed by the Concrete Installer in the location indicated by the Mechanical Installer.
- B. Concrete Bases: Anchor waste oil tank to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

### 3.7 PIPING SCHEDULE:

- A. Oil piping shall be the following:
  - 1. ½ inch Schedule 40, steel pipe; threaded or welded forged-steel fittings; and threaded or welded joints.
- B. Grease piping shall be the following:
  - 1. ½ inch Schedule 80, steel pipe; threaded or welded forged-steel fittings; and threaded or welded joints.
- C. Anti-Freeze piping shall be the following:

1. ½ inch Type K, copper tube; wrought-copper fittings; and soldered joints

### 3.8 FIELD QUALITY CONTROL

- A. Provide hydrostatic testing to comply with testing of metallic Category D and Normal fluid service process piping system constructed to ASME B31.3 “Process Piping. Nonmetallic piping and other fluid service categories have additional requirements.

1. Test medium shall be oil or water.
  - a. If water is used in piping systems for oils/grease, the piping must be dried after test.
  - b. If oil is used in piping system for antifreeze, the piping must be cleaned of oil and dried after test. Piping systems are to be free of containments after tests have been complete.

B. General Test Preparation:

1. All code and design required examinations shall be complete prior to testing.
2. A preliminary walk-down of the piping to be tested shall be made. Test personnel shall correct and./or identify test boundaries, any problems, incomplete items, joint access, fill points, vent points, and any scaffolding required.
3. All joints, including welds and mechanical joints are to be left un-insulated and exposed for examination during the test, except that joints previously tested may be insulated or covered.
4. Hangers and supports shall be placed in the proper position prior to the filling of the system to be tested.
5. Piping designed for vapor or gas shall be provided with additional temporary supports, if necessary to support the weight of the test liquid, as designated by the DESIGNER. Spring hangers should be placed in the locked position.
6. Expansion joints shall be provided with temporary restraint if required for additional pressure load under test, or shall be isolated from the test.
7. The test personnel shall assure that the components (e.g. instruments, valves, etc.) that are not to be subjected to the pressure test, are either disconnected from the piping or isolated by blind flanges or other means during the rests. Valves may be used for isolation, provided the valve (including the closure mechanism) is suitable for the proposed test pressure.
8. A flanged joint at which a blank is inserted to isolate other equipment during the test need not be examined for leaks. These joints should be leak tested during initial service.
9. If a pressure test is to be maintained for a period of time and the test liquid in the system is subject to changes in temperature, precautions shall be taken to avoid excessive pressure due to thermal expansion or freezing.
10. A preliminary air test at not more than 25 psi gage pressure may be made prior to hydrostatic test in order to locate major leaks

11. A test record shall be made for each leak test. The record shall include the following:
  - a. Date of test
  - b. Identification of piping to be tested (test boundaries)
  - c. Test fluid
  - d. Test pressure
  - e. Certification of the examiner
12. Following hydrostatic testing, the piping system shall be cleaned, and dried if necessary.
13. Prior to in-service leak test, the piping system shall be cleaned, and dried if necessary.
14. During hydrostatic testing or in-service leak testing, strainers shall be used to protect equipment against the introduction of construction debris and/or dirt.

C. Hydrostatic Leak Testing Test Fluid:

1. The test fluid shall be water unless there is a possibility of damage due to freezing, or if the process or piping material would be adversely affected by water. In that case, other suitable test fluids may be used. Special precautions are required if the test fluid is toxic or flammable.
2. The temperature of the test fluid shall be no less than 40 F in piping systems subject to brittle factor (i.e. carbon steel).
3. If test fluid temperature produces condensation on the piping exterior surface, the water shall be heated to a temperature above the dew point or the test shall be postponed to a time when the dew point temperature has changed sufficiently such that condensation will not occur on the piping exterior surface.
4. Material and test water temperatures shall be approximately equal prior to pressurizing the system.
5. High points in the system shall be vented so that air will be displaced while the system is being filled with the test fluid.
6. The operator shall take adequate measures to ensure that the piping system is not over-pressurized during hydrostatic testing. Adequate measures include a relief valve, or a dedicated operator to monitor pressure, or dual pressure regulators, etc.

D. Test Pressure:

1. Normal operating pump discharge pressures:
  - a. Grease Pump: normal operating discharge pressure is 4000 psi
  - b. Oil(s) Pump: normal operating discharge pressure is 1125 psi
  - c. Anti-freeze Pump: Normal operating discharge pressure is 100 psi
  - d. Used antifreeze evacuation system: Normal operating discharge pressure is 100 psi

2. The maximum test pressure shall not exceed 1.5 times the pumps normal operating discharge pressure or the working pressure or yield stress of any component or vessel in the system.
  - a. When a maximum test pressure is specified, the test pressure shall not exceed this amount.
  - b. When no maximum test pressure is specified, the test shall not be greater than 110% of the minimum.
  
3. The minimum hydrostatic test pressure for metallic piping shall be per the following equation.
  - a.  $PT = 1.5 PD \times ST/SD$ 
    - 1) Where: PT = minimum test gage pressure)
    - 2) PD = internal design gage pressure
    - 3) ST = allowable stress value at test temperature
    - 4) SD = allowable stress value at design temperature
    - 5) Note: The maximum allowable value of ST/SD is 6.5
  
4. When using water, static head due to differences in the elevation of the top of piping system and the elevation of the test gage shall be accounted for in pressuring the piping system to be tested by the following equations:
  - a.  $SH \text{ (psi)} = (HE - GE) \times 0.433$
  - b.  $PST = PT + SH$ 
    - 1) Where: HE = high point elevation (ft)
    - 2) GE = gage point elevation (ft)
    - 3) SH = static head (psi)
    - 4) PST = minimum test gage pressure corrected for static head.
    - 5) Note: 0.433 = conversion factor (ft of water to psi)
  
5. Pressure gages shall be connected directly to piping. Calibrated pressure gages shall be used in all Code testing. Pressure gage range shall exceed the intended test pressure by approximately double but in no case shall the range be less than one and one-half (1 ½) times the test pressure.

E. Hydrostatic Testing of Piping with Vessels as a System:

1. Where a test pressure of piping attached to a vessel is the same as or less than the test pressure for the vessel, the piping may be teste with the vessel at the test pressure of the piping.
2. Where the test pressure of the piping exceeds the vessel test pressure and isolation is not considered practicable, the piping and the vessel may be tested together at the test pressure of the vessel, if approved by the DESIGNER. The vessel test pressure must not be less than 77% of the piping test pressure.

F. Examination for Leaks:

1. Test personnel shall ensure the hydrostatic pressure is maintained for sufficient time to determine if there are any leaks. A minimum time of 10 minutes is required by Code. After hydrostatic pressure time has been satisfied, all joints shall be examined visually for leaks.
2. Examination shall be made of all welds and mechanical joints. There shall be no visible evidence of leakage. Welds and joints previously tested need not to be examined for leaks.
3. Leakage detected in welded joints shall be repaired by draining, repair welding, non-destructively examining in accordance with original requirements, and re-tested to the original test pressure.
4. Mechanical joint leakage at permanent joints shall be repaired, examined in accordance with original requirements, and re-tested to original test pressure.

G. Cleaning and Drying:

1. Clean and dry piping as required to remove all of the test media used so as not to contaminant different materials being used in piping distribution systems.

3.9 TRAINING:

- A. Refer to Form 818 Article 1.20-1.08.14 subsection 5 for additional information.
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.

END OF SECTION 111000

## SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SUMMARY:

##### A. Section Includes:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Balancing valves.
5. Strainers.
6. Hose bibbs.
7. Drain valves.
8. Water-hammer arresters.
9. Trap-seal primer valves.
10. Water filters.
11. NPS 1-1/2 reel-type hose stations.

##### B. Related CSI Requirements:

1. Division 22 Section 220519 "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Division 22 Section 221116 "Domestic Water Piping" for water meters.
3. Division 22 Section 224500 "Emergency Plumbing Fixtures" for water tempering equipment.

#### 1.2 ACTION SUBMITTALS:

##### A. Submit the following in accordance with Form 818 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

##### B. Product Data: For each type of product.

1. Spare Parts: Include name, address, and telephone number of in-state supplier of spare parts. No out-of-state suppliers shall be permitted.

#### 1.3 INFORMATIONAL SUBMITTALS:

##### A. Quality Assurance Submittals:

1. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS:

- A. Operation and Maintenance Data: For domestic water piping specialties to include in the operation, and maintenance manuals specified in Form 818 Article 1.20-1.08.14 subsection 4 and described in NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.5 SPARE PARTS:

- A. Furnish to the Engineer spare parts described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Water Filter Cartridges: Equal to 200% of amount installed for each type and size indicated.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES:

- A. Potable-water piping and components shall comply with NSF 61 and NSF 14.

2.2 PERFORMANCE REQUIREMENTS:

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 VACUUM BREAKERS:

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Conbraco Industries, Inc.
    - b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    - c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
  - 2. Standard: ASSE 1001.
  - 3. Size: NPS 1/4 to NPS 3, as required to match connected piping.
  - 4. Body: Bronze.

5. Inlet and Outlet Connections: Threaded.
6. Finish: Chrome plated.

B. Hose-Connection Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Conbraco Industries, Inc.
  - b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
  - c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
2. Standard: ASSE 1011.
3. Body: Bronze, nonremovable, with manual drain.
4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
5. Finish: Chrome or nickel plated.

2.4 BACKFLOW PREVENTERS:

A. Reduced-Pressure-Principle Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Conbraco Industries, Inc.
  - b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
  - c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle third of flow range.
5. Size: Full size of connecting piping.
6. Body: Bronze for NPS 2 and smaller.
7. End Connections: Threaded for NPS 2 and smaller.
8. Configuration: Designed for horizontal, straight-through flow.
9. Accessories:
  - a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
  - b. Air-Gap Fitting: Pressure differential relief valve with ASME A112.1.2 air-gap fitting located between two positive seating check valves, matching backflow-preventer connection.

## 2.5 WATER PRESSURE-REDUCING VALVES:

### A. Water Regulators:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Conbraco Industries, Inc.
  - b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
  - c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
2. Standard: ASSE 1003.
3. Pressure Rating: Initial working pressure of 150 psig.
4. Size: Full size of connecting piping.
5. Type: Single-seated, direct operated.
6. Body: Bronze for NPS 2 and smaller.
7. Valves for Booster Heater Water Supply: Include integral bypass.
8. End Connections: Threaded for NPS 2 and smaller.
9. Strainer: Include integral factory-installed or separate field-installed, Y-pattern strainer.

## 2.6 BALANCING VALVES:

### A. Copper-Alloy Calibrated Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. ITT Corporation; Bell & Gossett Div.
  - b. TACO Incorporated.
  - c. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
2. Type: Ball valve with two readout ports and memory-setting indicator.
3. Body: Bronze.
4. Size: Same as connected piping, but not larger than NPS 2.
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

### B. Memory-Stop Balancing Valves:

1. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
2. Pressure Rating: 400-psig minimum CWP.

3. Size: NPS 2 or smaller.
4. Body: Copper alloy.
5. Port: Standard or full port.
6. Ball: Chrome-plated brass.
7. Seats and Seals: Replaceable.
8. End Connections: Solder joint or threaded.
9. Handle: Vinyl-covered steel with memory-setting device.

## 2.7 STRAINERS FOR DOMESTIC WATER PIPING:

### A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Size: Full size of connecting piping.
3. Body: Bronze for NPS 2 and smaller.
4. End Connections: Threaded for NPS 2 and smaller.
5. Screen: Stainless steel with round perforations unless otherwise indicated.
6. Perforation Size:
  - a. Strainers NPS 2 and Smaller: 0.020 inch.
7. Drain: Pipe plug or factory-installed, hose-end drain valve.

## 2.8 HOSE BIBBS:

### A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig.
7. Vacuum Breaker: Integral or field-installation, nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Service Areas: Rough bronze, or chrome or nickel plated.
10. Operation: Metal wheel handle.
11. Include integral wall flange with each chrome- or nickel-plated hose bibb.

## 2.9 DRAIN VALVES:

### A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.

2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

## 2.10 WATER-HAMMER ARRESTERS:

### A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Josam Company.
  - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - c. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows with pressurized metal cushioning chamber.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

## 2.11 TRAP-SEAL PRIMER DEVICE:

### A. Supply-Type, Trap-Seal Primer Device:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. MIFAB, Inc.
  - b. Precision Plumbing Products, Inc.
  - c. Sioux Chief Manufacturing Company, Inc.
  - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - e. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.

5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.12 WATER FILTERS:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the model numbers listed below as manufactured by CUNO Incorporated, or approved equal.
- B. General: Cartridge-type assemblies suitable for potable water. Include housing, fittings, filter cartridges, and cartridge end caps.
- C. Wall-Mounting Type: Housing head section with threaded inlet and outlet, mounting bracket, and removable lower section for 10-inch long filter cartridge.
  1. Housing Material: Plastic, 125-psig minimum operating pressure, Model No. AP11T.
  2. Cartridge: Pure white cellulose fiber filter media, 10-inches, 5-micron-particulate removable rating, Model No. AP110.

2.13 NPS 1-1/2 REEL-TYPE HOSE STATIONS:

- A. Hose Reel:
  1. Standard: UL 47.
  2. Hose Reel and Bracket Material: Steel.
  3. Type: Hose-reel assembly. Include hose valve, wall bracket, hose reel, water-retention device, hose pins, and hose.
  4. Operation: Semiautomatic.
  5. Sized to hold fire hose.
  6. Finish: Red enamel.
- B. Hose Valve:
  1. Standard: UL 668, NPS 1-1/2, for connecting fire hose.
  2. Type: Adjustable.
  3. Pressure-Control Device: Pressure reducing or pressure restricting.
  4. Hose Valve and Trim Finish: Rough brass or bronze.
  5. Pressure Rating: 300 psig minimum.
  6. Pattern: Angle.
  7. Material: Brass or bronze.
  8. Pressure-Control Device: UL 1468, integral or for field installation if indicated.
  9. Size: NPS 1-1/2.
  10. Inlet: Female pipe threads.

11. Outlet: Male hose threads according to NFPA 1963 and matching local fire-department threads.

C. Hose:

1. Standards: NFPA 1961 and UL 219 lined fire hose with swivel inlet, coupling, gaskets, and nozzle.
2. Size: NPS 1-1/2.
3. Length: 50 feet.
4. Jacket: Combination of natural and synthetic threads.
5. Lining: Rubber, plastic, or combination of rubber and plastic compounds.
6. Cover: Rubber, plastic, or combination of rubber and plastic compounds.
7. Nozzle: UL 401.
  - a. Material: Brass.
  - b. Type: Spray, adjustable from shutoff to fog spray or straight stream.

## PART 3 - EXECUTION

### 3.1 INSTALLATION:

- A. Refer to CSI Division 22 Section 221116 “Domestic Water Piping” for piping joining materials, joint construction, and basic installation requirements.
- B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
  1. Locate backflow preventers in same room as connected equipment or system as shown on the Plans.
  2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
  3. Do not install bypass piping around backflow preventers.
- C. Install water regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.
- D. Install balancing valves in locations where they can easily be adjusted.
- E. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve, and pump.

- F. Install water-hammer arresters in water piping according to PDI-WH 201 and as indicated.
- G. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- H. Attach hose-reel hose stations to structure with bracket.

### 3.2 CONNECTIONS:

- A. Comply with requirements for piping specified in other CSI Division 22 Sections. Plans indicate general arrangement of piping, fittings, and specialties.

### 3.3 LABELING AND IDENTIFYING:

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
  - 1. Reduced-pressure-principle backflow preventers.
- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in CSI Division 22 Section 220553 "Identification for Plumbing Piping and Equipment."

### 3.4 FIELD QUALITY CONTROL:

- A. Inspect domestic water piping specialties in accordance with Form 818 Article 1.20-1.05.10.
- B. Perform the following tests and inspections:
  - 1. Test each reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.
- C. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.5 ADJUSTING:

- A. Set field-adjustable pressure set points of water pressure-reducing valves.
  - 1. Set outlet pressure to 80-psig maximum unless otherwise indicated.
- B. Set field-adjustable flow set points of balancing valves.

END OF SECTION 221119

## SECTION 302000 – GENERAL SITE WORK

### PART 1 - GENERAL

#### 1.1 SUMMARY:

##### A. Section Includes:

1. Asphalt Storage Shed
2. Bollard
3. Concrete Apron
4. Concrete Pad
5. Concrete Washout Area
6. Concrete Wheel Stop
7. Controlled Low Strength Material (Flowable Fill)
8. CORS Station
9. Flagpole
10. Fuel Island Canopy
11. Furnishing, Planting and Mulching Trees, Shrubs, Vines and Ground Cover Plants
12. No.3 Crushed Stone
13. Peastone Gravel Backfill
14. Steel Bollard
15. Storage Container

#### 1.2 ACTION SUBMITTALS:

A. Submit the following in accordance with Form 818 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated.

1. Asphalt Storage Shed
2. Bollard
3. Flagpole
4. Fuel Island Canopy
5. Furnishing, Planting and Mulching Trees, Shrubs, Vines and Ground Cover Plants
6. Steel Bollard

C. Shop Drawings: For each type of product indicated.

1. Asphalt Storage Shed
2. Concrete pad.
3. CORS Station

- D. Working Drawings: For each type of product indicated.
  - 1. Fuel Island Canopy

## PART 2 - PRODUCTS

### 2.1 MATERIALS:

- A. ASPHALT STORAGE SHED: Storage Container Cover shall be MODEL R35 with outside connection as manufactured by 'SteelMaster' or approved equal. Storage Container Cover to be Grounded. Storage Container Cover mounting equipment and hardware dimensions comply with manufacturer's specifications.
- B. BOLLARD:
  - 1. Steel bollard: Schedule 80 galvanized steel pipe, 8 inch nominal size (8.625" O.D.), conforming to the requirements of ASTM-A53.
  - 2. Concrete: Comply with requirements of CSI Division 03, Section 033000, "Cast-in-Place Concrete".
  - 3. Polyethylene sleeve. Bumper (Bollard) Post Sleeve #PLS1009, as manufactured by New Pig Corporation or approved equivalent. Sleeve shall be yellow in color with 1/4"-thick polyethylene shell.
- C. CONCRETE APRON:
  - 1. Concrete: Comply with requirements of CSI Division 03, Section 033000, "Cast-in-Place Concrete".
  - 2. Steel Reinforcement: Comply with requirements of CSI Division 03, Section 033000, "Cast-in-Place Concrete" Section 2.2.
  - 3. Water Repellants: Comply with requirements of CSI Division 07, Section 071900, "Water Repellants".
- D. CONCRETE PAD:
  - 1. Concrete: Comply with requirements of CSI Division 03, Section 033000, "Cast-in-Place Concrete".
  - 2. Steel Reinforcement: Comply with requirements of CSI Division 03, Section 033000, "Cast-in-Place Concrete" Section 2.2.
  - 3. Water Repellants: Comply with requirements of CSI Division 07, Section 071900, "Water Repellants".
- E. CONCRETE WASHOUT AREA: Refer to Contract Plan Sheets for requirements related to this work.
- F. CONCRETE WHEEL STOP:

1. Concrete: Comply with requirements of CSI Division 03, Section 033000, "Cast-in-Place Concrete", amended as follows:
  - a. Concrete shall have a minimum 28 day compressive strength of 4000 psi.
  - b. Reinforcement bars shall meet the requirements of Form 818, Article M.06.01.

G. CONTROLLED LOW STRENGTH MATERIAL (FLOWABLE FILL):

1. Materials: All materials utilized in the CLSM mix design shall be in accordance with the applicable requirements of Article M.03.01
  - a. Composition: The composition of the CLSM shall be in accordance with the requirements set forth in Article M.03.01-General Composition of Concrete Mixes, as well as the applicable sections of ACI 229R. The Contractor shall submit each proposed mix design, with all supporting data, to the Engineer for review and approval at least two weeks prior to its use.
  - b. The setting time of CLSM materials shall be designed so as to achieve the strength necessary to comply with the time constraints called for under the Maintenance and Protection of Traffic requirements of the project specifications. The use of chloride accelerators is not permitted.
  - c. The minimum compressive strength of the CLSM material shall be 30 pounds per square inch (psi) and the maximum compressive strength of the CLSM shall be 150 pounds per square inch (psi) when tested in accordance with ASTM D4832 after 56 days.
  - d. The CLSM mix design shall utilize a nominal maximum size of No. 8 aggregate as specified in M.01.01.
  - e. CLSM mixes shall have a minimum of 20% entrained air when tested in accordance with AASHTO T152.

H. CORS STATION:

1. Concrete: Shall meet the requirements of CSI Division 03, Section 033000, "Cast-in-Place Concrete". Class F.
2. Steel Reinforcement: Comply with requirements of CSI Division 03, Section 033000, "Cast-in-Place Concrete" Section 2.2.
3. Water Repellants: Comply with requirements of CSI Division 07, Section 071900, "Water Repellants".
4. Mast Steel: ASTM A36 Grade 50.
5. Steel for Anchor Bolts and Fasteners: ASTM F1554 Galvanized.
6. Grounding and Bonding: Comply with requirements of CSI Division 26 Section 260526, "Grounding and Bonding for Electrical Systems"
7. Raceways and Boxes: Comply with requirements of CSI Division 26 Section 260533, "Raceways and Boxes for Electrical Systems".
8. Conduit installed in trench: Comply with requirements of Division 26 Section 260543, "Underground Ducts and Raceways for Electrical Systems".
9. Power and Communication: Comply with requirements of Division 26 Section 262726, "Wiring Devices"

- I. **FLAGPOLE:** Flagpoles shall be ESR40C71 as manufactured by American Flagpole or approved equal. Poles shall be tapered aluminum tubing and shall measure 40'-0" high from the finished grade. Provide standard revolving truck and cleat and 6" ball. Provide copper clad lightning rod. Flagpole foundation shall meet the requirements of CSI Division 03, Section 033000 "Cast-in-Place Concrete". Flagpole foundation dimensions shall comply with manufacturer's specifications.
- J. **FUEL ISLAND CANOPY:** Canopy shall be a 'Delegated Design' based on Austin Mohawks & Company DWG NO. 04-032 (except no mansard roofing), 36' X 86' X 6 Column Canopy with a minimum clearance of 16' or approved equal. Additionally:
1. **Lighting:**
    - a) Provide 8 evenly spaced Cree CAN-304-SL-RS-06-E-UL-WH-700 304 Series Recessed LED Canopy Lights with Fixtures, or an approved equal.
  2. **Fascia system:** The fascia system shall be designed per industry standard based on the Connecticut State Building Code requirements. Additionally:
    - a) Aluminum Composite Material (ACM) Panels shall be provided with a 3mm thick pre-finished aluminum composite material substrate. Finish color shall be white and factory applied.
    - b) There shall be no exposed fasteners on exterior or bottom face of fascia panels.
    - c) Vertical seams shall be sealed from backside with angle closure attached by screws.
  3. **Gutter:**
    - a) Gutter shall conform to ASTM A653 Grade 40 steel with minimum yield strength of 40 ksi, with a G60 galvanized surface per ASTM A924.
    - b) Gutters shall have a finish side coated with a full coat of polyester paint baked on over an epoxy primer. A white wash coat baked on over an epoxy primer shall protect the interior side of the gutter.
    - c) Gutter leaders to column drain shall be one of the following options: 3 inch diameter PVC pipe with a 24 gauge leader cover (dry leader) or an 8 inch wide tapered (4 inch to 6 inch deep) 24 gauge steel leader (wet leader) or as approved by engineer. Larger gutters shall be used where required for proper drainage.
  4. **Downspouts:**
    - a) External downspouts shall be 3 x 4 roll formed aluminum with watertight locked seams or as approved by engineer. Exterior side coated with a full coat of white polyester paint baked on over an epoxy primer. External downspouts shall be mounted to the face of the column and be of one continuous length. Larger drains shall be used where required for proper drainage.
    - b) Internal downspouts shall be 4 inch diameter PVC with couplings provided at gutter leader attachment location and at

base of column where attachment to site drainage system is required.

K. FURNISHING, PLANTING AND MULCHING TREES, SHRUBS, VINES AND GROUND COVER PLANTS:

1. Comply with the requirements of Form 818 Article 09.49.02.

L. NO.3 CRUSHED STONE: Crushed stone shall be the product resulting from the artificial crushing of rocks, boulders or larger cobbles, substantially all faces of which have resulted from the crushing operation. Crushed stone shall consist of sound, tough, durable stone, reasonably free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces, mud, dirt or other deleterious material and shall be sized to meet the requirements of Form 818, Article M.01.01.

M. PEASTONE GRAVEL BACKFILL: Peastone gravel backfill shall be composed entirely of uncrushed stone sized rounded particles conforming to Section M.01.01 of the Form 818, Grading No. 6 unless otherwise specified by the tank manufacturer for compliance with the tank warranty.

N. STEEL BOLLARD:

1. Steel bollard: Schedule 40 galvanized steel pipe, 4 inch outside diameter, conforming to the requirements of ASTM-A53.
2. Concrete: Shall meet the requirements of CSI Division 03, Section 033000, "Cast-in-Place Concrete". Class F.
3. Paint: Bollard shall be primed and finished with "Highway Safety Yellow" rust preventive metal paint.

O. STORAGE CONTAINERS:

1. The storage containers shall have a minimum of 400 square feet of floor space and a ceiling height of 7 feet. Storage containers shall be weatherproof and of all steel construction with integral steel skids for ground level placement and accessibility. Tractor-trailer storage is not acceptable.
2. Storage containers shall include heavy-duty double steel doors with locking bars located at one end of unit. Doors shall include provisions for Owner supplied padlocks.

### PART 3 - EXECUTION

#### 3.1 EXECUTION:

GENERAL SITE WORK  
Project No. **0115-0121**

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**Addendum No. 2**

- A. ASPHALT STORAGE SHED: Install Storage Container Cover in location shown on the plans. Storage Container Cover to be installed on standard concrete blocks (2.5' X 2.5' X 5') stacked two high arranged to fit cover with back wall. All materials shall be installed in strict accordance with the manufacturer's recommendations. Depth shall be 25'.
- B. BOLLARD: Bollards shall be installed in the locations shown on the plans. The steel pipe shall be securely set plumb in concrete and filled with concrete. The polyethylene sleeve shall be installed as recommended by the manufacturer.
- C. CONCRETE APRON: Comply with CSI Division 03, Section 033000, "Cast-in-Place Concrete. Aprons shall be constructed at the locations and to the dimensions shown on the plans.
- D. CONCRETE PAD: Comply with CSI Division 03, Section 033000, "Cast-in-Place Concrete. Pads shall be constructed at the locations and to the dimensions shown on the plans.
- E. CONCRETE WASHOUT AREA: Refer to Contract Plan Sheets for requirements related to this work.
- F. CONCRETE WHEEL STOP: Concrete wheel stops shall be placed on the final layer of bituminous concrete pavement. The layout of concrete wheel stops shall be as shown on the plans and coordinated with the final pavement markings. Anchor dowels shall be driven flush with the top of the wheel stops.
- G. CONTROLLED LOW STRENGTH MATERIAL (FLOWABLE FILL): CLSM shall only be placed when the ambient temperature is at least 32° F and rising. CLSM material shall be deposited within 2 hours of initial mixing. CLSM may be placed by chutes, conveyors, buckets or pumps depending upon the application and accessibility of the site. Should voids or cavities remain after the placement of the CLSM, the Contractor shall modify the placement method or flow characteristics of the CLSM. Voids or cavities which have not been filled properly shall be corrected as directed by the Engineer and at the Contractor's expense.
- H. CORS STATION: Refer to Contract Plan Sheets for requirements related to this work. The welding shall be accordance with the current AWS code. Steel mast, gussets, and base plate shall be welded prior to hot dip galvanizing as a single piece in accordance with ASTM A153. The contract shall notify call before you dig prior to any excavation work. Work performed shall be coordinated with the Office of Central Surveys and performed under their supervision. Coordinate with the engineer.

- I. **FLAGPOLE:** Install flagpole in location shown on the plans. All materials shall be installed in strict accordance with the manufacturer's recommendations.
  
- J. **FUEL ISLAND CANOPY:** Refer to Contract Plan Sheets for requirements related to this work.
  - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - 2. All work related to the demolition required for the construction of the canopy to be included under this pay item
  - 3. All work related to the reinstallation of the fuel island equipment to be included under this pay item.
  
- K. **FURNISHING, PLANTING AND MULCHING TREES, SHRUBS, VINES AND GROUND COVER PLANTS:**
  - 1. All work under Form 818 Section 9.49 shall be performed in accordance with the latest edition of the ANSI A300 (Part 6).
  - 2. **Watering:** All plants must be kept moist and be watered during the period from June 1 through October 31. The contractor shall submit verification of this work each month during the establishment period to ensure the minimum requirements have been met. The engineer may direct the contractor to provide additional water if drought conditions exist.
  - 3. **One-Year Establishment Period:** Acceptance of all work under Section 9.49 for full payment shall be conditional on the successful completion of a 1-Year Establishment Period, as determined by the Engineer. The establishment period shall consist of a minimum of one full calendar year that will begin only after all plant materials specified in the Contract have been planted, and all initial planting operations have been accepted. The establishment period may extend past one calendar to coordinate the inventory and replacement. An inventory of all plant material will be conducted in the spring after plants have leafed out, or in the late summer after the warmest weather has past, and include the Contractor, the Engineer and the Landscape Designer. At this time the acceptability of the plant establishment as well as a list of corrective measures will be determined. The Contractor is responsible for procuring contract items for replacement and should take steps prior to receiving the inventory. The Contractor shall submit a plan for performing replacement work, which must include a thorough watering after planting. Replacement plants are subject to inspection before installation, and corrective measures must be approved before final acceptance.

- L. **NO.3 CRUSHED STONE:** No. 3 crushed stone shall be deposited in layers not over 6” in depth, with each layer thoroughly compacted before the addition of other layers. Stone shall be placed in the locations and to the dimensions shown on the plans.
  
- M. **PEASTONE GRAVEL BACKFILL:** Material shall be clean, dry and free from ice and snow, and shall be installed in accordance with the tank manufacturer's recommendations and as indicated on the Drawings, stated herein in the Specifications or as directed by the Engineer.
  - 1. **Underground Tanks:** Provide a minimum of 12-inches of peastone gravel bed for tanks. At start of backfilling, care must be taken to work material completely beneath the bottom of the tanks and underneath the end caps to provide adequate support. Backfill completely over the top of tanks, up to the bottom of the concrete apron. Peastone gravel should be added and compacted in 12-inch lifts.
  
- N. **STEEL BOLLARD:** Bollards shall be installed in the locations shown on the plans. The steel pipe shall be securely set plumb in concrete and shall comply with the manufacturer’s recommendations.
  
- O. **STORAGE CONTAINERS:** The Contractor shall locate the storage containers where shown on the plans and as directed by the Engineer.

END OF SECTION 302000