

JULY 7, 2020
CONSTRUCTION OF A NEW BROOKFIELD REPAIR FACILITY
FEDERAL AID PROJECT NO.: N/A
STATE PROJECT NO. 34-350
TOWN OF BROOKFIELD

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. 2, 3, 4, 5, 6, 12, 13, 14, 16, 18, 20, 23, 29, 34

SPECIAL PROVISIONS

REVISED SPECIAL PROVISIONS

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

- SECTION 083313 - COILING COUNTER FIRE DOORS
- SECTION 083323 - OVERHEAD COILING DOORS
- SECTION 083613 - SECTIONAL DOORS
- SECTION 105700 - BAY FURNISHINGS
- SECTION 111000 - VEHICLE SERVICE EQUIPMENT
- SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING
- SECTION 221325 - OIL-WATER SEPARATOR
- SECTION 232116 - HYDRONIC PIPING SPECIALTIES

PLANS

REVISED PLANS

The following Plan Sheets are hereby deleted and replaced with the like-numbered Plan Sheets (appended with A2):

<u>02.01.A2</u>	<u>07.11.A2</u>	<u>07.20.A2</u>	<u>09.05.A2</u>
<u>04.02.A2</u>	<u>07.13.A2</u>	<u>07.27.A2</u>	<u>10.04.A2</u>
<u>06.10.A2</u>	<u>07.18.A2</u>	<u>07.29.A2</u>	<u>10.08.A2</u>
<u>07.02.A2</u>	<u>07.19.A2</u>	<u>09.02.A2</u>	<u>10.12.A2</u>

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 083313 - COILING COUNTER FIRE DOORS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:

1. Fire-rated counter doors.

1.2 SUBMITTALS:

A. Submit the following in accordance with Form 817 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type and size of coiling counter door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
3. Include description of automatic closing device and testing and resetting instructions.

C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. Show locations of all controls, detectors, locking devices, and other accessories.

D. Qualification Data: For Installer.

E. Maintenance Data: For coiling counter fire doors to include in maintenance manuals to include in the operation and maintenance manuals specified in Form 817 Article 1.20-1.08.14 subsection 4 and described in NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.3 QUALITY ASSURANCE:

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252.
 - 1. Temperature-Rise Limit: Provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

PART 2 - PRODUCTS

2.1 FIRE-RATED COUNTER DOOR ASSEMBLY:

- A. Fire-Rated Counter Door: Overhead fire-rated coiling door formed with curtain of interlocking metal slats.
 - 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. ACME Rolling Doors.
 - b. Alpine Overhead Doors, Inc.
 - c. Amarr Garage Doors.
 - d. C.H.I. Overhead Doors.
 - e. City-Gates.
- B. Fire Rating: 3 hours with temperature-rise limit.
- C. STC Rating: 27.
- D. Curtain R-Value: 5.0 deg F x h x sq. ft./Btu (0.881 K x sq. m/W).
- E. Door Curtain Material: Galvanized steel.
- F. Door Curtain Slats: Flat profile slats of ~~1-1/2 inch (38 mm)~~ 3 inch (76-mm) center-to-center height.
 - 1. Insulated-Slat Interior Facing: Metal.
- G. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- H. ~~Integral~~ Frame, Hood, and Fascia: Galvanized steel.

1. Mounting: Face of wall.
- I. Sill Configuration: Integral metal sill.
- J. Locking Devices: Equip door with locking device assembly.
 1. Locking Device Assembly: Door shall be secured by means of cylinder locks, operable from sides of coil.
- K. Manual Door Operator: Manufacturer's standard crank operator.
 1. Provide operator with manufacturer's standard removable operating arm.
- L. Curtain Accessories: Equip door with smoke seals, automatic closing device, push/pull handles.
- M. Door Finish:
 1. Powder-Coated Finish: Color as selected by Designer from manufacturer's full range.
 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION:

- A. Door Curtains: Fabricate coiling counter-door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch (0.71 mm); and as required.
 2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84 or UL 723. Enclose insulation completely within slat faces.
 3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.
 1. Removable Posts and Jamb Guides: Manufacturer's standard.

2.3 HOODS:

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
 - 1. Galvanized Steel: Nominal 0.028-inch- (0.71-mm-) thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.
 - 2. Include automatic drop baffle on fire-rated doors to guard against passage of smoke or flame.

2.4 LOCKING DEVICES:

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks, located on both left and right sides, operable from coil side. Retain "Chain Lock Keeper" Paragraph below for chain-hoist-operated doors or emergency chain-hoist operation.

2.5 CURTAIN ACCESSORIES:

- A. Smoke Seals: Equip each fire-rated door with replaceable smoke-seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency.
- B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.
- C. Automatic-Closing Device: Equip each fire-rated door with an automatic-closing device or holder-release mechanism and governor unit complying with NFPA 80 and an easily tested and reset release mechanism. Testing for manually operated doors shall allow resetting by opening the door without retensioning the counterbalancing mechanism. Automatic-closing device shall be designed for activation by the following:
 - 1. Manufacturer's standard UL-labeled heat detector and door-holder-release devices.

2.6 COUNTERBALANCING MECHANISM:

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load.
- C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
 - 1. Fire-Rated Doors: Equip with auxiliary counterbalance spring and prevent tension release from main counterbalance spring when automatic closing device operates.

2.7 MANUAL DOOR OPERATORS:

- A. General: Equip door with manual door operator by door manufacturer.
- B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf (111 N).
- C. Crank Operator type.

2.8 GENERAL FINISH REQUIREMENTS:

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 STEEL AND GALVANIZED-STEEL FINISHES:

- A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrate areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

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

3.2 INSTALLATION:

- A. Fire-Rated Doors: Install according to NFPA 80.

3.3 STARTUP SERVICE:

- A. Engage a factory-authorized service representative to perform startup service.
 1. Perform installation and startup checks according to manufacturer's written instructions.
 2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
 3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.4 ADJUSTING:

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.

3.5 TRAINING:

- A. Refer to Form 817 Article 1.20-1.08.14 subsection 3 for additional information.
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 083313

SECTION 083323 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:

1. Insulated service doors.

B. Related CSI Sections include the following:

1. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.2 SUBMITTALS:

A. Submit the following in accordance with Form 817 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type and size of overhead coiling door and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

D. Quality Assurance Submittals:

1. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

E. Qualification Data: For qualified Installer.

- F. Seismic Qualification Certificates: For overhead coiling doors, accessories, and components, from manufacturer.
- G. Maintenance Data: For overhead coiling doors to include in the operation and maintenance manuals specified in Form 817 Article 1.20-1.08.14 subsection 4 and described in NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.
- H. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE:

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer in accordance with Form 817 Article 1.20-1.06.01
 - 1. Obtain operators and controls from overhead coiling door manufacturer.
- C. Sound-Control Doors: Assemblies that have been fabricated and tested to control the passage of sound and have minimum certified STC rating according to ASTM E 413.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Regulatory Requirements: Comply with applicable provisions in ICC/ANSI A117.1.

1.4 WARRANTY:

- A. Refer to Form 817 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 sectional doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Faulty operation of hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
 - d. Delamination of exterior or interior facing materials.
 - 2. Warranty Period: Five (5) years from date of Certificate of Compliance.

- C. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

- 1. Warranty Period: Ten (10) years from date of Certificate of Compliance.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. General Performance: Coiling doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
- C. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
 - 1. Fire/Windstorm Classification: Class 1A-105.
 - 2. Hail-Resistance Rating: MH.
 - 3. Approval Category for Wind Zone: HM-SM (hurricane-prone region with small debris impact).
 - 4. Design Loads: Refer to Structural Drawings.
 - 5. Lateral Pressures: Refer to Structural Drawings.
 - 6. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
- D. Seismic Performance: Overhead coiling doors and sectional shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 - 2. Seismic Component Importance Factor: 1.0.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Model DuraCoil Standard as manufactured by Raynor or an approved equal.

- B. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 - 1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch and as required to meet requirements.
 - 2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within slat faces.
- C. Endlocks and Windlocks for Service Doors: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
- D. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from manufacturer's standard hot-dip galvanized steel
- E. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.
- F. Vision Panels: Manufacturer's standard plexiglass vision panels for insulated flat slats uniformly spaced openings. Reference Door Schedule for dimensions and Building Elevations for graphic representations.

2.3 HOOD:

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
 - 1. Galvanized Steel: Nominal 0.028-inch thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.
 - 2. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

2.4 CURTAIN ACCESSORIES:

- A. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.
 - 1. At door head, use 1/8-inch thick, replaceable, continuous sheet secured to inside of hood.
 - 2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch thick seals of flexible vinyl, rubber, or neoprene.

2.5 COUNTERBALANCING MECHANISM:

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.6 ELECTRIC DOOR OPERATORS:

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-rewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 1. Comply with NFPA 70.
 - 2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
 - 3. Usage Classification: Standard duty, up to 60 cycles per hour.
 - 4. Emergency Manual Operation: Crank type.
 - 5. Control Station: Where shown on plans.

6. Operation Cycles: Not less than 20,000.
 7. No entrapment protection elements shall be used (e.g. bottom sensor edge, photo-eye, motion sensors)
- B. Door Operator Location(s): Operator location indicated for each door.
1. Front-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on coil side of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.
- C. Electric Motors and control: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements, unless otherwise indicated.
1. Electrical Characteristics:
 - a. Phase: Three phase.
 - b. Volts: 208 V.
 - c. Hertz: 60.
 2. Motor Type and Controller: Reversible motor and controller for motor exposure indicated.
 3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
 4. Motor, controller, accessories shall be rated NEMA 4 or 4X in wash bays.
 5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
 6. Operator Controls/Control Station: Constant-contact, three button control station with push-button controls labeled "Open", "close", and "Stop." User must continuously hold the "Close" button for the door to be lowered. NEMA 4 or 4X in wash bays.
- D. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- E. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 30 lbf.
- F. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit

switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

- G. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- H. ~~Control Station: Constant contact, three button control station with push button controls labeled "Open", "close", and "Stop." User must continuously hold the "Close" button for the door to be lowered.~~
 - 1. ~~Interior units, full guarded, surface mounted, heavy duty type, with general purpose NEMA ICS 6, Type 1 enclosure.~~

2.7 DOOR ASSEMBLY:

- A. Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Series 625 rolling service doors as manufactured by Overhead Door Corporation, or an approved equal.
- B. ~~Operation Cycles: Not less than 20,000.~~
- C. STC Rating: 21.
- D. Curtain R-Value: 7.7
- E. Door Curtain Material: Galvanized steel.
- F. Door Curtain Slats: Flat profile slats of manufacturer's standard center-to-center height.
- G. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- H. Hood: Match curtain material and finish.
 - 1. Shape: Round.
 - 2. Mounting: Face of wall.
- I. ~~Electric Door Operator:~~
 - 1. ~~Usage Classification: Standard duty, up to 60 cycles per hour.~~
 - 2. ~~Operator Location: Top of hood, front of hood, or wall.~~
 - 3. ~~Motor Exposure: Interior.~~
 - 4. ~~Emergency Manual Operation: Crank type.~~
 - 5. ~~Control Station: Where shown on plans.~~

J. Door Finish:

1. ~~Powder Coated Finish: Color as selected by Designer from manufacturer's full range of colors.~~
2. ~~Factory Prime Finish: Manufacturer's standard Brown.~~
3. Factory prime finish in the manufacturer's standard color, prior to the application of the powder-coated finish, color as selected by the Designer from manufacturer's full range of color.

2.8 GENERAL FINISH REQUIREMENTS:

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 STEEL AND GALVANIZED-STEEL FINISHES:

- A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
- B. Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICE:

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING:

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide weathertight fit around entire perimeter.

3.5 TRAINING:

- A. Refer to Form 817 Article 1.20-1.08.14 subsection 3 for additional information.
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 083323

SECTION 083613 - SECTIONAL DOORS

PART 1 - GENERAL

1.1 SUMMARY:

A. This Section includes the following:

1. Electrically operated sectional doors.

B. Related CSI Sections:

1. Division 23 Section 230900, "Instrumentation and Control for HVAC" for overhead door contacts.
2. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.2 SUBMITTALS:

A. Submit the following in accordance with Form 817 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type and size of sectional door and accessory. Include the following:

1. Motors: Show nameplate data and ratings, characteristics, and mounting arrangements

C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

D. Quality Assurance Submittals:

1. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For sectional doors to include in the operation and maintenance manuals specified in Form 817 Article 1.20-1.08.14 subsection 4 and described in NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

G. Warranties: Sample of special warranties

1.3 QUALITY ASSURANCE:

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Testing Agency Qualifications: Qualified according to Florida Building Code Testing Application Standards (TAS) 201 and 203, ASTM standards E1886 and E1996, or ANSI/DASMA 115.

C. Source Limitations: Obtain sectional doors from single source from single manufacturer in accordance with Form 817 Article 1.20-1.06.01.

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

1.4 WARRANTY:

A. Refer to Form 817 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 sectional doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

- a. Structural failures including, but not limited to, excessive deflection.
- b. Faulty operation of hardware.
- c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
- d. Delamination of exterior or interior facing materials.

2. Warranty Period: Five (5) years from date of Certificate of Compliance.

C. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: Ten (10) years from date of Certificate of Compliance.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Operation Cycles Requirements: Provide sectional overhead door components and operators capable of operating for not less than 10,000 cycles.
- C. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
 - 1. Fire/Windstorm Classification: Class 1A-105.
 - 2. Hail-Resistance Rating: MH.
 - 3. Approval Category for Wind Zone: HM-SM (hurricane-prone region with small debris impact).
 - 4. Design Loads: Refer to Structural Drawings.
 - 5. Lateral Pressures: Refer to Structural Drawings.
 - 6. Factor of Safety: 2.0.
 - 7. Testing: According to Florida Building Code Testing Application Standards (TAS) 201 and 203, ASTM standards E1886 and E1996, or ANSI/DASMA 115.

2.2 STEEL DOOR SECTIONS:

- A. Exterior Section Faces and Frames: Fabricate from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated zinc coating and thickness.
 - 1. Fabricate section faces from single sheets to provide sections not more than 24 inches high and of indicated thickness. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.
 - 2. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.
- B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than 0.064-inch thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches apart.
- C. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile and allowing installation of astragal.

- D. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place. Ensure that reinforcement does not obstruct vision lites.
- E. Provide reinforcement for hardware attachment.
- F. Foamed-in-Place Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free polyurethane insulation, foamed in place to completely fill interior of section and pressure bonded to face sheets to prevent delamination under wind load, and with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within steel sections that incorporate the following interior facing material, with no exposed insulation:
 - 1. Interior Facing Material: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated thickness.
 - 2. Interior Facing Material: Manufacturer's standard prefinished hardboard panel, 1/8 inch thick and complying with ANSI A135.5.
- G. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

2.3 TRACKS, SUPPORTS, AND ACCESSORIES:

- A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances shown on Drawings, and complying with ASTM A 653/A 653M for minimum G60 (Z180) zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.
- B. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
 - 1. Vertical Track Assembly: Track with wall jamb brackets attached to track and attached to wall.
 - 2. Horizontal Track Assembly: Track with continuous reinforcing angle attached to track and supported at points from curve in track to end of track by laterally braced attachments to overhead structural members.
- C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of overhead door.

1. Provide motor-operated doors with bottom weatherseal.
 2. Provide continuous flexible seals at door jambs for a weathertight installation.
- D. Windows: ½" insulated glass window units set in two-piece molded high-impact polymer frames for metal-framed doors. Provide removable stops of same material as door-section frames.
1. Size: Manufacturer's standard for type of glazing indicated.
 2. Vision Panels are to be factory installed, made by the door manufacturer for this purpose, and are fully covered under the warranty for the door.

2.4 HARDWARE:

- A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors over 14 feet wide unless otherwise recommended by door manufacturer.
- C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch diameter roller tires for 3-inch wide track and 2-inch diameter roller tires for 2-inch wide track.
- D. Push/Pull Handles: For push-up or emergency-operated doors, provide galvanized-steel lifting handles on each side of door.
- E. If door unit is power operated, provide safety interlock switch to disengage power supply when door is locked.

2.5 COUNTERBALANCE MECHANISM:

- A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.
- B. Weight Counterbalance: Counterbalance mechanism consisting of filled pipe weights that move vertically in a galvanized-steel weight pipe. Connect pipe weights with cable to weight-cable drums mounted on torsion shaft made of steel tube or solid steel.

- C. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide one additional midpoint bracket for shafts up to 14 feet long and two additional brackets at one-third points to support shafts more than 14 feet long unless closer spacing is recommended by door manufacturer.

2.6 ELECTRIC DOOR OPERATORS:

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

- 1. Comply with NFPA 70.
- 2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
- 3. Usage Classification: Standard duty, up to 60 cycles per hour.
- 4. Operator Type: Trolley.
- 5. Emergency Manual Operation: Chain type.
- 6. Control Station: Where shown on plans.
- 7. Operation Cycles: Not less than 10,000.
- 8. No entrapment protection elements shall be used (e.g. bottom sensor edge, photo-eye, motion sensors)

~~B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.~~

- C. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.

- 1. Trolley: Trolley operator mounted to ceiling above and to rear of door in raised position and directly connected to door with drawbar.

- D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements unless otherwise indicated.

- 1. Electrical Characteristics:

- a. Phase: Three phase.
- b. Volts: As indicated on Electrical Drawings.
- c. Hertz: 60 hz.

- 2. Motor Type and Controller: Reversible motor and controller for motor exposure indicated.

3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
4. Motor, controller, accessories shall be rated NEMA 4 or 4X in wash bays.
5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
6. Use adjustable motor-mounting bases for belt-driven operators.
7. Operating Controls/Control Station: Constant-contact, three button control station with push-button controls labeled "Open", "close", and "Stop." User must continuously hold the "Close" button for the door to be lowered. NEMA 4 or 4X in wash bays.

~~E. Control Station: Constant contact, three button control station with push button controls labeled "Open," "Close," and "Stop." User must continuously hold the "Close" button for the door to be lowered. NEMA 4X in wash bays.~~

F. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 35 lbf.

G. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

H. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

I. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

2.7 DOOR ASSEMBLY:

A. Steel Sectional Door: Sectional door formed with hinged sections.

1. Basis of Design: Clopay Building Products.

~~B. Operation Cycles: Not less than 10,000.~~

C. R-Value: 12.0 deg F x h x sq. ft./Btu.

D. Steel Sections: Zinc-coated (galvanized) steel sheet with G90 (Z275) zinc coating.

1. Section Thickness: 2 inches.

2. Exterior-Face, Steel Sheet Thickness: 0.019-inch nominal coated thickness.
 - a. Surface: Flat or ribbed to suit manufacturer's standard.
3. Insulation: Foamed in place.
4. Interior Facing Material: Zinc-coated (galvanized) steel sheet of manufacturer's recommended thickness to meet performance requirements nominal coated thickness.

E. Track:

1. Track Size: 3 inches or 2 inches; size shall be chosen based on the structural performance requirements in Section 2.1.A.
2. Configuration: Standard lift.

F. Weatherseals: Fitted to bottom and top and around entire perimeter of door.

G. Windows: Approximately 24 by 11 inches, with curved corners, and spaced apart the approximate distance as indicated on plans; in ~~four~~ one rows at height indicated on plans; installed with insulated glazing of the following type:

1. Insulating Glass: Manufacturer's standard.

H. Roller-Tire Material: Manufacturer's standard.

I. Locking Devices: Equip door with slide bolt for padlock.

J. Counterbalance Type: Torsion spring.

~~K. Electric Door Operator:~~

- ~~1. Usage Classification: Standard Duty, up to 60 cycles per hour.~~
- ~~2. Operator Type: Trolley.~~
- ~~3. Motor Exposure: Interior, clean, and dry.~~
- ~~4. Emergency Manual Operation: Chain type.~~
- ~~5. Remote Control Station: Where shown on plans.~~

L. Door Finish:

1. Finish of Interior/Exterior Facing Material: White/Dark Brown.

2.8 GENERAL FINISH REQUIREMENTS:

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Tracks:
 - 1. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches apart.
 - 2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
 - 3. Repair galvanized coating on tracks according to ASTM A 780.
- C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
- D. Insulate behind control stations mounted on steel.

3.3 STARTUP SERVICES:

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING:

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust doors and seals to provide weathertight fit around entire perimeter.
- D. Align and adjust motors, pulleys, belts, sprockets, chains, and controls according to manufacturer's written instructions.

3.5 TRAINING:

- A. Refer to Form 817 Article 1.20-1.08.14 subsection 3 for additional information.
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 083613

SECTION 105700 - BAY FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:

1. Shelving.
2. Cabinets.
3. Work benches.

1.2 PERFORMANCE REQUIREMENTS:

- A. Structural Performance for Post-and-Beam Metal Storage Shelving: Capable of withstanding the loads indicated according to MH 28.2.
- B. Seismic Performance: Metal storage shelving shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 1. Seismic Component Importance Factor: 1.5.

1.3 SUBMITTALS:

- A. Submit the following in accordance with Form 817 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.
- B. Product Data: For each type of product indicated. Include rated capacities, construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal storage shelving.
- C. Shop Drawings: For customized metal storage shelving. Include plans, elevations, sections, details, and attachments to other work. Include installation details of connectors, lateral bracing, and special bracing.
- D. Product Schedule: For metal storage shelving. Use same designations indicated on Plans.
- E. Qualification Data: For qualified professional engineer.

1.4 QUALITY ASSURANCE:

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Refer to Form 817 Article 1.06.03 and Form 817 Article 1.20-1.06.03 for additional information.
- B. Environmental Limitations: Do not deliver or install metal storage shelving until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.6 COORDINATION:

- A. Coordinate sizes and locations of blocking and backing required for installation of metal storage shelving attached to wall and ceiling assemblies.
- B. Coordinate locations and installation of metal storage shelving that may interfere with ceiling systems including lighting, HVAC, speakers, sprinklers, access panels, electrical switches or outlets, and floor drains.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Steel Tubing: ASTM A 513, Type 2.
- C. Stainless-Steel Tubing: ASTM A 554, Grade MT-304.
- D. Steel Wire: ASTM A 899.

2.2 SHELVING:

- A. Steel Pallet Rack "S" (Repair and Cold Storage Building): Factory-formed, field-assembled, freestanding system designed for shelves to span between and be supported by end frames, with shelves adjustable over the entire height of shelving unit.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Steel Pallet Rack as supplied by Grainger Item # 59LA59, Mfr. Model #41D992, or an approved equal.
 - 2. Load-Carrying Capacity per Shelf: ~~49,380~~ 6,111 lbs.
 - 3. Welded Upright Frame: Manufacturer's standard post and bracing, frame construction with notches and footplates.

4. Pallet Rack Beam: Manufacturer's standard steel beam designed to engage post notches on upright frames.
5. Framed-Type Wire Shelves: Manufacturer's standard wire decking construction with metal plated decking.
6. Overall Unit Width: 96 inches.
7. Overall Unit Depth: 48 inches.
8. Overall Unit Height: 96 inches.
9. Quantity of shelves: 8.
10. No. of shelves per rack: 2.

B. Freestanding Open Metal Shelving "M": Factory-formed, field-assembled, freestanding system designed for shelves to span between and be supported by end frames, with shelves adjustable over the entire height of shelving unit.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Bulk Storage Rack as supplied by Grainger Item # 39K786, Model #F7711-24HG, or an approved equal.
2. Load-Carrying Capacity per Shelf: 900 lbs.
3. No. of shelves: 6.
4. Shelving Type: Manufacturer's standard 18ga. metal shelving.
5. Shelving Post: Manufacturer's standard 14ga. Metal posts.
6. Overall Unit Width: 48 inches.
7. Overall Unit Depth: 24 inches.
8. Overall Unit Height: 87 inches.
9. Quantity of shelves: 6.

C. Heavy-Duty Truck Tire Folding Rack "R": Factory-formed, field-assembled, freestanding system, designed for heavy truck and bus tires.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Martin Industries product #MTFR-HD, or an approved equal.
2. Tire Capacity: 1 to 8.
3. Load Capacity: 2400 lbs.
4. Max. Tire size: 44"O.D.
5. Overall Unit Width: 93-1/2 inches
6. Overall Unit Depth: 48 inches.
7. Overall Unit Height: 56-1/4 inches.
8. Quantity: 4, stacked 2 high.

D. 3-Tier Tire Shelving "Y": Factory-formed, field-assembled, freestanding system, designed for light truck tires.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Martin Industries product #MTS-92, or an approved equal.
2. Tire Capacity: 27 to 33.
3. Load Capacity: 1500 lbs.

4. Max. Tire size: 44”O.D.
 5. Overall Unit Width: 92 inches
 6. Overall Unit Depth: 16-3/8 inches.
 7. Overall Unit Height: 92 inches.
 8. Quantity: 1.
- E. Bulk Storage Rack “CSB” (Cold Storage Building): Factory-formed, field-assembled, freestanding system designed for shelves to span between and be supported by end frames, with shelves adjustable over the entire height of shelving unit.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Steel Pallet Rack as supplied by Grainger Item # 5JN30, Mfr. Model #DD67533SW, or an approved equal.
 2. Load-Carrying Capacity per Shelf: 10,000 lbs.
 3. No. of shelves: 4.
 4. Welded Upright Frame: Manufacturer’s standard post and bracing, frame construction with notches and footplates.
 5. Rack Beam: Manufacturer’s standard steel beam designed to engage post notches on upright frames.
 6. Wire Shelves: Manufacturer’s standard wire decking.
 7. Overall Unit Width: 96 inches.
 8. Overall Unit Depth: 36 inches.
 9. Overall Unit Height: 96 inches.
 10. Quantity of shelves: 14.
- F. Boltless Metal Storage Shelving “AA”: Factory-formed, field-assembled, freestanding system, designed for shelves to span between and be supported by corner posts, with shelves adjustable over the height of shelving unit. Fabricate initial shelving unit with a post at each corner. Fabricate additional shelving units similarly, so each unit is independent as add-on units, designed to share two corner posts with initial shelving unit. Provide fixed top and bottom shelves, adjustable intermediate shelves, and accessories indicated.
1. Basis-of-Design Product: Subject to compliance with requirements, provide boltless shelving, as supplied by Grainger Item #1PWX5, EDSAL Model #HCU-963696, or an approved equal.
 2. Load-Carrying Capacity per Shelf: 2600lbs.
 3. Posts: Fabricated from cold-rolled steel; in manufacturer's standard shape; with perforations at 1-1/2 inches (38 mm) o.c. to receive shelf-to-post connectors.
 - a. Steel Thickness, Nominal: 14-ga.
 4. Solid-Type Shelves: Fabricated from steel sheet as follows:
 - a. Steel-Sheet Thickness, Nominal: 16-ga.

5. Overall Unit Width: 96 inches
6. Overall Unit Depth: 36 inches.
7. Overall Unit Height: 96 inches.
8. Quantity: 34.

G. Bin Storage Shelving “BB”: Factory-formed, field-assembled, freestanding system without back or end panels, designed for shelves to span between and be supported by corner posts, with shelves adjustable over the entire height of shelving unit. Fabricate initial shelving unit with a post at each corner. Fabricate additional shelving units similarly, so each unit is independent as add-on units, designed to share two corner posts with initial shelving unit. Provide fixed top and bottom shelves, adjustable intermediate shelves, and accessories indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Yellow Bins and Shelving as supplied by Grainger Item #7D417, EDSAL Model #2960, or an approved equal.
2. Load-Carrying Capacity per Shelf: 400 lbs.
3. Posts: Manufacturer's standard steel post with notches.
4. Shelf Quantity: Ten shelves per shelving unit in addition to top and bottom shelf.
5. Shelf-to-Post Connectors: Manufacturer's standard one-piece collet (wedge), designed to engage post collar attached to shelves.
6. Bracing: Manufacturer's standard diagonal cross bracing, as required for stability, load-carrying capacity of shelves, and number of shelves.
7. Overall Unit Width: 36 inches
8. Overall Unit Depth: 12 inches.
9. Overall Unit Height: 96 inches.
10. Quantity: 10.
11. Accessories:
 - a. Shelf Inlay: Manufacturer's standard Yellow Bins.

2.3 CABINETS:

A. Combustible Cabinet “F”: Factory-formed, freestanding system.

1. Basis-of-Design Product: Subject to compliance with requirements, provide storage cabinet supplied by Ford & Ulrich part Justrite Sure-Grip EX Safety Cabinet model #H896000, or an approved equal.
2. Construction: Steel construction, powder coated Yellow finish with 2 doors and 2 shelves.
3. Overall Unit Width: 34 inches.
4. Overall Unit Depth: 34 inches.
5. Overall Unit Height: 65 inches.
6. Quantity: 1.

2.4 WORK BENCHES:

- A. Work Benches “A”: Factory-formed, field-assembled, freestanding system.
1. Basis-of-Design Product: Subject to compliance with requirements, provide work benches supplied by Rousseau SKU: GT-XKG0004S (Closed Bench), or an approved equal.
 2. Construction: Partially assembled, painted steel “Classic Blue” color with stainless steel countertop.
 3. Overall Unit Width: 60 inches.
 4. Overall Unit Depth: 30 inches.
 5. Overall Unit Height: 36 inches.
 6. Doors: One door.
 7. Drawers: Four drawers.
 8. Quantity: 14.
- B. Work Benches “WB”: Factory-formed, field-assembled, freestanding system.
1. Basis-of-Design Product: Subject to compliance with requirements, provide work benches supplied by Rousseau Model: WSA1975 (Closed Double Workbench), or an approved equal.
 2. Construction: Partially assembled, painted steel countertop.
 3. Overall Unit Width: 144 inches.
 4. Overall Unit Depth: 30 inches.
 5. Overall Unit Height: 34 inches.
 6. Doors: Two sliding door.
 7. Quantity: 1.

2.5 FABRICATION:

- A. Shop Fabrication: Prefabricate shelving components in shop to greatest extent possible to minimize field fabrication; temporarily preassemble shelving components where necessary to ensure that field-assembled components fit together properly. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Fabricate metal storage shelving square and rigid, with posts plumb and true and shelves flat and free of dents or distortion. Fabricate connections to form a rigid structure, free of buckling and warping.
- C. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- D. Form edges and corners free of sharp edges or rough areas. Fold back and crimp exposed edges of unsupported sheet metal to form a 1/2-inch wide hem on the

concealed side; ease edges of metal plate to radius of approximately 1/32 inch. Shear and punch metals cleanly and accurately. Remove burrs.

- E. Weld corners and seams continuously to develop strength, minimize distortion, and maintain the corrosion resistance of base metals. At exposed locations, finish welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces before finishing.

2.6 GENERAL FINISH REQUIREMENTS:

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 STEEL FINISHES:

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling."
- B. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry thickness.

2.8 STAINLESS-STEEL FINISHES:

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Examine floors for suitable conditions where metal storage shelving will be installed.
- C. Examine walls to which metal storage shelving will be attached for properly located blocking, grounds, or other solid backing for attachment of support fasteners.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Vacuum finished floor and wet mop flooring over which metal storage shelving is to be installed.

3.3 INSTALLATION:

- A. Install metal storage shelving level, plumb, square, rigid, true, and with shelves flat and free of dents or distortion. Make connections to form a rigid structure, free of buckling and warping.
 - 1. Install exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
 - 2. Install braces, straps, plates, brackets, and other reinforcements as needed to support shelf loading and as required for stability.
 - 3. Adjust post-base bolt leveler to achieve level and plumb installation.
 - 4. Install seismic restraints.
 - 5. Connect side-to-side and back-to-back shelving units together.
 - 6. Install shelves in each shelving unit at spacing indicated on Plans or, if not indicated, at equal spacing.
 - a. Post-and-Beam Metal Storage Shelving: Install beams with beam-to-post connectors fully engaged in post perforations.

3.4 ERECTION TOLERANCES:

- A. Erect metal storage shelving to a maximum tolerance from vertical of 1/2 inch in up to 10 feet of height, not exceeding 1 inch for heights taller than 10 feet.
- B. Erect post-and-beam metal storage shelving to a maximum tolerance from vertical of 1/4 inch in 84 inches of height.

3.5 ADJUSTING:

- A. Adjust metal storage shelving so that connectors and other components engage accurately and securely.

- B. Adjust and lubricate operable components to operate smoothly and easily, without binding or warping. Check and readjust operating hardware.
- C. Touch up marred finishes or replace metal storage shelving that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal storage shelving manufacturer.
- D. Replace metal storage shelving that has been damaged or has deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 105700

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. Concealed floor anchor.
10. Horizontal Steel Aboveground Storage Tank.
11. Fluid Disposal Pump System.
12. Hose Reel Gantries

1.2 SUBMITTALS:

- A. Submit the following in accordance with Form 817 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 817 Article 1.20-1.08.14 subsection 4 and described in NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.
- A. Quality Assurance Submittals:
 1. Field quality-control reports.

- B. 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 817 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.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Series NFB24 Actuator as manufactured by Belimo or an approved equal.
2. Power Supply: 24V D/C
3. Torque: 90 in-lb minimum
4. Action: Power open, normally close spring return.
5. 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. Hose Reel Gantry:

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. A-FLO Equipment
 - b. Hartex Engineering

Description: Square metal frame to hold 4-6 hose reels. Aluminum framing anchored to 6" concrete slab. Hose reels to be mounted at a height of 7'-4" A.F.F. Entry holes at top of gantry to provide entrance of lubrication lines to connect to hose reels.

B. 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.

C. 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.

D. 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 reduced 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.

E. 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 four (4) 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 fuel oil and anti-freeze 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. Capacities:
 - a. Waste Oil: 500 gallons.
 - b. Waste Antifreeze: ~~275~~ 500 gallons.
 - c. Motor Oil: 325 gallons
 - d. Hydraulic Oil: 325 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. Spillbox: Construction to match tank, stainless steel fasteners, welded to top of primary tank. Spillbox shall have a screen in the bottom.
- F. Mechanical Level Gauge: 2" NPT, molded float, impervious to petroleum products, break resistant vile with UV inhibitors, to fit depth of tank required.
- G. Weatherproof Vent Cap: Open, atmospheric type, corrosion-resistant, internal wire screen designed to protect vent lines from water, debris, and insects.
- H. Tank Charts: Provide (3) copies. Mount 1 copy in a glass frame secured to the wall with 4 screws adjacent to the Fuel Control Center, or as directed by the Engineer. Charts shall be calibrated to show tank capacity in gallons from feet and inches, graduated by eighths.
- I. Gauge Stick: Wooden, manufacturer's recommended length, treated after graduating to prevent swelling and damage from fuel. Gauge stick shall be graduated in feet, inches, and eighths.
- J. 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 FLUID DISPOSAL PUMP SYSTEM:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Remote Pumping Station as manufactured by Myers Waste Oil Pump Systems, or an approved equal. Quantity two (2) for this project for waste oil and waste anti-freeze.
- B. Control Panel: Wall mount, fabricated from 1/8" steel and fixtured to facilitate mounting of all components, including:
 - 1. Waste oil pump assembly.
 - 2. Main air supply manual shut-off valve.
 - 3. Operating pressure control regulator and gauge.
 - 4. Main air supply on/off control valve operated by momentary pilot signal.
- C. Accessories:
 - 1. Grounding system: Ground lug for 6'-0" 14 gauge ground wire with bolt –lug and drum clamp.
 - 2. Optional 3/4" pick-up wand with flexible suction hose and wall bracket.
 - 3. In-line strainer on pump inlet.
- D. Capacities and Characteristics:

1. Operation: Compressed air.
2. Capacity: 16 GPM.
3. Inlet and Outlet Size: 1” NPS.

2.13 TANK INSTALLATION MATERIALS:

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

2.14 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 air safety valve in the main compressed air line feeding air-powered lubricant pumps before any tees to individual pumps.
- C. Install lubricant safety valves on the product outlet side of each pump. The supply side of the shutoff valve shall be welded to the supply pipe or sealed using a spiral metal gasket to ensure liquid content is maintained in the event of a fire.
- D. All solenoid valves shall be connected to the fire alarm system such that on alarm, the valves will close, closing all dispense lines from lubricant pumps and supply air piping to all lubricant pumps. Valve operation and installation shall comply with FM Global 7-32.
- E. 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.
- F. Install piping adjacent to equipment and machines to allow service and maintenance.
- G. Install piping free of sags and bends.

- H. Install fittings for changes in direction and branch connections.
- I. 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.
- E. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Join according to ASTM B 828 or CDA's "Copper Tube Handbook."

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 for the Waste Antifreeze Tank shall be the following:
 - 1. Health (Blue): 1
 - 2. Fire (Red): 1
 - 3. Instability (Yellow): 0
 - 4. Special Hazard (White): None

- G. Apply Hazard Sign directly to tank in a visible location. Hazard ratings for the Waste-Oil Tank shall be the following:

1. Health (Blue): 0
2. Fire (Red): 2
3. Instability (Yellow): 0
4. 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.
- J. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1/4: 60 inches with 3/8-inch rod.
2. NPS 3/8 and NPS 1/2: 72 inches with 3/8-inch rod.
3. NPS 3/4: 84 inches with 3/8-inch rod.
4. NPS 1: 96 inches with 3/8-inch rod.

K. Install supports for vertical copper tubing every 10 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. Schedule 40, steel pipe; threaded or welded forged-steel fittings; and threaded or welded joints.
- B. Grease piping shall be the following:
 1. Schedule 80, steel pipe; threaded or welded forged-steel fittings; and threaded or welded joints.
- C. Anti-Freeze piping shall be the following:
 1. 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 tests. 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 tested 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 817 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 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:

1. Bronze ball valves.
2. Bronze lift check valves.
3. Bronze swing check valves.
4. Bronze gate valves.

B. Related CSI Sections:

1. Division 22 Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
2. Division 22 Section 221116 "Domestic Water Piping" for valves applicable only to this piping.
3. Division 22 Section 221513 "General-Service Compressed-Air Piping" for valves applicable only to this piping.

1.2 DEFINITIONS:

- A. CWP: Cold working pressure.
- B. NRS: Nonrising stem.
- C. SWP: Steam working pressure.

1.3 ACTION SUBMITTALS:

- A. Submit the following in accordance with Form 817 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – SUBMITTALS.
- B. Product Data: For each type of valve indicated.

1.4 INFORMATIONAL SUBMITTALS:

- A. Quality Assurance Submittals:

1. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

1.5 QUALITY ASSURANCE:

A. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

B. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Refer to Form 817 Article 1.06.03 and Form 817 Article 1.20-1.06.03 for additional information.

B. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads.
3. Set ball valves open to minimize exposure of functional surfaces.
4. Block check valves in either closed or open position.
5. Set gate valves closed to prevent rattling.

C. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES:

A. Refer to Part 3 valve schedules for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:

1. Vinyl-Covered Handlever: For quarter-turn valves NPS 6 and smaller.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

F. Valve-End Connections:

1. Solder Joint: With sockets according to ASME B16.18.
2. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES:

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

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.; Apollo Valves.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. NIBCO INC.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig.
 - c. CWP Rating: 600 psig.
 - d. Body Design: Two piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE or TFE.
 - h. Stem: Bronze.
 - i. Ball: Chrome-plated brass.
 - j. Port: Full.

2.3 BRONZE LIFT CHECK VALVES:

A. Class 125, Lift Check Valves with Nonmetallic Disc:

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. Flo Fab Inc.
 - b. NIBCO INC.
 - c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
 - a. Standard: MSS SP-80, Type 2.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Vertical flow.
 - d. Body Material: ASTM B 61 or ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: NBR, PTFE, or TFE.

2.4 BRONZE SWING CHECK VALVES:

A. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:

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. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Stockham Division.
 - c. NIBCO INC.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
 - a. Standard: MSS SP-80, Type 4.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: PTFE or TFE.

2.5 BRONZE GATE VALVES

A. Bronze Gate Valves, NRS, Class 125:

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.; Apollo Valves.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. NIBCO INC.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
- a. Standard: MSS SP-80, Type 1.
 - b. CWP Rating: 200 psig.
 - c. Body Material: Bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded or solder joint.
 - e. Stem: Bronze.
 - f. Disc: Solid wedge; bronze.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION:

- A. Install valves with unions at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.
 - 2. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING:

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS:

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball valves.
 - 2. Throttling Service: Ball valves.
 - 3. Pump-Discharge: Check Valves.
 - a. NPS 2 and Smaller: Bronze swing check valves with nonmetallic disc.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- C. Select valves with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.

3.5 LOW-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 PSIG OR LESS):

- A. Pipe NPS 2 and Smaller:
 - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 - 2. Ball Valves: Two piece, full port, bronze with bronze trim.
 - 3. Bronze Lift Check Valves: Class 125, nonmetallic disc.
 - 4. Bronze Swing Check Valves: Class 125, nonmetallic disc.

3.6 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE:

- A. Pipe NPS 2 and Smaller:
 - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 - 2. Ball Valves: Two piece, full port, bronze with bronze trim.
 - 3. Bronze Swing Check Valves: Class 125, nonmetallic disc.
 - 4. For wash bay 1-1/2-inch hose fittings: Bronze gate valves, NRS, Class 125 with soldered or threaded ends.

END OF SECTION 220523

SECTION 221325 – OIL-WATER SEPARATOR

PART 1 - GENERAL

1.1 SUMMARY:

- A. The Contractor shall install the complete oil-water separator system, except as otherwise noted, in conformity with the lines, grades, dimensions and details shown on the Plans and as described herein.
- B. The manhole arrangement described herein and shown on the plans is based upon the oil-water separator identified herein. “Or Equal” submissions will address the need for an alternative manhole arrangement, if necessary, that is acceptable to the Designer. Alternative manhole arrangements will also be at no additional cost to the Engineer.
- C. Related CSI Sections include the following:
 - 1. Division 13 Section 132180, "Tank Monitoring System" for underground storage tank monitoring system.

1.2 DEFINITIONS:

- A. FRP: Glass-fiber-reinforced plastic.

1.3 SUBMITTALS:

- A. Submit the following in accordance with Form 817 Article 1.20-1.05.02 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, 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: Indicate all critical dimensions, locations of all fittings, accessories, manholes, etc.
- D. Quality Assurance Submittals:
 - 1. Installer Certificates.
 - 2. Field quality control test reports.

E. Maintenance Data: For oil-water separators to include in the operation and maintenance manuals specified in Form 817 Article 1.20-1.08.14 subsection 4 and described in NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

F. Warranty: Special warranties specified in Part 1.6, “WARRANTY.”

1.4 QUALITY ASSURANCE:

A. The Oil-Water Separator Installer shall be a certified installer for the manufacturer of the oil-water separator to be installed.

B. UL Listing: The Oil-Water Separator shall comply with the construction requirements of UL 1316 and the performance testing requirements of UL 2215.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Lift oil-water separators by lifting lugs and with the proper equipment. Do not use chain or cables around oil-water separators at any time. Chock and tie-down oil-water separators in accordance with manufacturer’s instructions until ready for installation. If oil-water separators have to be moved, set on smooth ground free of rocks and foreign objects, and rechock. Do not drop or roll oil-water separators. Do not allow oil-water separators to be impacted.

B. Store other material in a clean dry area protected from damage. Materials may be stored outside only with the written approval of the Engineer.

1.6 WARRANTY:

A. Refer to Form 817 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 oil-water separators that fail in materials or workmanship within specified warranty period.

1. Oil-Water Separators:

a. Failures include, but are not limited to, the following when used for storage of fuel oil at temperatures not exceeding 150 deg F:

- 1) Structural failures including cracking, breakup, and collapse.
- 2) Corrosion failure including external and internal corrosion of tanks.

b. Warranty Period: 30 years from the issuance of the Certificate of Compliance.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS:

- A. Steel Pipe: Schedule 40, galvanized, conforming to ASTM A53 with zinc-coated malleable iron fittings conforming to ANSI B16.3.
- B. PVC Pipe: Schedule 40, conforming to ASTM D1785 with flush, threaded joints.
- C. Drainage Piping and Fittings: As specified in CSI Division 30 Section 307000, "Drainage."

2.2 PIPING SPECIALTIES:

- A. Flexible Connectors: Comply with UL 567.

1. Metallic Connectors:

- a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Flexicraft Industries.
 - 2) FLEX-ING, Inc.; Model Fireflex with 346 swivel.
 - 3) Hose Master, Inc.
- b. Listed and labeled for aboveground and underground applications by an NRTL acceptable to authorities having jurisdiction.
- c. Stainless-steel bellows with woven, flexible, bronze or stainless-steel, wire-reinforcing protective jacket.
- d. Minimum Operating Pressure: 150 psig.
- e. End Connections: Socket, flanged, or threaded end to match connected piping.
- f. Maximum Length: 30 inches.
- g. Swivel end, 50-psig maximum operating pressure.

2.3 JOINING MATERIALS:

- A. Per manufacturer requirements unless otherwise noted.

2.4 FRP OIL-WATER SEPARATOR:

- A. Basis-of-Design Product: Subject to compliance with requirements, double-wall, brine-filled FRP underground oil-water separators Model No. DWT (4')-1000 OWS ULCSI-10 as manufactured by Containment Solutions, Inc., or an approved equal:

- B. The oil-water separators shall be designed and constructed in accordance with Stokes Law and shall meet the following:
1. Designed for gravity separation of free-floating oils from rainwater runoff or from secondary wash-down. The oil-water separators shall remove settable solids.
 - a. Specific Gravity Range for Separation of Oil: 0.68-0.90.
 - b. Maximum Continuous Inlet Concentration: 400 ppm.
 - c. Maximum Continuous Flowrate: 100 gpm.
 - d. Maximum Effluent Concentration: 10 ppm.
 - e. Oil Spill Capacity: 800 gallons.
 2. Have stationary under and overflow baffles to force all oil-water mixtures through the coalescing plates. There shall be two (2) sand/sludge walls separated by polypropylene coalescing plated to create a cross-flow pattern to trap settable solids.
 3. The effluent downcomer shall be positioned to prevent the discharge of free oil that has been separated from the carrier liquid.
 4. Separator plates shall be removable for maintenance and inspection through a dedicated access manway.
- C. The oil-water separators shall be inspected and tested for leakage by the manufacturer prior to shipment from the factory. The oil-water separators shall be shipped as completely assembled vessel ready for installation. Inspection, installation, and testing procedures shall be recorded on the manufacturer's letterhead and submitted to the Engineer upon delivery.
- D. The oil-water separator shall be fabricated with fiberglass-reinforced polyester resins; suitable for operation at atmospheric pressure; fabricated for the following loads:
1. External Hydrostatic Pressure: To withstand general buckling with safety factor of 5:1 if hole is fully flooded and 7-feet of overburden.
 2. Surface Loads: AASHTO's "Specifications for Highway Bridges," H-20 axle loads of 32,000 lb.
 3. Internal Loads on Primary and Secondary Tanks: Withstand 5-psi air pressure test with a 5:1 safety factor and an operating range of 1.5-psig pressure and 3-ounces of vacuum with backfill in place. Test prior to installation to test for leakage.

2.5 OIL-WATER SEPARATOR ACCESSORIES:

- A. Tank Manholes: 22-inch by 29-inch minimum (oval); bolted, flanged, and gasketed, with extension collar; for access to inside of tank. Access shall be unobstructed. No pipe connection fittings will be allowed on manhole cover.
- B. Threaded pipe connection fittings on top of tank for fill, supply, return, vent, sounding, and gaging, in locations and of sizes indicated. Include cast-iron plugs for shipping.

- C. Striker Plates: Inside tank, on bottom below fill, vent, sounding, gage, and other tube openings.
- D. Lifting Lugs: For handling and installation.
- E. Secondary Containment Collars: 42-inch diameter fiberglass collar integrally attached to the tank top to provide watertight seal in locations as indicated.
- F. Containment Sumps (Turbine Enclosure): 42-inch diameter fiberglass, with sump base, add-on extension pieces as required to provide access to the manway from grade, 40-inch sump top, lid, and gasket-seal joints. Include sump entry boots for pipe penetrations through sidewalls.
- G. Sump Entry Boots: Two-part pipe fitting for field assembly and of size required to fit over pipe. Include gaskets shaped to fit sump sidewall, sleeves, seals, and clamps as required for liquid-tight pipe penetrations.
- H. Deadman Anchor: Storage tank manufacturer's standard pre-fabricated deadman anchor, sized and reinforced for specific tank installation.
- I. Anchor Straps: Storage tank manufacturer's standard anchoring system, with straps, strap-insulating material, cables and turnbuckles, of strength at least one and one-half times maximum uplift force of empty tank without backfill in place. Furnish anchors to be attached to deadman anchors.
- J. Tank Charts: Provide (3) copies. Mount 1 copy in a glass frame secured to the wall with 4 screws adjacent to the Tank Monitoring System, or as directed by the Engineer. Charts shall be calibrated to show tank capacity in gallons from feet and inches, graduated by eighths.
- K. Gauge Stick: Wooden, manufacturer's recommended length, treated after graduating to prevent swelling and damage from fuel. Gauge stick shall be graduated in feet, inches, and eighths.

2.6 OIL-WATER SEPARATOR INSTALLATION MATERIALS:

- A. Filter Mat: Geotextile woven or spun filter fabric, in 1 or more layers, for minimum total weight of 3 oz./sq. yd. Filter fabric shall be provided to prevent the migration of peastone gravel backfill into the native soil and to maintain the integrity and stability of the backfill materials, Model No. Typar 3401 as manufactured by Reemay, Inc., or an approved equal.
- B. Peastone Gravel Backfill: Composed entirely of uncrushed stone-sized rounded particles conforming to Section M.01.01 of the Form 817, Grading No. 6, unless otherwise specified by the tank manufacturer for compliance with the tank warranty.

2.7 OIL-WATER SEPARATOR PIPING SPECIALTIES:

- A. Tank Manway Assembly and Manhole for Inlet, Pump-Out, and In-Tank Probe Assemblies:
 - 1. Manhole Frame and Cover: Composite frame with water-tight, fiberglass reinforced composite cover 36-inch diameter, Model No. FL90 as manufactured by Fiberlite, or an approved equal. Manhole frame and cover shall be black. Include one (1) lifting tool.
- B. Tank Pump-Out Assembly:
 - 1. Cap, Adapter, Suction Tube, and Slotted Pipe: 2-inch, per manufacturer's recommendations.
- C. Vent Assembly:
 - 1. Vent Cap: Open atmospheric type, corrosion-resistant, internal wire screen, designed to protect vent lines from water, debris, and insects, Model No. 23 as manufactured by OPW, or an approved equal.
- D. Tank Monitoring Assemblies:
 - 1. Probe Cap and Adaptor: Bronze, side-sealing adaptor, side sealing cap (tapped), wire grommet to secure cables, Model No. 62M as manufactured by OPW, or an approved equal.
- E. Sniff Tube Assemblies:
 - 1. Sniff Tubes: 4-inch inside diameter, Schedule 40 PVC, with flush threaded joints, Model No. 61SPVC as manufactured by OPW, or an approved equal. Sniff tubes shall be slotted 0.020-inch on center to within 2-feet of finished grade. Remaining pipe shall be solid. Wrap perforated portion of pipe with filter fabric as manufactured by Dupont Typar, or an approved equal.
 - 2. Sniff tubes shall terminate in handholes, with Well Cap Kit Model No. 634TTM as manufactured by OPW, or an approved equal.
 - 3. Sniff Tube Handholes: Watertight, cast iron cover with stainless steel bolts, steel skirt, 8-inch diameter, Model No. 104AOW as manufactured by OPW, or an approved equal.
- F. Inlet and Outlet Assemblies:
 - 1. Female coupling with Screw Plug: Per manufacturer's recommendations.
 - 2. Manhole Frames and Covers (Outlet): Composite frame with water-tight, fiberglass reinforced composite cover 18-inch diameter, with manufacturer's standard locking system, and rated for H-20 loading requirements, Model No.

FL180 as manufactured by Fibrelite, or an approved equal. Include the following accessories: a 6-inch diameter identification plate labeled "OUTLET".

2.8 LABELING AND IDENTIFYING:

- A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

2.9 SOURCE QUALITY CONTROL:

- A. Pressure test and inspect oil-water separators, after fabrication and before shipment, according to manufacturer's requirements and governing standards.
- B. Affix standards organization's code stamp.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL:

- A. Refer to 817 Section 2.02, "Roadway Excavation, Formation of Embankment and Disposal of Surplus Material" and Section 2.05, "Trench Excavation" for excavating, trenching, and backfilling requirements.
- B. Peastone Gravel Backfill: Peastone Gravel 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 Plans.
 - 1. Oil-water separators: Provide a minimum of 12-inches of peastone gravel bed for the oil-water separators. At start of backfilling, care must be taken to work material completely beneath the bottom of the oil-water separators and underneath the end caps to provide adequate support. Backfill completely over the top of the oil-water separators, up to bottom of the concrete apron. Peastone gravel should be added and compacted in 12-inch lifts.
 - 2. Piping: Piping in trenches shall have the minimum burial depth as indicated on the plans with a 6-inch bed of peastone gravel under and over the pipe, compacted to support the pipe installation.
- C. No backfilling over any underground piping or electrical connections may take place until the work is inspected by the Engineer and the authorities having jurisdiction. Failure to have work inspected will result in the Contractor uncovering work to allow for inspection.

3.2 OUTDOOR PIPING INSTALLATION:

- A. Install underground piping buried at least 24 inches below finished grade.
- B. Install drainage pipe as specified in CSI Division 22 Section 221316, "Sanitary Waste and Vent Piping" or as indicated on the Plans.
- C. Install vent pipe at a minimum slope of 2 percent (1/4 inch per foot) downward towards the oil-water separators unless otherwise noted.
- D. Assemble and install entry boots for pipe penetrations through sump sidewalls for liquid-tight joints.
- E. Install flexible connectors as shown on the Plans. Heat shrink-wrap flexible connectors with a minimum of 2-inches overlap on each end.
- F. Install fittings for changes in direction in rigid pipe.

3.3 PIPING JOINT CONSTRUCTION:

- A. Ream ends of pipes and tubes and remove burrs.
- 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. Fiberglass-Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.4 OIL-WATER SEPARATOR INSTALLATION:

- A. Excavate as described in Part 3.1 and as shown on the Plans. Allow for cast-in-place, concrete-ballast base plus peastone gravel between ballast base and tank. Extend excavation around perimeter of oil-water separator.
- B. Install filter mat.
- C. Set tie-down eyelets for hold-down straps in concrete-ballast base and tie to reinforcing steel.

- D. Place peastone gravel on top of concrete-ballast base.
- E. Set oil-water separator on fill materials and install hold-down straps.
 - 1. Prior to setting oil-water separator, soap tank and pressurize primary and secondary tanks to a minimum of 3 psig and a maximum of 5 psig. Test for 1 hour. Do not install oil-water separator until the tank successfully passes this pressure test for leaks.
- F. Each component of the oil-water separator system shall be installed as shown on the plans and in accordance with manufacturer recommendations. Additional installation requirements of the storage tank system are described in subsequent portions of this Section where applicable.
- G. Connect piping.
- H. Backfill excavation with peastone gravel in 12-inch lifts and tamp backfill lift to consolidate.
- I. Install filter mat between top of backfill material and earth fill.
- J. Install FRP oil-water separators with FRP hold-down straps, manhole extensions, and manhole risers.
- K. Pressure Testing of Oil-Water Separator and Piping: Refer to Part 3.6, "Field Quality Control."
 - 1. Underground piping shall not be backfilled until the piping has successfully passed the pressure test for leaks described in this Section.

3.5 LABELING AND IDENTIFYING:

- A. Install detectable warning tape directly above drainage piping, 6 inches below subgrade under pavements and slabs. Terminate tracer wire in an accessible area, and identify as "tracer wire" for future use with plastic-laminate sign.
 - 1. Piping: Over underground piping.
 - 2. Oil-Water Separators: Over edges of each.

3.6 FIELD QUALITY CONTROL:

- A. Perform tests and inspections:
 - 1. Oil-Water Separators: Minimum hydrostatic or compressed-air test pressures for oil-water separators for Double-Wall Tanks. Soap tanks. Isolate drainage piping from the oil-water separators during testing. In-tank probes shall not be installed in the tanks during testing.
 - a. Inner Tanks: Minimum 3 psig and maximum 5 psig.
 - b. Interstitial Space: Minimum 3 psig and maximum 5 psig.
 - c. Maintain the test pressure for one hour.
 - 2. Piping: Test for leaks and defects in piping.
 - a. Leave drainage and vent piping uncovered until it has been tested and approved. Expose work that was covered before it was tested.
 - b. Drainage Piping: Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - c. Isolate storage tanks if test pressure in piping will cause pressure in storage tanks to exceed 10 psig.
- B. Piping and equipment will be considered defective if it does not pass tests and inspections. Defective piping and equipment shall be repaired or replaced, and then retested.
- C. Prepare test and inspection reports.

3.7 PIPING SCHEDULE:

- A. Drainage Piping and Fittings: As specified in CSI Division 30 Section 307000, "Sanitary/Drainage."
- B. Oil-Water Separator piping shall be the following:
 - 1. Pipe Risers: Schedule 40 PVC pipe and fittings.
 - 2. Vent Pipe and Fittings, Underground: Schedule 40 PVC pipe and fittings.
 - 3. Vent Pipe and Fittings, Aboveground: Galvanized steel pipe and pipe fittings.

END OF SECTION 221325

SECTION 232116 - HYDRONIC PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY:

A. Section includes special-duty valves and specialties for the following:

1. Hot-water heating piping.
2. Makeup-water piping.
3. Condensate-drain piping.
4. Blowdown-drain piping.
5. Air-vent piping.
6. Safety-valve-inlet and -outlet piping.

1.2 ACTION SUBMITTALS:

A. Submit the following in accordance with Form 817 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

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

1. Valves: Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
2. Air-control devices.
3. Hydronic specialties.

1.3 CLOSEOUT SUBMITTALS:

A. Operation and Maintenance Data: For air control devices, hydronic specialties, and special-duty valves to include in the operation and maintenance manuals specified in Form 817 Article 1.20-1.08.14 subsection 4 and described in NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.4 QUALITY ASSURANCE:

A. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

1. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:
 - 1. Hot-Water Heating Piping: 125 psig at 200 deg F.
 - 2. Makeup-Water Piping: 80 psig at 150 deg F.
 - 3. Condensate-Drain Piping: 150 deg F.
 - 4. Blowdown-Drain Piping: 200 deg F.
 - 5. Air-Vent Piping: 200 deg F.
 - 6. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 VALVES:

- A. Check, Ball, and Butterfly Valves: Comply with requirements specified in CSI Division 23 Section 230523, "General-Duty Valves for HVAC Piping.
- B. Automatic Temperature-Control Valves, Actuators, and Sensors: Comply with requirements specified in CSI Division 23 Section 230900, "Instrumentation and Control for HVAC."
- C. Bronze, Calibrated-Orifice, 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. Bell & Gossett Domestic Pump.
 - b. Taco.
 - 2. Body: Bronze or brass, ball or plug type with calibrated orifice or venturi.
 - 3. Ball: Brass or stainless steel.
 - 4. Plug: Resin.
 - 5. Seat: PTFE.
 - 6. End Connections: Threaded or socket.
 - 7. Pressure Gage Connections: Integral seals for portable differential pressure meter.
 - 8. Handle Style: Removable lever, with memory stop to retain set position.
 - 9. CWP Rating: Minimum 125 psig.
 - 10. Maximum Operating Temperature: 250 deg F.
- D. Cast-Iron or Steel, Calibrated-Orifice, 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. Bell & Gossett Domestic Pump.
 - b. Taco.
2. Body: Cast-iron or steel body, ball, plug, or globe pattern with calibrated orifice or venturi.
3. Ball: Brass or stainless steel.
4. Stem Seals: EPDM O-rings.
5. Disc: Glass and carbon-filled PTFE or bronze.
6. Seat: PTFE.
7. End Connections: Flanged or grooved.
8. Pressure Gage Connections: Integral seals for portable differential pressure meter.
9. Handle Style: Lever, with memory stop to retain set position.
10. CWP Rating: Minimum 125 psig.
11. Maximum Operating Temperature: 250 deg F.

E. Diaphragm-Operated, Pressure-Reducing Valves: ASME labeled.

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. Amtrol, Inc.
 - b. Armstrong Pumps, Inc.
 - c. Bell & Gossett Domestic Pump.
2. Body: Bronze or brass.
3. Disc: Glass and carbon-filled PTFE.
4. Seat: Brass.
5. Stem Seals: EPDM O-rings.
6. Diaphragm: EPT.
7. Low inlet-pressure check valve.
8. Inlet Strainer: Removable without system shutdown.
9. Valve Seat and Stem: Noncorrosive.
10. Valve Size, Capacity, and Operating Pressure: Selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.

F. Diaphragm-Operated Safety Valves: ASME labeled.

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. Amtrol, Inc.
 - b. Armstrong Pumps, Inc.

c. Bell & Gossett Domestic Pump.

2. Body: Bronze or brass.
3. Disc: Glass and carbon-filled PTFE.
4. Seat: Brass.
5. Stem Seals: EPDM O-rings.
6. Diaphragm: EPT.
7. Wetted, Internal Work Parts: Brass and rubber.
8. Inlet Strainer: Removable without system shutdown.
9. Valve Seat and Stem: Noncorrosive.
10. Valve Size, Capacity, and Operating Pressure: Comply with ASME Boiler and Pressure Vessel Code: Section IV, and selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.

G. 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.

2.3 AIR-CONTROL DEVICES:

A. Automatic Air Vents:

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. Amtrol, Inc.
 - b. Armstrong Pumps, Inc.
 - c. Bell & Gossett Domestic Pump.
 - d. Taco, Inc.
2. Body: Bronze or cast iron.
3. Internal Parts: Nonferrous.
4. Operator: Noncorrosive metal float.
5. Inlet Connection: NPS ½.
6. Discharge Connection: NPS 1/4.
7. CWP Rating: 150 psig.
8. Maximum Operating Temperature: 240 deg F.

B. Bladder-Type Expansion Tanks:

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. AMTROL, Inc.
 - b. Armstrong Pumps, Inc.
 - c. Bell & Gossett Domestic Pump.
 - d. Taco, Inc.
2. Tank: Welded steel, rated for 125-psig working pressure and 240 deg F maximum operating temperature. Factory test after taps are fabricated and supports installed and are labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1
3. Tank Volume: ~~158~~ 132 gal (full acceptance).
4. Bladder: Securely sealed into tank to separate air charge from system water to maintain required expansion capacity.
5. Air-Charge Fittings: Schrader valve, stainless steel with EPDM seats.

C. Air Separators:

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. AMTROL, Inc.
 - b. Armstrong Pumps, Inc.
 - c. Bell & Gossett Domestic Pump.
 - d. Taco, Inc.
2. Tank: Welded steel; ASME constructed and labeled for 125-psig minimum working pressure and 270 deg F maximum operating temperature.
3. Inlet and Outlet Connections: Flanged.
4. Blowdown Connection: Threaded.
5. Size: Match system flow capacity.

2.4 HYDRONIC PIPING SPECIALTIES:

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: Stainless-steel, 40 or 60-mesh strainer, or perforated stainless-steel basket.

4. CWP Rating: 125 psig.
- B. Expansion Fittings: Comply with requirements in CSI Division 23 Section 230516 "Expansion Fittings and Loops for HVAC Piping."

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS:

- A. Install shutoff-duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, and at connection to automatic air vents.
- B. Install throttling-duty valves at each branch connection to return main.
- C. Install calibrated-orifice, balancing valves in the return pipe of each heating or cooling terminal.
- D. Install check valves at each pump discharge and elsewhere as required to control flow direction.
- E. Install safety valves at hot-water generators and elsewhere as required by ASME Boiler and Pressure Vessel Code. Install drip-pan elbow on safety-valve outlet and pipe drain as indicated on the Plans. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.
- F. Install pressure-reducing valves at makeup-water connection to regulate system fill pressure.

3.2 HYDRONIC SPECIALTIES INSTALLATION:

- A. Install automatic air vents with ball valve at high points of system piping, at heat-transfer coils, in air separators, and elsewhere as required for air venting.
- B. Install piping from boiler air outlet and air separator to expansion tank with a 2 percent upward slope toward tank.
- C. Install air separators in pump suction. Install drain valve on air separators.
- D. Install expansion tanks on the floor. Vent and purge air from hydronic system, and ensure that tank is properly charged with air to suit system Project requirements.

END OF SECTION 232116