4. Jamb anchors shall be of the corrugated or perforated T shape and extend not less than 8 inches into the masonry and lag bolted into solid blocking at metal stud walls. Provide a minimum of three anchors for each jamb up to 7 feet 6 inches in height.
5. Floor anchors shall be provided for each jamb and have a minimum of two holes for anchoring purposes. Floor anchors shall be fabricated from a minimum of 14-gauge galvanized steel.
6. Provide mortar boxes behind hardware cut outs and weld to frame.
7. Frame shall have cut outs and reinforcement for mortise and surface mounted finish hardware.
8. Provide removable spreader bars at the bottom of the frame tack welded to jambs.
9. Frame shall have provisions for silencers.
10. Frames for labeled fire rated doors.
    a. Comply with NFPA 80. Test by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual.
    b. Fire rated labels of approving laboratory permanently attached to frames as evidence of conformance with these requirements. Provide labels of metal or engraved stamp, with raised or incised markings.
    c. Shall have a 60-minute fire protection rating.

2.03 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Amweld Building Products, LLC.
2. Ceco Door Products; an ASSA ABLOY Group Company.
3. CURRIES Company; an ASSA ABLOY Group Company.
4. Republic Builders Products Company.
5. Steelcraft; an Ingersoll-Rand company.

2.04 FRAME ANCHORS

A. Jamb Anchors:
1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.05 STOPS AND MOLDINGS

A. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

B. Loose Stops for Glazed Lites in Frames (fixed interior windows): Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.06 LOUVERS

A. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.
   1. Sight proof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.
   2. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same testing and inspecting agency that established fire-resistance rating of door assembly.

2.07 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch-wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.08 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

C. Hollow Metal Doors:
   1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
   2. Glazed Lites: Factory cut openings in doors.
   3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
   1. Full Profile Welded Frames: Weld joints continuously; grind, fill, dress, and make smooth, flush, and not visible.
   2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
   4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
   5. Jamb Anchors: Provide number and spacing of anchors as follows:
      a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
         i. Two anchors per jamb up to 60 inches high.
         ii. Three anchors per jamb from 60 to 90 inches high.
         iii. Four anchors per jamb from 90 to 120 inches high.
         iv. Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
      b. Compression Type: Not less than two anchors in each jamb.
      c. Post-installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
   6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
      a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
      b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Section 08710 – Door Hardware.
   1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
   2. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
   3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
   1. Single Glazed Lites (fixed interior windows): Provide fixed stops and moldings welded on secure side of hollow metal work.
   2. Multiple Glazed Lites (fixed interior windows): Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.

3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.09 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard epoxy primer immediately after cleaning and pretreating.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
2. Refer to Section 09900 – Painting for field-applied coating. Coordinate shop primer with actual paints being furnished by the Painting Contractor under Section 09900 to verify and certify compatibility between the primer and the paint system being provided under Section 09900.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

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

3.02 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
   1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
      a. At fire-protection-rated openings, install frames according to NFPA 80.
      b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
      c. Install frames with removable glazing stops located on secure side of opening.
      d. Install door silencers in frames before grouting.
      e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
      f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
      g. Field apply bituminous coating to backs of frames that are filled with grout.
   2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
      a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
   3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
   4. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
   5. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
   6. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
   7. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
      a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
      b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch .
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with hollow metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9-inches o.c. and not more than 2-inches o.c. from each corner.

3.04 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of primer coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

SECTION 08302

FIBERGLASS DOORS AND FRAMES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide fiberglass doors and frames as required by the Contract Documents.
   1. In general, the work includes providing fiberglass doors and frames as indicated on the drawings.

1.02. RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions and Sections in Division 1 of these Specifications.
   1. Section 04200 Unit Masonry
   2. Section 06100 Rough Carpentry
   3. Section 08710 Finish Hardware
   4. Section 08800 Glazing
   5. Section 09900 Painting

B. Related Work Not Included:
   1. Installation of doors and frames is included in Section 06100, Rough Carpentry, but as specified in this Section.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Provide all products of this Section from a single manufacturer, who specializes in the production of this type of work.

C. The approved hardware set shall be provided to the door manufacturer for installation.
   1. Hardware for this door shall not be installed by any other company or person.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   3. Shop drawings showing details of each frame type, elevations of door designs, details of openings and details of construction, installation and anchorage.

4. Manufacturer's recommended installation procedures which, when approved by the Engineer will become the basis for accepting or rejecting actual installation procedures used on the Work.

C. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
1. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.05 PRODUCT HANDLING

A. Deliver materials in manufacturer's original unopened and undamaged packages with labels legible and intact.
1. Doors and frames shall be shipped in wood crates with wood perimeters.
2. Store materials in original cartons, on edge in such a way to prevent falling or damage to face, corners and edges.
3. Handle in accordance with manufacturer's instructions.

1.06 COORDINATION

A. Doors shall accommodate glass of type and thickness indicated and as specified in Section 08800 Glazing. Glass and glazing shall be provided by the Glass and Glazing Contractor under Section 08800.

B. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fiberglass Doors
1. Doors shall have 20 mil, molded-in gel coat finish and 18-ply, 24-ounce woven fiberglass screw blocks. Door shall have an overall thickness of 1-3/4 inches.
2. All hardware shall be supplied by the door manufacturer.
3. Finish shall be as listed in the Door Schedule.
4. Doors, frames and hardware shall be supplied by FRP Doors, Inc., Chem-Pruf Door Co., Ltd., FIB-R-DOR, a Division of Advanced Fiberglass, LLC, or approved equal.

B. Fiberglass Frames
1. Pultruded fiberglass double rabbet frame with a depth of 5-3/4 inches and a profile of 2 inches.
2. Finish shall match door as specified in the Door Schedule.

C. Door Cores
   1. Insulated doors are to be completely filled with a rigid polyurethane core chemically bonded to all interior surfaces with a minimum insulation value of R10.

D. Weather stripping: Manufacturer's standard. Color selected by the Engineer.

2.02 FINISH HARDWARE

A. Shall be as specified in Section 08710, Finish Hardware.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Installation shall be in strict compliance with the manufacturer's written instructions using non-corrosive materials.

B. Finish hardware shall be installed by the manufacturer of the door at his facility.
   1. The Contractor shall ship the approved hardware set to the door manufacturer.

3.03 GUARANTEE

A. The manufacturer shall unconditionally guarantee its door for five (5) years from the date of Substantial Completion.

3.04 CLEANING

A. Upon completion, the exposed surfaces of doors, and frames shall be cleaned thoroughly. All smears and other unsightly marks shall be removed.

END OF SECTION

SECTION 08306

ALUMINUM FLOOR HATCHES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Provide floor hatches as required by the Contract Documents.
   1. In general provide aluminum floor hatches for access to the tanks beneath the floor slab in the water treatment plant and the basement pipe gallery as shown on the Contract Documents.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 03300 Cast in Place Concrete.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. For purposes of designating type and quality for work in this Section, Drawings and Specifications are based on floor hatches as manufactured by The Bilco Company, New Haven, CT.

1.04 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   3. Shop Drawings showing details of each frame type, details of openings, and details of construction, installation and anchorage.
   4. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

C. The equipment to be furnished under this section shall be coordinated with all applicable structural and mechanical process drawings, including addenda.
   1. If no changes are required, provide a statement that no changes are required.
   2. If changes are required, furnish marked up drawings or statement detailing the modifications necessary for the equipment proposed.

3. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

D. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
1. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.05 PRODUCT HANDLING

A. Deliver materials in manufacturer's original unopened and undamaged packages with labels legible and intact.
1. Store materials in unopened packages in a manner to prevent damage from the environment and construction operations.
2. Handle in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 ALUMINUM HATCHES

A. Curb mounted floor hatch be Type SM Versamount (single leaf) as manufactured by the Bilco Co., New Haven, CT; Acudor; Howe Green; or approved equal, and shall have the following attributes:
1. Shall have 11 gauge aluminum diamond pattern plate to withstand a live load of 40 lbs. per square foot with a maximum deflection of 1/150th of the span.
2. Cover insulation shall be fiberglass of 1" thickness, fully covered and protected by an 18 gauge aluminum metal liner.
3. Cover shall be equipped with an EPDM gasket adhered to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
4. Equipped with 316 stainless steel hardware throughout.
5. Curb shall be 4-inch height and of 14 gauge paint bond G-90 galvanized steel. The curb shall be formed with a 2-5/8" mounting flange and 1-1/2" apron, fully welded at the corners
5. Automatically lock in the vertical position by means of a heavy hold-open arm with grip handle release.
6. Lock shall be of the slam lock design with removable key wrench.
a. Latch release protected by a flush gasketed, removable screw plug.
7. Compression spring operators enclosed in telescopic tubes.
8. Dimensions of the curb mounted access hatches shall be 36-inches by 30-inches (hinge side), unless otherwise noted on the Drawings. Larger hatch size for any discrepancies shall be provided.

B. Flush frame access hatch to the pipe gallery below the floor slab shall be type KD (double leaf floor access door) as manufactured by the Bilco Co., New Haven, CT; Acudor; Howe Green; or approved equal, and shall have the following attributes:

1. Shall have 1/4-inch aluminum diamond pattern plate to withstand a live load of 150 lbs. per square foot with a maximum deflection of 1/150th of the span.
2. Channel frame shall be aluminum with an strap anchors bolted to the exterior.
3. Torsion Bar Lifting Mechanisms: Provides, smooth, easy, and controlled cover operation through entire opening and closing arc and retarding downward motion of cover when closing.
4. Equipped with 316 stainless steel hardware throughout.
5. Automatically lock in the vertical position by means of a heavy hold-open arm with grip handle release.
6. Cover shall pivot so that it does not protude into the channel frame.
7. Lock shall be of the slam lock design with removable key wrench.
   a) Latch release protected by a flush gasketed, removable screw plug.
8. EPDM gasket mechanically attached to the frame to reduce the amount of dirt and debris that may enter the channel frame.
9. Dimensions of the flush mounted access hatch shall be 48-inches by 48-inches, unless otherwise noted on the Drawings. Larger hatch size for any discrepancies shall be provided.
10. Furnish factory installed fall protection grating under access doors with the following attributes:
    a) Shall meet OSHA 29 CFR 1910.23 requirements for fall protection.
    b) Aluminum grating with a safety-yellow powder coat paint finish.
    c) Equipped with a stainless steel automatic hold-open device that securely locks the panel in the fully open 90 degree position.
    d) 316 stainless steel hardware.
    e) Shall have a provision for locking to prevent unauthorized opening.
    f) Shall include a 25-Year manufacturer's warranty.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Access hatches to tanks shall be installed on a 6" high x 6" wide concrete curb as per manufacturer's installation instructions.
   1. Install 1-1/2 Sch. 80 PVC drain connected to the hatch drainage coupling, and exiting the curb at floor level, if applicable.

END OF SECTION

SECTION 08330

OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide overhead coiling doors as required by the Contract Documents.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions and Sections in Division 1 of these Specifications.
   1. Section 05500 Metal Fabrications
   2. Division 16 Electrical

1.03 REFERENCES

A. ANSI/DASMA108 - American National Standards Institute Standard Method For Testing Sectional Garage Doors And Rolling Doors: Determination Of Structural Performance Under Uniform Static Air Pressure Difference.

B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.

C. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

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

E. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

F. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of doors specified in this section, with not less than ten years of documented experience.

C. Installer Qualifications: Company specializing in installing the types of products specified in this section, with minimum of five years of documented experience, and approved by the door manufacturer.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
1. Materials list of items proposed to be provided under this Section.
2. Manufacturer’s specifications and other data needed to prove compliance with the specified requirements.
3. Shop drawings in sufficient detail to show fabrication, installation, anchorage and interface of the work of this Section with the work of adjacent trades.
4. Manufacturer’s recommended installation procedures which, when approved by the Engineer will become the basis for accepting or rejecting actual installation procedures used on the work.

C. Verification Samples: For each finish product specified, two samples, minimum size 6 inches long, representing actual product, color, and patterns.

1.05 PRODUCT HANDLING

A. Comply with manufacturer’s requirements.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

D. Store materials in a dry, warm, ventilated weathertight location.

1.06 WIND PERFORMANCE REQUIREMENTS

A. Design doors to withstand positive and negative wind loads as calculated in accordance with applicable building code.
1. Safety Factor: 1.5 times design wind load.

1.07 PROJECT CONDITIONS

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

B. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.08 COORDINATION

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

1.09 WARRANTY

A. Warranty: Manufacturer's limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for 3 years following Substantial Completion or 20,000 cycles, whichever occurs first.

PART 2 PRODUCTS

2.01 OVERHEAD COILING DOORS

A. Acceptable Manufacturers:
   1. Overhead Door, Lewisville, TX 75067.
   2. C.H.I. Overhead Doors, Arthur, IL 61911.
   3. Raynor Garage Doors, Dixon, IL 61021-0448.

B. Provide standard roll up service doors of the dimensions and arrangements shown on the Drawings and with the following attributes:
   1. Design wind load: 50 psf.
   2. Curtain: Interlocking slats fabricated from 20-gauge strip steel with a hot-dip galvanized coating of 1.25 oz. per square foot, in accordance with ASTM A525.
      a. Bottom slat reinforced with two (2) steel angles not less than 1/8 inch thick.
      b. Slats shall have a foamed in place layer of R-7.7 polyurethane insulation inside.
   3. Guides: Between jamb guides fabricated from structural steel angles of sufficient depth to retain the curtain in the guides against the specified wind load.
      a. Provided with anchors for wind locks and galvanized after construction.
   4. Wall Mounting Condition:
      a. Between jambs mounting.
   5. Full perimeter weatherstripping.
   6. Combination weather-strip and safety device at the door bottoms.
   7. An emergency hand chain operator shall be provided.
   8. Brackets: Fabricate from steel plate not less than 1/4 inch thick.
   9. Gears: Manufacturer’s standard gears designed for a maximum manual effort of not more than thirty (30) pounds.
   10. Barrel: Manufacturer’s standard barrel designed to limit maximum deflection to 0.03 inches per foot.
      a. Capable of counterbalancing weight of curtain and adjustable by means of an exterior wheel.
   11. Hood: Fabricated from 24-gauge hot dipped galvanized steel to fit curvature of the brackets.
   12. Finish:
      a. Galvanized Curtain and hood: Manufacturer’s standard baked acrylic primer.

b. Other exposed non-galvanized ferrous surfaces: One (1) coat of rust inhibitive paint.

c. Finish painting: After erection, painting shall be provided by the Painting Contractor in accordance with Section 09900.

B. Motor Operator and Controls:

1. Motor shall not be less than 1/2 horsepower.
   a. High starting torque, hoist-type having sufficient power to operate the doors at an average speed of one (1) foot per second, but not less than 2/3-foot per second.
   b. Overload device for motor protection sensitive to both heat and current.
2. Controlled by a momentary contact, three (3) button, push-button station at the interior side of the doors marked “OPEN”, “CLOSE” and “STOP”.
3. The push button station shall be a NEMA 4 stainless steel enclosure.
4. Furnished with a reversing magnetic starter for 240 volts, single (1) phase, 60 Hertz electric motor.
5. Starter enclosure shall be NEMA 4.
6. Controls shall be wired for 120 volts, single phase, 60 Hertz. A suitable control transformer shall be supplied mounted in the starter enclosure.
7. Doors shall have an automatic rotary limit switch which shall break the switch at termination of door travel.
8. Operator mounting position shall be at the front of the hood.

2.02 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

B. Verify opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

A. Coordinate as required with other trades to assure proper and adequate provisions in the work of those trades for interface with the work of this Section.

B. Doors shall be installed complete with operating equipment and hardware by the manufacturer or his authorized representative.

C. Install the work of this Section in strict accordance with the original design, the approved shop drawings, and door manufacturer’s recommended installation procedures as approved by the Engineer.

D. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

E. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

F. Fit and align assembly including hardware, level and plumb, to provide smooth operation.

G. Provide perimeter trim and closures as necessary based on the final fit of the door.

H. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

I. Upon completion of the installation, put all items through at least ten operating cycles. Make required adjustments and assure that components are in optimum operating condition.

3.03 CLEANING

A. Upon completion, the exposed surfaces of doors and frames shall be cleaned thoroughly. All smears and other unsightly marks shall be removed.

B. Remove labels and visible markings.

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

3.04 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION

SECTION 08501

METAL WINDOWS FILED SUB-BIDS

PART 1 GENERAL

1.01 METAL WINDOWS FILED SUB-BID

A. The work of the following sections requires a filed sub-bid in accordance with M.G.L. C.149, S.44A through 44J, inclusive, as amended. These sections will be covered under a single filed sub-bid for the Metal Windows category of work.
1. Section 08520 – Aluminum Windows

B. Reference Drawings: The work of this Section is shown on the following Drawings:
1. 01-A-1 through 01-A-3, 20-A-1 through 20-A-18, 99-A-1 through 99-A-3

C. Requirements of Submitting Sub-bids:
1. Sub-bids for work under this Section shall comply with the requirements of M.G.L. C.149, S.44D and 44F; shall be filed in a form furnished by the Awarding Authority, in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and Information for Bidders; and shall be accompanied by a Bid Deposit in the amount of five percent of the sub-bid price complying with the requirements of M.G.L. C.149, S.44B(2). The following should appear on the upper left-hand corner of the envelope:

SUB-BIDDER: Contractor Name

SUB-BID FOR: Metal Windows

PROJECT: Wading River Water Treatment Plant
Contract No. 10, DWSRF No. 16764

D. SUB-SUBLISTINGS

1. Sub-sub trades are categories of work within a filed sub-bid trade and are indicated in paragraph E on the Form for Sub-bid. If sub-sub trades are requested and identified follow the instructions below. The proposed contract price submitted by the filed sub-bidder on the Form for Sub-Bid includes the cost of any sub-sub trades.

a. Sub-sub bids are required for the following subcategories of this section:

Class of Work	Reference Paragraph

2. Sub-bidders shall include the appropriate information for the above listed sub-categories in Paragraph E of the Form for Sub-bid.
3. If the filed sub-bidder customarily performs the above work with its own workforce the sub-bidder should list its own name and trade, and <u>leave the dollar amount blank.</u>

4. If the filed sub-bidder does not customarily perform the above work with its own workforce the sub-bidder should list the name of the contractor performing the work, the trade and insert a dollar amount.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 08520

ALUMINUM WINDOWS

(PART OF WORK OF SECTION 08501 – METAL WINDOWS FILED SUB-BIDS,
Filed Sub-Bid Required)

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this Section includes all labor, materials, tools, staging, and equipment necessary to provide aluminum windows, complete, as required for the applications specified herein and as indicated on Drawings.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions and Sections in Division 1 of these Specifications.
   1. Section 04200 Unit Masonry
   1. Section 05500 Metal Fabrications
   2. Section 06100 Rough Carpentry
   3. Section 08800 Glazing

B. Related Work Not Included.
   1. Caulking between window frames and metal/masonry is included in Section 07900 - Joint Sealants, and shall be provided by the Waterproofing, Dampproofing, and Caulking Contractor.
   2. Windows shall accommodate glass of type and thickness indicated and as specified in Section 08800 - Glazing. Glass and glazing shall be provided by the Glass and Glazing Contractor under Section 08800.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.04 PROJECT COORDINATION

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.05 TESTING AND PERFORMANCE

A. Air, water, and structural test unit shall conform to requirements set forth in ASTM E283 and ASTM E331.

B. Thermal test unit sizes shall be 4’-0” x 6’-0”. Unit shall consist of a fixed window.

C. Windows shall conform to all AAMA/NWWDA 101/I.S.2-97 requirements for the window type referenced in 2.01.A in this Specification Section. In addition, the following performance requirements shall be met.

1. Air Infiltration Test:
   a. With ventilators closed and locked, test unit in accordance with ASTM E283 at a static air pressure difference of 6.24 psf.
   b. Air infiltration shall not exceed 0.10 cfm/ sq. ft. of unit.
2. Water Resistance Test:
   a. With ventilators closed and locked, test unit in accordance with ASTM E331/ASTM E547 at a static air pressure difference of 12.0 psf.
   b. There shall be no uncontrolled water leakage.
3. Uniform Load Deflection and Structural Test
   a. Test unit in accordance with ASTM E330 at a static air pressure difference of 100 psf, positive and negative pressure.
   b. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.
   c. No member shall deflect over L/175 of its span.
4. Condensation Resistance Test:
   a. With ventilators closed and locked test unit in accordance with AAMA 1503.1.
   b. Condensation Resistance Factor (CRF) shall not be less than 71 (frame).
5. Thermal Transmittance Test:
   a. With ventilators closed and locked test unit in accordance with AAMA 1503.1.
   b. Conductive thermal transmittance (U-Value) shall not be more than 0.30 BTU/hr/sq. ft/degree F.
6. Additional test criteria for small missile impact
   a. Small Missile Level A Impact Test conducted on test units in accordance with TAS 201 or ASTM E1886/E1996. Upon completion of the missile impact tests, the test units shall be tested in accordance with TAS 203 or ASTM E 1996 cyclic load test.
7. Additional test criteria for large missile impact
   a. Large Missile Level (C or D) Impact Test conducted on test units in accordance with TAS 201 or ASTM E1886/E1996. Upon completion of the missile impact tests, the test units shall be tested in accordance with TAS 203 or ASTM E1996 cyclic load test.

1.06 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
1. Materials list of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Shop drawings in sufficient detail to show fabrication, anchorage, installation and interface of the work of this Section with the work of adjacent trades.

4. Manufacturer's recommended installation procedures which, when approved by the Engineer will become the basis for accepting or rejecting actual installation procedures used on the Work.
5. Samples:
    a. Section of window frame with specified finish.
    b. Each type of stainless steel fastener to be used in the installation.
    c. Upon approval the above shall become the standard acceptance for the work in regard to construction and finish of each item.

C. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
1. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.07 PRODUCT HANDLING

A. Deliver materials in manufacturer's original unopened and undamaged packages with labels legible and intact.
1. Store materials in unopened packages in a manner to prevent damage from the environment and construction operations.
2. Handle in accordance with manufacturer's instructions.

1.08 WARRANTY

A. The manufacturer shall warrant the product against material defects or defects in manufacturing. If a defect is discovered and brought to the attention of the manufacturer, the defect will be corrected at no cost to the Owner. Warranty shall not be pro-rated. Warranties requiring the Owner to return windows to the factory for repair or replacement shall not be accepted.
1. Windows: Warrant entire window unit for 10 years against defects in material or workmanship under normal use.
2. Finish: Warrant finish for 10 years against chipping, peeling, cracking, chalking, or fading.

B. Installation shall be warranted for a period of one (1) year against defective workmanship, air infiltration, water infiltration and fastening or anchorage failure.

C. Warranties shall be effective on the date of Substantial Completion as defined in this Project manual and shall run for the full period specified from that date.

D. Warranties shall be original documents in writing in the name of the Owner and signed in ink.
1. If the entity offering the warranty is a corporation, a corporate seal shall be applied to the warranty in addition to the ink signature.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Window Basis of Design: Kawneer 516/518 Fixed Thermal Windows – 4-inch frame, or as manufactured by St. Cloud, EFCO, YKK, or approved equal.

2.02 ALUMINUM WINDOWS

A. Frames shall be extruded aluminum shapes of tempered 6063-T6 alloy recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish with a minimum wall thickness of 0.125 inches at any location.

B. Thermal Barrier
1. The thermal barrier shall consist of integral structural thermal break made with glass reinforced nylon strips installed continuously and mechanically bonded to the aluminum.

C. Weather Strip:
1. A rubberized vinyl EPDM weather stripping bulb to be used in secured extruded ports at all frame vent perimeter locations.

D. Fasteners: Aluminum, nonmagnetic stainless steel, or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

E. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

2.03 ACCESSORIES

A. Exterior Panning and Interior Trims: Extruded aluminum, 6063-T6 alloy and temper, extruded to profiles and details indicated.
1. Exterior Panning and Trims: All panning profiles shall be a minimum thickness of 0.062” (1.57 mm) to match the profiles as shown the drawings. Any profile variations shall be submitted to the Engineer for approval and may not be accepted. All panning shall be factory fabricated for field assembly. All corner joinery shall be factory cut. Joinery at the sill shall be coped and butt-type construction. All preparations for assembly shall be completed by the window manufacturer. Upon assembly, panning frame joints shall be back-sealed to prevent moisture penetration.
2. Interior Trims: The interior face trim minimum wall thickness shall be 0.062” (1.57 mm). The face trim shall snap-fit onto concealed mounting clip. Exposed fasteners shall not be accepted. The mounting clip shall be extruded aluminum of 6063-T6 alloy and temper. The minimum wall thickness shall be 0.062” (1.57 mm). The trim clips shall be provided in 3” (76.2 mm) lengths and spaced a maximum of 18” (457.2 mm) center to center.

B. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, non-migrating types in hardness recommended by manufacturer, and suitable for system performance requirements.

C. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

2.04 PERIMETER INSULATION

A. A one-component, minimal-expanding, low pressure-build, flexible sprayed-in polyurethane foam exclusively formulated to air seal the gap between a window frame and its opening.

B. The foam shall expands only enough to generate an effective seal between the exterior of the frame and the adjacent opening.

C. Product to conform to ASTM E-06/ ASTM E-2112.

2.05 WINDOW FINISH

A. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating or approved equal (color to be selected by the Owner).

PART 3 EXECUTION

3.01 INSPECTION

A. Window openings shall conform to details, dimensions and tolerances shown on the window manufacturer’s approved shop drawings.
   1. Conditions which may adversely affect the window installation must be corrected before installation commences.
   2. Coordinate exterior window openings with field measurements prior to fabrication.

3.02 INSTALLATION

A. Windows specified under this Section shall be installed by the window supplier.

B. Install windows in openings in strict accordance with the approved shop drawings.
   1. Set units plumb, level and true to line, without warp or rack of frame.
   2. Anchor units securely to surrounding construction with approved fasteners.

3.03 CLEANING

A. Labels:
   1. Leave all labels in place, intact and legible, until reviewed and approved by the Engineer.

B. Prior to completion of the work, thoroughly clean all exposed surfaces of windows and screens.

1. Use only the cleaning materials and techniques recommended by the manufacturer of the material being cleaned.
2. Do not scratch or otherwise damage the aluminum finish.

END OF SECTION

SECTION 08710

FINISH HARDWARE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and deliver all finish hardware necessary for all doors, also hardware as specified herein and as enumerated in hardware sets and as indicated and required by actual conditions at the building. The hardware shall include the furnishing of all necessary screws, bolts, expansion shields, drop plates, and all other devices necessary for the proper application of the hardware.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General and Supplementary Conditions and Sections in Division 1 of these Specifications.
   1. Section 06400 - Interior Architectural Woodwork
   2. Section 08100 - Hollow Metal Doors and Frames
   3. Section 08302 – Fiberglass Doors and Frames
   4. Specific Omissions: Hardware for the following is specified or indicated elsewhere, unless specifically listed in the hardware sets:
      a. Windows.
      b. Cabinets of all kinds, including open wall shelving and locks.
      c. Signs, except as noted.
      d. Toilet accessories of all kinds including grab bars and coat hooks.
      e. Overhead doors

1.03 REFERENCES

A. International Code Congress (ICC)/American National Standards Institute (ANSI):
   1. ICC/ANSI A117.1, Accessible and Usable Buildings and Facilities.
   2. ANSI/BHMA A156.1 – A156.24 – Standards for Hardware and Specialties.

B. National Fire Protection Association (NFPA):
   1. NFPA 80 - Standard for Fire Doors and Fire Windows
   2. NFPA 101 - Life Safety Code
   3. NFPA 105 - Smoke and Draft Control Door Assemblies

C. Underwriters Laboratories, Inc. (UL):
   1. UL 10C - Positive Pressure Test of Fire Door Assemblies
   2. UL 1784 - Air Leakage Tests of Door Assemblies
   3. UL 305 - Panic Hardware

D. Applicable state and local building codes.

E. Accessibility
   1. ADA - Americans with Disabilities Act
   2. ICC / ANSI A117.1 - Accessible and Usable Buildings and Facilities

F. Door and Hardware Institute (DHI):
   1. Sequence and Format for the Hardware Schedule.

2. Recommended Locations for Builders Hardware

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Include manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

C. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
1. Type, style, function, size, and finish of each hardware item.
2. Name and manufacturer of each item.
3. Fastenings and other pertinent information.
4. Location of each hardware set cross-referenced to indications on Drawings.
5. Explanation of all abbreviations, symbols, and codes contained in schedule.
6. Mounting locations for hardware.
7. Mounting type for closers.
8. Door and frame sizes, materials, degree of opening, handing, and fire/smoke rating.
9. Name and phone number for the local manufacturer's representative for each product.

D. Key Schedule: After a keying meeting between representatives of the Owner, Engineer, and the hardware supplier, provide a keying schedule, listing the levels of keying, as well as an explanation of the key system's function, the key symbols used, and the door numbers controlled. This schedule can be submitted as a part of the hardware schedule or as a separate schedule.

E. Samples: If requested by the Engineer, submit samples of each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule.
1. Samples will be returned to the supplier in like-new condition. Units that are acceptable may, after final check of operations, be incorporated in the Work, within limitations of key coordination requirements.

F. Templates: After final approval of the hardware schedule, provide templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware.

G. Operations and Maintenance Data: Provide in accordance with Section 01730 and include the following:
1. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
2. Catalog pages for each product.
3. Name, address, and phone number of local representative for each manufacturer.
4. Parts list for each product.
5. Copy of final approved hardware schedule, edited to reflect "As installed."
6. Copy of final keying schedule.
7. One (1) complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
8. Copy of warranties including appropriate reference numbers for manufacturers to identify the project.

1.05 QUALITY ASSURANCE

A. Substitutions: Submit substitutions in accordance with Division 01.

B. Supplier Qualifications: A recognized architectural hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an accredited Architectural Hardware Consultant (AHC), who is available to Owner, Engineer, and Contractor, at reasonable times during the course of the Work for consultation.

C. Product Single Source Responsibility: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer.

D. Supplier Single Source Responsibility: Procure hardware for all doors from a single supplier.

E. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Warnock Hersey, Factory Mutual, or other testing and inspecting organization acceptable to the authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.

1.06 DELIVERY, STORAGE AND HANDLING

A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Each article of hardware shall be individually packaged in manufacturer's original packaging.

C. Contractor will provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items so that completion of the Work will not be delayed by hardware losses both before and after installation.

D. Items damaged in shipment shall be replaced promptly and with proper material and paid for by whomever did the damage or caused the damage to occur.

E. All the hardware shall be handled at this project in a manner to avoid damage, marring or scratching. Any irregularities that occur to the hardware after it has been delivered to the project shall be corrected, replaced or repaired by the Contractor at their expense. All hardware items shall be protected against malfunction due to paint, solvent, cleanser or any chemical agent.

1.07 WARRANTY

A. Starting date for warranty periods to be the date of Substantial Completion.

B. No liability is to be assumed where damage or faulty operation is due to improper installation, improper usage or abuse.

C. Provide guarantee from hardware supplier as follows:
1. Hinges: Life of the building.

2. Closers: Life of the building.
3. Locksets: Life of the building.
4. Exit Devices: Seven (7) years.
5. All other Hardware: One (1) year.

D. Products judged to be defective during the warranty period shall be replaced or repaired in accordance with the manufacturer's warranty, at no additional cost to the Owner.

1.08 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approval of manufacturers other than those listed shall be in accordance with Paragraph 1.05.A.

B. Note that even though an acceptable substitute manufacturer may be listed, the product must provide all the functions and features of the specified product or it will not be approved.

C. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

D. Where the exact types of hardware specified are not adaptable to the finished shape or size of the members requiring hardware, furnish suitable types having as nearly as possible the same operation and quality as the type specified, subject to Engineer's approval.

2.02 MATERIALS

A. Fasteners:
1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent that no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely.
4. All hardware shall be installed with the fasteners provided by the hardware manufacturer.

2.03 HINGES

A. Provide five-knuckle, concealed bearing hinges of type, material, and height as outlined in the following guide for this specifications.

B. 1-3/4 inch thick doors, up to and including 36 inches wide:
   1. Exterior: standard weight, stainless steel, 4-1/2 inches high
   2. Interior: standard weight, steel, 4-1/2 inches high

C. 1-3/4 inch thick doors over 36 inches wide:
   1. Exterior: heavy weight, stainless steel, 5 inches high
   2. Interior: heavy weight, steel, 5 inches high

D. 2 inches or thicker doors:
   1. Exterior: heavy weight, stainless steel, 5 inches high
   2. Interior: heavy weight, steel, 5 inches high

E. Provide three hinges per door leaf for doors 90 inches or less in height, and one additional hinge for each 30 inches of additional door height.

F. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   1. Steel Hinges: Steel pins
   2. Non-Ferrous Hinges: Stainless steel pins
   3. Out-Swinging Exterior Doors: Non-removable pins
   4. Out-Swinging Interior Lockable Doors: Non-removable pins
   5. Interior Non-lockable Doors: Non-rising pins

G. The width of hinges shall be 4-1/2 inches at 1-3/4 inch thick doors, and 5 inches at 2 inches or thicker doors. Adjust hinge width as required for door, frame, and/or wall conditions to allow proper degree of opening.

H. Provide hinges with electrified option where specified. Provide with sufficient number and gage of concealed wires to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to the electrified locking component.

I. Acceptable manufacturers and/or products: Stanley CB series, Hager AB series, and McKinney TCA/T4CA series.

2.04 FLUSH BOLTS

A. Provide automatic and manual flush bolts with forged bronze face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch steel or brass rods at doors up to 90 inches in height. Top rods at manual flush bolts for doors over 90 inches in height shall be increased by 6 inches for each additional 6 inches of door height. Provide dust-proof strikes at each bottom flush bolt.

B. Acceptable manufacturers and/or products: Trimco or approved equal.

2.05 MORTISE LOCK

A. Provide mortise locks that comply with ANSI A156.13, Series 1000, BHMA Grade 1 Operational and Grade 2 Security and are ULC listed, and appear in BHMA's "Directory of Certified Locks & Latches".

B. Locks shall have stamped steel case with steel or brass parts, and levers constructed of forged or cast brass, bronze or stainless steel construction.

C. Lever design shall be Best 14H.

D. Provide function numbers and descriptions indicated at the end of this Section.

E. Lock throw shall comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:
   1. Mortise Locks: Minimum 3/4-inch latch bolt throw.
   2. Mortise Locks & Latches shall have an anti-friction, 3/4-inch throw latch bolt with anti-friction piece made of self-lubricated stainless steel. Latch bolt with plastic insert and three-piece latch bolt are unacceptable on this project.
   3. Mortise Locks & Latches shall have levers to be operated with a roller bearing spindle hub mechanism.

F. Acceptable manufacturers and/or products: Stanley Best 45H series, Allegion Schlage L9000 series, and ASSA Abloy Sargent 8200 series.

2.06 EXIT DEVICES

A. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, and UL listed for Panic Exit and/or Fire Exit Hardware.

B. Provide touchpad type exit devices, fabricated of stainless steel, plated to the standard architectural finishes to match the balance of the door hardware.

C. Touchpad shall extend a minimum of one half of the door width, but not the full length of the exit device rail.

D. Devices to incorporate a deadlatching feature.

E. Provide manufacturer's standard strikes.

F. Provide exit devices cut to door width and height. Locate exit devices at a height recommended by the exit device manufacturer, allowable by governing building codes, and approved by the Engineer.

G. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates.
   1. Lever style will match the lever style of the locksets.

H. Exit devices for fire rated openings shall be UL labeled fire exit hardware.

I. Provide electrical options as scheduled.

J. Removable mullions shall be a 2 inches x 3 inches steel tube. Where scheduled, mullion shall be of a type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.

K. Acceptable manufacturers and/or products: Stanley Precision Apex series, Allegion Von Duprin 98 series, and ASSA Abloy Sargent 80 series.

2.07 DOOR CLOSERS – HEAVY DUTY

A. Provide door closers certified to ANSI/BHMA A156.4 Grade 1 requirements by a BHMA certified independent testing laboratory. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron or aluminum cylinder. Cylinder body shall be 1-1/2 inch diameter.

B. Provide hydraulic fluid requiring no seasonal closer adjustment. Fluid shall be fireproof and shall pass the requirements of the UL10C "positive pressure" fire test.

C. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force as required by accessibility codes and standards. Closers shall have separate adjustment for latch speed, general speed, and backcheck.

D. Provide closers with heavy-duty forged forearms for parallel arm closers.

E. Closers shall not incorporate Pressure Relief Valve (PRV) technology.

F. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other finish hardware items interfering with closer mounting.

G. Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors.

H. Door closers meeting this specification: Stanley Commercial Hardware QDC100 series, Allegion LCN 4040 Series, and ASSA Abloy Sargent 280 series.

2.08 PROTECTION PLATES

A. Provide kick plates, minimum of 0.050 inch thick as scheduled. Furnish with machine or wood screws, finished to match plates. Sizes of plates shall be as follows:
1. Kick Plates – 8 inches high x 2 inches less width of door on single doors, 1 inch less width of door on pairs

B. Acceptable manufacturers and/or products: Trimco, Don-Jo Manufacturing, Burns, or equal.

2.09 DOOR STOPS

A. Provide door stops for all doors in accordance with the following requirements:
1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
2. Where wall stops cannot be used, provide dome type floor stops of the proper height.
3. At any opening where a wall or floor stop cannot be used, a medium duty surface mounted overhead stop shall be used.

B. Acceptable manufacturers and/or products: Trimco, Burns, ABH Manufacturing, or equal.

2.10 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Provide thresholds, weatherstripping (including door sweeps, seals, astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items as closely as possible. Size of thresholds shall be as follows:
1. Exterior Saddle Thresholds – 1/2 inch high x jamb width x door width
2. Interior Saddle Thresholds – ¼ inch high x jamb width x door width
3. Bumper Seal Thresholds – 1/2 inch high x 5 inches wide x door width

B. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

C. Acceptable manufacturers and/or products: National Guard, Reese, Pemko.

2.11 SILENCERS

A. Provide "Push-in" type silencers for each hollow metal or wood frame. Provide three for each single frame and two for each pair frame. Omit where gasketing is specified or required by code.

B. Shall be manufactured by Trimco, Burns Architectural Builders Hardware Manufacturing, Inc. of Itasca, Illinois, or approved equal.

2.12 FINISHES

A. With the exception of potential alternates for items listed below, the finish of hardware items shall be US26D (BHMA 626) satin chrome or US32D (BHMA 630) satin stainless steel, or as called out in the hardware schedule.

B. Exceptions are as follows:
1. Exit Devices: BHMA 626W (Weatherized Chrome)
2. Door Closers: BHMA 689 (Aluminum Powder Coated to Match).
3. Weatherstrip: Clear Anodized Aluminum
4. Thresholds: Mill Finish Aluminum
5. Door Silencers: Rubber

2.13 CYLINDERS AND KEYING

A. Provide a new key system from the same manufacturer as the locks conforming to the following requirements:
1. Provide restricted patented small formant interchangeable core cylinders at all keyed items. Restriction shall control the access to the products by requiring a signed letter of authorization and/or authorization form from the Owner or authorized agent of the Owner. Patent shall protect against the unauthorized manufacturing and duplication of the products. Restricted patented cores shall not be operable by non-patented key blanks. Restricted patented cores shall incorporate a mechanism to check for the patented features on the keys. Provide construction cores with construction master keying for use during construction. The hardware supplier, accompanied by the Owner or Owner's security agent, shall install permanent keyed cores upon completion of the project. The temporary construction cores are to be returned to the hardware supplier.
2. Provide permanent cores and cylinders keyed by the manufacturer or authorized distributor as directed by the Owner. Provide owner with a copy of the bitting list, return receipt requested.
3. The hardware supplier, accompanied by a qualified factory representative for the manufacturer of the cores and cylinders, shall meet with Owner and Engineer to review keying requirements and lock functions prior to ordering finish hardware. Submit a keying schedule to Engineer for approval.
4. Provide cores and cylinders, unless noted otherwise, operated by a Grand Master Key System to be established for this project (Do not use the letter "I", "O", or "X" for any of the grand masters). Allow for twenty-four Master Keys under each Grand Master, and sixty-four changes under each master key. All cylinders shall

be keyed in alike or different sets as noted by their respective key set number. Do not use the letter "I" or “O” in any of the master key sets.

5. Provide patented restricted keys as follows:
   a. Ten grand master keys for each set.
   b. Ten master keys for each set.
   c. Three keys per core and/or cylinder.
   d. Two construction core control keys
   e. Two permanent core control keys
   f. Six construction master keys for each type (Contractor is to provide one set of construction keys to Engineer)
6. Visual key control:
   a. Keys shall be stamped with their respective key set number and stamped “DO NOT DUPLICATE".
   b. Grand master and master keys shall be stamped with their respective key set letters.
   c. Do not stamp any keys with the factory key change number.
   d. Do not stamp any cores with key set on face (front) of Core. Stamp on back or side of cores so not to be visible when core is in cylinder.
7. Deliver grand master keys, master keys, change keys, and/or key blanks from the factory or authorized distributor directly to the Owner in sealed containers, return receipt requested. Failure to comply with these requirements may be cause to require replacement of all or any part of the keying system that was compromised at no additional cost to the Owner.
8. Approved products: Best Cormax, Schlage Everest 29T, Sargent Signature.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to installation of any hardware, examine doors, frames, walls and related items for conditions that would prevent proper installation of finish hardware. Correct defects prior to proceeding with installation.

B. Pre-Installation Conference: Prior to the installation of hardware, manufacturer’s representatives for locksets, closers, and exit devices shall arrange and hold a jobsite meeting to instruct the installing contractor’s personnel on the proper installation of their respective products. A letter of compliance, indicating when the meeting was held and who was in attendance, shall be sent to Engineer and Owner.

3.02 INSTALLATION

A. Hardware shall be installed by qualified tradesmen skilled in application of commercial grade hardware. For technical assistance if necessary, installers may contact manufacturer’s representative for the item in question, as listed in the hardware schedule.

B. Mount hardware units at heights indicated in “Recommended Locations for Builders Hardware for Standard Steel Doors and Frames” by the Door and Hardware Institute.

C. Install each hardware item in compliance with the manufacturer’s instructions and recommendations, using only the fasteners provided by the manufacturer.

D. Do not install surface mounted items until finishes have been completed on the substrate. Protect installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

F. Operating parts shall move freely and smoothly without binding, sticking, or excessive clearance.

G. Set thresholds for exterior doors in full bed of butyl rubber or polyisobutylene mastic sealant complying with requirements specified in Section 07920 – Joint Sealants.

3.03 ADJUSTING, CLEANING AND DEMONSTRATING

A. Adjust and check each operating item of hardware and each door, to insure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly.

B. Where door hardware is installed more than one (1) month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make a final check and adjustment of hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

C. Clean adjacent surfaces soiled by hardware installation. Remove bulk trash form the building, clean up any dust/debris caused by the installation of hardware.

D. Instruct Owner's personnel in the proper adjustment, lubrication, and maintenance of door hardware and hardware finishes.

3.04 FIELD QUALITY CONTROL

A. At completion of the project, a qualified factory representative for the manufacturers of locksets, closers, and exit devices shall inspect installations of their products. After the inspections, a letter shall be sent to the Engineer reporting on conditions, verifying that their respective products have been properly installed and adjusted.

B. Six-Month Adjustment: Approximately six months after the date of Substantial Completion, the installer, accompanied by representatives of the manufacturers of latchsets and locksets, door control devices, and of other major hardware suppliers, shall return to the Project to perform the following work:
   1. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.
   2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
   3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.
   4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.05 PROTECTION

A. Provide for the proper protection of items of hardware until Owner accepts the project as complete. Damaged or disfigured hardware shall be replaced or repaired by the responsible party.

3.06 HARDWARE SCHEDULE

A. Provide hardware for each door to comply with requirements of hardware set numbers indicated in door schedule, and in the following schedule of hardware sets.

B. It is intended that the following schedule includes all items of finish hardware necessary to complete the work. If a discrepancy is found in the schedule, such as a missing item, improper hardware for a frame, door or fire codes, the preamble will be the deciding document.

C. Abbreviations for manufacturers listed below include the following: Stanley (ST), Trimco (TR), Best (BE), Stanley Commercial Hardware (SH), National Guard (NG)

D. Hardware sets:

Qty.	Item	Model	Finish (ANSI/BHMA Standard)	Mfr.
SET #01 - EXTERIOR PAIR WITH PANIC				
8	Hinges	CB191 NRP SERIES AS SPECIFIED	US32D	ST
1	Exit Device	2208 X 4908D CD	626W	BE
1	Exit Device	2201-CD	626W	BE
2	Mortise Cylinder	AS REQUIRED	626	BE
1	Rim Cylinder	AS REQUIRED	626	BE
2	Door Closer	QDC113 R	689	SH
2	Kick Plate	KO050 8" X 1" LDW B4E CSK	630	TR
1	Perimeter Seal	706 E (HEAD & JAMBS)	N/A	NG
2	Door Sweep	C627 A	N/A	NG
1	Meeting Stile Seal	600A (2PCS @ DOOR HEIGHT)	N/A	NG
1	Threshold	8425	AL*	NG
SET #02 - EXTERIOR SINGLE WITH PANIC				
4	Hinges	CB199 NRP SERIES AS SPECIFIED	US32D	ST
1	Exit Device	2108 X 4908D CD	626W	PR
1	Mortise Cylinder	AS REQUIRED	626	BE
1	Rim Cylinder	AS REQUIRED	626	BE
1	Door Closer	QDC113 R	689	SH
1	Kick Plate	KO050 8" X 2' LDW B4E CSK	630	TR
1	Perimeter Seal	706 E (HEAD & JAMBS)	N/A	NG
1	Door Sweep	C627 A	N/A	NG
1	Threshold	8425	AL*	NG
SET #03 - EXTERIOR UNEQUAL PAIR WITH PANIC				
8	Hinges	CB191 NRP SERIES AS SPECIFIED	US32D	ST
1	Exit Device	2208 X 4908D CD	626W	BE
1	Exit Device	2201-CD	626W	BE
2	Mortise Cylinder	AS REQUIRED	626	BE
1	Rim Cylinder	AS REQUIRED	626	BE

2	Door Closer	QDC113 R	689	SH
2	Kick Plate	KO050 8" X 1" LDW B4E CSK	630	TR
1	Perimeter Seal	706 E (HEAD & JAMBS)	N/A	NG
2	Door Sweep	C627 A	N/A	NG
1	Astragal	178 SA	N/A	NG
1	Meeting Stile Seal	600A (2PCS @ DOOR HEIGHT)	N/A	NG
1	Threshold	8425	AL*	NG

SET #04 - INTERIOR SINGLE WITH OFFICE LOCK

3	Hinges	CB191 NRP SERIES AS SPECIFIED	US32D	ST
1	Office Lock	45H-7A14H	630	BE
1	Door Closer	QDC115 R	689	SH
1	Kick Plate	KO050 8" X 2' LDW B4E CSK	630	TR
1	Door Stop	1211/1270CV AS REQUIRED	626	TR
1	Gasketing	130 SA (HEAD & JAMBS)	N/A	NG
1	Door Sweep	200 NA	N/A	NG
1	Saddle Threshold	425 E	AL*	NG
3	Door Silencers	1229A	GREY**	TR

SET #05 - SINGLE WITH STOREROOM LOCK

3	Hinges	CB191 NRP SERIES AS SPECIFIED	US32D	ST
1	Storeroom Lock	45H-7D14H	630	BE
1	Door Closer	QDC115 R	689	SH
1	Kick Plate	KO050 8" X 2' LDW B4E CSK	630	TR
1	Door Stop	1211/1270CV AS REQUIRED	626	TR
1	Gasketing	130 SA (HEAD & JAMBS)	N/A	NG
1	Door Sweep	200 NA	N/A	NG
1	Saddle Threshold	425 E	AL*	NG
3	Door Silencers	1229A	GREY**	TR

SET #06 - SINGLE WITH PRIVACY LOCK

3	Hinges	CB191 NRP SERIES AS SPECIFIED	US32D	ST
1	Privacy Lock	45H-0L14H	630	BE
1	Door Closer	QDC115 R	689	SH
1	Kick Plate	KO050 8" X 2' LDW B4E CSK	630	TR
1	Door Stop	1211/1270CV AS REQUIRED	626	TR
1	Gasketing	130 SA (HEAD & JAMBS)	NA	NG
1	Door Sweep	200 NA	NA	NG
1	Saddle Threshold	425 E	AL*	NG
3	Door Silencers	1229A	GREY**	TR

SET #07 - INTERIOR PAIR WITH PANIC

8	Hinges	CB199 NRP SERIES AS SPECIFIED	US32D	ST
1	Exit Device	2208 X 4908D CD	626W	PR
1	Exit Device	2201 CD	626W	PR
2	Mortise Cylinder	AS REQUIRED	626	BE
1	Rim Cylinder	AS REQUIRED	626	BE
2	Door Closer	QDC113 R	689	SH
2	Kick Plate	KO050 8" X 1" LDW B4E CSK	630	TR
1	Perimeter Seal	706 E (HEAD & JAMBS)	N/A	NG
2	Door Sweep	C627 A	N/A	NG
1	Meeting Stile Seal	600 A (2PCS @ DOOR HEIGHT)	N/A	NG
1	Threshold	8425	AL*	NG

SET #08 - INTERIOR UNEQUAL PAIR WITH PANIC HARDWARE

6	Hinges	CB191 SERIES AS SPECIFIED	US32D	ST
2	Flush Bolt	3917-12	626	TR
1	Exit Device	2208 X 4908D CD	626W	PR
1	Door Closer	QDC111 R	689	SH
2	Kick Plate	KO050 8" X 1" LDW B4E CSK	630	TR
2	Door Stop	1211/1270CV AS REQUIRED	626	TR
1	Meeting Stile Seal	600 A (2PCS @ DOOR HEIGHT)	N/A	NG
1	Gasketing	130 SA (HEAD & JAMBS)	N/A	NG
2	Auto Door Bottom	320 N	N/A	NG
1	Saddle Threshold	425 E	AL*	NG
2	Door Silencers	1229A	GREY**	TR

NOTE: **PROVIDE CLOSER AT ACTIVE LEAF ONLY**

SET #09 - INTERIOR PAIR WITH STOREROOM LOCK

6	Hinges	CB191 SERIES AS SPECIFIED	US32D	ST
2	Flush Bolt	3917-12	626	TR
1	Storeroom Lock	45H-7D14H 7/8 LTC	630	BE
1	Door Closer	QDC111 R	689	SH
2	Door Stop	1211/1270CV AS REQUIRED	626	TR
2	Door Silencers	1229A	GREY**	TR
1	Meeting Stile Seal	600 A (2PCS @ DOOR HEIGHT)	N/A	NG
1	Gasketing	130 SA (HEAD & JAMBS)	N/A	NG

*Finish to be aluminum
*Rubber door silencer color to be gray

END OF SECTION

SECTION 08800

GLAZING

(PART OF WORK OF SECTION 08801 – GLASS AND GLAZING FILED SUB-BIDS, Filed Sub-Bid Required)

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this Section includes all labor, materials, tools, staging, and equipment necessary to provide glazing and glazing accessories, complete, for all doors and windows specified in Section 08100 – Hollow Metal Doors, Section 08302 – Fiberglass Doors and Frames, and Section 08520 – Aluminum Windows, as required for the applications specified herein and as indicated on Drawings.

B. For glass types and locations, see Door Schedule and Window Schedule on the Architectural Drawings and specifications herein.

1.02 RELATED WORK:

A. Documents affecting work of this Section, include, but are not necessarily limited to, General Conditions and Sections in Division 1 of these Specifications.
1. Section 08100 Hollow Metal Doors and Frames
2. Section 08302 Fiberglass Doors and Frames
3. Section 08520 Aluminum Windows

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

B. Comply with pertinent recommendations contained in:
1. Flat Glass Marketing Association:
   a. "Glazing Sealing Systems Manual"
   b. "Glazing Manual"

1.04 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the work.

C. Accompanying the above product data, submit the following samples:
1. A 4" x 8" sample of each type of glass to be used.
2. Gasket material at least 12" long.
3. Samples, at least 12" long, of each type of sealant proposed to be used, installed between samples of the material to be glazed, fully cured.

1.05 ACCEPTABLE MANUFACTURERS

A. Glazing materials shall be the products of the following manufacturers, or equal, subject to compliance with specification requirements:
1. Pilkington.
1. Vitro Architectural Glass.
2. ASG Glass Fabricators.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

B. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.07 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

B. Deliver glass to the site in suitable containers that will protect glass from the weather and from breakage. Carefully store material as directed in a safe place where breakage can be reduced to a minimum. Deliver sufficient glass to allow for normal breakage.

1.08 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to the Owner and signed by coated-glass manufacturer agreeing to replace coated glass units that deteriorate, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below. Deterioration includes defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
1. Warranty Period: Ten (10) years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to the Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below. Deterioration includes defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by laminated-glass standards.

1. Warranty Period: Five (5) years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to the Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below. Deterioration includes Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 GLASS

A. Unless otherwise specified hereinafter, all glass shall comply with requirements of Fed. Spec. DD-G-451c, as applicable to the glass type specified. Labels showing glass manufacturer’s identity, type of glass, thickness, and quality will be required on each piece of glass. Labels shall remain on glass until it has been set and inspected.

B. All glazing in hazardous locations shall comply with all safety glazing regulations and shall be in accordance with ANSI Z97.1.

C. When glass is not cut to size by the manufacturer, and is furnished unlabeled as “stock to cut”, the Contractor shall submit an affidavit, or other satisfactory evidence, stating the quality, thickness, type, and manufacturer of the glass furnished.

D. All putty and glazing compound shall arrive at the project site in labeled containers which have not been opened.

E. Tinted glass shall be of color indicated on the Drawings or specified herein or as approved by the Owner from samples submitted by the Contractor.

2.02 GLASS SCHEDULE

A. Laminated Safety Glass (Interior Doors Except Fire-Rated Doors)

1. Laminated safety glass shall be two sheets of double-strength clear sheet glass; ASTM C1036, Type I, Class 1, quality q3; permanently laminated together with a minimum 0.030-inch thick sheet of clear plasticized polyvinyl butyral, which has been produced specifically for laminating glass.

B. Insulated Glass (Exterior Windows)
   1. All exterior windows to be fully factory glazed with 1" overall insulated glass.
   2. All glass shall be glazed with removable stops and shall be replaceable without dismantling the sash or frame members.
   3. A continuous polyshim tape will be used on the exterior glazing leg and a continuous silicone cap bead over the polyshim bonding to the glass edge to prevent moisture from intruding into the window system. A continuous rubberized vinyl compression bulb to be used on the interior glazing stops.
   4. Nominal glass thickness and type shall be:
      a. Thickness: 1/4"
      b. Tint: clear
      c. Type: annealed (tempered where required)
      d. Coating: low E on #3 surface
      e. Air Space
         1. 1/2" 90% Argon Filled

C. Interior Lites (Interior Windows)
   1. Thickness: 1/4"
   2. Tint: clear
   3. Type: annealed (tempered where required)

2.03 GLAZING

A. Glazing for hollow metal doors and frames shall be neoprene gaskets standard with the manufacturer of the doors and framing system.

B. Glazing tape shall be polyisobutylene tape as manufactured by Tremco, Pecora, or equal.

C. Glazing compound used for stop bead glazing shall conform to Fed. Spec. TT-S-230a and shall be Tremco Mono, Pecora Unicrylic, DAP Acrylic, or equal. Color shall be as selected by the Owner.

2.04 SETTING BLOCKS AND SPACER SHIMS

A. Fabricate blocks and shims from neoprene, shape to required sizes and thicknesses. The Shore A Durometer hardness for setting block and shim material shall be 70 to 90 points for setting blocks, and 50 points for spacer shims. The material used for blocks and spacers must be compatible with type of compounds and sealants used and shall not cause staining or discoloration of the sealant or the frame.

2.05 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 EXECUTION

3.01 ACCEPTANCE OF OPENINGS

A. Inspect all sashes, frames, and surrounds to be glazed, and notify the Engineer of any defects, improper materials, or workmanship or other conditions which will affect satisfactory installation of glass.
   1. Absence of notification or the beginning of glazing shall constitute acceptance of all previously placed related work by the Contractor; later claims of defects in such work will not relieve the Contractor from responsibility to produce satisfactory work.

B. The Contractor shall verify compliance with the following requirements:
   1. That windows and glazed frames are firmly anchored in proper position, plumb and square within 1/8-inch of nominal dimensions on approved shop drawings.
   2. That all fastener heads, welding fillets, and other projections are removed from glazing rabbets to provide the specified clearances.
   3. That all corners and fabrication intersections are sealed, and sashes and frames are weather tight and watertight.
   4. That rabbets at sills weep to outside, and all rabbets are of sufficient depth and width to receive the glass provide the required overlap of the glass.
   5. That all sealing surfaces of metal have been prime coated.
   6. That openings are in a true plane, with a proper rabbet and recommended edge clearance at perimeter of glass.

3.02 GENERAL

A. Comply with the requirements of the “Flat Glass Jobbers Association Glazing Manual”, except as herein otherwise specified. Face clearance, edge clearance, and depth of rabbet or “bite” on glass, shall be as recommended for the particular type and thickness of glass and the glazing conditions.

B. Do not apply any compound or sealant at temperatures lower than 40 degrees F., nor on damp, dirty, or dusty surfaces.

C. After glazing, doors and ventilators in sashes shall be fixed so they cannot be operated until the compound has set. Remove any excess sealant or compounds from glass and adjoining surfaces during the working time of the material.

D. Where setting blocks and spacer shims are required to be set into a glazing compound or sealant, they may be buttered with the compound or sealant, placed in position, and allowed to firmly set prior to glass installation.

F. Where a combination of sealing materials is used in the same frame, the manufacturer shall certify that all the materials furnished for installation in the frame are compatible.

3.03 GLASS SIZES

A. Sizes shall be measured in the field from the actual doors, windows, and frames prior to fabrication.

1. All glass shall be set in place complete with proper clearances to eliminate breakage.
2. The Contractor shall assume entire responsibility with regard to correct sizes.
3. Make allowance for thermal movement of metal sash and frames.

B. No attempt shall be made to change the size of heat strengthened, tempered, or insulation glass units after they leave the factory.

3.04 PREPARATION

A. Remove moisture and clean glass edges with a solvent recommended by the Manufacturer of the glazing materials to be used.
1. Nipping to remove flares or to reduce oversized dimensions will not be permitted.

B. Do not apply glazing materials until the rabbet area has been primed.
1. Clean glazing rabbet areas with a solvent recommended by the manufacturer of the glazing materials to be used prior to application of glazing materials.

3.05 POSITIONING GLASS

A. Center in glazing rabbet to maintain correct clearance at perimeter on all four sides.
1. Maintain centered position of glass in rabbet and provide the required sealer thickness on both sides of glass.

B. Wherever glass dimensions (length plus width) are larger than 50 united inches, provide setting blocks at the sill and spacer shims on all four sides; locate setting blocks one quarter way in form each end of glass.

C. Wherever insulating or heat absorbing glass dimensions (length plus width) are larger than 100 united inches, a void shall be provided between the edge of glass and frame at head and jambs.

3.06 STOP BEAD GLAZING-USING GLAZING COMPOUND

A. Use elastic glazing compound for bedding glass in wood or hollow metal frames.

B. Apply glazing tape to exterior fixed stop. Install a heel bead of compound.
1. Press glass into position against tape.

C. Apply ample compound to rabbet so that it will ooze out when pressing glass into position and completely cover glass rabbet.
1. Place setting blocks and spacer shims as required.
2. Press glass into position.

D. Secure glass in place by the application of stop beads.
1. Bed stop beads against glass and bottom of rabbet with compound leaving proper thickness between glass and stop beads.
2. Install stop beads.

E. Strip surplus compound from glass and tool at a slight angle.

3.07 PROTECTION

A. Protect glass from breakage after installation by promptly installing streamers or ribbons, suitably attached to the framing and held free from glass.
   1. Do not apply warning markings, streamers, ribbons, or other items directly to the glass except as specifically directed by the Engineer.

B. Clean and remove all labels from all of the glass when directed by the Engineer.

3.08 REPLACEMENT AND CLEANING

A. At completion of work, all glass shall be free from cracks and other defects.
   1. Any defacement of glass resulting from other construction cleaning or silicone sealant applications and any defective glass that may appear before acceptance, or within the warranty period (that is a direct result of manufacturing, transporting, or the performance of the Contractor), shall be removed and replace with new glass without extra cost to the Owner.
   2. Remove from site all boxes, crates, containers, and other debris used for glazing operations.

B. At completion of the building, or when ordered by the Engineer, broken glass shall be replaced, and all glass mirrors shall be washed and cleaned of all oil, paint, mortar, dirt, grease, stains, or other soil and left clear and clean.
   1. Damage to adjoining finished surfaces shall be repaired.

C. Scraping shall be done carefully.
   1. Glass damaged or scratched by scraping shall be replaced.

END OF SECTION

SECTION 08801

GLASS AND GLAZING FILED SUB-BIDS

PART 1 GENERAL

1.01 GLASS AND GLAZING FILED SUB-BID

A. The work of the following sections requires a filed sub-bid in accordance with M.G.L. C.149, S.44A through 44J, inclusive, as amended. These sections will be covered under a single filed sub-bid for the Glass and Glazing category of work.
   1. Section 08800 – Glazing

B. Reference Drawings: The work of this Section is shown on the following Drawings:
   1. 01-A-1 through 01-A-3, 20-A-1 through 20-A-18, 99-A-1 through 99-A-3

C. Requirements of Submitting Sub-bids:
   1. Sub-bids for work under this Section shall comply with the requirements of M.G.L. C.149, S.44D and 44F; shall be filed in a form furnished by the Awarding Authority, in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and Information for Bidders; and shall be accompanied by a Bid Deposit in the amount of five percent of the sub-bid price complying with the requirements of M.G.L. C.149, S.44B(2). The following should appear on the upper left-hand corner of the envelope:

      SUB-BIDDER: Contractor Name

      SUB-BID FOR: Glass and Glazing

      PROJECT: Wading River Water Treatment Plant
      Contract No. 10, DWSRF No. 16764

D. SUB-SUBLISTINGS
   1. Sub-sub trades are categories of work within a filed sub-bid trade and are indicated in paragraph E on the Form for Sub-bid. If sub-sub trades are requested and identified follow the instructions below. The proposed contract price submitted by the filed sub-bidder on the Form for Sub-Bid includes the cost of any sub-sub trades.
      a. Sub-sub bids are required for the following subcategories of this section:

Class of Work	Reference Paragraph

   2. Sub-bidders shall include the appropriate information for the above listed sub-categories in Paragraph E of the Form for Sub-bid.
   3. If the filed sub-bidder customarily performs the above work with its own workforce the sub-bidder should list its own name and trade, and <u>leave the dollar amount blank.</u>
   4. If the filed sub-bidder does not customarily perform the above work with its own workforce the sub-bidder should list the name of the contractor performing the work, the trade and insert a dollar amount.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

INDEX

DIVISION 9 FINISHES

SECTION 09300

TILE

(PART OF WORK OF SECTION 09301 – TILE FILED SUB-BIDS, Filed Sub-Bid Required)

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials, tools, and equipment necessary to complete the work of this Section including, but not limited to, the following:
   1. Floor tile.
   2. Wall tile.
   3. Stone thresholds installed as part of tile installations.
   4. Waterproofing and crack-suppression membrane for thin-set tile installations.
   5. Elastomeric sealants for expansion, contraction, control, and isolation joints in tile surfaces.
   6. Surface preparation for tile and accessories.

B. Related Work: Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.02 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C1028:
   1. Level Surfaces: Minimum 0.6.
   2. Step Treads: Minimum 0.6.
   3. Ramp Surfaces: Minimum 0.8.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Product Data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit information for each type of product indicated.

C. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

D. Samples for Verification:
   1. Assembled samples with grouted joints for each type and composition of tile and for each color and finish required, at least 12 inches square and mounted on rigid panel. Use grout of type and in color or colors approved for completed work by the Owner.
   2. Full-size units of each type of trim and accessory for each color and finish required.
   3. Stone thresholds in 6-inch lengths.

4. Metal edge strips in 6-inch lengths.

E. Qualification Data: For Installer.

F. Material Test Reports: For each tile-setting and -grouting product.

1.04 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

B. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

D. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
1. Stone thresholds.
2. Waterproofing.
3. Joint sealants.
4. Cementitious backer units.
5. Metal edge strips.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

D. Store liquid additives in unopened containers and protected from freezing.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 PRODUCTS

2.01 GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
   1. Provide 12” x 12” glazed ceramic floor tile complying with Standard grade requirements, unless otherwise indicated.
   2. Tile Types: Provide tile types as manufactured by Daltile, American Olean, Crossville, and as selected by Engineer.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.

C. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.

E. Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes selected from manufacturer's standard shapes.

F. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; extruded aluminum exposed-edge material, with clear anodized satin finish.
   1. Available Manufacturer: Schluter Systems.

G. Marble Thresholds: Uniform, fine- to medium-grained white stone with gray veining, ASTM C503 with a minimum abrasion resistance of 10 per ASTM C1353 or ASTM C241 and with honed finish. Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
   1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch or less, and finish bevel to match face of threshold.

H. Fabric-Reinforced, Fluid-Applied Waterproofing and Crack Suppression Membrane: System consisting of liquid-latex rubber, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), and fabric reinforcement.

1. LATICRETE International Inc.; Laticrete 9235 Waterproof Membrane or approved equal.

I. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

J. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
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. Laticrete International, Inc or approved equal.
2. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15); or polyethylene sheeting, ASTM D4397, 4.0 mils thick.

K. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
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. Laticrete International, Inc.
2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

L. Standard Sanded and Unsanded Cement Grout: ANSI A118.6, color as selected by Owner.
1. Product: Laticrete Permacolor, or approved equal.

M. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

N. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.

2.02 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated.
1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Available Products:
    a. Dow Corning Corporation; Dow Corning 786.
    b. GE Silicones; Sanitary 1700.
    c. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
    d. Tremco, Inc.; Tremsil 600 White.

D. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.
1. Available Products:
    a. Bostik; Chem-Calk 550.
    b. Tremco, Inc.; Vulkem 245.
    c. Pecora Corporation; NR-200 Urexpan.
    d. Tremco, Inc.; THC-900.

2.03 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Engineer.

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

3.02 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Provide concrete substrates for tile floors that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
   1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
   2. Remove protrusions, bumps, and ridges by sanding or grinding.

C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.03 GENERAL INSTALLATION

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
   1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.

F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
   1. Locate joints in tile surfaces directly above joints in concrete substrates.
   2. Prepare joints and apply sealants to comply with requirements herein for joints in tile surfaces.

H. Grout tile to comply with requirements of the following tile installation standards:
   1. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.

2. For chemical-resistant epoxy grouts, comply with ANSI A108.6. I. Seal grout joints in accordance with manufacturers requirements.

3.04 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANE INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.

B. Install crack-suppression membrane to comply with manufacturer's written instructions to produce membrane of uniform thickness bonded securely to substrate.

C. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.05 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.
1. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.

B. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.
1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent non tile floor finish.

C. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

D. Interior floor installation on concrete; cement mortar bed (thickset) bonded to concrete; TCA F112 and ANSI A108.1A.
1. Thick-Set Mortar.
2. Grout: Polymer-modified unsanded grout.
3. Joint Width: 1/16 inch.

3.06 WALL TILE INSTALLATION

A. Install types of tiles designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting bed standards.
1. Bullnose Wall Base Tile Installation: Provide 3” x 12” bullnose wall base tile. Comply with tile manufacturer’s recommendations for setting beds and grouts.

3.07 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
1. Remove grout residue from tile as soon as possible.

2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed. After seven days, cover areas subject to construction traffic with heavy cardboard.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION

SECTION 09301

TILE FILED SUB-BIDS

PART 1 GENERAL

1.01 TILE FILED SUB-BID

A. The work of the following section requires a filed sub-bid in accordance with M.G.L. C.149, S.44A through 44J, inclusive, as amended. These sections will be covered under a single filed sub-bid for the Tile category of work.
1. Section 09300 – Tile

B. Reference Drawings: The work of this Section is shown on the following Drawings:
1. 01-A-1 through 01-A-3, 20-A-1 through 20-A-18, 99-A-1 through 99-A-3

C. Requirements of Submitting Sub-bids:
1. Sub-bids for work under this Section shall comply with the requirements of M.G.L. C.149, S.44D and 44F; shall be filed in a form furnished by the Awarding Authority, in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and Information for Bidders; and shall be accompanied by a Bid Deposit in the amount of five percent of the sub-bid price complying with the requirements of M.G.L. C.149, S.44B(2). The following should appear on the upper left-hand corner of the envelope:

SUB-BIDDER: Contractor Name

SUB-BID FOR: Tile

PROJECT: Wading River Water Treatment Plant
Contract No. 10, DWSRF No. 16764

D. SUB-SUBLISTINGS

1. Sub-sub trades are categories of work within a filed sub-bid trade and are indicated in paragraph E on the Form for Sub-bid. If sub-sub trades are requested and identified follow the instructions below. The proposed contract price submitted by the filed sub-bidder on the Form for Sub-Bid includes the cost of any sub-sub trades.
a. Sub-sub bids are required for the following subcategories of this section:

Class of Work	Reference Paragraph

2. Sub-bidders shall include the appropriate information for the above listed sub-categories in Paragraph E of the Form for Sub-bid.
3. If the filed sub-bidder customarily performs the above work with its own workforce the sub-bidder should list its own name and trade, and <u>leave the dollar amount blank.</u>

4. If the filed sub-bidder does not customarily perform the above work with its own workforce the sub-bidder should list the name of the contractor performing the work, the trade and insert a dollar amount.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 09500

ACOUSTICAL TILE

(PART OF WORK OF SECTION 09501 – ACOUSTICAL TILE FILED SUB-BIDS,
Filed Sub-Bid Required)

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials, tools and equipment necessary to complete the work of this Section including, but not limited to, the following:
   1. Acoustical ceiling tiles and panels.
   2. Suspension systems, grid systems and ceiling hangers.
   3. Acoustical sealant at edge moldings at acoustical ceilings.

B. Related Work: Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications. The following items are not included in this Section and are specified under the designated Sections:
   1. Section 15300 – Fire Protection, for fire-suppression components located in ceilings.
   2. Section 15500 – Heating, Ventilation, and Air Conditioning, for air handling and distribution components located in ceilings.
   3. Division 16 – Electrical, for light fixtures, devices and alarm system components located in ceilings.

1.02 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit information for each type of product indicated.

C. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
   1. Ceiling suspension members.
   2. Method of attaching hangers to building structure. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
   3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
   4. Minimum Drawing Scale: 1/4 inch = 1 foot.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
   1. Acoustical Panel: Set of 6 inch square Samples of each type, color, pattern, and texture.
   2. Exposed Suspension System Members, Moldings, and Trim: Set of 12 inch long samples of each type, finish, and color.

E. Asbestos Certification: Manufacturer's written certification that acoustical ceiling products contain no asbestos (0.0000%). Product labels indicating that it is the user's responsibility to test the products for asbestos are unacceptable and sufficient cause for rejection of the product on site.

F. Maintenance Data: For finishes to include in maintenance manuals.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

B. Source Limitations:
1. Acoustical Ceiling Panels: Obtain each type through one source from a single manufacturer.
2. Suspension Systems: Obtain each type through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
b. Identify materials with appropriate markings of applicable testing and inspecting agency.
2. Surface-Burning Characteristics: Provide acoustical panels complying with ASTM E1264 for Class A materials as determined by testing identical products per ASTM E84.

D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.05 PROJECT CONDITIONS

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

1.06 COORDINATION

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

PART 2 PRODUCTS

2.01 MATERIALS

A. ACT- 1 (Office, Control Room, Laboratory, Break Room)
1. Ceiling Tile shall be ULTIMA Health Zone AirAssure Lay-in Fine Texture Ceiling Panel Class A, panels as manufactured be Armstrong World Industries. Inc., or an approved equal.
a. Panel Size: 24 inches by 24 inches by 3/4 inch or 24 inches by 48 inches by 3/4 inch.
b. Panel Mounting: Square edge, lay-in.
c. Noise Reduction Coefficient (NRC): 0.70.
d. Light Reflectance (LR): 0.86.
e. Ceiling Attenuation Class (CAC): 40.
f. Articulation Class: NA.
g. Color: White.
h. Grid Material: Painted steel.
i. Grid Face Width: 15/16 inch, exposed Tee.

B. ACT-2 (Bathrooms)
1. Ceiling Tile shall be CERAMAGUARD FINE FISSURED Perforated, Square Lay-in Medium Texture Ceiling Panel Class A, panels as manufactured be Armstrong World Industries. Inc., or an approved equal.
a. Panel Size: 24 inches by 24 inches by 5/8 inch.
b. Panel Mounting: Square edge, lay-in.
c. Noise Reduction Coefficient (NRC): 0.55.
d. Light Reflectance (LR): 0.88.
e. Ceiling Attenuation Class (CAC): 40.
f. Articulation Class: NA.
g. Color: White.
h. Grid Material: Painted steel.
i. Grid Face Width: 15/16 inch, exposed Tee.

2.02 SUSPENSION SYSTEMS

A. All suspension system components, materials, and accessories shall be the product of a single manufacturer.

B. ASTM C635, Intermediate Duty:
   1. Exposed Aluminum Tee Grid:
      a. Nonrated, spaced to fit lay in panels.
      b. Color: White.
      c. Exposed Flange Width: 15/16 inch.
      d. Edges: Single molding to match grid.
      e. Manufacturers:
         1) Armstrong; AL Prelude Plus system.
         2) Chicago Metallic Corp.; All aluminum 830 system.
         3) Or approved equal.
   2. Edge Molding:
      a. Channel or angle shaped.
      b. Minimum flange width of 15/16 inch.
      c. Finish to match main members.
   3. Hanger Wire: ASTM A641, minimum 12 gauge, galvanized, soft annealed, mild steel wire.
   4. Wire Ties: ASTM A641, 18 gauge, galvanized, annealed steel wire.
   5. Furnish manufacturer's hold down clips and accessories required for a complete system in a seismic zone.

2.03 ACOUSTICAL SEALANT

A. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

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

3.02 PREPARATION

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

3.03 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C636 per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
   4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
   6. Do not attach hangers to steel deck tabs.
   7. Space hangers not more than 48" o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.

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

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

E. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
   1. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
   2. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

3.04 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and

touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09501

ACOUSTICAL TILE FILED SUB-BIDS

PART 1 GENERAL

1.01 ACOUSTICAL TILE FILED SUB-BID

A. The work of the following section requires a filed sub-bid in accordance with M.G.L. C.149, S.44A through 44J, inclusive, as amended. This section will be covered under a single filed sub-bid for the Acoustical Tile category of work.
   1. Section 09500 – Acoustical Tile

B. Reference Drawings: The work of this Section is shown on the following Drawings:
   1. 01-A-1 through 01-A-3, 20-A-1 through 20-A-18, 99-A-1 through 99-A-3

C. Requirements of Submitting Sub-bids:
   1. Sub-bids for work under this Section shall comply with the requirements of M.G.L. C.149, S.44D and 44F; shall be filed in a form furnished by the Awarding Authority, in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and Information for Bidders; and shall be accompanied by a Bid Deposit in the amount of five percent of the sub-bid price complying with the requirements of M.G.L. C.149, S.44B(2). The following should appear on the upper left-hand corner of the envelope:

      SUB-BIDDER: Contractor Name

      SUB-BID FOR: Acoustical Tile

      PROJECT: Wading River Water Treatment Plant
      Contract No. 10, DWSRF No, 16764

D. SUB-SUBLISTINGS

   1. Sub-sub trades are categories of work within a filed sub-bid trade and are indicated in paragraph E on the Form for Sub-bid. If sub-sub trades are requested and identified follow the instructions below. The proposed contract price submitted by the filed sub-bidder on the Form for Sub-Bid includes the cost of any sub-sub trades.
      a. Sub-sub bids are required for the following subcategories of this section:

Class of Work	Reference Paragraph

   2. Sub-bidders shall include the appropriate information for the above listed sub-categories in Paragraph E of the Form for Sub-bid.
   3. If the filed sub-bidder customarily performs the above work with its own workforce the sub-bidder should list its own name and trade, and <u>leave the dollar amount blank.</u>

4. If the filed sub-bidder does not customarily perform the above work with its own workforce the sub-bidder should list the name of the contractor performing the work, the trade and insert a dollar amount.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 09650

RESILIENT FLOORING AND ACCESSORIES

(PART OF WORK OF SECTION 09701 – RESILIENT FLOORS FILED SUB-BIDS, Filed Sub-Bid Required)

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Provide resilient flooring as required by the Contract Documents.
   1. In general the work of this Section includes all labor, materials, tools, equipment and accessories necessary for the complete application of the resilient flooring in the office, laboratory, control room, break room, and bathroom on the second floor.

B. Related work:
   1. Documents affecting work of this Section, include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.04 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   3. Color chart.

1.05 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 PRODUCTS

2.01 RESILIENT FLOORING

A. Static Control Vinyl Tile (STV):
   1. Static Dissipative Flooring to meet ANSI/ESD-S7.1, ASTM F-150, ANSI/ESD STM 97.1, ANSI/ESD STM 97.2, Static Dissipation @ 12%.
      a. Basis of Design: Armstrong World Industries, Excelon SDT.
   2. Style and Colors: 12" x 12", colors to be chosen by Owner.

3. Thickness: 1/4" (1/8" product + 1/8" wear layer).
4. Accessories:
    a. Adhesive
    b. Copper Grounding Strips
    c. Static Dissipative Polish

B. Vinyl Composition Tile (VCT-1):
1. Vinyl Composition Tile (VCT): ASTM F 1066.
    a. Armstrong World Industries, Inc or approved equal.
2. Style and Colors: 12" x 12", color as selected by the Owner.
3. Thickness: 0.125 inch.

C. Resilient Safety Flooring (RES-1):
1. Resilient Safety Flooring to meet ASTM F1303-2, Type 2, Grade 1, Class A moisture resistant backing.
    a. Altro USA, Inc. or approved equal.
2. Style and Colors: Aquarius, color to be selected by Owner.
3. Thickness: 2.0 mm
4. Accessories required for complete installation include, but are not limited to:
    a. Vinyl Welding Rod: Altro Weld Rod.
    b. Cove Former: Altro Cove former – 20R.
    c. Gulley Edge.
    d. Vinyl Cap Strip: Altro Cap Strip.
    e. Subfloor Filler and Leveler: Use only gray Portland cement moisture tolerant underlayments and patching compounds.
    f. Adhesives as recommended by manufacturer.
    g. Caulking as recommended by manufacturer.

2.02 BASE MATERIALS

A. General: ASTM F1861, uniform in 0.125 inch minimum thickness and in as long lengths as practicable to suit conditions of installation.
1. Johnsonite, Armstrong, Roppe, or approved equal.
2. Factory premolded internal and external corners to match base when available. Where vinyl base is indicated, use either rubber or vinyl base.
2. Rubber Base: Type TP, Group 2.
3. Vinyl Base: Type TV, Group 2.
4. Style: B, cove.
5. 4 inches high.

2.03 MOISTURE MITIGATION SYSTEM

A. Furnish and install a moisture mitigation system to the concrete floor slab in in the office, laboratory, control room, break room, and bathroom on the second floor. The moisture mitigation system shall be installed per the manufacturer's recommendations and shall include the following components:
1. A 100 percent solids, epoxy resin vapor suppression system, CMP LockDown or approved equal. Prepare existing concrete floor slab by shot-blasting as recommended by the manufacturer.

2. An interior/exterior acrylic primer, CMP AS- or approved equal.
3. A calcium aluminate-based, interior, self-leveling underlayment, CMP 210 or approved equal.

2.04 ACCESSORIES

A. Trim: Furnish in lengths as long as practical to suit conditions of installation.

B. Reducers:
1. Standard rubber or vinyl floor reducer in thickness to suit abutting floor covering by 1 inch wide, tapered or beveled edge strip.
2. Manufacturers and Products:
a. Johnsonite; Reducer Series RRS.
b. Mercer; 633 Tile Reducer.

C. Cove Cap:
1. Standard vinyl cap for use at coved sheet vinyl (integral base).
2. Manufacturers and Products:
a. Johnsonite; SCC XX A, round top.
b. Mercer; 0.40, round top.

D. Cove Filler:
1. Standard filler strip for supporting coved sheet vinyl (integral base).
2. Manufacturers and Products:
a. Johnsonite; CFS 00 A.
b. Mercer; 070 or 075.

E. Adhesive: Type and brands of adhesive as recommended by manufacturer of floor covering material for conditions of installation.

F. Primer and Crack Filler: Type and brand recommended by floor covering manufacturer.

G. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

2.05 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 EXECUTION

3.01 EXAMINATION AND SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

B. Examine substrate for excessive moisture content and unevenness preventing execution and quality of resilient flooring as specified and apply included moisture mitigation system.

C. Correct defects before installation of resilient flooring.

D. Remove dirt, oil, grease, or other foreign matter from surfaces to receive floor covering materials.

E. Fill cracks less than 1/16 inch wide and depression less than 1/8 inch deep with floor filler.

F. Prime sanded wood surfaces with one brush coat of primer.

G. Prime surfaces, other than wood, if recommended by floor covering manufacturer.

3.02 SEQUENCING AND SCHEDULING

A. Do not install floor coverings until concrete slab has cured for 60 days or until primer material in test patches cannot be scraped or peeled from the slab after drying 24 hours.

3.03 APPLICATION OF ADHESIVES

A. Mix and apply adhesives in accordance with manufacturer's instructions.

B. Provide safety precautions during mixing and applications as recommended by adhesive manufacturer.

C. Apply uniformly over surfaces:
1. Cover only amount of area that can be covered by flooring material within recommended working time of adhesive.
2. Remove any adhesive that dries or films over.
3. Do not soil walls, bases, or adjacent areas with adhesives.
4. Promptly remove any spillage.

D. Apply adhesives with notched trowel or other suitable tool.

E. Clean trowel and rework notches as necessary to ensure proper application of adhesive.

3.04 INSTALLATION OF TILE MATERIALS

A. Start tile at center of room or space; work toward perimeter.

B. Do not lay tile less than half the width of a field tile except where accepted by Engineer for irregularly shaped rooms or spaces.

C. Cut border tile neatly and accurately to fit within 1/64 inch of abutting surfaces.

D. Use reducer edge strip at exposed tile edges.

E. Fit flooring material neatly and tightly into breaks and recesses, against bases, around pipes and penetrations, under saddles or thresholds, and around permanent cabinets and equipment.

F. Lay tile parallel to room axis in straight courses with cross joints parallel. Lay tile with grain or pattern running in opposite direction between adjacent tile.

G. Roll flooring with 75 to 100 pound roller in both directions.

3.05 INSTALLATION OF BASE

A. General: Remove defects in wall and floor that would prevent level and true installation of base material.
   1. Install base around perimeter of room or space, where shown, and at toe spaces of casework and cabinets.
   2. Unroll base material and cut into accurate lengths as desired or as required for minimum number of joints.
   3. Match edges at seams or double cut adjoining lengths to give continuous appearance.
   4. Install with tight butt joints with no joint widths greater than 1/64 inch.

B. Top-Set Base:
   1. Apply adhesive and firmly adhere to wall surfaces.
   2. Press down so bottom cove edge follows floor profile.
   3. Ensure top and bottom edges of base are in firm contact with walls and floors.
   4. Form internal and external corners by using premolded corners. Other methods, acceptable to Engineer, may be used if premolded corners are not available.
   5. Scribe base accurately to abutting materials.

3.06 INSTALLATION OF TRIM MATERIALS

A. Provide reducers where floor covering terminates exposing edge of covering.

B. Center reducer under door, where floor covering terminates at a door opening. Fit end edges to door frames and abutting surfaces and other edges to adjoining materials.

C. Apply adhesives and bond securely to substrates in straight true lines. Meet visible and related features of building construction with a maximum deviation of 1/8 inch in 10 feet.

D. Provide required protection of resilient flooring surfaces to prevent damage prior to acceptance of the Work by the Owner.

3.07 CLEANING AND PROTECTION

A. Upon completion of the installation of floor covering and adjacent work, and after materials have set, clean surfaces with a neutral cleaner as recommended by manufacturer for type of floor covering material installed.

B. Repair adjacent surfaces damaged by flooring installation.

C. Wax Finishing:
   1. Provide wax, cleaner, or other finishing material as recommended by floor covering manufacturer for the particular type of flooring material.
   2. Apply one coat of nonslip wax or other finish as recommended by floor covering manufacturer; buff to a sheen.
   3. Do not wax radial rubber tile.

D. Protect completed work from traffic and damage until Substantial Completion by covering with plastic sheet, kraft paper, or plywood panels.

END OF SECTION

SECTION 09701

RESILIENT FLOORS FILED SUB-BIDS

PART 1 GENERAL

1.01 RESILIENT FLOORS FILED SUB-BID

A. The work of the following section requires a filed sub-bid in accordance with M.G.L. C.149, S.44A through 44J, inclusive, as amended. This section will be covered under a single filed sub-bid for the Resilient Floors category of work.
1. Section 09650 – Resilient Floors

B. Reference Drawings: The work of this Section is shown on the following Drawings:
1. 01-A-1 through 01-A-3, 20-A-1 through 20-A-18, 99-A-1 through 99-A-3

C. Requirements of Submitting Sub-bids:
1. Sub-bids for work under this Section shall comply with the requirements of M.G.L. C.149, S.44D and 44F; shall be filed in a form furnished by the Awarding Authority, in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and Information for Bidders; and shall be accompanied by a Bid Deposit in the amount of five percent of the sub-bid price complying with the requirements of M.G.L. C.149, S.44B(2). The following should appear on the upper left-hand corner of the envelope:

SUB-BIDDER: Contractor Name

SUB-BID FOR: Resilient Floors

PROJECT: Wading River Water Treatment Plant
Contract No. 10, DWSRF 16764

D. SUB-SUBLISTINGS

1. Sub-sub trades are categories of work within a filed sub-bid trade and are indicated in paragraph E on the Form for Sub-bid. If sub-sub trades are requested and identified follow the instructions below. The proposed contract price submitted by the filed sub-bidder on the Form for Sub-Bid includes the cost of any sub-sub trades.

a. Sub-sub bids are required for the following subcategories of this section:

Class of Work	Reference Paragraph

2. Sub-bidders shall include the appropriate information for the above listed sub-categories in Paragraph E of the Form for Sub-bid.
3. If the filed sub-bidder customarily performs the above work with its own workforce the sub-bidder should list its own name and trade, and leave the dollar amount blank.

4. If the filed sub-bidder does not customarily perform the above work with its own workforce the sub-bidder should list the name of the contractor performing the work, the trade and insert a dollar amount.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 09850

SECONDARY CONTAINMENT LINING SYSTEM

(PART OF WORK OF SECTION 09901 – PAINTING FILED SUB-BIDS, Filed Sub-Bid Required)

PART 1 GENERAL

1.01 SUMMARY

A. Provide all labor, materials, tools, and equipment necessary to complete the secondary containment lining system as required by the Contract Documents.
   1. In general the Work includes providing the secondary containment lining system on the concrete floor, concrete pads, concrete containment walls, including the top of face of the walls except where covered by CMU walls above, of the sodium hypochlorite, sodium hydroxide, phosphate, hydrofluorosilicic acid, and polyaluminum chloride chemical areas.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.03 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   3. Chemical resistance of lining to chemicals to be contained.
   4. A complete bill of materials and color charts showing full range of colors.
   5. Certified test results verifying that the liner material to be used for this project complies with all requirements specified herein.

1.04 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. For the purposes of designating type and quality for the Work of this Section these specifications are based on Secondary Containment Lining Systems as manufactured by Tnemec Company Inc., Kansas City, MI. Products by other manufacturers which meet or exceed the requirements of this Section will be considered.

1.05 PRODUCT HANDLING

A. Material shall be delivered to job site and checked by lining contractor for completeness and shipping damage prior to job start.

1. Material shall be stored in a dry, enclosed area protected from exposure to moisture. Temperature of storage area shall be maintained between 60 and 90 degrees F/16 and 32 degrees C.
2. Packaging, transportation, handling, and storage procedures shall be planned to prevent material damage. Material shall be storage in a secure area, and protected from adverse weather or other environmental conditions.

1.06 DESIGN CONDITIONS

A. Containment lining shall be designed to be immersed in with 15% sodium hypochlorite 50% sodium hydroxide, 35% zinc orthophosphate, 25% hydrofluorosilicic acid, polyaluminum chloride, and/or other common water treatment chemicals, for a period of up to 72 hours, without measurable deterioration or breakdown of the material.

B. The liner manufacturer shall be aware of the chemical feed systems specified in Section 11423 Chemical Feed Equipment, and shall acknowledge them in the secondary containment lining system warranty.

1.07 WARRANTY

A. The secondary containment lining system manufacturer shall warranty the lining against material and/or installation defects and material degradation in the exposure and service conditions anticipated, for a period of one (1) year from the date of final acceptance.
1. The manufacturer shall replace and re-install any materials which fail from above noted causes, within the warranty period.
2. The manufacturer shall furnish the Owner a written warranty covering the requirements of this paragraph.

PART 2 PRODUCTS

2.01 LINING

A. The system shall consist of the following products:
Series 218 (or Series 215 Surfacing Epoxy).
1. Epoxy Moodified Concrete
2. For filling voids, bugholes, and cracks in concrete substrates.
Series 201 (or Series 208 MVT primer for high moisture content)
1. Modified Polyamine Epoxy
2. High-solids moisture tolerant epoxy, used for priming concrete surfaces.
Series 239SC Chem-Bloc
1. Novolac Epoxy
2. Fiberglass reinforced novolac epoxy body coat with Series 211 fiberglass mat and saturation coat.
Series 282
1. Polyamine Novolac Epoxy
2. Chemical and solvent-resistant colored glaze coating for walls and floors.
3. Available in sixten (16) standard colors.
4. Gloss finish.

2.02 CHEMICAL RESISTANCE

A. The installed and finished lining shall be chemically resistant to the above noted chemicals listed in paragraph 1.06.A and B.
   1. Secondary containment is defined as: Suitable for continuous contact with chemical for up to a 72 hour period.
   2. The type of exposure to the noted chemicals shall involve the puddling of two (2) ounces of the noted chemicals at the concentration and temperatures given.
   3. This criteria is intended to simulate service conditions, radical spillage, pump and pipe leakage in the area where the lining is to be applied for the life of the installation.

B. Testing for compliance with any or all of the above noted chemicals may be ordered by the Engineer to be performed on representative lining material or on a mock up unit at no additional cost to the Owner.

PART 3 EXECUTION

3.01 PREPARATION

A. Substrate Preparation
   1. Concrete and CMU shall have been cured for 28 days minimum before application of materials.
   2. All areas to receive the lining shall be inspected.
   3. Surfaces not acceptable shall be reported to the Engineer.
   4. Abrasive or shot blast the concrete to receive the material and dispose of residue and flushing water by vacuum pickup, containerizing and removing from the site.
   5. Blast profile shall be uniform and shall equal the profile of 60 grit sand paper.
   6. It shall be the Contractor's respnsibility to provide substrates acceptable for proper application of the lining system.
   7. Use particular care to remove all the laitance in the preparation of surfaces.
   8. Chipping of concrete required to remove embedded oil and grease and subsequent patching with an approved compound is included in the work of this Section.
      a. Only a compound compatible with the proposed lining will be allowed for patching.
   9. Test substrate for moisture content and adhesion capabilities per ASTM F1869.
   10. Moisture content shall not exceed three pounds per 1,000 square feet in a 24 hour period.
   11. Maintain 60 degree F. minmum temperature in area to receive lining for a period of 48 hours during and 72 hours after installation.

3.02 APPLICATION

A. General
   1. Application of epoxy resin seamless lining material for horizontal and vertical planes where scheduled shall be generally as follows but as approved in the Submittals.
      a. Fill all voids and construction joints and form a ½-inch cant cove inside the containment area with Series 218, or 215, trowel applied.
      b. Prime all surfaces to be coated by applying epoxy prime coat, Series 201, (or 208 for high MVT surface) with roller/squeegee at 6.0-8.0 mils DFT.

c. Mix and apply the Series 239SC novolac epoxy bedding and saturation coats with Series 211 fiberglass mat for horizonal and vertical surfaces, to primed surfaces at 20-30 mils DFT.
d. Apply finish coat, Series 282, to cured intermediate coat at 8.0-10.0 mils DFT.

3.03 INSPECTION, PROTECTION, AND CLEANING

A. Cure lining materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.
1. Close area of application for a minimum of 24 hours.

B. Protect lining materials from damage and wear during construction operation.
1. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application.
2. General Contractor is responsible for protection and cleaning of surfaces after the final coat.

C. Cleaning
1. Remove temporary covering and clean lining just prior to final inspection. Use cleaning materials and procedures recommended by lining manufacturer.

END OF SECTION

SECTION 09900

PAINTING

(PART OF WORK OF SECTION 09901 – PAINTING FILED SUB-BIDS, Filed Sub-Bid Required)

PART 1 GENERAL

1.01 SUMMARY

A. Work Included: Provide painted surfaces as required by the Contract Documents.
   1. In general the work of this Section includes all labor, materials, tools, scaffolding, and equipment whether of a permanent or temporary nature, and all operations necessary and required in connection with painting or repainting of all required surfaces.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 03300 Cast-In-Place Concrete
   2. Section 04200 Unit Masonry
   3. Section 05120 Structural Steel
   4. Section 05220 Steel Joists
   5. Section 05311 Steel Deck
   6. Section 06100 Rough Carpentry
   7. Section 06400 Interior Architectural Woodwork
   8. Section 08100 Hollow Metal Doors and Frames
   9. Section 08302 Fiberglass Doors and Frames
   10. Seciton 08330 Overhead Coiling Doors
   11. Section 11210 Vertical Turbine Pumps
   12. Section 15075 Mechanical Identification
   13. Section 15100 Ductile Iron Pipe, Fittings and Appurtenances
   14. Section 15300 Fire Protection
   15. Section 15400 Plumbing

B. Work Not Included:
   1. Unless otherwise indicated, painting is not required on surfaces in inaccessible areas.
   2. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, and bronze will not require painting under this Section unless otherwise specified or noted on the Drawings.
   3. Do not paint moving parts of operating units: mechanical or electrical parts such as valve shafts, sensing devices and motor shafts unless otherwise indicated.
   4. Do not paint over required labels or equipment identification, performance rating, name or nomenclature plates.

C. Definitions:
   1. “Paint”, as used herein, means coating systems materials including primers, emulsions, epoxy, enamels, stain, sealers, fillers and other applied materials wheather used as prime, intermediate or finish coats.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Paint Coordination:
1. Provide finish coats which are compatible with the prime coats actually used.
2. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata.
3. Upon request, furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used.
4. Provide barrier coats over non-compatible primers, or remove the primer and reprime as required.
5. Notify the Engineer in writing of anticipated problems in using the specified coating system over prime coatings supplied under other Sections.
6. Apply paint of specified Dry Film Thickness (DFT) in mils, which thickness shall be absolute minimum coverage at any point of measurement.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
1. Complete listing of all products he intends to use, indicating the surfaces and areas for each product, and stating the number of coats and the DFT of each coat.
2. Product data sheets,
3. Color chip fans or books showing the manufacturer’s complete line of color selections,
4. Performance criteria indicating the proposed coating meets or exceeds ASTM test requirements for abrasion resistance, chemical resistance, adhesion and accelerated weathering.

C. The Contractor shall this submittal at least 30 days prior to any field work so as to allow the Engineer to select colors at the Owner’s discretion.

1.05 MAINTENANCE MATERIALS

A. Furnish not less than one gallon of each color used for each type of paint used, for maintenance

B. Containers to be unopened, tightly sealed and clearly labeled for identification.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, color designation and instruction for mixing and/or reducing.

B. Provide adequate storage facilities. Store paint materials at minimum ambient temperature of 45 degrees F in a well ventilated area.

C. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.07 ENVIRONMENTAL CONDITIONS

A. Comply with all OSHA & VOSHA requirements.

B. Environmental conditions shall be in compliance with the manufacturer's recommendations.

C. Provide adequate continuous ventilation and sufficient heating facilities to maintain required temperature.

D. Provide minimum 15 foot candles of lighting on surfaces to be finished.

1.08 PROTECTION

A. Adequately protect other surfaces from paint and damage.
   1. Repair damage as a result of inadequate or unsuitable protection.

B. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or drippings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

C. Place cotton waste, cloths and materials which may constitute a fire hazard in closed metal containers and remove daily from site.

D. Remove electrical plates, surface hardware, fittings and fastenings prior to painting operations.
   1. These items are to be carefully stored, cleaned and replaced on completion of work in each area.
   2. Do not use solvent to clean hardware that may remove permanent lacquer finish.

PART 2 PRODUCTS

2.01 PAINT MATERIALS

A. Acceptable Materials:
   1. The Painting Schedule in Part 3 of this Section is based, in general, on paint materials of Tnemec Coatings Kansas City, MO and International Paint/Devoe (IP).
   2. Equal products of Carboline or Dupont, approved in advance by the Engineer, may be substituted in accordance with provisions of this Contract.
   3. Where products are proposed other than those specified by name and number in the Painting Schedule, provide under the product data submittal required by article 1.04 of this Section a new painting schedule compiled in the same format used for the Painting Schedule included in this Section.
   4. All coatings shall comply with air pollution regulations and shall limit volatile organic compounds (VOCs) to a maximum of 340 grams per liter or 2.8 pounds per gallon or most current OTC regulations.
   5. Where materials to be painted have a shop-coated primer layer, paint systems provided in this specification shall be compatible with shop primer.

B. Undercoats and Thinners:
   1. Provide undercoat paint produced by the same manufacturer as the finish coat.
   2. Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits.

3. Insofar as practicable, use undercoat, finish coat and thinner material as parts of a unified system of paint finish.

2.02 COLOR SCHEDULES

A. The Engineer will prepare a color schedule from the approved manufacturer's color cards.
   1. The Engineer, at the discretion of the Owner, may select, allocate and vary colors on surfaces throughout the work.

2.03 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper coating system, as selected by the Contractor subject to the approval of the Engineer.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed.
   1. Correct conditions detrimental to timely and proper completion of the work.
   2. Do not proceed until unsatisfactory conditions are corrected.

3.02 MATERIALS PREPARATION

A. General:
   1. Mix and prepare paint materials in strict accordance with the manufacturer's recommendations as approved by the Engineer.
   2. When materials are not in use, store in tightly covered containers.
   3. Maintain containers used in storage, mixing and application of paint in a clean condition, free from foreign materials and residue.

B. Stirring:
   1. Stir materials before application, producing a mixture of uniform density.
   2. Do not stir into the material any film which may have formed on the surface, but remove the film and, if necessary, strain the material before using.

3.03 APPLICATION EQUIPMENT

A. For application of the approved paint, use only such equipment and proceedures as is recommended by the manufacturer of the particular paint.

B. Prior to use of application equipment, verify that the proposed equipment is actually compatible with the material to be applied, and that the integrity of the finish will not be jeopardized by use of the proposed equipment.

3.04 SURFACE PREPARATION

A. Unless otherwise specified, the following surface preparation procedures will be the minimum acceptable.

B. Surface Preparation for Ferrous Metals:

1. Steel: The term "Steel" as used herein includes cast iron, ductile iron and other ferrous metals. Surface preparation for steel shall be as defined by the Steel Structures Painting Council (SSPC) and as follows:
   a. Abrasive blast to near white metal per SSPC SP-#10 Standard_- shall be used for all steel in submerged service.
   b. SSPC-6 Commercial blast - shall be used for all steel in non-submerged service.
   c. Ductile Iron Pipe shall be prepared in accordance with NAPF 500-03-04 Standard.
   d. Steel acceptably cleaned and primed by fabricators will require cleaning by solvents and/or detergents only. This in no way relieves the Contractor from the obligation of repairing damage to shop coats or applying barrier coats if primer is incompatible with specified top coats.
   e. All steel surfaces shall be primed the same day as cleaned.

C. Surface Preparation for Non-Ferrous Metals:
1. Where required to be painted, remove surface contamination and any surface protective films per SSPC SP #1 Standard. Uniformly scarify/abrade surfaces per ASTM D6386 Standard to produce a 1.0 mil profile.

D. Surface Preparation for Plastics:
1. Shall depend on the surface to be cleaned, per SSPC SP #1 Standard. Any glazed surface shall be roughened by sanding.

E. Surface Preparation for Concrete:
1. Grease dirt, and other contaminants shall be removed with a solution of tri-sodium phosphate and water or with commercial compounds approved by the Engineer.
2. Prior to painting of all concrete surfaces, all holes, voids and cracks shall be patched to provide a smooth unblemished surface, with a compound compatible with the coating specified herein, (Tnemec Series N218 or 215). Concrete in immersion shall be prepared in accordance with SSPC SP #13 Standard plus required ICR Concrete Surface Profile, and for non-immersion, manufacturers surface preparation requirements. Test all concrete for moisture migration per manufacturers printed requirements prior to coating.

F. Surface Preparation for Wood:
1. Clean wood surfaces until free from dirt, dust and any other foreign substances.
2. Smooth finished wood surfaces exposed to view, using the proper sandpaper. Where so required, use varying degrees of coarseness in sandpaper to produce a uniform smooth and unmarred wood surface.
3. Unless specifically approved by the Engineer, do not proceed with painting of wood surfaces until the moisture content of the wood is 12 percent or less as measured by a moisture meter approved by the Engineer.
4. All knots and pitch streaks shall be scraped, sanded and spot primed before the full priming coat is applied.
5. All nail holes, or small openings shall be caulked after priming coat has been applied.

G. Surface Preparation for Pre-Painted Surfaces:
1. All surfaces to be coated shall be clean, dry and free from contamination from oil, grease, or any other contaminate which would prevent the paint from bonding to the surface.
2. Remove all accumulated surface contamination per SSPC SP #1 Standard.

3. All loose or flaking coatings, rust, rust scale and underfilm corrosion shall be removed per SSPC SP #11 Standard.
    a. Edges of remaining coating shall be feathered back to provide a smooth transition for the new coatings.
4. Glossy finishes shall be uniformly sanded prior to coating to "de-gloss" existing coatings.
5. Surface defects shall be repaired.
    a. All holes, voids and cracks shall be patched to provide a smooth unblemished surface, with a compound compatible with the coating specified herein.

3.05 PAINT APPLICATION

A. General:
1. Touch-up shop applied prime coats, which have been damaged and touch-up bare areas prior to start of finish coat application.
2. Slightly vary the color of succeeding coats.
    a. Do not apply additional coats until the completed coat has been inspected and approved.
    b. Only the inspected and approved coats of paint will be considered in determining the number of coats applied.
3. Sand and dust between coats to remove defects visible to the unaided eye from a distance of five (5) feet.
4. On removable panels and hinged panels, paint the back sides to match the exposed sides.
5. No painting shall be done when temperatures are below 50 degrees F., when the surface temperature is less than 5 degrees F. above the dewpoint or when the relative humidity is above 85 percent.
6. No open flame heaters shall be used during the painting work. Only indirect, hot-air heating is permitted. Vent all fumes from working spaces. Provide working conditions during application and curing of coatings.

B. Drying:
1. Allow manufactures required drying time between coats, modifying the curing period as recommended by the material manufacturer to suit adverse weather conditions.
2. Consider oil-base and oleo-resinous solvent type paint as dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and when the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Brush Applications:
1. Brush out and work the brush coats onto the surface in an even film.
2. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness and other surface imperfections will not be acceptable.

D. Spray Application:
1. Except as specifically otherwise approved by the Engineer, confine spray application to metal framework and similar surfaces where hand brush work would be inferior.
2. Where spray application is used, backroll all primer/first coats on masonry surfaces.
3. Do not double back with spray equipment to build up film thickness of two coats in one pass.

E. For completed work, match the approved samples as to texture, color and coverage. Remove, refinish or repaint work not in compliance with the specified requirements.

3.06 CLEANING

A. As work proceeds and upon completion, promptly clean where spilled, splashed or spattered.

B. During progress of work keep premises free from any unnecessary accumulation of tools, equipment, surplus materials and debris.

C. Upon completion of work, leave premises neat and clean, to the satisfaction of Engineer.

3.07 COLOR CODING (Pipes and Equipment)

A. Color coding shall consist of standard color code painting as specified in this Section.
1. All exposed pipelines for the transportation of air, potable and non-potable water, gas and including accessories such as valves, fittings and pipe coverings shall be painted.
2. All hangers, pipe supports, braces and floor stands shall be painted with the same paint and color as the pipe it is supporting.
3. The piping systems shall be painted up to, but not including the flange attached to the mechanical equipment.
4. PVC chemical piping shall not be painted, but shall be color banded in accordance with this specification section and Section 15075 – Mechanical Identification.
5. Refer to Section 15075 – Mechanical Identification for color coding/marking requirements.

3.08 APPLICATION OF COATINGS TO TANK INTERIORS

1. Apply in strict accordance with the manufacturer's printed application requirements.
2. Prepare surface in accordance with manufacturer's instructions, including power washing concrete surfaces.
3. Apply in slurry form to surfaces that are dry, sound, well brushed and wiped free from dust.
4 Coatings Schedule:
   a. Apply one (1) coat of Tnemec Series 215 or Series N218 to fill and surface prepared concrete surface.
   b. Apply one (1) coat of Tnemec Series 22 at 30-35 mils DFT.
5. Apply tank coatings in the following areas:
   a. Spent Backwash Tank: Inside surface of common wall between Spent Backwash Tank and Pipe Gallery, and inside surface of common wall between Spent Backwash Tank and Intermediate Wetwell, from base slab to underside of main floor slab. Coating shall be extended 1-foot beyond the wall, ceiling, and floor joints.
   b. Intermediate Wetwell: Inside surface of common wall between Intermediate Wetwell and Pipe Gallery, from base slab to underside of main floor slab. Coating shall be extended 1-foot beyond the wall, ceiling, and floor joints.
   c. Backwash Supply Tank: Inside surface of common wall between Backwash Supply Tank and Pipe Gallery, and inside of Backwash Supply Tank on the perimeter walls of the bordering Clearwell, from base slab to underside of main floor slab. Coating shall be extended 1-foot beyond the wall, ceiling, and floor joints.

3.09 ITEMS TO BE PAINTED:

A. It is not the objective of this Specification to name every item that will require a painter's finish. Where items are noted, it is intended that all items of a similar material shall have the same decorative or protective coating within the same space or use area of the facility. However, as a guide to the Contractor, the following list is given as typical of the items and surfaces requiring a painter's finish:

1. Metal and fiberglass doors and frames.
2. Interior uninsulated non-stainless steel ferrous pipe, fittings, valves and accessories.
3. Exposed exterior pipe, fittings, valves, and accessories.
4. Steel vents, pipes, etc. above and below roof levels.
5. Piping hangers, supports and restraints.
6. Exposed interior masonry block walls.
7. Steel joists, decking and other exposed steel components (all exposed interior steel surfaces shall be shop primed with intermediate and finish coats provided by Painting Contractor under this Specification Section).
8. Structural steel (all exposed interior surfaces of columns, beams, trusses, etc. shall be shop primed with intermediate and finish coats provided by Painting Contractor under this Specification Section).
9. Pipe bollards.
10. Concrete curbs at floor hatches.
11. Overhead coiling door jambs and doors.
12. Steel pan stairs (all exposed steel).
13. Outside face of containment area concrete curb (interior and top of containment area curb painted in accordance with Section 09850).
14. Interior of below grade water holding tanks (where indicated on Drawings and required by Section 3.08 in this specification).
15. GreensandPlus Vessels Exterior (intermediate and finish coats only, vessels provided w/ factory prime).
16. Architectural Woodwork

3.10 PAINTING SCHEDULE

A. Industrial Epoxy Coatings:

1. Provide the Following Finishes:

Exterior & Interior Ferrous Metal

1 coat	Tnemec 1 Omnithane or IP CathaCoat 302	3.0 DFT
2 coats	Tnemec N69 (interior) or IP DEVRAN 224 HS	6.0 DFT
2 coats	Tnemec N69 & 1095 Endurashield (exterior) or IP IP DEVRAN 224 HS & DEVTHANE 378	6.0 DFT

Interior Ductile Iron Piping

1 coat	Tnemec Series 1 Omnithane or IP DEVRAN 205	2.5 DFT
2 coats	Tnemec Series N69 or IP DEVRAN 224 HS	10.0 DFT

Galvanized Metal

2 coats	Tnemec N69 (interior) or IP DEVRAN 224 HS	5.0 DFT
2 coats	Tnemec N69 & 1095 Endurashield (exterior) or IP DEVRAN 224 HS & DEVTHANE 378	4.0 DFT

Plastic Piping

1 coat	Tnemec Series N69 or IP DEVRAN 224 HS	3.0 DFT
1 coat	Tnemec Series N69 or IP DEVRAN 224 HS	3.0 DFT

Concrete (non-immersion)

2 coats	Tnemec Series N69 or IP DEVRAN 224 HS	12.0 DFT

Concrete (Tank Interior)

1 coat	Tnemec Series 215 or 218	
1 coat	Tnemec Series 22	30-35 DFT

B. Acrylic Coatings:

1. Provide the Following Finishes:

Interior Trim and Doors (FRP)

1 coat	Tnemec Series 1029 Enduratone	3.0 DFT
2 coats	Tnemec Series 1029 Enduratone	3.0 DFT

Interior CMU Walls

1 coat	Tnemec Series 130 Envirofill	
2 coats	Tnemec Series 1029 Enduratone Paint	3.0 DFT

2. All surfaces to painted with acrylic paint shall receive a minimum of 3 coats of paints (1 coat primer/filler and 2 coats of finish paint) per the manufacturer's recommendations.
   a. Preparation of priming of all surfaces to be painted shall be per manufacturer's recommendation.

C. Latex Coatings:

1. Provide the Following Finishes:

Architectural Woodwork

1 coat	Benjamin Moore Eco Spec WB Primer (372)	1.2 DFT
2 coats	Benjamin Moore Eco Spec WB semi-gloss (376)	3.0 DFT

D. Pipe Identification Painting and Banding:

1. Color code nonsubmerged metal piping, except electrical conduit. Paint fittings and valves the same color as pipe, except equipment isolation valves.
2. Pipe Color Coding: To facilitate identification of piping in plants and pumping stations, it is recommended that the following color scheme be used:
3. For color coding for PVC chemical feed lines, see Section 15075 – Mechanical Identification.

Water Lines	
Prefiltered Water (PFW)	Aqua
MIEX Effluent (ME) Water	Aqua
Filtered Water (FLT) (Post-GreensandPlus)	Light Blue
Treated Water (TW) (Post-PFAS)	Light Blue
Finished or Potable Water	Dark blue
Supernatant Return (SR)	Aqua
Waste Lines	
Filter-To-Waste (FTW)	Light Brown
Backwash Supply (BWS)	Light Brown
Spent Backwash Water (SBW)	Dark Brown
Residuals (Sludge)	Dark Brown
Other	
Gas	Red
Other Lines	Light Gray
Fire Sprinkler	OSHA Red

END OF SECTION

SECTION 09901

PAINTING FILED SUB-BIDS

PART 1 GENERAL

1.01 PAINTING FILED SUB-BID

A. The work of the following sections requires a filed sub-bid in accordance with M.G.L. C.149, S.44A through 44J, inclusive, as amended. These sections will be covered under a single filed sub-bid for the Painting category of work.
1. Section 09850 – Secondary Containment Lining System
2. Section 09900 – Painting

B. Reference Drawings: The work of this Section is shown on the following Drawings:
1. 02-C-5, 99-C-4
2. 01-A-1 through 01-A-3, 20-A-1 through 20-A-18, 99-A-1 through 99-A-3
3. 01-S-01, 20-S-1 through 20-S-30
4. 20-D-1 through 20-D-16, 99-D-1 through 99-D-4
5. 20-P-1 through 20-P-2, 99-P-1 through 99-P-2
6. 01-FP-1, 20-FP-1 through 20-FP-4

C. Requirements of Submitting Sub-bids:
1. Sub-bids for work under this Section shall comply with the requirements of M.G.L. C.149, S.44D and 44F; shall be filed in a form furnished by the Awarding Authority, in a sealed envelope, at the time and place stipulated in the Advertisement for Bids and Information for Bidders; and shall be accompanied by a Bid Deposit in the amount of five percent of the sub-bid price complying with the requirements of M.G.L. C.149, S.44B(2). The following should appear on the upper left-hand corner of the envelope:

SUB-BIDDER: Contractor Name

SUB-BID FOR: Painting

PROJECT: Wading River Water Treatment Plant
Contract No. 10, DWSRF No. 16764

D. SUB-SUBLISTINGS

1. Sub-sub trades are categories of work within a filed sub-bid trade and are indicated in paragraph E on the Form for Sub-bid. If sub-sub trades are requested and identified follow the instructions below. The proposed contract price submitted by the filed sub-bidder on the Form for Sub-Bid includes the cost of any sub-sub trades**.**
a. Sub-sub bids are required for the following subcategories of this section:

Class of Work Reference Paragraph

2. Sub-bidders shall include the appropriate information for the above listed sub-categories in Paragraph E of the Form for Sub-bid.
3. If the filed sub-bidder customarily performs the above work with its own workforce the sub-bidder should list its own name and trade, and leave the dollar amount blank.
4. If the filed sub-bidder does not customarily perform the above work with its own workforce the sub-bidder should list the name of the contractor performing the work, the trade and insert a dollar amount.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

INDEX

DIVISION 10 SPECIALTIES

SECTION 10115

MARKERBOARD

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide a wall mounted markerboard as required by the Contract Documents.
   1. In general provide a wall mounted markerboard, mounting devices and appurtenances as required for the Control Room.

1.02 RELATED WORK

A. Documents affecting the work of this Section include but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. For purposes of designating type and quality, the markerboard listed in this Section is manufactured by Ghent Manufacturing Inc., Lebanon, Ohio. Products of equal or better quality will be considered.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
   1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   2. Catalog cuts which show materials of construction, thickness of all materials, and details of construction.

PART 2 PRODUCTS

2.01 MARKERBOARD

A. Provide a Ghent Manufacturing Series 135 factory built markerboard laminated and framed as specified.
   1. Size: Six (6) feet long by forty two (42) inches wide.
   2. Writing Surface: 24 gage Centurion Porcelain.
   3. Core Material: ½ inch industrial grade fiberboard.
   4. Moisture Barrier: Mylar.

5. Frame and Trim: Not less than 0.062" extruded aluminum.
   a. Alloy; 6063-T6.
   b. Complete with chalk rail, maprail with cork insert, framing and mullion as required.
   c. Chalkrail endcaps shall be provided.
6. Mounting: Angle clips top and bottom.

2.02 ACCESSORY KIT

A. Provide four (4) assorted markers, eraser and one pint of board cleaner.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the work of this Section in strict accordance with the manufacturer's recommendations as approved by the Engineer.
   1. Actual location shall be determined by the Owner.

3.02 GUARANTEE

A. Performance Guarantee
   1. To retain the original writing and erasing qualities for fifty (50) years after the date of installation.
   2. The ceramic finish shall not exhibit excessive fading of color, crazing, cracking or flaking.

END OF SECTION

SECTION 10200

LOUVERS

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide louvers as required by the Contract Documents.
   1. In general the work of this Section includes all labor, materials, tools and equipment required to furnish and install louvers as specified herein and of the size shown on the Drawings.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 04200 Unit Masonry
   2. Section 15500 Heating, Ventilation, and Air Conditioning

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
   1. Shop drawings of all units showing materials of construction, thickness of all materials, finish, hardware, and details of construction.
   2. Manufacturer's recommended installation procedures which, when approved by the Engineer will become the basis for accepting or rejecting actual installation procedures used on the Work.
   3. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.05 COORDINATION

A. Coordinate the work of this Section with:
   1. Section 15500 for HVAC interface.

PART 2 PRODUCTS

2.01 INTAKE AND EXHAUST LOUVERS

A. The louvers shall be high performance, drainable, fixed extruded mullion louvers as manufactured by Airline, Airolite, or Russkin.
   1 Heads, sills, jambs and mullions shall be one-piece structural members with integral caulking slot and retaining beads. Mullions shall be sliding interlock type with internal drains.

2. The louver shall be four (4) inches thick. Extrusion thicknesses shall be as follows:
   a. Head, sills, jambs and mullions 0.081 inches,
   b. Fixed blades 0.081 inches,
3. Louvers shall be furnished with 1/2-inch mesh, 0.063 diameter wire intercrimp bird screens secured in a removable 12-gauge aluminum frame.
4. All fasteners shall be stainless steel or aluminum.
5 Finish:
   a. All louvers shall be furnished with Kynar 500, with a minimum thickness of one (1) mil.
   b. The finish shall have a limited warranty for a five (5) year period.
   c. Color to be selected by Owner.
6. Pan Flashing. Pan flashing shall be .063-inch-thick brake metal aluminum and ends abutting vertical sides of openings shall be caulked with sealant.
7 Closed cell PVC compression gaskets shall be provided between bottom of mullion or jamb and top of sill to insure leak-tight connections.
8. Accessories. All screens, aluminum panels, frames, flashing, sealants and screw fasteners shall match the color of the louver.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. All louvers shall be installed in accordance with manufacturer's approved shop drawings and as shown.
   1. Provide all necessary fastenings and anchors required for a complete installation, all to be secure, plumb and true to line.
   2. All fasteners shall be stainless steel.
   3. Provide the necessary flashing and sealants to insure a weather-proof installation.

3.03 CLEANING AND PROTECTION

A. Upon completion of the louver/damper installation, all louver/dampers shall be cleaned of all dirt and grime and any excess caulking material to the satisfaction of the Engineer.

B. Louvers shall be protected from damage from subsequent and adjacent work.

END OF SECTION

SECTION 10420

DEDICATION PLAQUE

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide a plaque as required by the Contract Documents
   1. In general the work of this Section includes all labor, materials, tools and equipment required to furnish and install one plaque as specified herein.

1.02 SUBMITTALS

A. Submit camera ready art work of plaque and samples of cast bronze finishes and available letter styles to the Engineer for approval.
   1. Plaque fabrication and delivery shall be approximately two months prior to the completion of the project.
   2. Text will not be available until six months prior to the scheduled completion date of the project.

1.03 RELATED WORK

A. Documents affecting the work of this Section include but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

PART 2 PRODUCTS

2.01 PLAQUE

A. Plaque shall be as manufactured by A.R.K. Ramos, Oklahoma City, Oklahoma, The Southwell Co., San Antonio, TX, or equal.

B. Plaque shall be fabricated from virgin ingots 85-5-5-5 Standard U.S. Bronze Alloy.
   1. Background texture shall be leatherette.
   2. Background color to be oxidized brown.
   3. All raised surfaces (letters, boarders) shall be satin finished.
   4. Border shall be double line.
   5. Size shall be 24-inch by 36-inch.
   6. Plaque shall be cast as one casting with no joints.

C. The following is a sample listing of text to be include:
   1. Project Title
   2. Project Officials including:
      a. Municipal Council Members
      b. Mayor
      c. Water Superintendent
      d. Engineer and Contractor w/ Names and Logo

e. Date Completed

3. Final text and composition will be furnished by the Engineer after receipt of the submittal package.

PART 3 EXECUTION

3.01 MOUNTING

A. Mounting shall be with welded stud invisible frame and fasteners.

END OF SECTION

SECTION 10440

SIGNS

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide signs as required by the Contract Documents
   1. In General: The work of this Section includes all labor, materials, tools and equipment required to furnish and install signs of the types described herein.

1.02 RELATED WORK

A. Documents affecting work of this Section include but are not necessarily limited to General Conditions, Supplementary Conditions, and the Sections in Division 1 of these Specifications.

1.03 QUALITY ASSURANCE

A. For the purpose of designating type and quality of work in this Section, the Specifications are base on signs as manufactured by Seton Identification Products, Branford, CT.
   1. Similar products that are equal in design, function, quality, and finish may be considered.

1.04 SUBMITTALS

A. Make all submittals in accordance with Section 01300.

B. Product Data:
   1. Shop drawings of all signs showing materials of construction, thickness of material, finish, and print style.
   2. Prior to fabrication of signs, the manufacturers' current full line catalog, rubbings, letter samples and types shall be submitted.

PART 2 PRODUCTS

2.01 MATERIALS

A. Area identification signs shall be "Front Office Signs" as manufactured by Seton Name Plate Co., Branford, CT., or approved equal. Signs shall be provided as follows:
   1. Size: 12 inches wide by 4 inches high for 2 line signs.
   2. Size: 12-inches wide by 2-inches high for single line signs
   3. Wording: See schedule,
   4. Anchorage: Pressure sensitive adhesive,
   5. Edges: Beveled.
   6. Material: Setonply
   7. Letter Style: Roman
   8. Location: Centered

SIGN SCHEDULE

QUANTITY	WORDING
1	Electrical Room
2	Storage Room
1	Janitor Room
1	Men's Restroom
1	Women's Restroom
1	Maintenance Room
1	Office
1	Workshop
1	Pump Room
1	Hydrofluorosilicic Acid Room
1	Process Area
1	Control Room
1	Laboratory
1	Restroom
1	Break Room

B. Pictorial Symbols
   1. Material: Plastic with round corners, match door nameplates.
   2. Conform to ANSI A117.1, Section 4.30.
   3. Provide International Symbol of Accessibility at Restrooms.
   4. Provide symbol designation of sex for Restrooms.

C. Fire Extinguisher signs
   1. Shall be three dimensional, rigid vinyl with pressure sensitive adhesive.
   2. Seton Style No. 39445.
   3. Six (6) required.

D. Right-To-Know Training Center
   1. Seton Style No.: 36340.
   2. 14-inches wide by 20-inches high by 5-inches deep.
   3. PVC coated wire rack.
   4. 2-inch thick SDS Binder with 24-inch chain.
   5. One (1) required.

E. Custom NFPA Signs:
   1. Provide where required by NFPA No. 704 and UFC, Chapter 79
   2. Seton Style No. TMIT023
   3. Size: 10"x10"
   4. Shall be flexible vinyl with adhesive to mount on plastic, metal, or concrete.
   5. Chemical (required quantity)
      a. Hydrofluorosilicic Acid (three required)
      b. Sodium Hypochlorite (three required)
      c. Sodium Hydroxide (three required)
      d. Phosphate (two required)
      e. Polyaluminum Chloride (one required)
      f. Propane (one required)
      g. Diesel (one required)

F. Chemical Signs: (Provide one (1) for each process chemical in 2.01.E – five (5) total excluding propane and diesel fuel).
   1. Size: 10 inches by 24 inches.
   2. 0.125 inches thick polyethylene with urethane coating.
   3. NFPA labeling:
      a. Name of product.
      b. Signal word.
      c. Statement of hazards.
      d. Precautionary measures.
      e. Antidote or instructions in case of contact or exposure.
      f. Personal protection required.
      g. Extinguishing method.
      h. NFPA hazard identification number.

G. GHS Signs:
   1. Seton Style No. L8560GGVSTDALU
   2. Size: 7 inches by 10 inches.
   3. Shall be vinyl with adhesive for use with plastic, concrete, or metal.
   4. Chemical: (required quantity).
      a. Hydrofluorosilicic Acid (three required)
      b. Sodium Hypochlorite (three required)
      c. Sodium Hydroxide (three required)
      d. Phosphate (two required)
      e. Polyaluminum Chloride (one required)
      f. Propane (one required)
      g. Diesel (one required)

H. Hazardous Material Poster
   1. Seton Style No. 25935
   2. 26-inches wide by 22-inches high.
   3. Flexible plastic poster

I. Lockout/Tag Out Station:
   1. Provide two (2) Lockout/Tag Out Stations to hold padlocks, lockouts, tags and labels, 10 booklets entitled Lockout/Tag Out.
   2. Provide Lockout signs and tags as required.

J. Exterior Signs
   1. Post and Panel Signs:
      a. Sign posts and frames shall be manufactured from heavy-duty 6063T5 alloy aluminum extrusions produced to Aluminum Association standards.
      b. Standard sign panels shall be manufactured from heavy-duty 5052 alloy aluminum produced to Aluminum Association standards in 0.125 aluminum with tempers of H14 or H34.
   2. Finish:
      a. Architectural Class I anodic coating in 0.70-mil thickness; color as required by specifications.
      b. Painted Graphics: Color as selected by Owner or Engineer.

EXTERIOR SIGN SCHEDULE:

QUANTITY	WORDING				SIGN				
	Message	Text Height	Style	Color	Location	Mounting	Width	Height	Color
6	NOTICE This area is under 24-HOUR Video Surveillance	1" min.	Helvetica	White	Fence	Bolts	20"	14"	Black
6	NOTICE Public Drinking Water Supply Facility NO TRESPASSING	1" min	Helvetica	White	Fence	Bolts	20"	14"	Blue
8	Nonpotable Water Not for Drinking	1" min	Helvetica	Black	Wall	Screws/ Bolts	20"	14"	White
8	CAUTION Equipment Starts Automatically	1" min	Helvetica	Black	Equipment/ Wall	Screws/ Bolts/ Adhesive	20"	14"	Yellow
2	DANGER High Voltage	1" min	Helvetica	Black	Wall	Adhesive	20"	14"	White
2	NO PARKING FIRE LANE	1" min	Helvetica	Red	Post	Bolts	20"	14"	White
3	NO IDLING For Longer Than Five Minutes	1" min	Helvetica	Black	Post	Bolts	12"	18"	White

PART 3 EXECUTION

3.01 INSTALLATION

A. Mount signs at locations directed by Engineer.

END OF SECTION

SECTION 10500

LOCKERS

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. 12-inch wide standard metal lockers.
   2. Benches.

1.02 REFERENCES

A. ADAAG - Americans with Disabilities Act, Accessibility Guidelines.

B. IBC - International Building Code.

1.03 RELATED WORK

A. Documents affecting Work of this Section include but are not necessarily limited to General Conditions, Supplementary Conditions and the Sections in Division 1 of these Specifications. Work not included in this section includes:
   1. Section 06100 – Rough Carpentry: Wood ground and furring for anchoring lockers.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

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

C. Shop Drawings: Prepared specifically for this project; show dimensions of lockers and interface with other products.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have a Quality System in place to ensure and be able to substantiate that manufactured units conform to requirements and match the approved design and must be ISO 9001:2015 certified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Locker components shall be stored flat, if shipped unassembled, until assembly. All finishes shall be protected from soiling and damage during handling.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 WARRANTY

A. Manufacturer's standard warranty to repair or replace components of locker products that fail in materials or workmanship within three (3) years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Salsbury Industries
   2. Global Industries
   3. Bradford Systems

2.02 LOCKERS

A. Single Locker: Standard, single-tier, single-door type made of cold-rolled sheet metal.
   1. Locker sides, backs, tops, bottoms, and shelves; minimum 24-gauge steel.
   2. Doors and frames; minimum 16-gauge steel.

B. Double Locker: Same as Single Locker, but double-tier.

C. Size: 12 inches wide by 15 inches deep by 72 inches.

D. Top: 20-gauge sloping top.

E. Bottom: Flat for mounting on raised base.

F. Doors: Standard, with louvers top and bottom.

G. Recess Trim: Manufacturer’s standard 18-gauge recess trim.

H. Finish: Baked-on enamel, over bonding and rust resisting phosphate undercoat. Color to be selected by the Owner from the manufacturer’s standard colors.

2.03 INTERIOR EQUIPMENT

A. ADA-Compliant Lockers (Recessed Handles with Multi-Point Latch):
   1. Single-tier: Additional shelf at maximum 48 inches (1,219 mm) above the floor for unobstructed forward and side reach.
   2. Locker Compartment Bottom: Minimum of 15 inches (381 mm) above the floor or an extra shelf placed 15 inches (381 mm) above the floor for unobstructed forward and side reach.
   3. Hooks and rods as specified.

B. Standard Hardware Features:
   1. Padlock hasp.
   2. One top-mounted, two-pronged stainless steel coat hook.
   3. Three wall-mounted, single-prong stainless steel coat hooks.
   4. Horizontal venting.
   5. Five knuckle door hinges.
   6. Adjustable hat shelf.
   7. Hanging rod: 5/8-inch diameter galvanized steel rod in each compartment.
   8. Number plates: Noncorrosive with black numerals, numbered consecutively.

2.04 LOCKER BENCHES

A. Tops:
   1. High-density polyethylene (HPDE) formed under pressure into single component section, with homogenous color throughout.
   2. 9-1/2 inches wide by minimum 1-3/8 inches thick by lengths shown on Drawings.
   3. Manufacturer's standard plastic sealer finish.

B. Pedestals:
   1. Aluminum.
   2. Heavy-duty tubes welded to top and bottom flanges.
   3. 16 inches high, minimum.
   4. Free standing.
   5. Spacing as recommended by manufacturer, but not to exceed 3 feet on center.
   6. Finish and Color: Manufacturer's standard.

C. Manufacturers:
   1. Comtec Industries.
   2. Santana Plastic Products.
   3. Or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

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

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

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

3.03 INSTALLATION

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

B. Anchor the units to the wall studs through the locker back and to the floor.

C. Attach pedestals to top with fasteners supplied by the bench manufacturer.

3.04 PROTECTION

A. Protect installed products until completion of project.

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

END OF SECTION

SECTION 10520

FIRE-PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following – quantities and locations shown on the drawings:
   1. Portable fire extinguishers.
   2. Mounting brackets for fire extinguishers.
   3. Knox Boxes.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 04200 Unit Masonry

1.03 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each item.
   1. Fire Extinguishers: Include rating and classification.

B. Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1.05 COORDINATION

A. Coordinate size and locations of fire-protection cabinets and mounting brackets and extinguishers to ensure that type and capacity of fire extinguishers indicated are accommodated.

PART 2 PRODUCTS

2.01 PORTABLE FIRE EXTINGUISHERS

A. Provide six (6) 10-pound Multi-Purpose Dry Chemical fire extinguishers at locations shown on drawing unless otherwise directed by the Engineer or Authorities having jurisdiction.
   1. Seamless aluminum cylinder,
   2. Corrosion and impact resistant epoxy finish,
   3. Visual pressure gauge,
   4. Upright squeeze grip operator,
   5. Rechargeable.
   6. Wall mounting bracket.

2.02 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Engineer.

2.03 KNOX BOXES

A. High security key lock boxes shall be 10-key, hinged Knox Box Series 3200 as manufactured by the Knox Company, Phoenix, Arizona, unless otherwise standardized on by the local Fire Department. Knox Boxes shall be provided at the main entrance door to the WTP as well as post-mounted at the entrance gate as shown on the Drawings.

2.04 GENERAL FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for compliance on finishes for brackets.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine walls and partitions for suitable framing and blocking where mounting brackets will be installed.

B. Examine fire extinguishers for proper charging and tagging. Contractor shall be responsible for fire extinguisher tagging by a certified service technician located within 75 miles of the project.
   1. Remove and replace damaged, defective, or undercharged units.

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

3.02 INSTALLATION

A. General: Install fire-protection specialties in locations and at mounting heights indicated on the Drawings and acceptable to authorities having jurisdiction.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

C. Identification: Apply vinyl lettering at locations indicated.

3.03 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION

SECTION 10800

MISCELLANEOUS SPECIALTIES

PART 1 GENERAL

1.01 SUBMITTALS

A. Action Submittals:
1. Shop Drawings:
a. Manufacturer's literature clearly indicating:
1) Engineer's identification mark, size, and description of components.
2) Base material with surface finish inside and out.
3) Hardware and locks and attachment devices.
4) Description of rough-in framing.
5) Details of blocking and anchorage required.
6) Color choices available.

B. Informational Submittals:
1. Distributor's List: List of local distributors for all supplies required for the accessories installed.
2. Cleaning instructions.

PART 2 PRODUCTS

1.02 FLOOR MATS

A. Entrance Floor Mat (Quantity 1):
1. Manufacturers and Model: Musson Rubber Co.; LL-10 or approved equal.
2. Size: 3 feet by 7 feet.
3. 3/8-inch thick with beveled edges for surface use.
4. Pyramid top with pebble base.
5. Slots: 3/16 inch by 3/4 inch.
6. Color to be selected from manufacturer's standard colors.

B. Corrugated Switchboard Floor Mat (Quantity 6)
1. Manufacturer and Model: Rhino Mat SB-448.
2. Size: 3 feet by 4 feet.
3. 1/4" thick.
4. Corrugated non-conductive vinyl.
5. Color: Black.

C. Floor Protection Chair Mats (Quantity 2)
1. Manufacturer and Model: Floortex FR1212119ER.
2. Size: 48 inches by 48 inches.
3. 0.08" thick.
4. Polycarbonate.
5. Color to be selected from manufacturer's standard colors.

1.03 MANUFACTURED UNITS

A. Refrigerator (Quantity 2):
   1. Refrigerator with top freezer, no-frost, 21-cubic-foot capacity, with automatic ice maker, rollers, and Energy Star rating.
   2. Manufacturers and Products:
      a. Frigidaire: FFHT2126PB with IM-115 ice maker installed.
      b. General Electric: GTH21GLEBB.
      c. Whirlpool: WRT771REYB.

B. Cooktop:
   1. Provide 30” cooktop:
      a. Basis of design: GE 30” Built-in Knob Control Cooktop.
      b. Model: JEP5030DTBB.
      c. Dimensions: 29 3/4” (w) x 3 1/4” (h) x 21 3/8” (d).
      d. Color: Stainless Steel on black.
      e. Frame Color/Material: Black.

C. Over the Range Microwave:
   1. Provide Over the Range Microwave:
      a. Basis of Design: GE Profile 1.7 cu. ft. Convection Over the Range Microwave Oven.
      b. Model: PVM9179SRBL.
      c. Dimensions 29 7/8” (w) x 16 5/16” (h) x 21 3/8” (d).
      d. Color: Black.
      e. 300 CFM recirculating exhaust fan.

D. Finishes: Manufacturer’s standard black baked enamel finish unless otherwise indicated.

PART 3 EXECUTION

1.04 PREPARATION

A. Coordinate support framing and backing as necessary for the proper installation of all accessories.

1.05 INSTALLATION

A. Locate where mark is shown on Drawings at height indicated or as recommended by Engineer.

B. Follow manufacturer’s instruction and recommendations.

C. Install and securely anchor all accessories in their proper locations, plumb and level and without distortion.

D. Remove all protective maskings and clean surfaces, leaving them free of soil and imperfections.

E. Fill all units with necessary supplies within 10 days before Substantial Completion.

F. Deliver to Owner all keys and devices required to fill and service units.

END OF SECTION

SECTION 10810

TOILET ACCESSORIES

1.01 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Toilet accessories.

B. Related Work: Documents affecting Work of this Section include but are not necessarily limited to General Conditions, Supplementary Conditions, and the Sections in Division 1 of these Specifications. The following items are not included in this Section and are specified under the designated Sections:
   1. Section 04200 – Unit Masonry

1.02 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:
   1. Construction details and dimensions.
   2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
   3. Material and finish descriptions.
   4. Features that will be included for Project.
   5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
   1. Identify locations using room designations indicated on Drawings.
   2. Identify products using designations indicated on Drawings.

C. Maintenance Data: For toilet accessories to include in maintenance manuals.

1.04 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

1.05 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 PRODUCTS

2.01 BATHROOM ACCESSORIES

A. For purposes of designating type and quality of work in this Section, Drawings and Specifications are based on bathroom accessories as manufactured by Bradley Corporation, Menomonee Falls, WI. Products of equal quality and type will be considered.
1. Waste Receptacle, three (3) Model No. 3251
2. Multi-Purpose Unit, three (3) Model No. 130
3. Grab Bars, six (6) Series 812-2 (Length and configuration approved by Engineer).
4. Toilet Tissue Holder, three (3) Model No. 5106-52
5. Paper Towel Dispenser, three (3) Model No. 250-15
6. Soap Dispenser, three (3) Model No. 901-60
7. Hat and Coat Hook, three (3) Model No. 9135
8. Robe Hook, nine (9) Model No. 9119
9. Shower Rod, Exposed Mounting – three (3) Model No. 953
10. Shower Curtain, three (3) Model 9535 w/s.s. curtain hooks
11. Framed Mirror, 3'-0" by 2'-0" – three (3).

B. Material: Provide stainless steel with satin finish on all items of this Section except the lockers.

C. Miscellaneous: Provide all mounting kits and anchoring devices required for installation.

2.02 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.

B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359inch (0.9-mm) minimum nominal thickness.

C. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

D. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper and-theft resistant where exposed, and of galvanized steel where concealed.

2.04 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to the Owner.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units' level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.02 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION

SECTION 10850

SAFETY EQUIPMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide safety equipment as required by the Contract Documents.

1.02 RELATED WORK

A. Documents affecting the work of this Section include but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. For purposes of designating type and quality, the products listed in this Section are supplied by the Direct Safety Company, Tempe, Arizona. Products of equal or better quality will be considered.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
2. Catalog cuts which show materials of construction, thickness of all materials, and details of construction.

PART 2 PRODUCTS

2.01 SAFETY EQUIPMENT

A. First Aid Kit: Part No. 08-150, (Provide three (3)).
1. Metal case: 7 x 10 x 2 ¾..
2. 25 person kit.
3. Meets ANSI Z308.1-2003 minimum fill requirements.

B. Fire Blanket: The Contractor shall furnish one (1) wall-mounted 62-inch x 82-inch fire blanket, Catalog No. 11-436. The fire blanket shall be located as directed by the Engineer.

C. Caustic Spill Clean-up Kit: The Contractor shall furnish one (1) caustic spill clean-up kit, catalog No. 8B-9892 and one 5-gallon bucket of neutralizer, catalog No. 8B-11678 as distributed by Lab Safety Supply, Janesville, Wisconsin.

D. Neoprene Gloves: The Contractor shall furnish four (4) pairs of neoprene gloves, part No. 07-484, and two (2) pairs gloves, part No. 07-053, as distributed by Direct Safety Co., Phoenix, AZ.

E. Safety Goggles and Face Shields: The Contractor shall furnish four (4) pair of stack-trap vented chemical safety goggles, Part No. 02-170, and two (2) full face shields, Part No. 02-310 as distributed by Direct Safety Co., Phoenix, AZ.

F. Reusable Respirators: Provide two NIOSH-approved (2) half-face respirators for acid gas with soft rubber face-to-mask and replaceable cartridges. Furnish one (1) size large and one (1) size medium respirators, 3M Model 7502 and 7503, and six (6) replacement acid gas cartridges, 3M Model No. No. 6002.

G. Provide three (3) rubber aprons Part No. 03-311 as distributed by Direct Safety Company, Phoenix, AZ.

H. Provide three (3) pair over-the-shoe rubber boots, Part No. 06-222 (size selected by Owner) as distributed by Direct Safety Company, Phoenix, AZ.

I. Provide three (3) pairs noise reduction earmuffs, PELTOR Optime 105 as manufactured by 3M, or equal.

J. Provide one (1) box of two-hundred (200) count disposable foam earplugs (pairs) and one (1) Hinged Top & Bottom Tray Box/Tray Style Earplug Dispenser.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the work of this Section in strict accordance with the manufacturer's recommendations as approved by the Engineer.
   1. Products which have to be installed shall be installed at locations provided by the Engineer.

END OF SECTION

INDEX

DIVISION 11 EQUIPMENT

SECTION 11209

PFAS REMOVAL TREATMENT SYSTEM

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This section of the specification covers all labor, materials and equipment required to design, procure, fabricate, deliver, install, startup, and test a manually operated PFAS removal absorption system complete and operable, as indicated on the drawings and as specified herein.

B. The following items shall be included in this section and shall be supplied by one manufacturer.
   1. Treatment pressure vessels with internals for media retention
   2. Influent, effluent and backwash piping with valves
   3. Accessories as listed herein
   4. Manufacturer's services

C. The equipment specified herein and detailed on the drawings is based on the AdEdge Water Technologies, LLC Model MODPFx-12060CS-2-MVT-LL adsorption system. Absorption systems furnished by other acceptable manufacturers shall be considered provided they conform with these specifications and process drawing(s).
   1. Any building or process piping revisions required to accommodate equipment other than that specified herein shall be at Contractor's expense. The Contractor shall include the proposed revisions with their submittal.
   2. Any building modifications required to provide similar clearances between equipment and building structure shall require the Contractor to furnish revised structural drawings stamped and signed by a structural engineer registered in the State of Massachusetts.
   3. Any pilot testing required by the Massachusetts Department of Environmental Protection (MassDEP) to confirm alternate technology is suitable for this application shall be done at no expense to the Owner.

D. The selected treatment system equipment supplier shall furnish all proposed equipment, delivered to the Wading River Water Treatment Plant (WTP) site, within a maximum of 20 weeks after submittal approval.

E. The treatment system equipment supplier shall be present during delivery and un-loading of the equipment and shall coordinate with the contractor to ensure proper assembly of all piping, equipment, and media. The treatment system equipment supplier shall also be present for the start-up and pressure testing of the complete PFAS treatment system. Contractor shall be fully responsible for delivery, unload-ing, and installation of the treatment system equipment.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General and Supplementary Conditions and Sections in Division 1 of these Specifications.

1. Concrete work is specified under Division 3.
2. Painting is specified under Section 09900.
3. PFAS filter media is specified under Section 11390.
4. Instrumentation and Control is specified under Section 13100.
5. Process Piping is specified under Division 15.
6. Electrical work is specified under Division 16.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Product data: Within 35 calendar days after receipt of the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage and interface of the work of this Section with the work of adjacent trades.
4. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.
5. Data required to be furnished under Paragraph 1.05 Quality Assurance of the Specification Section.

C. The equipment to be furnished under this section shall be coordinated with all applicable structural and mechanical process drawings, including addenda.
1. If no changes are required, provide a statement that no changes are required.
2. If changes are required, furnish marked up drawings or statement detailing the modifications necessary for the equipment proposed.
3. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

D. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
1. If deviations and clarifications from the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

E. Certification of satisfactory installation shall be provided by the system manufacturer following contractor’s installation of all equipment.

F. No material furnished under this Specification shall be shipped to the jobsite until submittals have been approved by the Engineer.

1.04 OPERATION AND MAINTENANCE

A. Operating and maintenance (O&M) instructions shall be furnished to the Engineer. The instructions shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc., that are required to instruct operating personnel unfamiliar with the operation and maintenance of equipment.

B. Three (3) draft copies of the O&M instructions shall be submitted to the Engineer for review prior to start-up and training on the equipment. Upon approval by the Engineer, three (3) final copies of the O&M manual shall be submitted in accordance with the provisions of Section 01730 of these Specifications.

1.05 QUALITY ASSURANCE.

A. The treatment system shall be furnished by a single manufacturer who shall:
   1. Furnish proof of at least five (5) years of successful operating experience in deploying and implementing fully packaged water treatment systems for Municipal, Public and Community Water Systems.
   2. Provide a list of at least five (5) installations where similar PFAS removal equipment is currently in comparable service include contact name, telephone number, location, engineer or owner, and approximate date of installation.
   3. Where major components of another manufacturer are proposed to be used, engage and pay for the services of a qualified service engineer of that manufacturer for the purposes of ensuring proper installation, adjustment, and placement into service.
   4. Accept responsibility for placing the entire filtration system into satisfactory operation, including the major components of other manufacturers referenced above that comprise the filter system.
   5. Guarantee for one (1) year from the date of "Substantial Completion" (building occupancy permit has been obtained along with acceptance by the MassDEP for the filtration system to be placed in operation), that all equipment is free from defects in design, materials and workmanship. Furnish replacement parts and labor for any defective component at no additional cost.

1.06. DELIVERY, STORAGE AND HANDLING

A. Delivery, storage and handling shall be in accordance with manufacturer's written recommendations.

B. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer.

C. Shipping:
   1. Ship equipment, material and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.
   2. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.
   3. The Contractor shall obtain spare parts from the manufacturer at the same time as pertaining equipment. The Contractor shall maintain possession of

spare parts until Substantial Completion at which time, all spare parts shall be turned over to the Owner.

D. Receiving:
   1. Inspect and inventory items upon delivery to site.
   2. Store and safeguard equipment, material and spare parts in accordance with manufacturer's written recommendations and instructions.

1.07 TREATMENT EFFLUENT GUARANTEE:

A. Treatment Effluent Guarantee: The PRTS supplier shall review the influent source water quality identified herein and the specific requirements of these specifications. The PRTS supplier shall guarantee in writing that the equipment supplied hereunder will consistently produce PFAS6 effluent concentrations through the lead PRTS vessel(s) below MassDEP Certified Laboratory reporting limits for PFAS, referred to as Non-Detect (ND) levels (less than 2.0 ng/L), for the identified life of the media specified in Section 11390. The media, in conjunction with the PRTS equipment, shall provide a minimum treatment capacity of 200,000 bed volumes (BVs).

PART 2 PRODUCTS

2.01 BABA CLASSIFICATION

A. The PFAS Removal Treatment System shall be classified as one complete and single “manufactured product” as it relates to Build America Buy America (BABA) Act compliance defined in Specification Section 00820G. The list of products below shall be considered “components” of this manufactured product as it relates to BABA compliance.

2.02 MANUFACTURERS

A. The PFAS Removal Treatment System to be supplied shall be a Model MODPFx-12060CS-2-MVT-LL, as manufactured by AdEdge Water Technologies, LLC, or approved equal.

2.03 DESIGN CRITERIA

A. The materials and equipment covered by this specification are intended to be standard equipment of proven ability as manufactured by reputable concerns. Equipment shall be designed, constructed and assembled in accordance with the best practice of the industry, and shall operate satisfactorily when installed in accordance with manufacturer's recommendations. The specifications call attention to certain features but do not purport to cover all details entering into the construction of the equipment.

2.04 SERVICE CONDITIONS

A. The system shall consist of three (3) pairs of vessels (with one pair already existing at the current Wading River WTP and being relocated as part of this Work) designed and constructed for installation indoors and continuous operation with the

following service conditions, and based on the following parameters for each pair of vessels assuming one of the three pairs of vessels is out of service:

1. Design Flow Rate: 695 gallons per minute (gpm)
2. Maximum Allowable Working Pressure: 100 psi
3. Number of Vessels: Two
4. Vessel Size: 120" O.D. x 60" Side Shell
5. EBCT: 3.0 minutes per vessel
6. Media Volume: 275 cubic feet (ft^3) per vessel
7. Vessel Configuration: Series operation
8. Typical Operating Pressure: 50 psi
9. Typical Influent source water quality:
    a. pH – 6.5-8.0
    b. Iron - < 0.1 mg/L
    c. Manganese < 0.05 mg/L
    d. Total Organic Carbon (TOC) - < 5 mg/L
    e. Total Dissolved Solids (TDS) - < 200 mg/L
    f. Turbidity - 0.1 NTU
    g. PFAS6: See Table No. 1 below.

Table No. 1: Wading River WTP Source Water PFAS6 Levels

Substance	Units	PFAS6 Sampling Results					
		10/08/2020	**1/29/2021**	**4/13/2021**	**5/27/2021**	**6/01/2021**	**9/24/2021**
PFOS	ng/L	22.3	6.02	8.8	16	13	9.98
PFOA	ng/L	6.69	2.82	2.9	11	8.2	3.44
PFHxS	ng/L	1.89**	1.72**	2.3	2.3	1.5**	1.15**
PFNA	ng/L	1.02**	ND	ND	0.75**	0.62**	0.592**
PFHpA	ng/L	2.33	0.809**	0.9**	5.1	3.1	0.814**
PFDA	ng/L	ND*	ND*	ND*	ND*	ND*	ND*
Total PFAS6	**ng/L**	**31.32**	**8.84**	**14.0**	**34.4**	**24.3**	**13.42**

*ND represents a result that is non-detect or below MassDEP Certified Laboratory detectable limits.
**Indicates a result below the maximum reporting limit (2.0 ng/L). These are not included in the total.

2.05 EQUIPMENT

A. Pressure Filter Vessels
    1. Shell and Heads Acceptable Material
        a. Shell: SA516Gr70 Carbon Steel or Equal
        b. Head: SA51Gr70 Carbon Steel or Equal
    2. Acceptable Head Types:
        a. 2:1 Semi-elliptical Heads
        b. Flanged and Dished Heads
    3. Exterior Coat:
        a. Surface Preparation: SSPC-SP10 Near White Metal Blast (immersion)
        b. Shop Finish Film Thickness: 5-8 mils DFT
        c. Acceptable Shop Finish Product: Carboline Carboquick 200, Color to be selected by Owner.
    4. Inner Liner:
        a. SSPC-SP5 Full White Metal Blast (immersion)
        b. Shop Finish Film Thickness: 10-16 mils DFT
        c. Acceptable Shop Finish Product: Carboline Carboguard 891VOC

Epoxy, Certified to ANSI/NSF 61 and 600

5. Lifting Lugs: Minimum of two (2) on vessels 36" Ø and larger.
6. Connections:
   a. Process Inlet and Outlet: Threaded couplings, flanged spools, or double-drilled pad flanges.
   b. Air Vent: Minimum 1" NPT half coupling located on top head.
   c. Three (3) screened sideshell sample ports per vessel sideshell.
   d. Media Loading: 12" x 16" manway on top head of vessels.
   e. Accessing Tank Internals: 12" x 16" handhole on lower side shell.
7. Vessel Internals
   a. Inlet distributor:
      i. Type: Four-Point upturned on vessels 72" Ø and larger.
      ii. Material: 316SS.
      iii. Distributors shall be NSF 61 compliant.
   b. Outlet Collector:
      i. Type: Hub and slotted laterals w/ 0.010" slots.
      ii. Material: 316SS.
      iii. Distributors shall be NSF 61 compliant
   c. Internal clips shall be provided whenever required to support the weight of vessel internals; this shall remain at the discretion of the manufacturer.
8. Leg Requirements:
   a. Four (4) angle legs with foot pads and anchor holes shall be provided on vessels 48" Ø and larger.
9. Maximum Working Pressure (MWP): 100 psi
10. Maximum Operating Temperature: 120° F
11. ASME Code Certification: Yes

2.06 MEDIA

A. Media to be provided under this Section is specified under Section 11390.

B. PFAS media is to be defined as "not an integral part of the structure or permanently affixed to the infrastructure project" as described in the Office of Management and Budget's Memorandum M-22-11 and therefore not required to comply with the BABA requirements defined in Specification Section 00820G.

2.07 SYSTEM VALVES

A. Process Valves:
1. General: Process valves shall be installed in a valve tree suitable for manual control of the system and provide all functionality such as, but not limited to, backwashing, draining, and lead-lag alternation.
2. Specification:
   a. Type: Lug-style butterfly valves.
   b. Materials: Ductile Iron body, EPDM seat, 416 SS stem, and Ductile Iron with Nylon 11 Coated disc.
   c. Operation: 175 psi max pressure.
   d. Process Mounting: ANSI class 125/150 flanges.
   e. Actuator Mounting: ISO 5211 compliant.
   f. Manufacturer: Bray S31 or Engineer-approved equal.

B. Air Release Valve

1. General: Combination Air/Vacuum Valve shall be installed on each vessel's vent piping and shall be the equal of APCO Valve and Primer Corporation.
   a. Size: Per Filter Manufacturer
   b. Body: Cast iron
   c. Stem: Stainless Steel
   d. Float: Stainless Steel
   e. Seat: Buna-N

2.08 INSTRUMENTATION

A. Instrumentation will be accessible from grade.

B. Each vessel will be provided with a differential pressure indicator, Mid-West Instrument Model 522 or approved equal with appropriate range.

C. Pressure gauges shall be supplied and installed on the pre-assembled valve tree on each vessel's inlet and outlet.

1. Type: Glycerin-filled 2.5" dial, 1/4-inch NPT connection
2. Materials: Brass or 316SS internals; 304SS case
3. Accuracy: ±2.5% of full scale
4. Output: Local reading only
5. Pressure Range: 0-100 psi
6. Manufacturer: WIKA or Engineer-Approved Equal

D. Valves:

1. PVC ball valves shall be supplied and installed on the pre-assembled valve tree on each vessel's inlet sample port, outlet sample port and three screened sample ports per vessel sideshell (25%, 50%, and 100% media depth).
   a. Metallic Piping (does not include stainless steel):
      i. Two piece bronze body,
      ii. WOG pressure rating: 600 psi,
      iii. Teflon seats and seals,
      iv. Full port design,
      v. Adjustable packing gland,
      vi. Screwed or soldered ends.
   b. Stainless Piping:
      i. All 316L stainless steel construction,
      ii. Teflon seats, packing and "O" rings,
      iii. Swing-out design,
      iv. Full port design,
      v. Joint: As required,
      vi. Locking stainless steel handle.
2. SS toggle valve specification:
   a. Type: SS toggle valves, 1/4-inch NPT, panel-mounted
   b. Material: 316 SS body conforms to ASTM A182
   c. Operation: 450 psi max working pressure, quick opening & closing
   d. Manufacturer: Hylok or Engineer-approved equal

3. A stainless-steel hydraulic panel shall be furnished and mounted on each valve tree, which shall contain:
   a. The two differential pressure indicators (one for each vessel).
   b. The inlet and outlet pressure gauges (two for each vessel - 4 total)
   c. Inlet and outlet sample ports (two for each vessel - 4 total)
   d. The hydraulic panel shall be mounted at a location and height to allow for ease of access and use.

2.09 SYSTEM PIPING

A. All piping 6-inches in diameter and larger shall be ductile iron as specified under Section 15100.

B. All piping smaller than 6" shall be 316 stainless steel.

2.10 MISCELLANEOUS

A. Anchor Bolts, Nuts, and Washers
   1. Type 316 stainless steel

B. The media fill and discharge will be fitted with hose connections, such that media transfer to and from the adsorbers can be facilitated using transfer hoses. These connectors will be 4" Quick Disconnect Adaptors constructed of aluminum as manufactured by Dover Corp. as Kamlock connectors or equal.

C. Spare Parts
   1. The following spare parts shall be furnished with the filter assemblies by the Filter Manufacturer. These spare parts shall be package separately and the contents clearly indicated on the shipping container:
      (4) Manhole gaskets
      (2) Replacement pressure gauges
      (1) Differential pressure indicator

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Install the filter systems in strict accordance with the manufacturer's installation drawings and printed recommendations and as specified. Obtain from the filter manufacturer such written installation details, recommendations, and training required, and as specified herein.

B. The supervisory service of a factory trained service engineer, who is specifically trained on the equipment being provided, to assist the contractor or subcontractor with technical advice on the installation of the major components of the treatment equipment to include:
   1. Two (2) cumulative 8-hour man days, during initial filter installation to assist the contractor with proper placement and conditioning of the filter media, and methods of protecting all of the equipment prior to placing it into service.

C. Upon completion of the initial installation, the services of the above service engineer will be available for a period of not less than three (3) 8-hour man days to check the completed installation, make any required adjustments, initiate a trial performance run, and place the system in satisfactory operation for the performance test described in paragraph 3.04 below.

1. The service engineer/filter system supplier shall furnish a letter to the Owner/Engineer stating that the installation is complete and is acceptable to the manufacturer. This indicates to the Owner/Engineer that failure of the filter system to provide the specified filter performance is not due to faulty equipment or installation.

3.02 TRAINING

A. Contractor shall provide the services of a fully qualified factory-trained representative for one 8-hour day to train Owner's personnel in the proper operation of all equipment. This training shall be in addition to all services provided through installation and Performance Testing of the equipment. Training shall consist of not less than one (1) separate 8-hour day, which can be requested at any time by Owner within one (1) year after acceptance of the equipment.

B. Contractor shall submit resume and qualifications/certifications of training personnel to Owner/Engineer for approval 30 days in advance of commencement of training services.

C. Contractor shall video all training sessions and provide Owner with copy of all recordings.

3.03 APPROVAL

A. No form of energy shall be turned on to any part of the filtration system prior to receipt by the Engineer of a certified statement of approval of the installation from the Contractor containing supplier's authorization to turn on energy to the system.

3.04 PERFORMANCE TESTING

A. The Contractor shall be required to conduct a 7-day performance test of the entire facility. This will only occur after all the requirements of paragraph 3.01 have been satisfied by the filter supplier associated with the initial phase of construction.

B. The filter system supplier shall provide the Owner/Engineer with a contact name and telephone number to assist the Contractor with any problems that may occur during the performance test period.

C. Should the filter system fail to meet the required performance criteria and such failure is attributed to improper filter design and or installation of the filter system, all costs associated in correcting the deficiencies and reconducting of the 7-day performance test shall be borne by the filter supplier.

D. Performance testing shall include the following at a minimum:

1. All testing and sampling required to demonstrate treatment that meets the effluent guarantee as specified in paragraph 1.07.A of this section.
2. All testing and sampling required to demonstrate operation in accordance with design criteria specified in paragraphs 2.03 and 2.04 of this section.

3.05 FIELD TOUCH-UP PAINTING:

A. After installation and approved testing by the Engineer, apply touch-up paint as specified under Section 09900 to all scratched, abraded and damaged shop painted surfaces. Coating type and color shall match shop painting.

3.06 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 11210

VERTICAL TURBINE PUMPS

PART 1 GENERAL

1.01 SUMMARY

A. The work under this section shall consist of furnishing all equipment, materials and labor for the installation of the variable speed driven vertical turbine pumps, motors, and appurtenances, complete.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 13100 Instrumentation and Controls
   2. Section 15060 Ductile Iron Pipe, Fittings and Appurtenances
   3. Division 16 Electrical

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Operating and Maintenance Manuals: Include manufacturer's instructions for equipment installation, start-up, operation, and maintenance, including parts lists for operation and maintenance manuals specified in Division 1.

C. Shop Drawings: Include illustrations, dimensions, materials, performance and wiring diagrams, and pump curves.

D. Certified Performance Test Reports: Submit certified report performance test. Perform factory tests to certify that pumps meet the specified requirements for head and capacity, and meet or exceed all applicable National Hydraulic Institute standards.

E. Critical Frequency Analyses: A natural frequency analysis of the head, motor stand, and electric motor shall be performed by a licensed Professional Engineer using FEA software, for variable frequency driven pumping units. A report shall be provided with the submittal showing that the natural frequencies and mode shapes of the pump and motor have been considered in the design of the discharge head, and certify that the critical frequency is at least 20% above or below the operating range.

F. The equipment to be furnished under this section shall be coordinated with all applicable structural and mechanical process drawings, including addenda.
   1. If no changes are required, provide a statement that no changes are required.
   2. If changes are required, furnish marked up drawings or statement detailing the modifications necessary for the equipment proposed.

3. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

G. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
1. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.04 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
1. Manufacturer shall have a minimum of five (5) years experience producing substantially similar equipment to that specified in this Section and shall be able to document at least five installations in satisfactory operation for at least five years.
2. The manufacturer shall have the following certifications: ISO 9001.

B. All pump material that will be in contact with the potable water supply shall be approved for such use in accordance with NSF/ANSI Standard 61 and Annex G (NSF 372) and section 1417 of the US Safe Drinking Water Act (SDWA) of 2014.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store pumps on site according to pump and motor manufacturer's recommendations.

PART 2 PRODUCTS

2.01 VERTICAL TURBINE PUMPS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following:
1. Xylem
2. Floway Pump.

B. Pump and Discharge Column Assembly: Open-line shaft, vertical turbine.

C. Pump Bowls:
1. Close-grained cast iron ASTM A48 class 30.
2. Free from blowholes, sandholes, and other defects.
3. Bowl interiors and exteriors shall have a factory-applied NSF certified drinking water coating.
4. Provide stainless steel suction strainers on in-plant pumps.

D. Impeller Shaft:
   1. Type 416 stainless steel.

E. Bowl Bearings: Bismuth Tin Bronze UNS C89835.

F. Impeller Shaft Bearings:
   1. Bronze in top and suction bowls
   2. Cutless rubber in the intermediate bowls.

G. Line Shafting:
   1. Stainless steel in compliance with ASTM A582-88a grade 416, turned and ground.
   2. Line Shaft Bearings: Removable water-lubricated, styrene butadiene rubber.
   3. Top Shaft: Removable, with coupling located above stuffing box.

H. Impellers:
   1. Semi-open or closed type
   2. Bronze certified to NSF 61-G/NSF 372 Standards, or 316 stainless steel ASTM A744 Grade CF-8M.
   3. Statically and dynamically balanced.
   4. Secured to the shaft with stainless steel taper locks collets.

I. Column Pipe:
   1. ASTM A53 Grade B steel, with uniform interchangeable threaded sections, each not to exceed five (5) feet in length for the in-plant pumps. Provide bearing retainers between column sections. Top and bottom sections of column pipe shall not exceed 5 feet in length.
   2. The column section that attaches to the discharge head or motor stand shall be a flanged and bolted design. Additional column shall be threaded pipe.
   3. Column pipe shall be shop coated with 2 coats of epoxy paint, approved by NSF for use in a potable water supply.

J. Pump Discharge Heads and Motor Stands:
   1. The fabricated discharge head shall be fabricated of carbon steel using ASTM A105 flanges, ASTM A53 Grade B body pipe, and ASTM A36 steel plate.
   2. The discharge head shall be capable of containing maximum pressures developed by the pump.
   3. Flanges shall be 150# ANSI raised face.
   4. The top of the head shall be machined to accept a standard NEMA base, vertical hollow or solid shaft driver.
   5. Discharge head shall be supplied with adequate integral motor stand height to accept seal arrangement and adjustable flanged or spacer coupling, if required.
   5. Head shall be supplied with removable coupling guards.
   6. A 1/2-inch NPT pressure gauge connection shall be supplied on discharge pipe.

K. Pump Shaft Seal:
   1. The pump discharge heads shall be fitted with a packing box that shall be rated for 150 PSI.
   2. Shall have a housing, that bolts to the discharge head with an “O”-ring seal
   3. The housing shall have a lower bronze throttle bushing.
   4. A balanced seal shall be mounted on a shaft sleeve.

5. Housing seal chamber shall accommodate a single sleeved balanced mechanical seal suitable for the maximum pressure developed by the pump (shutoff head) and temperature of 60 degrees F maximum.
6. John Crane 5610 or equal.

L. Include a manufacturer's stainless steel engraved data plate to include bowl number and type, design flow and TDH, number of stages, column length, and RPM.

M. Pump discharge head seal water and drain shall be copper tubing piped to nearest drain.

VERTICAL TURBINE PUMP REQUIREMENTS

CHARACTERISTICS		High Lift Pumps	Backwash Pumps
Design Flow (GPM)		1,400	1,500
Design Head (feet)		325	55
Pump Efficiency (% at Design Pt.)		82	80
Shut-off Head (feet)		455	93
Maximum Flow (GPM)		2,075	1,875
Head at Maximum Flow (feet)		205	39
Motor	Horsepower	150	30
	Volts	460	460
	Phase	3	3
	Speed (rpm)	1,800	1,800
Total Column Length (feet)*		See Dwgs	See Dwgs
Number of Bowls		4	1
Column Pipe Diameter (inches)		10	10
Line Shaft Diameter (inches)		1.5	1
Discharge Head Diameter (inches)		10	10

*From Base Of Discharge Head To Lowest Impeller

2.02 DISCHARGE PRESSURE GAUGES

A. Each individual pump shall be furnished with a pressure gauge with the following attributes:
1. Size: 4 1/2-inch phenolic case.
2. Threaded phenolic bayonet ring
3. 316 stainless steel internals
4. Bottom connection: 1/2-inch NPT stainless steel.
5. Lens: Laminated safety glass.
6. Movement: Stainless steel with polished bearing surfaces
7. Accuracy: +- 1/2% full scale, ANSI Grade A.
8. Dial: Aluminum, white background with black markings.
9. Liquid filled with glycerine.
10. Range: Coordinated with the shut-off head of the respective pump.

B. Gage Piping
1. All piping shall be threaded bronze.
2. Each gage shall have a bronze isolation ball valve.
a. WOG: 600 PSI
b. Seats: Teflon
c. Ends: Threaded

2.03 MOTORS

A. Vertical Turbine Pumps:
1. Motors shall be supplied in accordance with the NEMA Premium Efficiency standard.
a. Motors shall meet IP-23 standards for drip-proof WP-1 (weather protected) enclosures.
b. Motors shall have a five (5) year manufacturer's warranty.
c. Motor shafts shall be:
i. Hollow shaft for motors up to and including 250 horsepower.
ii. Solid shaft for motors greater than 250 horsepower.
2. Motors shall be drip-proof, squirrel-cage induction motor; with a 1.15 service factor, Type F insulation, inverter duty.
a. Inverter duty per NEMA MG1 Part 31 for Variable Torque and suitable for a 4:1 minimum turndown.
b. Compatible with the variable frequency drives to be furnished under Division 16.
c. Furnish a ball or pin type non-reverse ratchet.
3. Operating Point: Develop sufficient torque to start the pump full of water and accelerate to full speed, and continue to operate without entering the service factor.
4 Bearings: Two sets of ball bearings.
a. Upper Set: Combination radial and thrust type, to carry the thrust load of the motor and pump parts imposed during startup and operation.
i. Bearings shall be lubricated in an oil-bath for motor frames 320 and larger. Smaller frames shall be grease lubricated.
5. Coupling: Mechanical.
6. Motors 10 horsepower and larger shall be equipped with a thermal device to protect the motor from overheating during operation. The thermal device shall be a normally closed contact that shall open in the event of excessive motor heat buildup. Restart will require manual reset at motor starter.
7. Manufacturers: U.S. Motors, or equal.

2.04 NOISE

A. Pumps shall be capable of continuous operation without producing noise in excess of Hydraulic Institute and OSHA guidelines.

2.05 SPARE PARTS

A. A complete replacement pump shaft seal assembly shall be furnished for pumps provided. The spare seal container shall include complete installation instructions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install pump baseplate on a square concrete pad and anchor with four bolts.
   1. Construct concrete base as required to achieve discharge centerline elevation indicated on the drawings.
   2. Imbed 1-inch diameter anchor bolts utilizing with pump manufacturer's templates.
   3. Shim baseplate and pack with non-shrink grout to insure baseplate is level and centered over opening.

3.02 TESTING

A. The equipment supplier shall provide the services of a factory-authorized service representative to inspect the equipment prior to installation to assure that the equipment has not been damaged in any way, which may nullify the warranty.
   1. The service representative shall furnish to the Owner the results of his inspection.
   2. The service representative shall inspect the installation, supervise pre-start-up and final performance tests once the pumps have been installed.
   3. During the tests, observe discharge head, pumping capacity, motor amperage draw on each leg, pump vibration, and general performance.
   4. Repair or replace defective equipment and repeat tests until satisfactory results are achieved.
   5. Adjust equipment to achieve specified performance requirements.
   6. A detailed signature vibration analysis shall be conducted on the variable frequency driven pumps to prove compliance with the vibration limits set forth in the latest edition of the Hydraulic Institute.
      a. The Contractor shall take corrective action to ensure full compliance.

3.03 DEMONSTRATION

A. Provide the services of a factory-authorized service representative to train Owner's maintenance personnel in proper operation, servicing, and maintenance of equipment.
   1. Allow 8 hours for training.
   2. Conduct training at the WTP, after and separate from the start-up tests.
   3. The Owner shall schedule training time.

3.04 WARRANTY

A. The equipment supplier shall warrant its equipment for a period of one (1) year after Substantial Completion by the Owner. The contractor will be responsible for providing the pump manufacturer with a specific date associated with startup.

END OF SECTION

SECTION 11211

CENTRIFUGAL PUMPS

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide centrifugal pumps, motors, and appurtenances as required by the Contract Documents.
   1. In General the work under this Section shall consist of furnishing all equipment, materials and labor for the installation of the centrifugal pumps, motors, and appurtenances, complete.

B. The pumps shall be either horizontal close-coupled or horizontal frame-mounted end suction pumps as indicated on the drawings, equipped with variable speed motors. Pumps shall be manufactured by Aurora Pumps, Aurora, Illinois; Gould Pump, Seneca Falls, N.Y., or equal.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 13100 Instrumentation and Controls
   2. Section 15060 Ductile Iron Pipe, Fittings, and Appurt.
   3. Division 16 Electrical

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Shop Drawings: Include illustrations, dimensions, materials, performance and wiring diagrams, and certified factory pump curves.

C. Operating and Maintenance Manuals: Include manufacturer's instructions for equipment installation, start-up, operation, and maintenance, including parts lists for operation and maintenance manuals specified in Division 1.

D. Certified Performance Test Reports: Submit certified report performance test. Perform factory tests to certify that pumps meet the specified requirements for head and capacity, and meet or exceed all applicable National Hydraulic Institute standards.

E. The equipment to be furnished under this section shall be coordinated with all applicable structural and mechanical process drawings, including addenda.
   1. If no changes are required, provide a statement that no changes are required.
   2. If changes are required, furnish marked up drawings or statement detailing the modifications necessary for the equipment proposed.

3. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

F. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
1. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store equipment on site according to manufacturer's recommendations.

PART 2 PRODUCTS

2.01 GENERAL

A. The contractor shall furnish and install high performance, electric motor-driven centrifugal pumps as shown in the plans and described in these specifications.

B. Operating Conditions: Centrifugal pumps shall be provided for the following systems as indicated on the Contract Drawings.

Individual Pump Characteristics (Three-point Curve)							
Pump Designation	Horse Power	Design Flow (gpm)	Design Head (feet)	Design Efficiency (%)	Shutoff Head (feet)	Run-out Flow (gpm)	Run-out Head (feet)
Intermediate	60	1,400	125	84	145	1,900	97
Supernatant	15	300	126	81	138	500	75
Residuals	1	80	24	67	26	125	18

C. Casing: Pump casing shall be close-grain cast iron (ASTM A48, Class 30) fitted with a replaceable Bizmuth brass case wear ring.
1. Pump shall be of the back pullout design so that the rotating element can be removed from the casing without disconnecting the suction or discharge piping.
2. Casing bolts shall be steel SAE 1200 Grade 5.
3. Where possible, casing size shall allow for future installation of a larger diameter impeller.
4. Suction and discharge connections shall be as follows:
   a. NPT thread for pumps with suction size 2" and smaller and discharge or 1-1/2" and smaller.
   b. ANSI 125# flat-face flange for larger connections.
5. Tangential outlet.

6. Tapped and plugged holes for priming and draining.

D. Impeller: Pump impeller shall be of the enclosed type of ASTM B584 cast bronze and shall be statically and dynamically balanced.
   1. Impeller diameter shall be trimmed for the specified design conditions.
   2. Keyed to shaft and fastened with gasket and stainless steel washer and cap screw.

E. Shaft and Sealing: Pump shaft shall be AISI C1045 steel.
   1. Shaft sleeve of AISI 316 stainless steel sealed to the impeller hub by an O-ring, and pinned to the keyway (adhesive compounds are not acceptable).
   2. Close-coupled pumps shall have impeller direct-coupled to motor shaft, machined to provide a keyway.

F. Power Frame: Pump shall be mounted on a heavy-duty cast iron power frame.
   1. Bearings shall be grease lubricated and provided with accessible grease fittings and relief fittings.
   2. Lip type seals shall be provided in the bearing housing and cover to prevent water and contaminants from entering bearings.
   3. The bearing assembly shall be bolted in a register fit to the volute cover for accurate positioning.

G. Coupling: A flexible coupling shall be provided to connect the pump shaft to the motor shaft.
   1. Coupling shall be of an all-metal type with a flexible rubber insert.
   2. A coupling guard shall enclose the entire rotating coupling assembly.

H. Base: Pump units shall be mounted on heavy steel drip rim bases with drain connection.
   1. Pumps shall be mounted to bases using cap screws. Pumps shall not be secured using floor studs.

I. Motors shall be supplied in accordance with the NEMA Premium Efficiency standard.
   1. Motors shall meet IP-23 standards for drip-proof WP-1 (weather protected) enclosures.
   2. Motors shall have a five (5) year manufacturer's warranty.
   3. Pump shall be close-coupled to a 3 phase, 60 Hertz, 480-volt horizontal open drip-proof motor with 1.15 service factor. 40°C ambient.
   4. Motors shall be designed for Class B temperature rise with Class F insulation.
   5. Motor shall be sized to operate continuously without exceeding the horsepower rating specified regardless of flow and head, throughout the entire range of operation.
   6. Each motor 10 horsepower or greater shall be equipped with a thermal device to protect the motor from overheating during operation.
      a. The thermal device shall be a normally closed contact that shall open in the event of excessive motor heat buildup.
   7. Motors shall be inverter duty for use with variable speed drives.
   8. Provide a shaft grounding ring as manufactured by Aegis or approved equal, on the drive end and a ceramic ball bearing on the non-drive end of the motor shaft.

J. Noise: Each pump shall be capable of continuous operation without producing noise in excess of Hydraulic Institute and OSHA guidelines.

2.02 SPARE PARTS

A. A complete replacement pump shaft seal assembly shall be furnished for each pump provided. The spare seal container shall include complete installation instructions.

2.03 PRESSURE GAUGES

A. Pressure gauges shall be 2-1/2" diameter, with petcock.
   1. Pressure gauges shall be installed on each pump suction and discharge line.
   2. Gauges shall be equipped with snubbers.
   3. Pressure range for discharge gauges shall be coordinated with the respective pump shut-off head.
   4. Suction gauges shall be 0- 15 PSI.
   5. Gauges shall be graduated in 2-psi increments.
   6. Accuracy shall be within 1.5 percent of gauge range.

PART 3 EXECUTION

3.01 INSTALLATION

A. Construct concrete base as required. Imbed anchor bolts. Set anchor bolts with pump manufacturer's templates.

B. Install all pump baseplates on a concrete pad as detailed in the drawings and anchor with bolts per the manufacturer's requirements. Grout baseplate to pad.

C. All pumps shall be installed with bellows type expansion fittings on either the suction or discharge piping of each pump, whether or not indicated on the drawings, to facilitate ease of alignment.

3.02 FIELD TESTING

A. During the tests, observe head, capacity, motor input, pump vibration, alignment, and general performance and fitness.
   1. Repair or replace defective equipment and repeat tests until satisfactory results are achieved.
   2. Adjust or replace equipment to achieve indicated performance.

B. The manufacturer's representative shall be present during the period of the field tests. The cost of this supervision shall be part of the work under this section.

C. The Contractor shall submit a certificate from the equipment manufacturer stating that the installation of the equipment is satisfactory, that the equipment is ready for operation, and that the operating personnel have been instructed in the operation and maintenance of each unit.

3.03 STARTUP

A. Retain the services of a factory-authorized service representative to inspect installation, supervise pre-start-up and final performance tests as specified in Section 01650, Facility Start-up.

B After 3 months of facility operation, a factory-authorized service representative shall return to check and readjust, if necessary, the pump alignments at no additional cost to the Owner.

3.04 TRAINING

A. Provide the services of a factory-authorized service representative for training of Owner's maintenance personnel in proper operation, servicing, and maintenance of equipment.
   1. Allow 4 hours for training.
   2. Conduct training separate from, and after the start-up.

3.05 WARRANTY

A. The equipment supplier shall warrant his equipment for a period of one (1) year after Substantial Completion by the Owner. The contractor will be responsible for providing the pump manufacturer with a specific date associated with startup.

END OF SECTION

SECTION 11216

SUBMERSIBLE WELL PUMPS

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide submersible well pump and appurtenances as required by the Contract Documents.
   1. In general the work consists of providing a submersible well pump, submersible motor, column pipe, check valve, and appurtenances as required for installation on the existing pitless adaptor at both well locations.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 13100 Instrumentation and Controls
   2. Division 16 Electrical

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Operating and Maintenance Manuals: Include manufacturer's instructions for equipment installation, start-up, operation, and maintenance, including parts lists for operation and maintenance manuals specified in Division 1.

C. Shop Drawings: Include illustrations, dimensions, materials, performance and wiring diagrams, and pump curves.

D. Certified Performance Test Reports: Submit certified performance test report specified in paragraph 2.02 - Source Quality Control of this Section.

E The equipment to be furnished under this section shall be coordinated with all applicable structural and mechanical process drawings, including addenda.
   1. If no changes are required, provide a statement that no changes are required.
   2. If changes are required, furnish marked up drawings or statement detailing the modifications necessary for the equipment proposed.
   3. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

F. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
   1. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.

2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.04 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
1. Manufacturer shall have a minimum of five years experience producing substantially similar equipment to that specified in this Section and shall be able to document at least five installations in satisfactory operation for at least five years.
2. The manufacturer shall have the following certifications: ISO 9001, ISO 14001 and OSHAS 18001.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store pumps on site according to pump and motor manufacturer's recommendations.

PART 2 PRODUCTS

2.01 SUBMERSIBLE WELL PUMP

A General:
1. Unless otherwise stated in this Section, the pump shall in all respects conform to ANSI/AWWA-E101 for Vertical Turbine Pumps, Lineshaft and Submersible Types, and be in compliance with all Local and State sanitary and safety regulations.
2. The pumps may either be of cast iron or all stainless steel construction. However, pump selection shall be either both cast iron, or both stainless steel, and of the same manufacturer.
3. Maximum Pump Intake Elevation at both well locations shall be 113 feet. See detail on Contract Drawing No. 99-C-2.

B. Design Conditions:
1. For bidding purposes, both pumps shall be based on the following design criteria

a. For cast iron pumps:

Horse Power	Design Flow (gpm)	Design Head (feet)	Design Efficiency (%)	Shutoff Head (feet)	Run-out Flow (gpm)	Run-out Head (feet)
15	700	66	81	98	980	30

b. For stainless steel pumps:

Horse Power	Design Flow (gpm)	Design Head (feet)	Design Efficiency (%)	Shutoff Head (feet)	Run-out Flow (gpm)	Run-out Head (feet)
15	700	60	79	101	1200	30

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following:
1. Goulds
2. Floway
3. Franklin

D. Stainless Steel Pumps:
1. Pump Assembly:

a.	Discharge Head	Stainless Steel–ASTM CF-8 (AISI 304 cast)
b.	Check Valve Support	Stainless Steel–ASTM CF-8 (AISI 304 cast)
c.	Check Valve	Stainless Steel–AISI 304 SS
d.	Elastomers	EPDM
e.	Bolt and Screws	Stainless Steel–AISI 304 SS
f.	Shaft Sleeve and Bushing	Tungsten Carbide
g.	Thrust Bearing	PTFE and Graphite
h.	Impeller	Stainless Steel–AISI 304 SS
i.	Diffuser	Stainless Steel–AISI 304 SS
j.	Spacer	Stainless Steel–AISI 431 SS
k.	Tie Rod	Stainless Steel–AISI 304 SS
l.	Cable Guard	Stainless Steel–AISI 304 SS
m.	Wear rings	Technopolymer PPO
n.	Strainer	Stainless Steel–AISI 304 SS
o.	Shaft	Stainless Steel–AISI 431 SS
p.	Shaft Coupling	Stainless Steel–AISI 431 SS
q.	Motor Adaptor	Stainless Steel–ASTM CF-8 (AISI 304 cast)

2. Submersible Motors
   a. Power requirements: 3 phase, 60 Hertz, 480 Volts.
   b. RPM: 1800
   c. Horsepower: As indicated above
   d. Service factor: 1.15
   e. Stainless steel
   f. Diameter: 6-inch
   g. Shaft: Stainless steel
   h. Windings: Wet type
   i. Copper bar rotor.
   j. Integral motor lead.
   k. Motor rating shall be selected so that the load at design is not greater than a rating of 1.0 service factor.
      1) A no point on the curve shall the load exceed that rating by more than 10 percent.
   l. Motor thrust bearings shall carry the weight of rotating parts, plus the hydraulic thrust of the pump unit.
   m. Motor shall be compatible with variable frequency drive. Coordinate overcurrent settings with electrical contractor.

E. Cast Iron Pumps:
1. Pump Bowl Assembly and Shafting
   a. Close grained cast iron, ASTM A48 Class 30.
   b. Bowl interiors and exteriors shall have a factory-applied NSF certified drinking water coating.

c. Impellers:
   1) Semi-open or closed type
   2) Bronze certified to NSF 61-G/NSF 372 Standards, or 316 stainless steel ASTM A744 Grade CF-8M.
   3) Statically and dynamically balanced.
   4) Secured to the shaft with stainless steel taper locks collets.
d. Intermediate bowl bearings.
e. Pump shaft shall be stainless steel and supported by bronze bearings.
f. The size of the shaft shall be no less than that determined by ANSI/AWWA Specification E101, Section A4.3 paragraph 4.3.3.
g. Motor coupling shall be stainless steel splined to fit the motor shaft.
h. Shaft shall be fitted with an upthrust collar.

2. Motor Adapter
   a. Close grained cast iron with rabbeted fits to connect the submersible motor to the bowl assemblies.
   b. Shall include motor adaptor bearing assembly.
   c. Stainless steel strainer whose free area shall be at least three (3) times the impeller suction eye area.
   d. Maximum strainer opening shall not be more than 75 percent of the minimum opening or water passage through the bowl or impeller.

3. Submersible Motors
   a. Power requirements: 3 phase, 60 Hertz, 480 Volts.
   b. RPM: 1800
   c. Service factor: 1.15
   d. Shaft: Stainless steel
   e. Windings: Wet type
   f. Copper bar rotor.
   g. Integral motor lead.
   h. Motor rating shall be selected so that the load at design is not greater than a rating of 1.0 service factor and at no point on the curve shall the load exceed that rating by more than 10 percent.
   i. Motor thrust bearings shall carry the weight of rotating parts, plus the hydraulic thrust of the pump unit.
   j. Motor shall be compatible with soft start. Coordinate overcurrent settings with electrical contractor.

F. Riser Pipe

1.	Diameter	10 inch
2.	Section Length	Not to exceed 10 feet
3.	Type	Threaded (NPT)
4.	Material	Conforming to ASTM A53 Grade B.

G. Column Check

1.	Size: 10-inch (same as riser pipe).	
2.	Threaded female x female connections.	
3.	Body:	Ductile Iron (ASTM A536)
4.	Disc	Ductile Iron (ASTM A536)
5.	Seal	Buna-N
6.	Follower	Ductile Iron (ASTM A536)
7.	Poppet Assembly Bolt/Nut	18-8 Stainless Steel

8.	Spring	18-8 Stainless Steel
9.	Finish	Painted with NSF certified drinking water coating

H. Submersible Power Cable:
1. Single cable assembly with three conductors plus ground conductor.
2. Size cable as required for the motor according to the National Electrical Code voltage drop requirements.
3. Insulate each conductor with rubber or plastic suitable for continuous immersion in water.
4. Protect cable with a guard where it passes the bowl assembly to prevent damage from contact with the well casing.
5. Provide water-resistant plastic coated cable straps or tape to support the cable at maximum intervals of 20-foot along the riser pipe.
6. Power cable shall be connected from pump motor lead to junction box at top of well casing.
7. Only splice allowed is between the motor lead and the junction box.

I. Flow Inducer Sleeves:
1. Furnish PVC flow inducer sleeves on each pump/motor assembly.

2.02 SOURCE QUALITY CONTROL

A. Perform factory tests to certify that pumps meet the specified requirements for efficiency, head and capacity, and are within vibration limits. Testing shall conform to ANSI/HI 14.6 grade 1U. Test results shall be certified and stamped by a professional engineer. Test results shall be sent to the Engineer for approval. No pumps shall be shipped prior to approval of the Engineer.

PART 3 EXECUTION

3.01 INSTALLATION OF SUBMERSIBLE PUMP

A. The submersible pumps are to form complete pumping units and shall be installed in accordance with the manufacturer's instructions.

B. Install the level transducer specified (under Section 13100 – Instrumentation and Control). Do not secure transducer and/or cable to pump column pipe or motor cable so as to allow removal. Bottom of transducer is to be set one (1) foot above pump intake.

3.02 TESTING

A. After the submersible pump has been installed and connected, and after inspection, operation and adjustment has been completed by the manufacturer's representative, the pump shall be field tested in the presence of the Engineer for the service specified.
1. Results of these tests shall be submitted to the Engineer.

B. If the capacity or efficiency of the submersible pump unit under the design pumping heads fail to deliver the design requirements, the Contractor shall, at his own expense, upon written request of the Engineer, replace the motor, impellers or other parts, or otherwise improve the units until the capacity and efficiency requirements are fulfilled.

3.03 DISINFECTION

A. Upon completion of the submersible pump installation, the well shall be disinfected with chlorine and completely flushed in accordance with AWWA C654 Standards for Disinfection of Wells. The Contractor shall take samples to a State certified laboratory and provide results that certify each well is free of bacteria and chlorine.

B. Water pumped from the wells during the work shall be disposed of in an approved manner. Chlorinated water shall be neutralized completely with sodium thiosulfate. The method of neutralization shall be approved by the Engineer. An appropriate stilling/neutralization basin shall be used to prevent damage to the ground surface and for conditioning the wastewater as necessary.

END OF SECTION

SECTION 11240

HORIZONTAL GREENSANDPLUS FILTERS

PART 1 GENERAL

1.01 SUMMARY

A. This section of the specification covers all labor, materials and equipment required to furnish, deliver, install, and test a fully automatic pressure type iron and manganese removal filtration system, complete and operable, as indicated on the drawings and as specified herein.

B. The equipment and process operational description specified herein is based on a pressure filtration system using GreensandPlus media which was piloted on-site and approved by the Massachusetts Department of Environmental Protection (MADEP).

C. The process drawings were developed from standard filter design drawings furnished by Hungerford & Terry, Inc. However, the Contractor shall be responsible to field verify all required piping connections prior to ordering the interconnecting piping and appurtenances to assure that no production modifications were made. No additional compensation will be made for changes in piping associated with the Contractor not having field verified connection locations. No additional compensation will be made for alternative equipment requiring a change in the design of the facility. The Contractor will be responsible for additional design or design review costs incurred by the Owner.

D. The filter system shall include the following elements and be supplied by one manufacturer:
1. Three (3) 10-foot diameter horizontal filter vessels
2. Underdrain
3. Inlet Distributor/Backwash Collector
4. Air Wash Distributor
5. Gravel Retaining Screen
6. Support Gravel
7. Filter Media
8. Manway Access Platforms
9. Control Valves
10. Isolation Valves
11. Accessories
12. Filter Control Panel
13. (3) Induvial Remote I/O Panels Assigned to Each Filter
14. Filter Face and Connecting Piping
15. Air Backwash Blower
16. Air Backwash System Valves and Piping
17. Instrumentation and Controls
18. Start-up and Training

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The following items are a part of the contract work but are specified elsewhere herein:
1. Concrete work is specified under Division 3.
2. Electrical work specified under Division 16.
3. Painting is specified under Division 9.

4. Process Piping and Valves are specified under Division 15.
5. Pumps are specified under Division 11.
6. Instrumentation and Control is specified under Section 13100.

1.03 QUALITY ASSURANCE

A. The equipment specified shall be the product of a company experienced in the design and manufacture of iron and manganese pressure filtration systems. The minimum acceptable qualifications shall be ten (10) years of continuous manufacturing of vertical pressure filter systems, have at least ten (10) similar installations, and a minimum five (5) installations operating at a filter loading rate equal to or higher than the filter loading rate specified. This list shall also include location, customer with contact person and phone number, unit size, capacity in GPM, and year installed.

B. The filter system shall be furnished by a single manufacturer, as supplied by Hungerford and Terry, Inc., Clayton, N.J., Roberts Filter Group, Media, PA., Refinite Water Conditioning Company, Inc., Rock Hill, SC, Tonka Equipment Company, Plymouth, MN, or approved equal. Suppliers, other than the above specifically named, shall submit for examination detailed drawings and specifications of their system and suitable evidence of their experience to obtain approval.

C. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.04 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
1. A current copy of the equipment supplier's ASME Certification of Authorization.
2. Code calculations for the pressure vessel(s) in accordance with ASME Section VIII, Division 1.
3. Catalog cut sheets for all filter internals including media.
4. Elevation drawing for filter internals including media loading schedule.
5. Catalog cut sheets for all control valves, actuators, manual valves, instrumentation, control components, and all other equipment items included.
6. Materials of construction for all major components, surface preparation and painting.
7. Elevation and plan views including general arrangement drawings of the filter system, including the location and orientation of all nozzles, manways, and connections.
8. P&ID showing all components of the filter system and all ancillary equipment being provided and/or controlled by the Filter Control Panel PLC.
9. Instrumentation & Control documentation, including Electrical Component Catalog Cut Sheets, Control System Description, HMI Graphics Screens, Electrical Schematic drawings, Control Panel layout drawings.
10. Operation and maintenance manuals.

B. The equipment to be furnished under this section shall be coordinated with all applicable structural and mechanical process drawings, including addenda.
1. If no changes are required, provide a statement that no changes are required.

2. If changes are required, furnish marked up drawings or statement detailing the modifications necessary for the equipment proposed.
3. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

C. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
1. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

D. The Operation and Maintenance Manuals shall include:
1. Manufacturer's instructions for equipment installation, startup, operation, preventive maintenance, servicing, and troubleshooting procedures.
2. ASME Form U-1A Manufacturer's Data Report for each vessel.
3. Filter system data sheets, control panel wiring, process logic control, etc. and final as-built drawings of all equipment.
4. Name, address, and telephone number of factory service technician.
5. Media data sheets including support gravel type and gradations, and quantities and depths per filter cell.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store filter vessels, media, valves, piping, and ancillary components on site according to manufacturer's recommendations.

PART 2 PRODUCTS

2.01 BABA CLASSIFICATION

A. The Horizontal GreensandPlus Filters shall be classified as one complete and single "manufactured product" as it relates to Build America Buy America (BABA) Act compliance defined in Specification Section 00820G. The list of products below shall be considered "components" of this manufactured product as it relates to BABA compliance.

2.02 HORIZONTAL PRESSURE FILTRATION SYSTEM

A. In order to maintain the highest quality control, the supplier and manufacturer shall be one and the same. The pressure filtration system shall be manufactured and assembled by the supplier in his own manufacturing facility.

B. Pressure vessels shall be fabricated in a shop that holds an ASME "U" Stamp. Equipment supplier shall submit a copy of his ASME Certificate of Authorization.

C. Welding of the vessel and internals shall be performed by welders qualified in accordance with the latest ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications.

D. The equipment specified herein shall be provided as a package by a single manufacturer/supplier.

E. If the General Contractor proposes alternate "or equal" units, the General Contractor shall be solely responsible for all costs and work relative to the redesign and construction of any and all piping systems, structural design and analysis of the concrete foundations due to different loadings, and any other changes that are required due to the design and/or construction changes.

F. The operating requirements of the vertical pressure filtration system shall meet the following guidelines:

1. The filter system shall consist of three (3) 10-foot diameter, 31-foot straight shell length horizontal pressure filters.
2. Based on the following piloted influent water quality:
   Manganese – 0.92 mg/L
   Iron – < 0.30 mg/L
   pH – 7.5 (adjusted)
   Alkalinity – 31 mg/l as $CaCO_3$
   The filters shall successfully treat a filter loading rate of 2.25 GPM/ft^2 when operated at the design water flow rate of 1390 GPM (2 filters in service).
3. Provided that the continuous chlorine dose is properly set to oxidize all dissolved iron and manganese, the system shall produce filtrate with the following quality:
   Manganese - less than 0.05 mg/l
   Iron - less than 0.1 mg/l
4. The filter run length must be at least 24 hours long between backwashing cycles at all times while achieving the effluent iron and manganese concentrations established by 2.02.F.3.
5. The operating weight of each filter, including face piping, shall be approximately 300,000 pounds.

2.03 VESSELS

A. The General Contractor shall provide and install a complete horizontal pressure filter system as shown on the plans.

1. Each filter shall be 10' diameter by 31' straight shell.
2. The filter tanks shall be of welded steel construction using SA-516 Grade 70 steel, and shall be tested to withstand a hydrostatic pressure 30% in excess of the designed working pressure of 100 psi. The tanks shall be ASME code section VIII construction with stamp.
3. Vessel design and manufacturing shall be in accordance with the latest Edition and Addenda of the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. All pressure retaining parts will be constructed of Pressure Vessel Quality materials.
4. The filter tank shall be of the "three cell" design, with steel plate and support beams separating the three compartments. A common underdrain plate shall be welded into the bottom of the vessel, drilled and tapped to receive the sand valve distributors.

5. The heads shall be ASME 2:1 elliptical and shall not be less than 1/4" thick steel and the shell walls shall not be less than 1/4" thick steel.
6. Each tank shall be furnished with two (2) structural steel saddles to support the total operating weight of the filter. Each tank shall be furnished with four (4) 14"x 18" manways, one for each cell and a manway in the lower portion of the vessel. For tanks that utilize concrete-filled bottoms, only three of the above referenced hatches shall be furnished, one for each cell. Each tank shall be provided with a sufficient number of lifting lugs designed to support the entire weight of the filter assembly.
7. One (1) standard company nameplate containing vessel identification and one (1) ASME nameplate containing the ASME Code Stamp shall be located on the vessel shell on those vessels required to be ASME certified.
8. All flange bolt holes shall straddle major vessel centerlines. This applies to all interior and exterior flanges.
9. The vessel(s) and face piping shall have surfaces prepared and coated with the surface preparation and coating described later in this specification.

B. Filter Underdrain System. The filter underdrain system shall be common to all three filter compartments.
1. The underdrain system shall consist of either of the following designed to uniformly distribute the backwash water and evenly collect the filtered water:
   a. A fully supported bottom plate with 1" drilled and tapped openings.
   b. A header lateral of Sch. 80 PVC construction with concrete fill to the bottom of the sand valves.
2. Each drilled and tapped opening shall receive 5" square stainless steel sand valve assemblies as manufactured by Hungerford & Terry, Inc., Clayton, NJ, or approved equal.
3. The sand valve distributors are of the non-clogging design with a horizontal discharge.
4. Well screen or strainer assemblies are not acceptable.
5. The underdrain systems are to be installed by the Filter Manufacturer prior to shipment.

C. Influent Distribution and Wash Water Collection. Each filter compartment shall receive its own inlet distributor/backwash collector of the header/lateral design. The distributors shall be fabricated from Sch. 10 316 stainless steel..
1. The distributor manifold shall be an integral part of the filter vessel.
2. The three (3) 8" manifolds shall each receive eight (8) lateral arms of 3" pipe, with 2" diameter orifice holes on 6" centers, to uniformly distribute the inlet flow and evenly collect the backwash water discharge flow.
3. The inlet distributors/backwash collector shall be completely installed by the Filter Manufacturer prior to shipment.
4. Baffle plate distributors are not acceptable.

D. Air Wash Distributor. Each filter compartment shall receive its own air wash distributor of the header/lateral design.
1. The air wash distributors within the filter tank shall be fabricated from Sch. 40, #316 stainless steel pipe with 150 lb., #316 stainless steel threaded fittings and flanges.
2. The 3" pipe connecting each air wash manifold shall be an integral part of the filter vessel.

3. Each distributor shall consist of a 3" stainless steel manifold with 3/8" slotted stainless steel threaded and capped laterals, spaced to provide uniform air distribution.
4. The air wash distributor shall be firmly supported from the gravel retaining screen using a 1" stainless steel support pipe and stainless steel U-bolts.
5. Each lateral shall have a series slotted openings by first milling a longitudinal slot, every 3.5 inches, approximately 1" long and 1/50" in width, two thirds (2/3) of the way through the side wall of the lateral.
6. An orifice, 1/8" long and slightly less than 1/50" in width, shall be punched through the remainder of the sidewall.
7. The end of each lateral shall receive one 1/16" diameter hole as low as possible in the cap.
8. The air wash distributors are to be field installed by the Contractor.
9. The slotted openings of the air wash laterals must face downward.

E. Gravel Retaining Screen. Each filter compartment shall be supplied with a gravel retaining screen.
1. The screen shall be installed at the intersection between the top of the graded gravel bed and the start of the GreensandPlus.
2. The gravel retaining screen shall help to prevent an upset to the graded gravel bed.
3. The gravel retaining screen assembly shall consist of all necessary stainless steel cross angles and flats and 3/8" Nelson pointed stainless steel studs welded around the interior of the filter vessel at the proper level.
4. The various cross angles shall be affixed with stainless steel clips to support the air wash distributor manifold and laterals.
5. All cross angles are to be 2" x 2" x 1/4" angles, cut to the proper length with the Nelson pointed studs welded on 12" centers and an associate flat to secure the screen.
6. The cross angle support spacing shall be approximately 16" and provide a rigid retaining screen assembly.
7. The screen shall consist of #304 stainless steel, No. 8 x No. 8 mesh size with a wire diameter of 0.028".
8. The screen shall be cut to the proper lengths and must be installed so the lap between the screen sections runs parallel with angle supports.
9. All fasteners shall be #304 stainless steel.
10. The gravel retaining screen assemblies are to be field installed by the Contractor.

F. Surface Preparation and Painting
1. All paints, coatings, and sealants in contact with potable water shall be NSF-approved for potable water.
2. The interior and exterior of the filter vessels shall be thoroughly cleaned of loose mill scale, rust, weld slag, weld splatter and grease.
3. Tank exteriors are to be commercial sandblasted per SSPC-SP6, and painted with one (1) shop coat (3 - 5 mils DFT) of Tnemec 66-1211 primer. The General Contractor shall touch up any damage occurring during shipment and installation.
4. Tank interiors are to be near white metal sandblasted per SSPC-SP10 and lined with a Tnemec Series 21 polyamidoamine epoxy potable water tank coating system consisting of the following:
   a. One (1) coat (3.0 - 5.0 mils DFT) of Tnemec #N140-1211 Pota-Pox primer.
   b. One (1) coat (4.0 - 6.0 mils DFT) of Tnemec #N140-1255 Pota-Pox intermediate.
   c. One (1) coat (4.0 - 6.0 mils DFT) of Tnemec #N140-15BL Pota-Pox finish.

Coating shall be applied and cured in strict accordance with the manufacturer's instructions. All interior surfaces of the vessels shall be primed and finish painted, including the underside of the underdrain plate and all removable covers. The internal coating shall be carried through all vessel nozzles and penetrations and onto flange face.

5. All other equipment shall be furnished with manufacturer's standard finish paint.

2.04 FILTER MEDIA

A. GreensandPlus: Each filter compartment shall be provided with enough material for a 24" bed depth of filtration media.

1. The GreensandPlus shall be processed from a naturally occurring silica sand substrate to which a manganese dioxide coating is fusion bonded prior to shipment.
2. The GreensandPlus shall bear the WQA Gold Seal Certification for compliance with NSF/ANSI-61 and shall meet the following criteria:

Specific Gravity	approx. 2.4
Effective Size	0.30 - 0.35 mm
Uniformity Coefficient	less than 1.6
Screen Grading	18 x 60 mesh

3. GreensandPlus shall be loaded into the filters, backwashed, skimmed and conditioned in accordance with the filter manufacturer's recommendations.
   a. GreensandPlus fines must be removed from the filter prior to loading the anthracite to avoid excessive pressure drop.

B. Anthracite: Each filter compartment shall be provided with enough material for a 12" bed depth of specially graded anthracite.

1. The anthracite shall meet the following criteria:

Specific Gravity	approx. 1.6
Effective Size	0.6 - 0.8 mm
Uniformity Coefficient	less than 1.6

2. The anthracite shall be in compliance with NSF/ANSI-61.

C. The total GreensandPlus and Anthracite bed depth shall total 36 inches.

1. All filtration media shall be shipped in bags, palletized and stretch wrapped.
2. All filter media is to be field installed by the general contractor.

D. Gravel Support Bed: A graded gravel support bed shall be incorporated in the bottom of each filter cell, consisting of five (5) layers of graded gravel, with the largest size gravel loaded into the filter first and the succeeding smaller sizes placed on top.

2. The gravel graduations shall be as follows:

1/8" x 1/16"	(4) inches
1/4" x 1/8"	(4) inches
1/2" x 1/4"	(2) inches
3/4" x 1/2"	(2) inches
1-1/2" x 3/4"	(4) inches

3. The gravel shall be washed and screened and shipped in clearly marked fifty (50#) pound bags.
4. The gravel must meet the requirements of the American Water Works Association (AWWA) Specification number B-100-96 and in compliance with NSF/ANSI-61.

E. Filter media is to be defined as “not an integral part of the structure or permanently affixed to the infrastructure project” as described in the Office of Management and Budget’s Memorandum M-22-11 and therefore not required to comply with the BABA requirements defined in Specification Section 00820G.

2.05 MANWAY ACCESS PLATFORMS

A. Design and provide two (2) GreensandPlus platforms and ladders as shown on Drawings and as specified herein. The design and platforms shall meet the following requirements:
   1. Coordinate the layout of grating panels with work of this and other sections to provide openings for approved structural columns, mechanical equipment, and other items which require penetrations or openings in the grating.
   2. Platforms, supports, and ladders to meet local and state structural and building code, and shall be designed and stamped by a registered Massachusetts structural engineer.
   3. Shall be rated for a 100 PSF live load plus equipment weight.
   4. The grating shall be designed to be supported from clips or "L" channels welded onto the side of the filter vessels.
      a. The clips or "L" channels shall be welded to the filter side shell during vessel fabrication.
   5. Shall be designed so that the upper manway of each filter compartment is accessible from the platform with a general layout as shown on the Drawings.
   6. Anticipated platform location, dimensions and elevations are indicated on the Drawings. The exact locations, dimensions, elevations, and clearances of the platforms shall be coordinated with and approved by the Owner and Engineer prior to fabrication. Every reasonable effort shall be made to minimize the number of vertical supports required, to minimize obstruction to the first floor process area. Any changes to the design shall be incorporated by the Contractor at no additional cost to the Owner.

B. Platforms shall include guardrails around the exterior perimeter of the grating platform to a height of 3’-6” above the platform, or as required by State Building Code, with a 4-inch high kickplate.

C. Platforms fasteners shall be Type 316 stainless steel.

D. The grating shall be fabricated from a non-corrosive fiberglass designed to withstand the weight of a pallet for media loading. See FRP grating specifications in Section 06610 for grating requirements.

E. The upper manways in each of the filter compartments shall be made accessible from the grating platforms.

F. Access Ladders shall be provided for each platform. The access ladder shall be in accordance with Specification Section 06610 (Fiberglass Fabrications).

G. The Filter Manufacturer shall furnish all of the grating and grating supports for installation by the general contractor.

2.06 PIPING AND FITTINGS

A. Filter Face Piping and Fittings. The piping shall be arranged to carry out all the operations of filtering and backwashing, including source water inlet, effluent distribution and distribution to spent backwash tank.

1. Piping to the furnished by the filter manufacturer shall be as noted on the drawings.
2. All piping 6" diameter and larger shall be cement lined, flanged ductile iron in accordance with specification Section 15100 – Ductile Iron Pipe, Fittings, and Appurtenances.
3. All piping 4" diameter and smaller shall be stainless steel as specified under Sections 15106 and 15107 – Stainless Steel Pipe.
4. Provide unions or flanged joints on all piping to allow disassembly as needed to service valves and equipment located in the piping.
   a. Unions less than three (3) inches shall be 3-piece unions with O-ring seal.

2.07 VALVES

A. All valves necessary for the operation of the equipment shall be provided, and shall be as specified under Section 15110 – Valves and Appurtenances. These shall include as a minimum per vessel:

SIZE	QUANTITY	FUNCTION	TYPE
8”	3	Influent	Motor operated butterfly
10"	1	Effluent	Motor operated butterfly
10”	1	Backwash	Motor operated butterfly
8"	3	Backwash Outlet	Motor operated butterfly
10”	1	Rinse	Motor operated butterfly
4"	1	Air Pressurizing	Motor operated butterfly
3"	3	Air Scour Inlet	Motor operated butterfly

B. The following manual valves shall be provided for unit isolation and/or flow control per vessel.

SIZE	QUANTITY	FUNCTION	TYPE
10"	1	Inlet isolation	Butterfly w/manual gear operator
10"	1	Effluent Isolation	Butterfly w/manual gear operator
10"	1	Waste Isolation	Butterfly w/manual gear operator
10"	1	Rinse Rate Set	Butterfly w/manual gear operator
10”	1	Backwash isolation	Butterfly w/manual gear operator

C. An appropriately sized combination air/vacuum valve shall be furnished on the top of each pressure vessel.
   1. Drain piping and a manual isolation valve shall be supplied for each valve.

D. All vessels shall be provided with a manual drain valve with appropriate pipe and fittings.

E. All valves shall be tagged with an identifying number that corresponds to the valve number on the filter system manufacturer’s P&ID.
   1. Tags shall be anodized aluminum and attached to the valve/actuator with stainless steel chain.

2.08 AIR BLOWER

A. The manufacturer shall provide a positive displacement air blower for supplement air wash, with a minimum capacity of 207 SCFM at 8 psi discharge pressure, Dresser Industries Roots Model No. 45URAI, or equal.
   1. The blower shall have a V-belt drive with coupling guard and a 15 HP, 1800 RPM 3-Phase, 60 Hz, TEFC motor suitable for 480-volt service, all mounted on a steel base plate.
   2. The blower shall be equipped with flexible air discharge connections, inlet and outlet filter-silencer, 2-1/2" stainless steel discharge check valve, weight loaded relief valve, and 1/2" stainless steel drain valve.

2.09 ACCESSORIES

A. Each filter shall be provided with the following accessory items:
   1. One automatic air and vacuum relief valve with isolation valve, and drain piping as portrayed on the contract drawings.
   2. Three (3) magnetic flow meters shall be furnished, one for each filter for monitoring of the filter flow.
      a. The magnetic flow meters shall be as specified and shall be of the same manufacturer as the meter being furnished under Section 13100 – Instrumentation and Controls.
      b. The filter flow meters shall be 10" and furnished with remote indicator/transmitter with brackets to allow pipe flange mounting or mounting to the pressure gauge assembly board noted below.
   3. 5 sample ports: filter inlet, immediately above the filter media, filter outlet, between the anthracite and greensandplus bed, and middle of greensandplus bed.
      a. The tank sidewall sample ports shall be located within easy reach near the rear of the filters.
      b. Sample ports shall be equipped with ball-type isolation valves near the tap and terminate with a miniature Male x Barb PVC ball valves located 4 feet above the finished floor.
   4. Pressure Gauge Assemblies: The inlet and outlet connections on each filter shall include a pressure gauge assembly consisting of inlet and outlet pressure gauges and necessary isolating and sample valves mounted on a common corrosion-resistant backboard located at the front of each filter (face piping side).
      a. Each pressure gauge shall be clearly identified as "Influent" or "Effluent."
      b. The pressure gauges shall be Ashcroft model 45-1279-AS-02L with 4-1/2" dials, stainless steel bourdon tubes and 1/4" NPT stainless steel end connection or approved equal.
      c. Isolating valves shall be 1/4" brass needle valves and the sample valves shall be 1/4" stainless steel ball valves.

B. One differential pressure sensor shall be furnished and installed between the common inlet and outlet headers to the filters.
   1. The pressure sensor shall be as specified under Section 13100 – Instrumentation and Controls.

2.08. AUTOMATIC CONTROL

A. The filter control panel shall include all hardware and software as further described herein, to monitor and control the pressure filtration system.
   1. The filter control panel (FCP) shall be linked via Ethernet to the computerized SCADA main control panel that will monitor and control all other functions within the treatment facility.
   2. All control functions accessible from the FCP touch pad interface shall also be accessible via the SCADA workstation computer.
   3. The filtering system is to be fully automatic in its operation, with set point adjustability, automatic process control and alarm capability, and provide for operator manual override capability and visual monitoring.
   4. The FCP shall be provided by the filter manufacturer, who shall guarantee its operation.
   5. The FCP shall provide all necessary logic and time sequences to backwash the filter system automatically without operator intervention.
   6. The spent backwash tank high level switch shall be tied into the FCP for shutdown of backwash operations on high level.

B. The Filter Control Panel HMI shall be provided with a Backwash Control Screen from which the Operator may select one of three Backwash Modes. The Backwash Modes shall be Throughput, Time and Manual.
   1. By selecting the Throughput Mode, the backwash sequence shall automatically be initiated when a treated flow totalizer reaches the Operator assignable throughput set point. Upon initiating the filter backwash sequence, the treated flow totalizer shall be reset to zero and begin accumulating flow volume when the filer returns to service.
   2. By selecting the Time Mode, the backwash sequence shall automatically be initiated when the Operator assignable time of day set point. Subsequent Time mode backwashes shall be automatically initiated when the time of day reaches an Operator adjustable set point (i.e. :10 AM).
   3. By selecting the Manual Mode, the Operator shall initiate the backwash manually, then the backwash sequence shall run to completion automatically.

C. The Filter System shall be supplied with a differential pressure sensor across the filter which shall alert the Operator upon a high differential pressure condition.
   1. The Operator may then initiate a Manual Mode backwash.

H. Once initiated, the backwash sequence will backwash all vessels in the treatment train consecutively.
   1. When one filter is backwashing, the other filters will be locked out of the backwash sequence.
   2. The filter backwash sequence shall be interlocked with the level in the backwash supply tank via the SCADA system so that backwash is only permitted on the availability of backwash water.

I. The filter control panel shall be housed in a NEMA 4 enclosure, UL approved and labeled.

J. PLC shall be Allen-Bradley MicroLogix or CompactLogix, and supplied with appropriate power supply, discrete I/O and analog cards as required.

K. Operator interface HMI shall be a 10" color TFT Touch Screen Allen-Bradley PanelView Plus.
   1. All screens shall be provided to the SCADA integrator for display on the SCADA system.
   2. Operator Interface shall provide the following minimum graphic screens:
      a. Main Menu – provides navigation pushbuttons to allow the Operator to navigate to specific process graphics and controls.
      b. System Overview – provides complete filter system status including filter modes, process measurements, flow totalizer actual and target values, and valve and motor status.
      c. Vessel Detail Screen – provides all details associated with a single filter and allow further navigation to filter valve control screen.
      d. Vessel Valve Control Screen – provides vessel auto/manual selector and individual open/close selector switches for all vessel associated valves.
      e. System Status Screen – provides a summary of process measurements in digital indicator format.
      f. Backwash Control Screen – provides mode selector, backwash permissive indicator and backwash sequence status including filter in backwash, current backwash step description, step time remaining and step start, step stop and step advance pushbuttons.
         i. The screen shall also allow the operator to set a backwash rate setpoint that that will control the speed the backwash pump via the SCADA system.
      g. Set Point Screen – provide numeric entry popup keypads to allow Operator to enter desired set point. Operator entry of a zero set point shall result in a default set point created by the filter manufacturer.
      h. Alarm Screen – provides a summary of all acknowledged and unacknowledged alarm conditions.

L. The PLC Filter Control Panel shall be provided with UPS/surge protection sized to provide 30 minutes back-up power for the following:
   1. PLC, OIT, loop power supplies and control devices within the panel.
   2. Closing of the following motorized valves on each filter, if open, to prevent filter draindown and filling of spent backwash tank during a power outage:
      a. 8" backwash outlet
      b. 10" rinse

M. The FCP shall be mounted as shown on the plans.

N. All local/main disconnects, auxiliary contacts, transformers, motor starters, breakers and thermal overload protection, etc. is provided by others in an appropriate location. 120 VAC, single phase clean power shall be provided to the main control panel.
   1. All other wiring and inter-connecting wiring will be supplied by others.
   2. All motor-operated filter valves and magnetic flow meters shall have their 120V power furnished from the FCP.

O. All wiring and connections inside panels shall be properly marked with labeling and identification.
   1. All wiring shall be uniquely numbered to match the wiring designations shown on the Electrical Schematic drawing.

P. The PLC in the FCP will be linked to the MCP via Ethernet, and will allow the operator full monitoring and control of the filters including, but not limited to:
1. Individual filter flows, totalized flow, and hours of operation since backwashing.
2. Backwash/rinse flow indication and totalization (combined).
3. Filter status (on-line, backwashing, off-line).
4. Overall filtering system differential pressure.
5. Open/closed status of individual filter valves.
6. Initiation of backwash from the SCADA OWS.
7. Annunciation of all individual filter system operational alarms.
8. Backwash flow rate.

Q. The control panel will also accept the spent backwash tank high level float switch (LS-200) which will halt backwash operations and furnish an alarm to the WTP's SCADA system.

R. Each of the three (3) filters will be furnished with a remote I/O panel. Each panel shall consist of a NEMA 4, single-door type electrical control panel of ANSI 61 Grey painted steel construction complete with an Allen Bradley CompactLogix #1769-AENT Remote I/O Ethernet module with #1769 series I/O modules, and all required nameplates, Phoenix Contact #UT series terminal blocks, internal type "THHN" wire, Phoenix Contact 120AC surge suppressor, Phoenix Contact Ethernet surge suppressor, Phoenix Contact Quint series 24VDC power supply, Allen Bradley #700-HK36A1 interposing relays, C3 Controls door-mount disconnect switch, Panduit Type "G" gray/white wire duct, Phoenix Contact heat-shrink white wire sleeves, GFCI duplex receptacle, internal light kit, UL-508A label, and etc.

PART 3 EXECUTION

3.01 INSTALLATION

A. The General Contractor shall provide all field labor and equipment for installation of the filter system. The General Contractor shall unload, assemble and install the complete filtration system including the filter vessels, which includes piping, valves, instrumentation, accessories and any other equipment pertinent to the system. Electrical and mechanical connections to the equipment and any instruments or monitoring devices shall be provided by the Contractor as specified elsewhere.

B. The supervisory service of a factory trained service engineer, who is specifically trained on the equipment being provided, will be available for a period of three (3) cumulative 8 hour man days, during construction to assist the contractor or subcontractor with technical advice on the installation of the major components of the treatment equipment to include:
1. Proper setting of the interior piping.
2. Proper placement and conditioning of the filter media.
3. Advice on proper electrical valve sequence and methods of protecting all of the equipment prior to placing it into service.

C. Upon setting of filter vessels on top of equipment pad, the Contractor shall shim the base and pack with non-shrink grout to insure the vessels are level, and fully supported on the pad.

D. Upon completion of the installation, the services of the above service engineer will be available for a period of not less than three (3) 8-hour man days to check the completed installation, make any required adjustments, initiate a trial performance run, and place the

system in satisfactory operation for the performance test described in paragraph 3.07 below.

1. The service engineer/filter system supplier shall verify that all control/interlock functions of the filter control panel operate as specified and that all controls and communications with the SCADA system function as intended.
2. The service engineer/filter system supplier shall furnish a letter to the Owner stating that the installation is complete and is acceptable to the manufacturer. This indicates to the Owner that failure of the filter system to provide the specified filter performance is not due to faulty equipment or media installation, or inadequate/improper media conditioning (if required).

3.02 TESTING

A. Pressure Testing
   1. Pressure testing of the filters and face piping shall be performed in conjunction with testing of the all connecting piping, as specified under Section 15100 – Ductile Iron Pipe, Fittings, and Appurtenances.

3.03 APPROVAL

A. No form of energy shall be turned on to any part of the filtration system prior to receipt by the Engineer of a certified statement of approval of the installation from the Contractor containing his supplier's authorization for turning on energy to the system.
   1. The statement of approval shall also certify that the filter supplier has verified that all specified communications between the filter control panel and SCADA system as defined under Section 13100 – Instrumentation and Controls has been coordinated and tested with the SCADA integrator.

3.04 TRAINING

A. The manufacturer shall provide the services of the above service engineer for a period of not less than three (3) 8-hour man days for instructing the operating personnel.
   1. The training shall be conducted while the system is in satisfactory operation during the 7-day performance test described below.
   2. Contractor shall video record all training sessions and provide Owner with copy of all flash/thumb drives.

B. Contractor shall submit resume and qualifications/certifications of training personnel to Owner for approval 30 days in advance of commencement of training services.

C. In addition to the above training, Contractor shall provide the services of a fully qualified factory-trained representative to provide additional training of new Owner’s personnel, or to assist the operators in optimizing filter performance. Training shall consist of not less than three (3) separate 8-hour days, which can be requested at any time by Owner within one (1) year after acceptance of the equipment.

3.05 CLEAN UP

A. Prior to start-up and field testing, all foreign matter shall be removed from the filter, channels, and piping. Spillage of lubricants used in servicing the system shall be cleaned from all equipment and concrete surfaces.

B. Prior to the Owner taking "Substantial Completion" of the facility, the Contractor shall drain, and remove and dispose of all accumulated material from within the spent backwash tank in an approved manner.

3.06 DISINFECTION

A. At the conclusion of filter installation work, and as soon as water is available, each filter shall be thoroughly disinfected by chlorination at a concentration of 50 parts per million (ppm). All start-up and/or disinfection chemicals, etc. shall be provided and disposed of by the General Contractor.

3.07 PERFORMANCE TESTING

A. The General Contractor for the construction of the water treatment plant shall be required to conduct a 7-day performance test of the entire facility. This will only occur after all the requirements of paragraph 3.01 have been satisfied by the filter supplier.

B. Performance testing shall demonstrate conformance with the performance criteria specified under paragraph 2.01.

C. The filter system supplier shall provide the General Contractor with a contact name and telephone number to assist the Contractor with any problems that may occur during the performance test period.

D. Prior to the termination of the 7-day test period and as approved by the Owner, the filter system supplier shall take duplicate effluent water quality samples from each filter for iron and manganese analyses by an independent laboratory approved by the Owner.
   1. The costs for the analyses shall be borne by the filter supplier.
   2. Interim iron and manganese analyses will be performed by the Owner and the results forwarded to the General Contractor.
   3. The filter system supplier shall assist the General Contractor in modifying chemical feed dosages as may be required to achieve the specified effluent results.

E. Should the filter system fail to meet the required performance criteria and such failure is attributed to improper filter design and or installation of the filter system, all costs associated in correcting the deficiencies and reconducting of the 7-day performance test shall be borne by the filter supplier.

3.08 WARRANTY

A. The equipment supplier shall warrant his equipment for a period of one (1) year after Substantial Completion by the Owner. The Contractor will be responsible for providing the filter manufacturer with the specific date of the start of warranty.

3.09 SERVICE REQUIREMENTS

A. Prior to the end of the warranty period, the equipment supplier shall present in writing to the Owner, optional service agreements for one (1) year, three (3) years, and five (5) years.

END OF SECTION

SECTION 11300

LOADING DOCK EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work of this section includes all labor, materials and equipment required to furnish and install loading dock equipment as shown on the Drawings, specified herein and required to complete the work including, but not limited to:
   1. Edge of dock levelers.
   2. Dock bumpers.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Division 3 Concrete
   2. Section 05500 Metal Fabrications

1.03 SUBMITTALS

A. Product Data: For each product specified. Indicate unit dimensions, method of anchorage, and details of construction. Indicate materials and finish, installation details, roughing-in measurements, and operation of unit.

B. Shop Drawings:
   1. Indicate required opening dimensions, tolerances of opening dimensions, placement dimensions, and perimeter conditions of construction.
   2. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
   3. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.04 QUALITY ASSURANCE

A. Dock Levelers: Conform to requirements of ANSI MH30.1.

B. Manufacturer Qualifications:
   1. Specializing in manufacturing Products specified with 30 years' experience.
   2. Quality assurance improvement programs and ISO certified.
   3. Manufacturer must be associated with Loading Dock Equipment Manufacturers (LODEM) setting ANSI standards.
   4. Manufacturers welding procedure compliant with A.W.S.D1.1.

C. Installer Qualifications: Company specializing in performing the Work of this Section with minimum ten (10) years' experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards. Store materials within absolute limits for temperature and humidity recommended by manufacturer. Protect from damage.

B. Store products in manufacturer's labeled packaging until ready for installation.

1.06 WARRANTY

A. Warranty: Provide manufacturer's standard warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Blue Giant Equipment Corporation or approved equal.

2.02 MECHANICAL DOCK LEVELER

A. Edge-of-Dock (EOD) Series Dock Levelers.
   1. Type: Mechanical edge-of-dock, hinged dock leveler welded to 8 inches pour-in channel embedment within foundation dock face and furnished complete with wall mounted bumper blocks.
      a. Deck length includes 15-inch lip when extended.
      b. Model MDC7230M: (W x L) 72 x 27 inches
   2. Function:
      a. Vertical Travel: Working range up to 5 inches above and below dock level.
      b. Automatic Vertical Compensation: Float up to 5 inches above and below dock level.
      c. Lip Operation: Lip automatically extends as unit is lowered onto truck bed. Lip is returned to stored position upon truck's departure. Length of lip shall be minimum 15 inches overall length.
   3. Operation:
      a. Mechanical Model: Pulling removable comfort grip handle back raises spring-assisted deck to a vertical position. Pushing comfort grip handle forward lowers deck, and lip automatically extends.
   4. Rated Capacity:
      a. Welding procedure compliant with A.W.S.D1.1.
      b. Capacity: 30,000 lbs.
   5. Finish and Color:
      a. Unit painted grey.
   6. Warranty: Subject to standard limitations on liability. Consult manufacturer for full details on warranty information and product registration.

7. Standard Accessories:
   a. Night Locks.
   b. Lip: 15 inch long.
8. Dock Bumpers: Standard, two model DB13 laminated bumpers.
   a. Size (W x H x D): 14 x 10 x 4-1/2 inches. Bolt flange both sides.
9. Lip Extensions: Standard, 15 inch long lip.
10. Included Optional Features and Accessories:
    a. Pour-In Channel: 8 inch.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not proceed with installation until substrates are properly prepared and deviations from manufacturer's recommended tolerances corrected. Commencement of the installation constitutes acceptance of conditions.

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

C. If preparation is the responsibility of another installer, notify Architect, in writing, of deviations from manufacturer's recommended installation tolerances and conditions.

D. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.

3.02 INSTALLATION

A. Install products in prepared opening in accordance with manufacturer's instructions. Set square and level. Anchor unit securely, flush with dock. Weld back of dock leveler to pit frame. Touch-up welds with matching paint.

B. Install dock bumpers in accordance with manufacturer's instructions.

3.03 ADJUSTING

A. Adjust installed unit for smooth and balanced operation.

END OF SECTION

SECTION 11338

FLOATING DECANT ASSEMBLY

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide floating decant assembly as required by the Contract Documents.
   1. In general provide one (1) floating decant assembly for instalation in the spent backwash tank as shown on the Drawings.

1.02 RELATED WORK

A. Documents affecting the work of this Section include but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. For purposes of designating type and quality, the floating decant device as represented by Oil Skimmers, Inc. Model 3F360-4-316SS-2000 Series. Products of equal or better quality will be considered.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
   1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   2. Catalog cuts which show materials of construction, thickness of all materials, and details of construction.
   3. Plan and section views of hose and float assembly, and stainless steel guide cable installation, verifying that the unit will function under the typical range of between 1.5 feet and 9 feet without interferences.

C. The equipment to be furnished under this section shall be coordinated with all applicable structural drawings, including addenda.
   1. If no changes are required, provide a statement that no changes are required.
   2. If changes are required, furnish marked up drawings or statement detailing the modifications necessary for the equipment proposed.
   3. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

D. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
   1. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
   2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

PART 2 PRODUCTS

2.01 FLOATING DECANT ASSEMBLY

A. Provide one (1) floating decant assembly with the following attributes:
   1. Floats, weir, mesh screen, and support plates constructed of 316 stainless steel.
   2. Floats shall be fixed with center weir being adjustable to take more or lees of a cut of the water surface.
   3. Hydraulic capacity of 320 gpm.
   4. Provide 10-foot length of 4-inch elastomer polyurethane suction hose approved for use with potable water with NSF 61 Certification:
      a. Hose shall be vinyl-coated spring wire helix.
      b. Provide quick disconnect to connect skimmer to pump suction pipe.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the work of this Section in strict accordance with the manufacturer's recommendations as approved by the Engineer.

END OF SECTION

SECTION 11390

PFAS FILTER MEDIA

PART 1 GENERAL

1.01 DESCRIPTION:

A. Furnish, install, and test filter media as indicated and as specified, which was pilot tested and approved by MassDEP. No other filter media may be proposed for substitution.

1.02 RELATED WORK:

A. Documents affecting the work of this Section include but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.03 QUALITY ASSURANCE:

A. Contractor is responsible for coordinating the supply of materials and equipment specified herein. Coordination is required during submittals, construction, start-up, testing and training.

B. Furnish samples of filter media to the Engineer as follows:
   1. Samples furnished prior to shipment of materials to work site.
      a. Representative sample of adsorptive media. Number of bags or semi-bulk containers sampled in accordance with AWWA B100.
      b. Each sample shall be certified and marked with the following information:
         1. Supplier's name
         2. Gradation
         3. Source
         4. Date of sampling
         5. Lot or stockpile
   2. Samples required at time of delivery of media.

1.04 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300:
   1. Affidavit of compliance for filter media and gravel.
   2. Material specifications.
   3. Filter media samples as specified.
   4. Manufacturer's literature including written installation procedures and operating and maintenance procedures. A backwash rise-rate chart to be provided for a range of temperatures.
   5. Acceptance test data.

B. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
   1. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.

2. Failure to include a copy of the marked-up specification sections and/or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.05 MEDIA LIFE GUARENTEE

A. Media Life Guarantee – The media supplier shall provide the media life expectancy guarantee in units of Bed Volumes (BVs) based on the influent source water quality parameters listed herein and the required effluent concentrations for PFAS6 below laboratory reporting limits (<2.0 ng/L PFAS6). The media shall provide a minimum treatment capacity of 200,000 bed volumes (BVsj). Proposals shall include a calculation for the expected media life in units of days based on treating a total source water flow rate of 700 gpm through the lead PRTS vessel(s), operating the system for a duration of 24 hours per day, the identified capacity of the media in BVs, and the source water quality listed herein.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Shipping:
   1. Filter media.
      a. Bulk shipment of filter media is not acceptable.
      b. Deliver filter media to job site in suitable protective bags or semi-bulk containers to prevent contamination of any sort in accordance with AWWA B100.
      c. Prior to shipment, provide certification that media is conforming to manufacturer's specifications.
      d. Mark each bag or semi-bulk container clearly with information pertaining to material, gradation, source, date of packing for shipment to site, lot or stockpile identification.

B. Receiving:
   1. Storage of filter media.
      a. Upon initial receipt, save a copy of the Bill of Lading and confirm shipment is correct for both quantity and type of media.
      b. Provide storage space for filter media if suitable space is not available at jobsite. Protect bagged materials from environmental damage such as ultraviolet radiation, moisture, wind, etc.
      c. Store filter media in such manner as to prevent breakage of bags or semi-bulk containers and spillage of media.
      d. Do not remove media from bags or semi-bulk containers prior to placement in filters.
      e. Place media directly in filters from bags or semi-bulk containers without discharging contents to belt conveyors.
      f. If media is segregated in any way, remix to meet specified gradation. If remixing of media does not restore specified gradation, reject and remove such media from the site of the work and replace with new media.

PART 2 PRODUCTS

2.01 BABA CLASSIFICATION

A. PFAS Filter Media defined as “not an integral part of the structure or permanently affixed to the infrastructure project” as described in the Office of Management and Budget’s Memorandum M-22-11 and therefore not required to comply with the BABA requirements defined in Specification Section 00820G.

2.02 FILTER MEDIA:

A. Media shall be Fluoro-sorb® FS-200 Adsorbent media manufactured by CETCO®, 2870 Forbes Avenue, Hoffman Estates, IL. This media was pilot tested and approved by MassDEP. No substitutions are allowed.

2.03 SERVICE CONDITIONS:

A. Design:

1.	Total flow	2.0 mgd (1,389 gpm)
2.	Filter size	10 ft. dia. x 5 ft. side shell
3.	Filter unit area	78.5 sq. ft.
4.	Number of filters	6 (three pairs of filters)
5.	Total filter area	471 sq. ft.
6.	Filtration rate for WTP capacity of 2.0 mgd:	
	a. vessel loading rate	8.8 gpm/sq. ft. (one pair out of service, series operation)
7.	Media depth:	
	a. Fluoro-Sorb 200	42 inches
	b. Gravel Underbedding	10 inches
	c. Garnet Underbedding	4 inches
8.	Initial Backwash Flow Rate	450 gpm
9.	Estimated Initial Backwash Duration	30 minutes

PART 3 EXECUTION

3.01 INSTALLATION:

B. Install all items in accordance with manufacturer's printed instructions and as indicated and specified.

C. Contractor is responsible for the supply, delivery, installation and start-up of the media and appurtenances covered by this specification.

D. Provide services of factory-trained Service Engineers, specifically trained in the placement of filter media and specified equipment. Man-days listed are exclusive of travel time and do not relieve Contractor of obligation to provide sufficient service to place filters in satisfactory operation.
1. To direct placement of media: 2 days.
2. To direct field acceptance tests: 2 days.
3. Provide a service engineer to instruct operating personal in operation and maintenance: 1 day.

4. Upon completion of the Service Engineer's services, provide a written certification that all materials are in accordance with the specifications, and they have been installed in accordance with the specifications.

E. Load filter media as follows:
1. Pressure vessel manufacturer to inspect the interior components and installation of the vessels and confirm proper installation,
2. After the proper mechanical installation of the pressure vessels has been confirmed, thoroughly clean and disinfect the vessels before any filter media is placed and keep clean throughout entire operation. Remove media made dirty in any way and replace with clean material. Preparation of each pressure vessel prior to the placement of media shall be in accordance with AWWA B100.
3. Carefully place filter media through water so that depth is uniform over entire bed.
4. Do not stand or walk directly upon media. Use boards which will sustain weight of workers without displacing media.
5. Provide detailed supervision and written instructions for placement of filter media by manufacturer of filter bed and services of qualified representative of manufacturer for a period of time to completely install all filter beds.

F. Preconditioning
1. After media is loaded, it must be conditioned which requires performing an initial backflush. Flows, durations, and overall execution of the conditioning process must meet the manufacturer's specifications and are the responsibility of the Contractor.
2. The water needed for this process shall be coordinated with the Owner/Engineer and may be a combination of treated water from the remaining vessels in operation and/or from a reversal of flow from the distribution system. Auxiliary equipment such as tanks and pumps needed to meet the initial backflush requirements are the full responsibility of the Contractor.
3. The effluent water from this backflushing process will go to the existing lagoon/infiltration basins. The Contractor shall make the necessary provisions in order to assure that adequate volume is available in the basins to accommodate the backwash volumes, including the furnishing of pump(s) to lower the water levels. Collection and disposal of the water used for the start-up and testing of the filters shall be as identified in Section 01650, Facility Startup.
4. The Contractor shall make every effort to minimize the amount of water pumped to waste during the start-up of the vessels. Filter-to-waste water shall not be pumped through treatment equipment adjacent to or downstream of the PFAS system.

3.02 DISINFECTION

A. At the conclusion of filter installation work, and as soon as water is available, each filter shall be thoroughly disinfected by chlorination in accordance with AWWA C653 (Disinfection of Water Treatment Plants).

3.03 PERFORMANCE TESTING:

A. PFAS system including the media shall be tested as a complete system as specified in Section 11209.

B. The Contractor shall be responsible for collecting and paying for all water quality analyses required by the MassDEP to indicate that the system is performing as required.

END OF SECTION

SECTION 11423

CHEMICAL FEED EQUIPMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. The work under this section shall consist of furnishing all materials and labor for the installation of the following chemical feed equipment and appurtenances:
   1. Bulk tanks, day tanks, mix tanks, and transfer pumps.
   2. Weigh scale.
   3. Chemical feed pumps and appurtenances.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 13100 Instrumentation and Controls
   2. Section 13400 Supervisory Control and Data Acquisition
   3. Section 15104 Plastic Pipe and Fittings
   4. Section 15108 Tubing, Hose, Fittings and Appurtenances
   5. Section 15100 Valves and Appurtenances
   6. Division 16 Electrical

1.03 SYSTEM DESCRIPTION

A. The Contractor shall furnish and install five (5) complete, independent chemical feed systems shown on the Drawings.
   1. The number and sizes of chemical diffusers shall be as indicated on the process piping drawings, and shall be no less than that required for each of the chemical injection points indicated on the chemical feed system schematics and also include any spare injection points identified.

B. The sodium hydroxide (caustic) feed system consists of two (2) 2,550 gallon bulk storage tanks, a 275 gallon day tank, chemical transfer pump, two (2) metering pumps, and all necessary hose, tubing, piping, fittings and appurtenances.

C. The sodium hypochlorite system consists of two (2) 2,550 gallon bulk storage tanks, a 330 gallon day tank, chemical transfer pump, two (2) metering pumps, and all necessary hose, tubing, piping, fittings and appurtenances.

D. The phosphate system consists of a 905 gallon bulk storage tank, a 30 gallon day tank, chemical transfer pump, two (2) metering pumps, and all necessary hose, tubing, piping, fittings and appurtenances.

E. The hydrofluorosilicic acid system consists of a 545 gallon bulk storage tank, a 30 gallon day tank, chemical transfer pump, two (2) metering pumps, and all necessary hose, tubing, piping, fittings and appurtenances.

F. The poly aluminum chloride system consists of a weigh scale, two (2) metering pumps, and all necessary hose, tubing, piping, fittings and appurtenances.

K. Appurtenances to be furnished vary with each feed system dependent on type of metering pump used and equipment installation. Appurtenances shall include but are not limited to pump mounting shelves, strainers, pulsation dampeners, calibration columns, pressure relief valves, backpressure valves, four-function valves, auto-prime valves, foot valves, pressure gauges, diffusers, ball valves, instrumentation and controls.

L. All monitoring and control of the chemical feed systems shall be via the control systems specified under Division 13.
   1. All analog signals to and from the equipment specified under this section be 4-20mA.
   2. All discrete signals shall be 24 VDC.
   4. Any power supplies and relays required for signal transmission from the equipment provided under this section to the control system shall be coordinated with the control system provider, and supplied and installed in control cabinets provided under this section.

1.04 SUBMITTALS

A. The shop drawing submittals for each tank shall contain production drawings, plans and sections showing dimensions, wall thickness, details of tank penetrations, design data, test reports, certificates of compliance with hydrostatic and impact tests, location of fittings, warranty, and installation and use instructions.

B. The shop drawing submittals for chemical transfer and metering pumps shall contain pump curves, plans and sections showing dimensions, details, controls, design data, test reports showing rated flow and steady state accuracy at 100% setting, operation and maintenance manuals, warranty, and installation instructions.

C. Shop drawings shall be submitted for all appurtenances including strainers, pulsation dampeners, calibration columns, control panels, safety valves, pipe diffusers and all other associated equipment.

D. Operation and Maintenance Manuals: Include manufacturer's instructions for equipment installation, start-up, operation, and maintenance, including parts lists for operation and maintenance manuals specified in Division 1.

E. The equipment to be furnished under this section shall be coordinated with all applicable structural and mechanical process drawings, including addenda.
   1. If no changes are required, provide a statement that no changes are required.
   2. If changes are required, furnish marked up drawings or statement detailing the modifications necessary for the equipment proposed.
   3. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

F. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
   1. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
   2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in

submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.05 WARRANTY

A. The equipment manufacturer shall warrant all parts to be free from defective material and workmanship for a period of one year after final acceptance, and shall furnish to the Owner replacement for any such items found to be defective by the manufacturer.

B. This warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other warranties made under the requirements of the Contract Documents.

C. Warranties: Submit a written warranty, executed by the manufacturer of the equipment and the Contractor, agreeing to repair or replace components of the equipment that fail in materials or workmanship within the specified warranty period.

PART 2 PRODUCTS

2.01 BULK CHEMICAL STORAGE TANKS

A. General:
1. The bulk storage tanks shall be vertical with flat bottoms and domed tops and shall be constructed of fiberglass-reinforced plastic (FRP) or high-density cross-linked polyethylene (HDXLPE).
   a. Linear polyethylene tanks shall not be accepted.
   b. HDXLPE sodium hypochlorite tank shall have an oxidation resistant liner homogeneously molded as the interior surface of the part.
2. The tanks shall be provided by one manufacturer and shall be designed for the process liquids specified herein.
3. The tanks shall be shop fabricated by a supplier with a minimum of five years experience manufacturing chemical storage tanks.
4. The tanks shall be manufactured with an integrally molded, "full drain" non-threaded outlet connection, and shall have a PVC companion flange assembly with split back-up flange for connection to process piping. Fiberglass tanks shall be shipped and stored with removable external supports fastened to the bottom of the tanks to protect the tank nozzles from damage during shipping and storage.
5. The foundation for the tanks shall be prefabricated polyethylene pads furnished by the bulk tank manufacturer specifically designed for tank to be supplied.
6. Each tank shall include the following accessories and fittings:
   a. Dome Fittings (unless otherwise indicated on drawings):
      i. 2-inch fill pipe nozzle,
      ii. 4-inch vent pipe nozzle,
      iii. 3-inch level sensor fitting (to be confirmed and coordinated with the level sensor furnished under Division 13),
      iv. 1/2-inch transfer pump return fitting:
   b. "Full drain" outlets:
   c. 3-inch sidewall overflow flanged fitting located at top of tank wall.
   d. A 1-1/4 inch wide translucent liquid level indicator strip with inch and foot calibration markings.
   e. Fume-tight combination manway cover shall be 24-inch for tanks 2,000 gallons and greater and 17-inch for tanks under 2,000 gallons. Covers shall be 16-bolt and have a 10-inch coarse threaded cover with a push plate and