FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

FLORISSANT, COLORADO
PMIS # 162953

100% SUBMITTAL
FOR CLIENT APPROVAL
NOT FOR CONSTRUCTION
PRIOR TO NPS & DEQ APPROVAL

TECHNICAL SPECIFICATIONS

PREPARED FOR

PREPARED BY

222 NORTH 32ND STREET
SUITE 700
P.O. BOX 31318
BILLINGS, MT 59107-1318

JULY 30, 2012

FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

FLORISSANT, COLORADO
PMIS # 162953

DIVISION 13 – SPECIAL CONSTRUCTION

Non-applicable

DIVISION 14 – CONVEYING EQUIPMENT

Non-applicable

DIVISION 21 – FIRE SUPPRESSION

Non-applicable

DIVISION 22 – PLUMBING

221113 Facility Water Distribution Piping
221116 Domestic Water Piping
221313 Facility Sanitary Sewers

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING

235400 Furnaces

DIVISION 25 – INTEGRATED AUTOMATION

Non-applicable

DIVISION 26- ELECTRICAL

260500 Common Work Results For Electrical
262421 Electrical Power, Service And Distribution For Pump House
265000 Lighting

DIVISION 27- COMMUNICATIONS

270120 Operation and Maintenance of Data Communications

DIVISION 28- ELECTRONIC SAFETY AND SECURITY

Non-applicable

DIVISION 31 – EARTHWORK

311000 Site Clearing
312000 Earth Moving

DIVISION 32 – EXTERIOR IMPROVEMENTS

329200 Turf And Grasses

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Ready-Mixed Concrete Producer Qualifications: ASTM C 94/C 94M.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Comply with ACI 301, "Specification for Structural Concrete"; ACI 117, "Specifications for Tolerances for Concrete Construction and Materials"; and CRSI's "Manual of Standard Practice."

2.2 MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain Steel Wire: ASTM A 82, as drawn.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185.

D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, as drawn, flat sheet.

E. Portland Cement: ASTM C 150, Type I or II.

F. Aggregates: ASTM C 33.

1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.

G. Air-Entraining Admixture: ASTM C 260.

H. Chemical Admixtures: ASTM C 494 water reducing and retarding. Do not use calcium chloride or admixtures containing calcium chloride.

I. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

J. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

K. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.3 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301.

B. Normal-Weight Concrete:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 4 inches (100 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of floor slabs to receive troweled finishes to exceed 3 percent.
5. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
6. For concrete exposed to deicing chemicals, limit use of fly ash to 25 percent replacement of portland cement by weight and granulated blast-furnace slag to 40 percent of portland cement by weight; silica fume to 10 percent of portland cement by weight.

C. Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M.

PART 3 - EXECUTION

3.1 CONCRETING

A. Construct formwork according to ACI 301 and maintain tolerances and surface irregularities within ACI 347R limits of Class A, 1/8 inch (3.2 mm) for concrete exposed to view and Class C, 1/2 inch (13 mm) for other concrete surfaces.

B. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

C. Install construction, isolation, and contraction joints where indicated. Install full-depth joint-filler strips at isolation joints.

D. Place concrete in a continuous operation and consolidate using mechanical vibrating equipment.

E. Protect concrete from physical damage, premature drying, and reduced strength due to hot or cold weather during mixing, placing, and curing.

F. Formed Surface Finish: Smooth-formed finish for concrete exposed to view, coated, or covered by waterproofing or other direct-applied material; rough-formed finish elsewhere.

G. Slab Finishes: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces. Provide the following finishes:

1. Scratch finish for surfaces to receive mortar setting beds.
2. Float finish for surfaces to receive waterproofing or other direct-applied material.
3. Troweled finish for floor surfaces and floors to receive paint.

4. Nonslip-broom finish to exterior concrete platforms, steps, and ramps.

H. Cure formed surfaces by moisture curing for at least seven days.

I. Begin curing concrete slabs after finishing. Keep concrete continuously moist for at least seven days, apply membrane-forming curing compound to concrete.

J. Owner will engage a testing agency to perform field tests and to submit test reports.

K. Protect concrete from damage. Repair and patch defective areas.

END OF SECTION 033000

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Regional Requirements:
   1. Concrete Masonry Units shall be manufactured within 500 miles of Project site from aggregates [and cement] that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project Site.

B. Submittals:
   1. Material Certificates: For each CMU include statements of material properties indicating compliance with requirements.

PART 2 - PRODUCTS

2.1 UNIT MASONRY

A. Comply with ASTM C90.

2.2 MASONRY UNITS

A. Decorative Concrete Masonry Units: ASTM C 90; Density Classification, either Lightweight or Normal Weight units are acceptable.

   1. Finish: Exposed faces with standard pattern, split-face finish.

   2. Color and Type: As selected by Contracting Officer's Representative.

   3. Integral Water Repellent: Provide units made with liquid polymeric, integral water repellent admixture that does not reduce flexural bond strength for all exposed units.

   4. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3050 psi.

   5. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions.

2.3 MORTAR AND GROUT

A. Mortar: ASTM C 270, proportion specification.

   1. Use portland cement-lime or masonry cement mortar.
   2. Do not use calcium chloride in mortar.

3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions, and for other applications where another type is not indicated, use Type N.
4. Sand: ASTM C144; Volume 2 ¼ to 3 times the total volume of Portland cement and Masonry cement.
5. Water: Potable, clear and free of pollutants.

B. Grout: ASTM C 476 with a slump of 8 to 11 inches (200 to 280 mm).

2.4 REINFORCEMENT, TIES, AND ANCHORS

A. Steel Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420).

B. Joint Reinforcement: ASTM A 951.

C. Coating: Mill galvanized at interior walls and hot-dip galvanized at exterior walls.

D. Wall Anchors/Ties: Mill galvanized at interior walls and hot-dip galvanized at exterior walls.

E. Anchor Bolts: ½" dia. F1554 Grade 36 anchor bolts @ 24" o.c.

F. Bond Breaker Strips: 15 pound minimum asphalt roofing felt.

2.5 EMBEDDED FLASHING MATERIALS

A. Sheet Metal Flashing: Galvanized.

B. Rubberized Asphalt Sheet Flashing: Pliable, adhesive rubberized-asphalt compound, bonded to a polyethylene film to produce an overall thickness of 0.040 inch (1.02 mm). Use only where flashing is fully concealed.

C. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy with a 0.025 inch (0.64 mm) thick coating of adhesive. Use only where flashing is fully concealed.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded strips complying with ASTM D 1056, Grade 2A1.

B. Preformed Control-Joint Gaskets: Designed to fit standard sash block and to maintain lateral stability in masonry wall; made from styrene-butadiene rubber or PVC.

C. Weep Holes: Cellular-plastic extrusion, full height and width of head joint or Round polyethylene tubing, 3/8-inch (9.5-mm).

D. Cavity Drainage Material: Free-draining polymer mesh, full depth of cavity.

E. Loose-Granular Perlite Insulation: ASTM C 549, Type II or IV, water repellent, R= 3.13 per inch minimum.

F. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV or X.

G. Acidic Masonry Cleaner: Product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cut masonry units with saw. Install with cut surfaces and, where possible, cut edges concealed.

B. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

C. Stopping and Resuming Work: Rack back units; do not tooth.

D. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

E. Tool exposed joints slightly concave when thumbprint hard unless otherwise indicated.

F. Keep cavities clean of mortar droppings and other materials during construction.

3.2 LINTELS (BOND BEAMS)

A. Any of the following may be used:
   a. Concrete Lintels: ASTM C1623, matching CMU's in color, texture and density classification and with reinforcing bars as required by design engineer.
   b. Concrete Lintels: Precast or formed-in-place concrete lintels with reinforcing bars as required by design engineer.
   c. Masonry Lintels: Prefabricated or built in place masonry lintels from bond beam CMU's with reinforcing bars as required by design engineer and filled with coarse grout.

B. Install lintels where indicated.

C. Minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.3 FLASHING AND WEEP HOLES

A. Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.

B. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing before covering with mortar.

   1. Extend flashing 4 inches (100 mm) into masonry at each end and turn up 2 inches (50 mm) to form a pan.

C. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

3.4 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections required by authorities having jurisdiction.

3.5 CLEANING

A. Clean masonry as work progresses. Remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly cured, clean exposed masonry.

1. Wet wall surfaces with water before applying acidic cleaner, then remove cleaner promptly by rinsing thoroughly with clear water.
2. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 042000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

Not Used

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Plywood: DOC PS 1.

B. Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.

2.2 TREATED MATERIALS

A. Preservative-Treated Materials: AWPA C2.

1. Use treatment containing no arsenic or chromium.
2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
4. Manufacturer: McFarland Cascade.

B. Provide preservative-treated materials for all rough carpentry unless otherwise indicated, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, blocking and similar concealed members in contact with masonry or concrete.

2.3 FRAMING

A. Certified Wood: Wood framing shall be certified according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship".

B. Dimension Lumber:

1. Maximum Moisture Content: 19 percent**.**
2. Framing Other Than Non-Load-Bearing Interior Partitions: Construction, Stud, or No. 3.

2.4 MISCELLANEOUS PRODUCTS

A. Fasteners: Size and type indicated. Provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M, G60 (Z180) coating designation for interior locations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Do not splice structural members between supports unless otherwise indicated.

D. Securely attach rough carpentry to substrates, complying with the following:

1. CABO NER-272 for power-driven fasteners.
2. Published requirements of metal framing anchor manufacturer.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

Not Used

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

A. Plywood: Treated Exterior Rated CDX.

2.2 ROOF SHEATHING

A. Plywood Roof Sheathing: ½" minimum Exterior rated sheathing.

B. Gable End Sheathing: ½" minimum Exterior rated sheathing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fastening Methods:

1. Roof Sheathing:

a. Nail to wood framing.

END OF SECTION 061600

SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

B. Roof Pitch: 4:12

C. Members sized and spaced to handle all loads including:
   1. Top chord dead load – 25 PSF
   2. Top chord live load – 20 PSF
   3. Top chord snow load (balanced) – 30 PSF
   4. Unbalanced snow load – 9 PSF windward; 51 PSF leeward
   5. Bottom chord dead load – 10 PSF

D. Galvanized metal rafter ties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads indicated without exceeding TPI 1 deflection limits.

B. Comply with applicable requirements and recommendations of the following publications:

   1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."

2.2 MATERIALS

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review, any species, graded visually or mechanically.

   1. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

B. Connector Plates: Simpson strongtie galvanized.

C. Fasteners: Where trusses are exposed to weather or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

2.3 FABRICATION

A. Assemble trusses using jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted. Fabricate wood trusses within manufacturing tolerances in TPI 1.

2.4 MANUFACTURER

A. A. D. Martin Trusses

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and brace trusses according to TPI recommendations and as indicated. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

B. Do not alter trusses in field.

C. Remove wood trusses that are damaged or do not meet requirements and replace with trusses that do meet requirements.

END OF SECTION 061753

SECTION 066400 - PLASTIC PANELING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 COMPOSITE INTERIOR WALL AND CEILING PANELING

A. General: Fiber-glass reinforced plastic panels laminated to plywood.
   1. Manufacturers: Glasteel, Glaslinen FRP wall liner panel.
   2. Plywood Thickness: 0.5 inch.
   3. Surface Finish: Molded pebble texture.
   4. Flexural Strength (ASTM D790): 7600 lbf/in^2
   5. Flexural Modulus (ASTM D790): 854,234 psi
   6. Tensile Strength (ASTM D638): 5000 psi
   7. Izod Impact (ASTM D256): 7.16 ft-lb-in
   8. Surface Burning Characteristics (ASTM E84): Class C
   9. Color: White

B. Custom Fasteners and Adhesive: As recommended by plastic paneling manufacturer.

   1. Install with custom fasteners and adhesives and seal all seams with caulk and white vinyl trim.

C. Sealant: Single-component, mildew-resistant, silicone sealant recommended by plastic paneling manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install according to manufacturer’s instructions.

END OF SECTION 066400

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. When applying interior building panels over or with foam plastic insulation, an approved thermal barrier system (i.e. ½" gypsum board or other approved system) must be used between the foam and panels.

B. In all cases, design, use, and installation shall comply with current ICC building code requirements.

PART 2 - PRODUCTS

2.1 INSULATION PRODUCTS

A. Extruded-Polystyrene Board Insulation: ASTM C 578, R-5 per inch.
   1. Use for Foundation Insulation and Interior Block Wall Insulation:
      a. Minimum compressive strength of 15 psi.
   2. Manufacturers: InSoFast and Owens Corning.

B. Glass-Fiber Loose-Fill Insulation: ASTM C 764, Type 1, pneumatic application, with flame-spread and smoke-developed indexes of 25 and 450, respectively.
   1. R-19 minimum.
   2. Manufacturer: CertainTeed InsulSafe SP.

C. Masonry Fill Insulation: chemically treated for flame-resistance, processing, and handling characteristics.
   1. Perlite, R=3.13 per inch minimum.
   2. Water Repellant.

2.2 ACCESSORIES

A. Vapor Retarder: 4 mil translucent Polyethylene film.
   1. Manufacturer: BPI

B. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed to fit between roof framing members and to provide cross-ventilation between insulated attic spaces and vented eaves.

C. Sill Seal: Styrene – ¼" thick x width of the block.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install insulation in areas and in thicknesses indicated or required to produce R-values indicated. Cut and fit tightly around obstructions and fill voids with insulation.

B. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

C. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.

D. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage. Locate seams at framing members, overlap, and seal with tape. Seal joints caused by pipes, conduits, electrical boxes, and similar items with tape.

END OF SECTION 072100

SECTION 074113 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Summary: Factory-formed metal roof panels, and trim.

B. Warranties: Provide manufacturer's standard written warranty, without monetary limitation, signed by manufacturer agreeing to promptly repair or replace metal roof panels that fail to remain weathertight within 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL ROOF PANELS

A. Roof Panel Type: Exposed-fastener, lap-seam metal roof panels, trapezoidal ribs at 9 inch O.C.

B. Metallic-Coated Steel Roof Panels: Fabricated from galvanized structural-steel sheet, ASTM A 653/A 653M, G90 (Z275), or aluminum-zinc alloy-coated structural-steel sheet, ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275).

1. Nominal Metal Thickness: 0.026 inch (0.56 mm).
2. Finish: Manufacturer's standard epoxy primer and silicone-modified, polyester-enamel topcoat.
3. Color: Forest Green, or other as selected by Contracting Officer from manufacturer’s standard colors.

C. Manufacturer: ASC Building Products, Colorguard 25 with Spectra Scope, Nor-Clad.

2.2 ACCESSORIES

A. Provide components required for a complete roof panel assembly including trim, ridge covers, clips, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Formed from 0.025-inch (0.64-mm) nominal thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal roof panels.

C. Felt Underlayment: ASTM D 226, Type II (No. 30) asphalt-saturated organic felts.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install felt underlayment on roof deck.

B. Install flashings to cover underlayment.

C. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.

1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.
2. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
3. Install ridge caps as metal roof panel work proceeds.

D. Install gaskets, joint fillers, and sealants where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants recommended by metal roof panel manufacturer.

END OF SECTION 074113

SECTION 074600 - SIDING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Warranties: Manufacturer's standard from in which siding manufacturer agrees to repair or replace siding that fails in materials or workmanship within 20 years. Failures include, but are not limited to, cracking, deforming, or otherwise deteriorating beyond normal weathering.

PART 2 - PRODUCTS

2.1 SIDING

A. Aluminum Siding: AAMA 1402.

1. Horizontal Pattern: plain, double 4-inch (102-mm) -board style or 5-inch (127-mm)-board style.
2. Vertical Pattern: 12-inch (305-mm) exposure in board-and-batten style.
3. Texture: Wood grain, embossed concealing nailing strips.
4. Finish: Pre finished aluminum or color impregnated vinyl.
5. Manufacturer: Rollex.

2.2 SOFFIT

A. Aluminum Soffit: AAMA 1402.
1. Ventilation: Continuous vent all sections, concealing nailing strips.
2. Finish: Pre finished aluminum or color impregnated vinyl.
3. Manufacturer: Rollex.

2.3 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories made from same material as adjacent siding unless otherwise indicated.

2.4 FASTENERS: Hot-dip galvanized.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install aluminum siding and soffit and related accessories, according to AAMA 1402.

1. Install fasteners no more than 24 inches (600 mm) o.c.

END OF SECTION 074600

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Shop Drawings.

B. Single Door: 3’ x 7’ tall with frame depth matching thickness of wall.

C. Shop primed and phosphatized.

D. Rubber Bumpers.

E. Outward opening.

F. Bolted on steel protection for locking mechanism.

G. Locking doorstop.

H. Weatherproof threshold on bottom.

PART 2 - PRODUCTS

2.1 HOLLOW METAL DOORS AND FRAMES

A. Manufacturers:
1. Windsor Republic Doors.
    a. DE Series doors
    b. ME Series Universal Mitered Frames.

B. Doors: Complying with SDI A250.8 for level and model and SDI A250.4 for physical-endurance level indicated, 1-3/4 inches (44 mm) thick unless otherwise indicated.
1. Exterior Doors: Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush), metallic-coated steel sheet faces.

    a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors with thermal-resistance value (R-value) of not less than 10.11 when tested according to ASTM C 1363, foamed in-place polyurethane.

    b. 16 gauge.

C. Frames: ANSI A250.8; conceal fastenings unless otherwise indicated.
1. Steel Sheet for Exterior Frames
    a. 14 gauge.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, suitable for exposed applications.

B. Frame Anchors: ASTM A 879/A 879M, 4Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, sheet steel complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install hollow metal frames to comply with SDI A250.11.

B. Install doors to provide clearances between doors and frames as indicated in SDI A250.11.

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

END OF SECTION 081113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

Not Used

PART 2 - PRODUCTS

2.1 HARDWARE

A. Hinges:

1. Manufacturers:
   a. Hager Companies.

2. Product: Hager BB1199 4 ½" x 4 ½" US32D NRP.

3. Stainless-steel ball bearing hinges vandal proof, heavy weight with one spring hinge per door.
4. Three hinges.

B. Locksets and Latchsets:

1. Manufacturers:
   a. Best Access Systems; Div. of Stanley Security Solutions, Inc.

2. Product Number: Best 45H7B (Std.) 15 J 630 LH.

3. All single doors shall have a deadbolt heavy-duty Mortise-Type lock.

4. Equip with automatic door closing device with lock open feature.

5. Stainless steel finish.

6. Function: ANSI F21 entrance.

7. Supply two keys to Contracting Officer's Representative.

C. Closers:

1. Manufacturers:
   a. Hager Companies.

2. Mount closers on interior side (room side) of door opening. Provide regular-arm, parallel-arm, or top-jamb-mounted closers as necessary.

3. Product: Hager 5100 Series ALM, Grade 1 Heavy Duty Surface Door Closer.

D. Door Stop:

1. Manufacturers: Hager 258F

E. Hardware Finishes:

1. Hinges: Matching finish of lockset/latchset.
2. Locksets, Latchsets, and Exit Devices: Satin chrome plated or as chosen by Contracting Officer's Representative.
3. Closers and Door Holder: Aluminum finish.
4. Other Hardware: Matching finish of lockset/latchset.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount hardware in locations required to comply with governing regulations and according to SDI A250.8 and DHI WDHS.3.

B. Deliver keys to Contracting Officer's Representative.

END OF SECTION 087100

SECTION 099000 - PAINTING AND COATING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data.

PART 2 - PRODUCTS

2.1 DOOR PAINT

A. Manufacturers:
1. Primer:
   a. Sherwin Williams Macropoxy 646 Fast Cure Epoxy Part A Mill White.
   b. Sherwin Williams Macropoxy 646 Fast Cure Epoxy Part B Hardener.
2. Paint:
   a. Sherwin Williams Acrolon 218 HS Polyurethane Gloss Part A Extra White.
   b. Sherwin Williams Acrolon 218 HS Polyurethane Gloss Part B Hardener.

B. Provide materials that comply with standards indicated:

1. Paint Primer Materials:

   a. Suitable for wet, chemical exposure, and mild physical abuse.
   b. Polyamide Epoxy.
   c. AWWA D102 Standard for Inside Systems
   d. 56 +/- 2 solids (mixed).
   e. Unthinned Volatile Organic Compounds: 3.02 lb/gal
   f. Dry Temperature Resistance: 250 ° F.
   g. Two component.

2. Finish Coat Materials:

   a. Aliphatic acrylic Polyurethane.
   b. 66+/- 2.0% solids (mixed).
   c. Unthinned Volatile Organic Compounds: 2.24 lb/gal
   d. Dry Film Thickness: 2 to 5 mils.
   e. Dry Temperature Resistance: 250 ° F.
   f. Color: As approved by Contracting Officer.

2.2 PAINTS AND COATINGS FOR PROCESS PIPING

A. Manufacturers:

1. Primer for Ductile Iron:
   a. Sherwin Williams Corothane I Galvapac Two Pack Zinc Primer Gray
   b. Sherwin Williams Zinc clad zinc dust Part F
2. Primer and Paint for Galvanized Steel:
   a. Sherwin Williams Corothane I Mio-Aluminum Primer/Topcoat
3. Paint for Ductile Iron:
   a. Sherwin Williams Macropoxy 646 Fast Cure Epoxy Part A Mill White.
   b. Sherwin Williams Macropoxy 646 Fast Cure Epoxy Part B Hardener.

B. Provide materials that comply with standards indicated for Ductile Iron and Galvanized Steel pipe:

1. Paint Primer Materials:
   a. Suitable for wet, chemical exposure, interior use.
   b. DFT as recommended by manufacturer.
   c. Meet zinc-rich primer requirements of AWWA D102-03 Standard for Inside System No. 5 and Outside System No. 4 & 6.
   d. Meets the requirements of ASTM D 520 Type III and contains less than .002% lead.
   e. 63% +/- 2.0% solids (mixed)
   f. Dry Film Thickness: 2.5 to 3.5 mils.
   g. Unthinned Volatile Organic Compounds: 2.65 lb/gal
   h. Dry Temperature Resistance: 250° F.

2. Primer for Ductile Iron:
   a. Aromatic Urethane, Zinc-Rich
   b. ANSI/NSF 61 certified
   c. AWWA D102 Paint System: ICS-3

3. Primer for Galvanized Steel:
   a. ANSI/NSF 61 certified
   b. 61.0 +/- 2.0% solids (mixed)
   c. Dry Film Thickness: 2.5 to 3.5 mils per coat.
   d. Unthinned Volatile Organic Compounds: 2.79 lb/gal
   e. Dry Temperature Resistance: 250° F

4. Finish Coat for Ductile Iron or Galvanized Steel:
   a. Polyamidoamine Epoxy.
   b. ANSI/NSF 61 certified
   c. AWWA D 102 Inside Systems No. 1 and No. 2.
   d. 67 +/- 2.0% solids (mixed)
   e. Dry Film Thickness: 4.0 to 6.0 mils
   f. Unthinned Volatile Organic Compounds: 2.37 lb/gal.
   g. Two Component
   h. Dry Temperature Resistance: 250° F.

5. Finish Coat for PVC:
   a. Polyamidoamine Epoxy
   b. ANSI/NSF 61 certified
   c. AWWA D 102 inside Systems No. 1 and No. 2.

d. 67.0 +/- 2.0% solids (mixed)
e. Dry Film Thickness: 4.0 to 6.0 mils.
f. Unthinned Volatile Organic Compounds: 2.37 lb/gal.
g. Two Component
h. Dry Temperature Resistance: 250° F.

C. Colors:
1. Raw Waterlines: Olive Green
2. Potable: Dark Blue
3. Chemical Lines: Yellow
4. Waste Lines: Light Brown
5. Other Miscellaneous: Light Gray

2.3 PAINTS AND COATINGS FOR CONCRETE FLOOR

A. Manufacturers:
1. Primer: Sherwin Williams ArmorSeal 33 Epoxy Primer Sealer Part A and B Clear.
2. Paint: Sherwin Williams ArmorSeal 650 SL/RC Self-Leveling/Recoatable Epoxy Part A White Tinting base.

B. Provide materials that comply with standards indicated for Concrete floor:

1. Paint Primer Materials:
a. Suitable for moderate abuse, frequently wet conditions, and exposure to chemicals such as sodium Hypochlorite.
b. DFT: as recommended by manufacturer.
c. Modified Polyamide Epoxy
d. 100 % solids (mixed)
e. Unthinned Volatile Organic Compounds: .24 lb/gal
f. Two Component
g. Dry Temperature Resistance: 250° F.

2. Finish Coat Materials:
a. Polyamine Novolac Epoxy
b. 100 % solids (mixed)
c. Unthinned Volatile Organic Compounds: .13 lb/gal.
d. Two Component
e. Dry Temperature Resistance: 275° F.

3. Color: As approved by Contracting Officer’s Representative

2.4 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use brushes only for exterior painting and where the use of other applicators is not practical.

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

END OF SECTION 099000

SECTION 102600 - WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Extruded Plastic: ASTM D 1784, Class 1, textured, PVC or acrylic-modified vinyl plastic.

2.2 DOOR PROTECTION

A. Door Protection System: Weather Stripping Jamb, Weather Stripping Sweep and Threshold.
   1. Basis-of-Design Product: Hager Companies as noted below.
   2. Jamb: Sized appropriately for application.
      a. Neoprene: Withstands temperatures from - 40° F to 200° F, resists ozone, sunlight, and oxygen aging.
      b. Hager 891S N 48” x 88”
   3. Sweep: Sized appropriately for application.
      a. Polyurethane: Flexible to -90° F, unaffected by ultraviolet light, resistant to fungus and petroleum based solvents.
      b. Hager 779S N 48”
   4. Threshold: BHMA A156.21; fabricated to full width of opening indicated.
      a. Hager 417S 48”
   5. Color: MIL.

B. Door Protection Plates: Fabricated from plastic laminate 0.125” (3.2mm) thick; beveled 4 sides.
   1. Kick Plates: 8” high X 30” X 1/8”.
   2. Hager 214S – US3 – 8” x 30”
   3. Color and Texture: Brown plastic.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install components level, plumb, and true to line without distortions.

END OF SECTION 102600

SECTION 102824 – EMERGENCY EYEWASH AND SAFETY EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 EMERGENCY EYEWASH

A. Manufacturers:

B. Basis-of-Design Product: Provide a Guardian model G1562, 15-gallon portable Eye Wash and Drench hose unit:
   1. Color: Stainless Steel
   2. Height: 39-inches
   3. Covers: Nylon “Flip Top” Dust Covers
   4. Eye Wash Activates by Flag Handle
   5. Fittings: Chrome Plated Brass
   6. Handle: Powder Coated Cast Aluminum
   7. Head Diameter: 1-1/4”
   8. Include Bottle of Bacteriostativ Additive (G1540BA), ANSI-Compliant Identification Sign and Inspection Tag
   9. Preserve: G1540BA
   10. Standards: ANSI Z358.1-2009
   11. Type: Self-Contained Pressurized
   12. Valve: 1/2” IPS Chrome Plated Brass Ball Valve
   13. Weight Empty: 36.5 lb
   14. Weight Full: 118.9 lb

C. Safety Equipment:
   1. 1 pair of shoulder length, neoprene gloves
   2. 1 rubber apron
   3. 1 half-face respirator, NIOSH approved, with a 1-year supply of filter cartridges specifically designed for sodium hypochlorite handling.
   4. 1 pair of tight fitting chemical splash safety goggles.
   5. Full face shield, 8 inch minimum.
   6. 1 Wall mounted fire extinguisher UL size 3-A:40-B:C

D. Warning Signs:
   1. Minimum dimensions: 10 inches x 14 inches
   2. Material: 1/4 inch thick polyethylene.
   3. Letter Color: Red and black on a white background

4. Sign Information: DANGER WEAR PROTECTIVE SAFETY EQUIPMENT WHEN HANDLING CHEMICALS

2.2 MATERIALS

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

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

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install 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. Adjust for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

END OF SECTION 102824

SECTION 221113 - FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Summary: This Section includes water-distribution piping outside the building for water service.

B. Submittals:

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

1.2 FIELD CONDITIONS

A. Notify Contracting Officer's Representative no fewer than 2 days in advance of proposed installation.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Comply with NSF 14 for plastic potable-water-service piping.

B. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

2.2 PIPE AND FITTINGS

A. High Density Polyethylene Pipe: Conform to AWWA C906 for 4 inch and greater or AWWA C901 for ½" to 3", IPS dimensions (OD based) DR 9 or DR 11.5 with minimum pressure rating of 200 psi or as needed to meet the flow and pressure requirements of the systems.

B. Fittings for High Density Polyethylene Pipe:
1. Fittings shall be in accordance with ASTM 3350 & 3261 and be manufactured by injection molding, a combination of extraction and machining of fabricated of HDPE pipe.
2. Butt-fuse all PE to PE joints.
3. PE to PVC transition connection: butt-fused mechanical joint adapter with joint restraint devices.

2.3 JOINING MATERIALS

A. HDPE: High density, ultra high molecular weight polyethylene pipe compound 3408 or 4710.

B. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.4 VALVES

A. AWWA, Cast-Iron Gate Valves: Non-rising-stem, resilient-wedge type seated gate valves.

1. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.

    a. Standard: AWWA C509.
    b. Minimum Pressure Rating: 200 psig (1380 kPa).
    c. End Connections: Mechanical joint.
    d. Interior Coating: Complying with AWWA C550.
    e. Synthetic rubber O-ring seals.
2. Mueller, resilient wedge gate valve.

2.5 VALVE ACCESSORIES AND SPECIALTIES

A. Valve Boxes:

1. Comply with AWWA M44 for cast-iron valve boxes.
2. Provide 3 piece screw type, adjustable cast iron valve boxes.
3. Provide locking cover with:
    a. Brass cotter pin or brass rod as a keeper
    b. “WATER” plainly marked.
4. Valve boxes shall be long enough to reach from the pipe to at least 3-inches above the final ground surface elevation.
5. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
6. Manufacturer: East Jordan Iron Works, cast iron valve box, 8550 or 8560 series.

B. Valve Extensions:
1. For valves over 5 feet deep, a valve extension stem shall be provided to raise the valve wrench nut to within 18-inches of finished grade.
2. The stem shall have a space to keep the valve nut centered within the valve box.
3. Manufacturer: Fab Pipe Inc., Number 320.

C. Pressure Relief Valve:
1. Manufacturers:
    a. 4” Cla-Val PRV 690G-4BAS
    b. Valley precast PRV manhole
    c. Castings MH-310-24 bolt down CAID

2.6 FLUSHING HYDRANTS

A. Hydrant length shall be appropriate lengths to match bury depth.
1. Hydrant Features:

a. 2” main valve opening
b. 2 ½” hose nozzle
c. Meet AWWA C502 with a post type dry barrel design
d. Compression type main valve which closes with pressure.
e. Field replaceable hose nozzles.
f. Dual bronze drain valves
g. Inlet Connection: Mechanical Joint
h. Provide auxiliary gate valve and box meeting requirements of Valve and Valve Accessories above.
i. Weep holes to allow the hydrant to drain
j. O-Ring type stem seals

2. Mainguard Model 77.

2.7 SPECIALTIES

A. Tools: Contractor to provide 2 sets of tools needed to operate all valves, valve box lids, and hydrants to the Contracting Officer.

B. Plastic Underground Warning Tapes: Polyethylene plastic tape, 6 inches (150 mm) wide by 4 mils (0.1 mm) thick, solid blue in color with metallic core and continuously printed black-letter caption "CAUTION - WATER LINE BURIED BELOW."

C. Tracer Wire and Box: Wire shall be #12 AWG jacketed solid copper wire, type THHN/THWN and box shall be adjustable. Include a splice kit for underground

D. Above Ground Utility Markers: Provide utility markers a minimum of 78 inches in length made of composite materials.
1. Color: Blue
2. Decal: “Caution Water Pipeline”.

E. Transition Couplings: Center Rings -Ductile iron conforming to ASTM A536, Grade 65-45-12
1. Fusion bonded epoxy coated
2. Corrosion resistant allow bolts and nuts
3. Color coded followers and gaskets
4. Rated for minimum 200 psi working pressure

F. Screened End for Drain Lines
1. Schedule 40 galvanized steel conforming to ASTM A53.
2. #4 mesh non-corrodible metal screen gasket type with flange union.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Install HDPE pipe according to ASTM D 2774 and ASTM F 645.

B. Minimum bury depth is 7 feet.

C. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

D. Install underground piping with restrained joints at horizontal and vertical changes in direction as well as at all tees, plugs, caps, bends and hydrant branches. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other mechanical joints or joint restraint rodding.

3.2 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. Install specialties according to manufacturer's instructions.

3.3 FLUSHING HYDRANT INSTALLATION

A. General: Install each hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.

1. Use drainage aggregate meeting ASTM C33-03 which is uniformly graded passing a 2 inch sieve.

2. Filter Fabric: Monofilament polypropylene fabric with minimum 15 mil thickness.

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Provide minimum of 1 post type flush hydrant on the supply line between the well and the pump house and 1 flush hydrant between the pump house and the storage tank.

C. Provide sufficient number of gate valves along the supply line to allow for isolation of segments to allow for operation and maintenance of the system.

D. Combination Air Release/Vacuum valves with valves shall be installed at all high and low points along the water line and as required by code or recommended for the operational conditions of the water line. Where installed, such valves shall be place in below-ground vaults that have covers which are flush with the ground.

3.5 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

1. Prepare reports of testing activities.

B. Upon completion of work contractor shall flush, pressure test, and chlorinate the water line per applicable codes.

3.6 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping.

3.7 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Pressure test all lines prior to disinfecting:
   a. Perform testing in the presence of the Contracting Officer's Representative.
   b. Maximum length of test section: ½ mile
   c. Slowly raise the internal pressure by pumping in water to 50 psig above the maximum anticipated service pressure at the point of test gauge attachment or 150 psi whichever is greater.
2. Disinfection of all water lines:
   a. Perform in accordance with AWWA C651
   b. Dispose of chlorinated water only after neutralization.
   c. Instead of neutralization contractor may elect to haul the chlorinated water outside the park for disposal in a legal manner.
3. Bacteriological Examination:
   a. After the system has been thoroughly flushed, and prior to the waterlines being placed into service, take samples from representative points in the system in sterile bottles and submit to authorities having jurisdiction.
   b. Take two consecutive samples, 24 hours apart.
   c. If the sample results are unsatisfactory, repeat the disinfection procedure until satisfactory results are obtained.
   d. Do not place water lines in service until safe bacteriological results have been obtained. Provide results to Contracting Officer's Representative and authorities having jurisdiction.

END OF SECTION 221113

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For transition fittings and dielectric fittings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

B. Process piping shall be defined as all PVC, Ductile Iron, Steel and Brass interior piping; meters; valves; mixers; appurtenances, and fittings within the pump house.

2.2 PROCESS PIPE AND FITTINGS

A. Flanged Ductile Iron
1. Conform to AWWA C110 and AWWA C151
2. Flanges: class 125, true 90° with the pipe axis, hex head stainless steel bolts and nuts.
3. Gaskets: 1/16-inch thick rubber sheet equal to Garlock No. 22
4. Threaded Connections: thread sealant.

B. Brass Nipples and Fittings:
1. Threaded fittings shall be NPT
2. Flange Adaptors shall be threaded wit hex head stainless steel bolts and nuts
3. Gaskets: 1/16-inch thick rubber sheet equal to Garlock No. 22

C. PVC Piping: ASTM D 1785, Schedule 80 pipe using ASTM D 2467, solvent weld type fittings.
1. Connections: 150 Class flanged connections, Van Stone style for connections to valve, flow meters, pumps; solvent weld elsewhere. Comply with manufacturer’s recommendations for glue (IPS PVC 711) and primer (IPS P-70)
2. Flanges: class 125, true 90° with the pipe axis, hex head stainless steel bolts and nuts.

D. Ball Valves:
1. Spears, PVC True Union Ball Valves.

E. Check Valves:
1. Spears, True Union 2000 Industrial Ball Check Valves.

F. Static Mixer:

1. Fixed element, static mixer suitable for rapid mix applications.
2. Class 125 flanged or true union connections.
3. Schedule 80 PVC housing with helical mixing element.
4. Koflo Model 2-80-4-6-2.

G. Water Meter (to measure flow rate from well to storage tank)
1. Endress and Hauser 2" Promag, Model Low 50-ULGA1AAOB4AA.

H. Pressure Gauges:
1. Brass gauge cock with 1/4-inch NPT connection.
2. Capable of reading pressure ranges of 0 to 160 within 1%.
3. Glycerin filled.
4. 2 1/2-inch diameter.
5. WIKAI Model 214.53 LM/RF.

I. Sample Taps:
1. Connections: 1/2"(M) NPT inlet by plain-end spout.
2. Ball or needle valve design with smooth-nosed spout.
3. Functions: drip-tight shut-off; sample draw flow control.
4. Body: Brass, polished

J. Pipe Supports:
1. Supports and restraints shall be designed and provided to prevent excessive movement and separation during operation.
2. Sized with a capacity safety factor of 5:1.
3. Maximum pipe deflection under full load to be 1/8-inch.
4. Follow manufacturer's recommendations on support spacing.
5. Determine and provide all required mounting equipment and supports.
6. Manufacturer: ITT Grinnell.

K. Pipe Sleeving:
1. Use "Link Seal" pipe to wall penetration seal between wall sleeve and carrier pipe.

PART 3 - EXECUTION

3.1 INSTALLATION

Process Piping Installation:

A. Contractor shall install all piping, valves, hangers, supports, fittings, and appurtenances required for a fully functional pump house piping system.

B. Provide a minimum of one (1) sample tap, and pressure gauge upstream of the chemical injection point.

C. Provide a minimum of one (1) sample tap, and pressure gauge downstream of the chemical injection point.

D. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight.

3.2 INSPECTING AND CLEANING

A. Inspect and test piping systems as follows:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

2. All systems shall be subjected to operating conditions. Based upon visual observations, any leaks, vibrations, deflections, or stress in the piping system shall be corrected to the satisfaction of the Contracting Officer's Representative.

B. Contractor shall test the bacteriological quality of the installed equipment after the pressure test. Disinfection shall comply with AWWA C651.

END OF SECTION 221116

SECTION 221313 – FACILITY SANITARY SEWER

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data:

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. 4” Schedule 40 PVC.

B. Infitrator Quick 4 Plus.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install per manufacturer’s instructions.

3.2 FIELD QUALITY CONTROL

A. Clean and inspect piping and structures.

B. Test complete piping according to authorities having jurisdiction.

END OF SECTION 221313

SECTION 235400 - FURNACES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

2.1 GAS-FIRED HEATER

A. Manufacturers: Modine Model HD 30.

B. Comply with AGA Z21.47 and NFPA 54, and bear AGA label.

1. Type of Gas: Propane.
2. Fan Motor: Multispeed.
3. Sized appropriately for application
4. Direct drive propeller
5. Direct Vent wall of ceiling mount unit heater with thermostat.
6. Gravity vent
7. Heating Capacity: Capable of maintaining a minimum of 50 degrees F in winter months.
8. Accessories: Thermostat shall range from 45 ° - 85° F.
9. Wire thermostat in accordance with NEC and local Administrative codes.

C. Capacities and Characteristics:

1. Exhaust Fan:
   a. Capable of moving a minimum of 2 CFM/sqft. of floor area

2. Fan Motor:
   a. Permanently lubricated, heavy duty type matched to the fan load.
   b. Wired to operate when light switch is turned on or door switch is activated (open door turns fan on.)
3. Manufacturer: Loren Cook Company, Model CBF.

2.2 ELECTRIC HEATER

A. Comply with NFPA 70.

1. Provide an electric forced air heater with 120 VAC, thermostat which ranged from
2. 50° to 90° F , with a tip-over switch that shuts the unit off if it falls over.
3. Manufacturer: Dayton 3VU33.

2.3 CONTROLS

A. Thermostat: 24-V ac, single-stage, heating only wall-mounted unit with fan on/auto selector.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Suspended Units: Suspend from structure using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.

B. Base-Mounted Units: Secure units to substrate. Provide optional bottom closure base where installation conditions require.

C. Controls: Install thermostats adjacent to door with a common switch to control lights and fan at approximately 60 inches (1500 mm) above finished floor.

END OF SECTION 235400

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

1. Products shall be new and unused and meet UL standards and be UL labeled.

PART 2 - PRODUCTS

2.1 CONDUITS, RACEWAYS, AND BOXES

A. Conduits and Raceways:
   1. Rigid Non-metallic:
      a. Interior/underground – PVC schedule 40
      b. Exterior/above ground – PVC Schedule 80.
   2. Raceway Fittings: Specifically designed for raceway type used in Project.

B. Boxes:
      a. Fittings, Boxes, Clamps, and Straps – PVC to match conduit and raceway.
      b. Commercial Grade Quality.
      c. Suitable for wet location.
      d. Rated at minimum 20 Amps.
      e. GFI Duplex receptacles.

C. Hardware:
      a. Corrosion Proof or Corrosion resistant hardware, suitable for wet locations.

2.2 CONDUCTORS AND CABLES

A. Conductors:

   1. Comply with NEMA WC70.
   2. Insulation: Thermoplastic, Type THWN or THW in conduit.
   3. USE/UF insulation for underground.
   4. Copper Connectors: Units of size, amperage rating, material, type, and class suitable for service indicated.
   5. Minimum 600 V rating.

2.3 ELECTRICAL IDENTIFICATION MATERIALS

A. Underground-Line Warning Tape: Permanent, bright-colored, continuous-printed, polyethylene tape with continuous metallic strip or core.

PART 3 - EXECUTION

3.1 GENERAL ELECTRICAL EQUIPMENT INSTALLATION REQUIREMENTS

A. Install electrical equipment to allow right of way for piping and conduit installed at required slope.

B. Install electrical equipment to ensure that connecting raceways are clear of obstructions and of the working and access space of other equipment.

C. Comply with NECA 1 and local administrative codes.

3.2 CONDUIT, RACEWAY AND CABLE INSTALLATION

A. Circuits:
   a. Minimum No. 12 AWG branch circuits
   b. Minimum No. 14 AWG control circuits

B. Color code and number conductors.

C. Surface mount all conduit, raceways, and boxes.

D. Conduit bends shall be formed with a bending machine.

E. Provide support clamps and straps to ensure a rigid installation.

F. Install switches and outlets as required for operation and as needed to conform to code requirements.

G. Complete installation suitable for wet location.

3.3 IDENTIFICATION

A. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring.

B. Warning Labels for Enclosures for Power and Lighting: Comply with 29 CFR 1910.145; identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

C. Equipment Identification Labels:

   1. Labeling Instructions:

      a. Indoor Equipment: Adhesive film label with clear protective overlay. Provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
      b. Outdoor Equipment: Engraved, laminated acrylic or melamine label, drilled for screw attachment.

c. Elevated Components: Increase sizes of labels and legend to those appropriate for viewing from the floor.

2. Equipment to Be Labeled:

a. Panelboards, electrical cabinets, and enclosures.
b. Electrical switchgear and switchboards.

D. Verify identity of each item before installing identification products.

3.4 SLEEVE AND SLEEVE-SEALS INSTALLATION

A. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

B. Cut sleeves to length for mounting flush with both wall surfaces.

C. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.

D. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and cable unless sleeve seal is to be installed.

E. Seal space outside of sleeves with grout for penetrations of concrete and masonry.

END OF SECTION 260500

SECTION 262421 – ELECTRICAL POWER, SERVICE AND DISTRIBUTION FOR PUMP HOUSE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

B. Provide new materials approved by the Underwriters Laboratory (UL listed).

C. Materials shall be standard products of current design from a manufacturer regularly engaged in the production of such equipment.

D. Meter Socket/Loop per local electrical company requirements.

2.2 GENERAL REQUIREMENTS FOR ELECTRICAL SERVICE

A. Install a 200-amp, 120/240 VAC, single phase, 3 wire, 60 Hz electrical power, service, and distribution to the pump house.

B. Provide Class 1630, 1670 panel boards.

C. Provide E-frame or better thermal magnetic molded case circuit breakers.

2.3 PANELBOARDS

A. Pump House Main Electrical Service Panel:
   1. Hoffman, NEMA 12, factory primed and painted.

B. Main Circuit Breaker for Pump House Main Electrical Service Panel:
   1. 2-Pole molded case breaker
   2. Utilized as main disconnecting device
   3. Match the interrupting current rating to the fault current at the electrical service.
   4. Minimum trip rating of 200 amps.
   5. Operating Handle shall allow for locking in the On or Off position.

C. Lightning Arrestors:
   1. Type of Design: Silicon Oxide Varistor

2. Maximum Current: 100,000 amps
3. Maximum energy: 3,000 joules per pole
4. Maximum number of surges: Unlimited
5. Response time one milliamp test: 5 nanoseconds
6. Response time to clamp 10,000 amps: 10 nanoseconds
7. Leak current at double the rated voltage: none
8. Type THHN leads
9. Case Material: PVC

D. Circuit Breakers:
1. 240V/120V, 18 circuit, with separate circuits for:
   a. Control System
   b. Submersible Well Pump
   c. Chemical Feed outlet
   d. Lighting
   e. Convenience outlet
   f. Heater
   g. Exhaust Fan
   h. Spare
   i. Spare
2. Branch circuit breakers shall trip before main circuit breakers to ensure the system will remain operational.

E. Transformers at Pump House:
1. 240/120V transformer for main electrical service panel, oil type, sized to handle all 120 V electrical services and pumps.
2. 24V transformer, dry type, sized for control panel and its components.

F. Chemical feed outlets capable of accepting no twist-lock GFI.

G. Manufacturer: GE Panel Board Type AQ.

PART 3 - EXECUTION

3.1 INSTALLATION

A. 200-amp, 240 VAC, single phase, three wire, 60 cycle service.

B. Contact local Electrical Cooperative (Intermountain Region Electric Association) to provide power to the site.

C. Prepare, obtain, and pay for all permits required to provide electrical power and service to the site.

D. Secondary service wiring, conduit, and trim shall be in accordance with electrical utility standards.

E. Establish and pay for the installation of electrical power and service including secondary wiring, metering, and trim in the name of Florissant Fossil Beds National Monument.

F. Install buried electrical power and service in accordance with electrical utility requirements.

END OF SECTION 262421

SECTION 265000 - LIGHTING

PART 1 - GENERAL

Not Used

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

A. Interior Non-metallic ceiling mounted fluorescent lighting:
   1. Operating temperatures 50° to 120° F.
   2. Rapid start ballasts
   3. Acrylic shielding
   4. Corrosion free construction
   5. Two 48” Fluorescent Lamps per fixture.
   6. Install minimum of two ceiling mounted light fixtures inside the pump house.
   7. Install wall switches on interior wall near door.
   8. Manufacturer: Columbia Lighting, LUN4232EU.

B. Interior Combination Emergency and Exit Lighting:
   1. Corrosion proof and impact and scratch resistant thermoplastic housing.
   2. Automatically charging sealed lead calcium battery shall provide minimum 90 minutes of emergency lighting.
   3. NFPA compliant.
   4. UL listed.
   5. Install combination emergency and exit lights above the interior of exit door.
   6. Manufacturer: Cooper Lighting, AP Series exit with square head combo.

C. Exterior Lighting:
   1. Manufacturer: RAB Lighting, VAN6S50.
   2. Construction: 120V normal power factor housing is white polyester powder painted
   3. Finish: bronze corrosion resistant polyester powder.
   4. Optical System: Injection-molded, one-piece, UV-stabilized polycarbonate Front cover/refractor. Sealed and gasketed to inhibit the entrance of outside contaminants.
   5. Install exterior light fixtures near the door.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate ceiling-mounted luminaires with ceiling construction, mechanical work, and security and fire-prevention features mounted in ceiling space and on ceiling.

B. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

C. Comply with NFPA 70 for minimum fixture supports.

END OF SECTION 265000

SECTION 270120 – OPERATION AND MAINTENANCE OF DATA COMMUNICATIONS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

1. Provide a monitoring system which allows the operators to detect pump malfunctions and determine various pump, flow and tank information via Wild Blue Satellite modem.

2.2 PUMP HOUSE MONITORING

A. SCADA Equipment:
   1. Level instruments at storage tank shall be monitored and transmitted back to the pump house Programmable Logic Controller (PLC). The storage tank controls shall include a solar power supply with battery backup and radio transmitter.
   2. The pump house shall include a complete PLC system with Wild Blue Satellite modem capable of:
      a. Transmitting all system alarms via text message.
      b. Containing an HMI screen with all data points shown.
      c. Trending information related to tank level, flow rate and total flow.
   3. Pump House Controls:
      a. See section 330910 for Pump House Control details.
   4. Equipment:
      a. Hoffman, A363612LP, Hoffman; 36” x 36” x 12” Enclosure.
      b. Hoffman, A36P36, Hoffman; 36” x 36” Back Pan.
      c. Motorola, ACE 38cm Metal Chassis (up to 3 slots).
      d. Motorola, V261AC, ACE Power Supply, AC, w/ Battery Charger.
      e. Motorola, V114AP, ACE 6.5 Ah Backup Battery.
      f. Motorola, ACE 3 Slot Rack Fits on Small Chassis.
      g. Motorola, V245AF, ACE Module, Mixed, DI-16/DO-4/AI-4/EE +/- 20mA.
      h. Banner, 77950, 900 MHZ ISM Band Gateway – Model DX80G9M6S4P4M2M2.
      i. Banner, BWC-1MRSMN05, .5m Antenna Cable.
      j. Wild Blue Satellite Modem and Dish.
      k. Samlek, SDC-5, 24VDC to 12VDC Converter.
      l. Idec, PS5R-B24, Power Supply DC24V 15 Watt.
      m. Idec, SH1B-05, 1 Pole Relay Base.
      n. Idec, RH1B-ULDC24V, 1 Pole Relay DC 24V w/ Indicator Light.
      o. Idec, SH2B-05, 2 Pole Relay Base.
      p. Idec, RH2B-ULDC24V, 2 Pole Relay DC 24V w/ Indicator Light.

q. PolyPhaser, IS-50NX-C2, Antenna Feedline Protector, S Side – Fem, P Side – Fem.
r. Hesco, Enforcer 1, Surge Arrestor, AC 120/240.
s. Allen Bradley (Rockwell), 1492-SP1C100, 10 Amp Circuit Breaker.
t. Entrelec, 125 116 01, Blue Terminal.
u. Entrelec, 105 116 16, Yellow Terminal.
v. Entrelec, 105 031 14, Black Terminal.
w. Entrelec, 105 051 20, White Terminal.
x. Entrelec, 165 113 16, Ground Terminal (Green / Yellow).
y. Entrelec, 103 002 26, End Stop.
z. Entrelec, 115 663 23, 24V Gray Fused Terminal.
aa. Panduit, C1LG6, Gray Wire Duct Cover, 1".
bb. Panduit, G1X2LG6, Gray Wire Duct, 1" x 2".
cc. Iboco, 3FAL1, Din Rail.
dd. Red Lion, G306C000, OIT Standard Graphic Operator Interface.
ee. Culter Hammer, 10250T2, Contact Black 2NO.
ff. Banner Engineering, DX80N9X2SN2M4C, 900 MHz, Flex Node w/External Power, 2-In (sink), 2-Out (NMos), 4 Analog In (4 – 20mA).
gg. Banner Engineering, BWA-905-C, Antenna, 900 MHz, 5DBi Omni w/Rubber Swivel, RP-SMA Male.
hh. Banner Engineering, DX81P6, Battery Pack (6 batteries) (located at storage tank).
ii. Banner Engineering, DX81, Battery Module (module driven by one lithium primary battery) (located at storage tank).
jj. Banner Engineering, BWA-SOLAR-001, Includes Solar Panel, Controller, and Rechargeable Battery Pack (located at storage tank).
kk. Maxrad ~~z~~ 1000 900 mh~~z~~ antenna.

PART 3 - EXECUTION

3.1 GENERAL COMMUNICATION EQUIPMENT INSTALLATION REQUIREMENTS

A. Install communication equipment to ensure that connecting pathways and cables are clear of obstructions and of the working and access space of other equipment.

B. Install sleeve and sleeve seals of type and number required for sealing communication service penetrations of exterior walls.

3.2 GROUNDING

A. Comply with J-STD-607-A.

3.3 SLEEVE AND SLEEVE-SEALS INSTALLATION

A. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint.

B. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.

C. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

END OF SECTION 270120

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service: Notify Colorado One Call utility locator service for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

E. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect remaining trees and shrubs from damage and maintain vegetation.

D. Do not store materials or equipment or permit excavation within drip line of remaining trees.

E. Protect site improvements to remain from damage. Restore damaged improvements to condition existing before start of site clearing.

F. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to a sediment and erosion control plan, specific to the site

G. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.

3.2 SITE CLEARING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.

1. Chip brush, branches, and trees and dispose of on-site.

B. Strip topsoil. Remove sod and grass before stripping topsoil. Stockpile topsoil that will be reused in the Work.

1. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

C. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

D. Dispose of waste materials, including trash and debris, off Owner's property. Burning waste materials on-site is not permitted.

1. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Utility Locator Service: Notify utility locator service "Colorado 811" for area where Project is located before beginning earth moving operations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, or other deleterious matter.

B. Unsatisfactory Soil: ASTM D 2487 Soil Classification Groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.

C. Backfill and Fill: Satisfactory soil materials. Refer to Geotechnical report.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Protect and maintain erosion and sedimentation controls during earth moving operations.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Excavate for structures, building slabs, pavements, and walkways. Trim subgrades to required lines and grades.

D. Refer to Geotechnical report for earthwork execution requirements.

E. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them at Owner's dump site.

END OF SECTION 312000

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Colorado Certified Seed mixture receipt.

B. Planting Restrictions: Plant during one of the following periods:

1. Spring Planting: April 15th – May 15th.
2. Fall Planting: August 30th – September 30th.

PART 2 - PRODUCTS

2.1 GRASSES

A. Grass Seed Mix:

1. Products:

a. Colorado Certified Seed.

b. Revegetation Seed Mix

Scientific/Common Name	% of Mixture	LBS PLS/acre
Bouteloua gracilis / Blue Grama	17	0.422
Elymus elymoides / Bottlebrush Squirreltail	16	0.464
Festuca arizonica / Arizona Fescue	33	1.266
Bromus anomalus / Nodding Brome	17	2.326
Stipa viridula / Green Needlegrass	17	1.515

2.2 SOILS AND AMENDMENTS

A. Topsoil: Reuse existing topsoil.

B. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium; 20 percent nitrogen; 10 percent phosphorous; and 10 percent potassium; by weight.

C. Straw Mulch: Clean, mildew- and seed-free salt hay or threshed straw of wheat, rye, oats, or barley.

PART 3 - EXECUTION

3.1 PREPARATION

A. Loosen subgrade to a minimum depth of 4 inches (100 mm**)**; remove stones, sticks, existing grass, vegetation, and other extraneous materials.

1. At newly graded subgrades, spread planting soil mix to a depth of 4 inches (100 mm), but not less than required to meet finish grades.
2. At unchanged grades, apply fertilizers and mix thoroughly into top 4 inches (100 mm) of soil. Till soil to a homogeneous mixture of fine texture.

3.2 PLANTING

A. Seeding: Evenly distribute seed by sowing with a spreader or a seeding machine. Rake seed lightly into top 1/8 inch (3 mm) of topsoil and water with fine spray. Protect seeded areas by spreading straw mulch 1-1/2 inches (38 mm) in loose depth.

1. Seeding Rate: See 2.1 Grasses.

END OF SECTION 329200

SECTION 330910 – INSTRUMENTATION AND CONTROL FOR WATER UTILITIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of unit indicated.

B. Warranty: Provide copies of manufacturer's standard limited warranty for all units placed in service.

C. Manuals: Provide Contracting Officer's Representative with a copy of all manuals for each unit placed in service.

D. Electrical Requirements: Conform to National Electric Code, State, Local, and NEMA Electrical Standards.

E. Provide properly sized PVC conduit for all wiring in accordance with the National Electric Code. Provide outlets, junctions, and pull boxes suitable for damp locations. Refer to Electrical Materials and Methods Section.

1.2 FIELD TESTS

A. Tests shall be conducted by the design engineer or a factory trained, qualified representative. All system components shall be checked to verify they have been installed properly and that all terminations have been made correctly and all deficiencies and irregularities shall be corrected.

B. Witnessed Field tests shall be performed on the complete system.

C. Each function shall be demonstrated to the satisfaction of the Contracting Officer's Representative.

D. Each test shall be witnessed and signed off by the system supplier and the Contracting Officer's Representative upon satisfactory completion.

E. Provide written certification that from the manufacturer to the Contracting Officer's Representative that the installation is in accordance with the manufacturer's requirements and the warranty is validated.

PART 2 - PRODUCTS

2.1 PUMP HOUSE CONTROL PERFORMANCE REQUIREMENTS

A. The system shall operate in a “pump-up” mode with an HOA switch to manually operate the well pump. The controller shall operate the pump, low water level alarm, and high water level alarm for the pump house. All alarms shall be wired to an automatic dialer.

B. Pump On when water level in storage tank drops to below the desired low water level.

C. Pump Off when water level in storage tank reaches the desired high water level.

D. Hi Water Level Alarm when water level exceeds desired High water level by 6- inches.

E. Low Water Level alarm when water level drops below desire low water level by 6- inches.

F. Pump Off, when water level exceeds High Water Level Alarm level by 2-inches.

G. Over Pressure Shut off if line pressure exceeds a point that would damage system.

H. Design, install, and wire all control system components in accordance with NEC and state, and local codes.

2.2 PUMP CONTROLS

A. Control Box:
1. Provide single-phase motor control box for the submersible well pump installed
2. Rated for necessary horse-power required to obtain the required flow and head requirements of the system.
3. Start capacitor to provide high starting torque.

B. Xylem, CentriPro CB20412MCPump Running Meters and Starter Counters:
1. Shall measure hours and tenths of hours up to 9,999.9
2. Meters shall be non-manual reset type.
3. Shall operate at control voltage by an auxiliary contact on the motor starter.
4. Visible on the outside of the enclosure (displayed on operator interface).
5. IDEC Timer, RTE-P1.
6. Shall record to 9,999 starts.
7. Meters shall be non-manual reset type.
8. Shall operate at control voltage power.
9. Visible on the outside of the enclosure.

C. External Alarm Indicator:
1. Edwards Signaling & Security Systems Visual Signal Model 51R-N5-40W.

D. Overpressure Shut Off
1. Provide an auxiliary pressure switch to prevent system from becoming over pressurized in either the “Hand” or “Auto” mode of operation.
2. Set overpressure shut off at an appropriate setting to prevent damage to the system.
   a. Ashcroft, B – Series Switch.

E. Tank Hi/Low Alarm Controller:
1. The controller shall be a PLC type controller.
2. Capable of operating the submersible well pump.
3. Shall indicate high and low water alarms as well as high pressure alarm via HMI.
4. Gems Sensors, Mechanical Tilt Flow Switch, Model M GRE 40 W.

F. No Flow Protection:
1. In-line flow meter shall be provided to prevent chemical feed pumps from operating with no flow and to protect pumps from loss of flow.
2. Meter shall be wired to the pump controller modules.
3. Flow switch in the PLC to shut off pump if "no flow condition" occurs when pump is in the "hand" or "Auto" position.
4. Supply door mounted, replaceable bulb, push to test, red pilot light to signal a no flow condition.
5. W.E. Anderson, FLOTEUT Vane Operated Flow Switch, Model V4-55-2-U.

G. Pressure Transmitter:
1. Adjustable pressure range as needed to ensure over pressure shut off occurs and to match the parameters of the system.
2. External switch set points.
3. General-purpose.
4. Accuracy of +/- 0.5 of full operating range.
5. Ashcroft, B Series.

H. Level Transmitter:
1. Level Range as needed to control the water level in the storage tank.
2. Submersible level transducer designed to meet the environments encountered in this application.
3. Repeatable precision depth measurements under the most adverse conditions.
4. Wetted Material: Std 316SS
5. Static accuracy of +/- .25%.
6. Esterline, KPSI Transducer Series 700.

2.3 ELECTRICAL COMPONENTS

A. Enclosures:
1. Hoffman NEMA Type 12 wall mounted enclosure for indoor locations.
2. Enclosure shall be UL approved with a lockable front door.
3. HOA switches, selector switches, and resets shall be operable from the exterior front panel in the closed position.
4. Install the following on the exterior of the control panel and starter enclosure:
   a. Pump and alarm controller
   b. HOA switches

B. Hand Off Auto Switch:
1. Manual 3-position selector switch.
2. Door mounted.
3. Culter Hammer, 1025T1323.

C. Circuit Breakers:

1. Circuit breakers shall be thermal magnetic molded case circuit breaker ("E" Frame or better).
2. Supply one for Control Panel Power.
3. Supply separate breakers for each pump, the controller, convenience outlets, chemical feed equipment, heaters, water heater, fans, and lighting.
4. Allen Bradley or Square D.

D. Wiring and Conduit Boxes:
1. Provide properly sized solid copper wire with minimum 600V insulation.
2. Color code control wiring.
3. Conductor: moisture and heat resistant Thermo-plastic insulated type THWN or THW.
4. Branch circuit conductors shall not be smaller than No. 12 AWG.
5. Wiring within panels and boxes shall be installed neatly within wire raceways without the use of excessive amounts of wire.
6. Where circuits and terminals are provided for connection of wires for other system components, space and a clear path within the panel or box shall be provided by the control manufacturer to allow the installation of these wires without disturbance of the control wiring.

E. Voltage:
1. Provide over voltage and under voltage detection sensor.
2. Manually adjustable set points w/ automatic reset.
3. +/- 1% set point stability.
4. Software only.

2.4 BUILDING ALARMS

A. Door Alarm:
1. 3/4" recessed door contacts on the door.
2. Delay timer and acknowledge code in PLC.
3. GE intrusion switch 2500 Series.

B. High Low Temperature Alert:
1. Mechanical temp alert that requires no power for operation.
2. Adjustable high and low set points
3. 2 dry contact closure contacts for high and low alarms.
4. Dayton Line voltage thermostat, Model 2E816.

C. Satellite Alarm Notifier:
1. Minimum of 8 channels. Alarms shall be programmed to the Red Lion HMI.
2. Install the following on the Auto Dialer:
   a. High and low water level alarms for the system.
   b. Power Failure to the system.
   c. No flow alarm.
   d. Pump overload alarm.
   e. Over Pressure Shut Off.
   f. Door Open.
   g. High and Low building temperature.

2.5 ACCESSORIES

A. Nameplates to be identified as follows:

	Nameplate	**Device**
1.	Pump No. 1 – Selector Switch	H-O-A Switch (physical switch, see 23C)
2.	Power Failure	Pilot Light, (Red) (ONHMI)
3.	Power Failure	Voltage Sensor) (ONHMI)
4.	Over Pressure	Pilot Light (Red) (ONHMI)
5.	Pump No. 1 – Run	Pilot Light (Green) (ONHMI)
6.	Pump No. 1 – No Flow	Pilot Light (Red) (ONHMI)
7.	Pump No. 1 – Overload	Pilot Light (Red) (ONHMI)
8.	Pump No. 1 – Reset (Overload)	Reset Push Button (ONHMI)
9.	Pump No. 1 – Reset (No Flow)	Rest Push Button (ONHMI)
10.	Pump No. 1 – Cycle Counter	Counter (ONHMI)
11.	Pump No. 1 – Running Time Meter	Meter (ONHMI)
12.	Pump No. 1 – Motor Starter	Starter (ONHMI)

PART 3 - EXECUTION

3.1 TESTING AND STARTUP

A. All elements of the control system shall be tested to demonstrate a fully functional control system.

B. Control system supplier shall provide all special testing materials and equipment.

C. Coordinate and schedule all testing and start up work with the Contracting Officer’s Representative.

3.2 TRAINING

A. Provide a minimum on site 8-hour training to demonstrate operation of all pump house control system components.

B. Instructors shall be thoroughly trained in operating theory as well as practical operation and maintenance work for each component of the system.

END OF SECTION 330910

SECTION 331313 – CHEMICAL FEED EQUIPMENT FOR PUMP HOUSE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of unit indicated.

PART 2 - PRODUCTS

2.1 CHEMICAL FEED EQUIPMENT

A. Hach Pocket Colorimeter II Colorimeter (No 58700-00) with the following characteristics:
1. Free and Total Chlorine test kit
2. Light Emitting Diode (LED)
3. Fixed wavelength +/- 2 nm
4. Filter bandwidth: 15 nm
5. Absorbance Range: 0 to 2.5 abs
6. Display: Liquid Crystal Display(LCD), backlit
7. Enclosure: IP67, waterproof at 1 m for 30 minutes
8. Dimensions: 3.5 x 6.1 x 15.5 cm

B. Hypochlorinator Pump Equipment:
1. Provide one (1) peristaltic metering pump.
2. Compatible with the liquid to be pumped.
3. Capable of providing the required output against the anticipated working pressures.
4. External control via flow meter in raw water supply line from well (refer to PH Control System Section 330910 2.2 I).
5. All housings; Lexan polycarbonate plastic.
6. Peristaltic Tube: Thermoplastic rubber (TPR) NSF listed.
7. All fasteners: Stainless Steel.
8. Suction/discharge tubing: Low Density Polyethylene (LDPE) – NSF listed.
9. Tube fittings, connecting nuts, check valve fittings, and ceramic weight clip: Type 1 Rigid PVC-NSF listed.
10. Blue-White Model A3 V 2 45 ND.

C. Solution Tank:
1. 15-gallon minimum translucent polyethylene tank.
Rigid Fiberglass cover
2. Blue-White K Series.

D. Sodium Hypochlorite Solution:
   1. Provide 3 gallons of commercial grade chlorine bleach (Sodium Hypochlorite) (12.5% active ingredient) meeting AWWA requirements for use in drinking water systems.
   2. Provide credit to Florissant Fossil Beds National Monument maintenance department from supplier for an additional 30 gallons Sodium Hypochlorite Solution.

E. Chlorine Solution Injection Assembly:
   1. Suitable for potable water.
   2. Chemical injector configuration shall provide a single feed point into the center of the pipe where chlorine solution is being injected.
   3. Materials shall be compatible with chlorine solution and be capable of withstanding the maximum discharge line pressure as determined by the design engineer.
   4. Wetted parts shall be constructed of materials suitable for potable water use.

F. Solution Tube:
   1. An acceptable locking device shall be included to prevent accidental release of the solution tube from the process piping while under pressure.
   2. A ball check shall be included to prevent backpressure from the process piping entering the chemical feed system.
   3. A Stainless safety chain shall be included to prevent withdrawal of solution tube past corporation stop. Safety chain shall be preset by manufacturer for closure of the corporation stop before withdrawal of solution tube.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install testing and pump equipment according to manufacturer’s instructions and in accordance with local codes where applicable.

END OF SECTION 331313

SECTION 331616 – UNDERGROUND WATER UTILITY STORAGE TANK

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For underground storage tank.

B. Warranty: Provide manufacturer's standard limited warranty at time of purchase.

C. Manufacturers:
1. Tank manufacturer shall be in the business of manufacturing tanks to Underwriters Laboratories, Inc. (UL) Standard 1316.
2. Tank manufacturer shall be in the business of manufacturing tanks with materials conforming to the requirements of NSF Standard 61.
3. Tank manufacturer shall be in the business of manufacturing tanks conforming to the requirements of ANSI/AWWA D120-02 Thermosetting Fiberglass-Reinforced Plastic Tanks.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Internal Load: Tank shall be designed to withstand a 3-psig air-pressure test with 2:1 safety factor. When tank is designed for on-site testing, contractor shall individually test tank for leakage prior to installation. Maximum test pressure is 5 psig (3 psig for 12-ft diameter tank).

B. Surface Loads: Tank shall withstand foot traffic surface loads when properly installed according to tank manufacturer's current Installation Manual and Operating Guidelines.

C. External Hydrostatic Pressure: Tank shall be capable of being buried in ground with 3 feet of overburden over the top of the tank, the hole fully flooded and a safety factor of 5:1 against general buckling. Tank shall support accessory equipment such as access hatch, ladders, inlet, outlet, and installed according to tank manufacturer's current installation Manual and Operating Guidelines.

D. Darco 10'-0" I.D. 35,000 gallon fiberglass horizontal tank.

2.2 PRODUCT STORAGE

A. Tank shall be capable of storing water products with specific gravity up to 1.1.

B. Tank shall be vented to atmospheric pressure.

C. Tank shall be capable of storing products identified in the manufacturer's current standard limited warranty.

2.3 MATERIALS

A. The structural glass fiber content shall be 35% minimum with no sand fillers.

B. The laminate materials used in the internal coating system of a potable water tank shall conform to the requirements of NSF standard 61.

2.4 MANWAYS

A. All manways shall be flanged and 30-inch I.D., complete with hinged, lockable lid with 2-inch lip and gasket.

B. FRP Manway extension shall extend the distance required by the state above the surrounding ground surface.

2.5 LADDERS

A. Ladders shall be the standard ladder as supplied by the tank manufacturer.

B. Manufactured with materials conforming to the requirements of NSF Standard 61.

2.6 FITTINGS

A. All threaded fittings shall be constructed of carbon steel or FRP.

B. All standard threaded couplings shall be half-couplings, and of 2-inch, 4-inch, or 6- inch diameter. Reducers are to be used for smaller sizes where shown and provided by contractor.

C. All FRP and PVC nozzles shall be flat-faced and flanged, and shall conform to ANSI B16.5 150# bolting pattern.

PART 3 - EXECUTION

3.1 TESTING

A. Tank shall be tested according to tank supplier's Installation Manual and Operating Guidelines in effect at time of installation.

3.2 INSTALLATION

A. Contractor shall be trained by the tank manufacturer, the state or other approved agency in proper installation procedures.

B. Tank shall be installed according to manufacturer's installation manual and guidelines in effect at time of installation.

END OF SECTION 331616

SECTION 332100 - WATER SUPPLY WELLS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of part used.

a. Certified performance curves and rated capacities of well pumps.

B. Performance:

1. Modify existing Sawmill Trail Well to install new pump and pitless adapter.

1.2 FIELD CONDITIONS

A. Well is existing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. The National Park Service specified use of the existing Sawmill Trail well.

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

C. Comply with AWWA A100.

1. Martinson S series S-130x.

2.2 WELL CASINGS

A. Drop Pipe: Shall be PVC Schedule 80 with stainless steel couplings.

1. Contractor shall set the top of the pump at a depth of 150 feet below top of casing. Minimum diameter drop pipe allowed is 2-inches.

B. Pitless Adapter: Fitting, of shape required to fit onto casing, with waterproof seals.

1. Bury depth of adapter shall be 7 feet.

2. Provide appropriately sized threaded discharge and drop pipe connections.

3. Campbell Pitless Adapter, Part S-130x.

C. Pitless Unit: Factory-assembled equipment that includes pitless adapter.

D. Well Seals: Casing cap, with holes for piping and cables that fits into top of casing and is removable, waterproof, and vermin proof.

1. All nuts and bolts shall be made of non-corrodible material.
2. Screened downward facing vent not less than ¼ inch diameter.
3. Screen shall be made of non-corrodible material.
4. Monitor Standard Industrial model or approved equal.

2.3 WELL PUMP

A. Submersible Pump:

1. Manufacturers:
   a. Goulds Pumps, Model 13GS10 412C.

B. Capacities and Characteristics:

1. Pump:

   a. Capacity: 15 gpm.
   b. Discharge Head: 106.6 psig.
   c. Discharge Size: 1¼.
   d. Lift: 206.5 feet.

C. Submersible Pump Cable: Manufactured in accordance with the National Electric Code.

1. Shall be RHW or TW insulated and jacketed.
2. UL Listed.
3. Rated at 600 volts
4. Contractor shall determine the required wire size such that the voltage drop through cable from the electrical service to the pump motor is in accordance with the pump manufacturer's recommendation.
5. No more than 5 % maximum voltage drop will be allowed between the electrical service and the pump motor.
6. Service Wire Co., Type THW-TWISTED.

D. Buried Electrical Cable: Manufactured in accordance with local power company regulations, applicable state and local codes, and the National Electric Code.

1. Type UF/USE direct burial electric cable.
2. Contractor shall determine required wire size such that the voltage drop through the cable from the electrical service to the pump motor is in accordance with the p ump manufacturer's recommendation.
3. No more than 5 % maximum voltage drop will be allowed between the electrical service and the pump motor.

4. Place cable in rigid non-metallic conduit.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Pitless Adapter:

1. Make all joints watertight.
2. Mount to casing in accordance with manufacturer's recommendations.

B. Buried Electric Cable: Connect buried electric cable to the submersible pump cable under the well cap. Provide 12 inches of extra cable under well cap.

1. Connect a ground wire to the casing with a threaded screw tapped or drilled through the casing.
2. Place cable in rigid conduit at a minimum bury depth fo 2 ft underground.
3. Install compete wiring, from the well seat to the motor control center.
4. Provide sufficient slack in cable to prevent separation of the cable by settlement of the trench.
5. Underground cable splices are not allowed.

C. Test and disinfect wells according to AWWA A100, AWWA C654, and authorities having jurisdiction.

END OF SECTION 332100