13125 METAL BUILDING SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. The Contractor shall furnish, deliver and erect a pre-engineered metal building complete with accessories as shown on the plans and as specified. This will include a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding loads required by the 2010 Florida Building Code.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract.

1.03 SUMMARY

A. This Section includes the following:

1. Structural framing.
2. Roof panels.
3. Wall panels and liners.
4. Insulation
5. Accessories and trim.

1.04 DEFINITIONS

A. Bay Spacing: Dimension between main frames measured normal to frame (at centerline of frame) for interior bays, and dimension from centerline of first interior main frame measured perpendicular to end wall (outside face of end-wall girt).

B. Building Length: Dimension of the building measured perpendicular to main framing from end wall to end wall (outside face of girt to outside face of girt).

C. Building Width: Dimension of the building measured parallel to main framing from sidewall to sidewall (outside face of girt to outside face of girt).

D. Clear Span: Distance between supports of beams, girders, or trusses (measured from lowest level of connecting area of a column and a rafter frame, or knee).

E. Eave Height: Vertical dimension from finished floor to eave (the line along the sidewall formed by intersection of the planes of the roof and wall).

F. Clear Height under Structure: Vertical dimension from finished floor to lowest point of any part of primary or secondary structure.

G. Terminology Standard: Refer to MBMA's "Low Rise Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.

1.05 SYSTEM PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Engineer metal building systems according to procedures in MBMA's "Low Rise Building Systems Manual."

2. Design Loads:

   a. Live Loads: Include vertical loads induced by the building occupancy indicated on Drawings. Include loads induced by maintenance workers, materials, and equipment for roof live loads.
   b. Wind Loads: Include vertical and horizontal loads as required by the 2010 Florida Building Code, Basic wind speed 155 MPH, Exp C, Risk Category III-IV, Structural Category II, Open Building.
   c. Collateral Loads: Include additional 10 psf collateral dead load.

3. Load Combinations: Design metal building systems to withstand the most critical effects of load factors and load combinations.

4. Deflection Limits: Engineer assemblies to withstand design loads with deflections no greater than the following:

   a. Purlins and Rafters: Vertical deflection of 1/180 of the span.
   b. Girts: Horizontal deflection of 1/180 of the span.
   c. Metal Roof Panels: Vertical deflection of 1/180 of the span.
   d. Metal Wall Panels: Horizontal deflection of 1/180 of the span.
   e. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.

5. Drift Limit: Engineer building structure to withstand design loads with drift limits no greater than the following:

   a. Lateral Drift: Maximum of 1/200 of the building height.

6. The design of the framing system shall be based on columns having pinned conditions such that there is no moment transferred into the foundations.

7. All lateral loads shall be resisted by bracing. Panel diaphragm capacity of the roofs and walls shall not be used to resist lateral loads.

B. Thermal Movements: Provide metal building roof and wall panel systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on

surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

C. Water Penetration for Roof Panels: Provide roof panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 1646 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

D. Water Penetration for Wall Panels: Provide wall panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

E. Water Penetration for Flashing at joint/interface of all combinations of walls and roof elements: Provide assemblies with no water penetration as defined in the test method when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressures.

F. Wind-Uplift Resistance: Provide roof panel assemblies that meet requirements of UL 580 for the following wind-uplift resistance for 155 mph, Exp C, Open Building loadings.

1.06 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following metal building system components:

1. Structural-framing system.

2. Roof panels.

3. Wall panels and liners.

4. Trim and closures.

5. Accessories.

B. Shop Drawings: For the following metal building system components include plans, elevations, sections, details, and attachments to other work.

1. For all components provided, include structural analysis data signed and sealed by the qualified professional engineer licensed in Florida responsible for their preparation.

2. The shop drawings shall be signed and sealed by a Florida licensed professional engineer and shall include the design basis loads. The wind loads shall include reference to the 2010 Florida Building Code, 155 MPH, Exp C, Structural Category II, Risk Category III-IV, Open Building.

3. Anchor-Rod Plans: Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location. Locations shall be shown on a plan sheet with column line designations as defined on project drawings. All loads shall be clearly referenced to the column grid designations on project drawings.

4. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

5. Roof and Wall Panel Layout Drawings: Show layouts of panels on support framing, details of edge conditions, joints, panel profiles, corners, custom profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work.

6. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:10):

   a. Gutters.
   b. Downspouts.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of the following products with factory-applied color finishes:

1. Roof panels.

2. Wall panels.

3. Trim and closures.

4. Accessories.

D. Product Certificates: Signed by manufacturers of metal building systems certifying that products furnished comply with requirements.

1. Letter of Design Certification: Signed and sealed by a Florida licensed professional engineer. Include the following:

   a. Name and location of Project.
   b. Order number.
   c. Name of manufacturer.
   d. Name of Contractor.
   e. Building dimensions, including width, length, height, and roof slope.
   f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
   g. Reference to conformance to the requirements of the Florida Building Code.
      1) Florida Approval certificates for roof panels, wall panels, and accessories.

h. Design Loads: Include dead load, roof live load, collateral loads, deflection, design wind speed & exposure, statement of partially enclosed building design basis, wind loads (MWFRS Loads and component loads) and auxiliary loads.

i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.

j. Building-Use Category: Indicate category of building use and its effect on load importance factors.

k. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.

E. Structural Steel Certifications and inspections as required. The certifications and inspection reports shall be signed and sealed by the qualified professional engineer licensed in Florida.

F. Welding Certificates: Copies of certificates for welding procedures and personnel.

G. Erector Certificates: Signed by manufacturer certifying that erectors comply with requirements.

H. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements. Include evidence of manufacturing experience.

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

J. Material Test Reports: From a qualified testing agency indicating compliance with the specifications for the metal building.

K. Material Certificates: Signed by manufacturers certifying that products comply with project specifications.

L. Surveys: Show final elevations and locations of major members. Engage a qualified engineer or land surveyor to perform surveys and certify their accuracy. Indicate discrepancies between actual installation and the Contract Documents.

M. Warranties: Special warranties specified in this Section.

N. Primary loads & load combination for each column shall be provided in spreadsheet format. Column grids shall be displayed in horizontal row. The spreadsheet columns shall include col.line, dead, live, wind vertical, Wind X, Wind Y, EQ X, and EQ Y.

1.07 QUALITY ASSURANCE

A. Erector Qualifications: An experienced erector who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal building systems that are similar to those indicated for this Project in material, design, and extent.

C. Manufacturer Qualifications: A firm experienced in manufacturing metal building systems similar to those indicated for this Project and with a record of successful in-service performance.

1. Member of MBMA.

2. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.

3. Engineering Responsibility: Preparation of Shop Drawings, testing program development, test result interpretation, comprehensive engineering analysis, and regulatory required construction observation by a qualified professional engineer registered in the State of Florida.

D. Surveyor Qualifications: A land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.

E. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

F. Source Limitations: Obtain each type of metal building system component through one source from a single manufacturer.

G. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal building system and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section 1670, "Substitution and Product Options".

H. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel"; and AWS D1.3, "Structural Welding Code--Sheet Steel."

I. Regulatory Requirements: Fabricate and label structural framing to comply with special inspection requirements at point of fabrication for welding and other connections required by authorities having jurisdiction. Verify installation per special inspection requirements required by authorities having jurisdiction.

J. Structural Steel: Comply with AISC S335, "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design"; or AISC S342, "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.

K. Cold-Formed Steel: Comply with AISI SG-671, "Specification for the Design of Cold-Formed Steel Structural Members," and AISI SG-911, "Load and Resistance Facet Design Specification for Steel Structural Members," for design requirements and allowable stresses.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package roof and wall panels for protection during transportation and handling.

B. Handling: Unload, store, and erect roof and wall panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store roof and wall panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

1.09 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit roof and wall panel installation to be performed according to manufacturer's written instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate size and location of concrete foundations and casting of anchor rods into concrete pedestal. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

1.11 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty on Panels: Written warranty, executed by manufacturer agreeing to repair or replace roof and wall panels that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

C. Special Warranty on Panel Finishes: Written warranty, signed by manufacturer agreeing to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

1. Warranty Period for Roof Panels: 20 years from date of Substantial Completion.

2. Warranty Period for Wall Panels: 20 years from date of Substantial Completion.

D. Special Warranty on Standing-Seam Roof Panel Weathertightness: Written warranty, signed by manufacturer agreeing to repair or replace standing-seam roof panel assemblies that fail to remain weathertight within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 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. Butler Manufacturing Company.

2. Ceco Building Systems.

3. Varco-Pruden Buildings; a United Dominion Company.

2.02 STRUCTURAL FRAMING MATERIALS

A. Structural-Steel Shapes: ASTM A 36/A 36M or ASTM A 529/A 529M.

B. Steel Plate, Bar, or Strip: ASTM A 529 42; 42,000-psi minimum yield strength.

C. Steel Tubing or Pipe: ASTM A 500, Grade B.

D. Structural-Steel Sheet: Hot-rolled, ASTM 568 or ASTM A 569; or cold-rolled, ASTM A 366 or ASTM A 568.

E. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 446 with G90 coating complying with ASTM A525. Grade to suite manufacturer's standards.

F. Anchor Rods, Bolts, Nuts, and Washers: Type 316 stainless steel.

G. Primers: As selected by manufacturer for resistance to normal atmospheric corrosion, compatibility with finish paint systems, capability to provide a sound foundation for field-applied topcoats despite prolonged exposure, and as follows:

1. Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer; complying with performance requirements of FS TT-P-664.

2. Primer: SSPC-Paint 25; red iron oxide, zinc oxide, raw linseed oil and alkyd primer.

3. Primer: SSPC-Paint 23, latex primer.

4. Primer: SSPC-Paint 15, Type I, red oxide.

5. Primer: Manufacturer's standard, lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

6. Primer: Nonasphaltic primer complying with SSPC's "Painting System Guide No. 7.00: Guide for Selecting One-Coat Shop Painting Systems."

H. Bolts for Structural Framing: Comply with ASTM A307 or ASTM A325 as necessary for design loads and connection details.

2.03 PANEL MATERIALS

A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M and the following requirements:

1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating, Grade 40 (Class AZ150 coating, Grade 275); structural quality.

2. Surface: Smooth, flat, mill finish.

B. Panel Sealants: Provide the following:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

2. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant; of type, grade, class, and use classifications required to seal joints in panels and remain weathertight; and as recommended by metal building system manufacturer.

2.04 MISCELLANEOUS MATERIALS

A. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

B. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage

compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and with a 30-minute working time.

C. Finish Painting: Refer to Division 9 Section "Painting."

2.05 FABRICATION, GENERAL

A. General: Design components and field connections required for erection to permit easy assembly and disassembly.

1. Fabricate components in a manner that once assembled in the shop, they may be disassembled, repackaged, and reassembled in the field.

2. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.

3. Fabricate framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Cold-formed members shall be free of cracks, tears, and ruptures.

B. Framing: Shop-fabricate framing components to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

1. Make shop connections by welding or by using high-strength bolts.

2. Join flanges to webs of built-up members by a continuous submerged arc-welding process.

3. Brace compression flange of primary framing by angles connected between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.

4. Weld clips to frames for attaching secondary framing members.

5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary structural members with specified primer after fabrication.

C. Tolerances: Comply with MBMA's "Low Rise Building Systems Manual": Chapter IV, Section 9, "Fabrication and Erection Tolerances."

2.06 STRUCTURAL FRAMING

A. Primary Framing: Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; door support frames, and wind bracing.

1. General: Provide framing members with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly.

2. Rigid Frame: Fabricated from hot-rolled structural steel shapes. Provide factory-welded, shop painted, built-up "I-beam" shape or open-web type frames consisting of tapered or parallel flange beams and tapered columns.

B. Bolts: Provide shop-painted bolts unless structural-framing components are in direct contact with roof and wall panels. Provide galvanized bolts when structural-framing components are in direct contact with roof and wall panels. Anchors to the concrete pedestal shall be Type 316 stainless steel.

2.07 ROOF PANELS

A. Standing-Seam Roof Panels: Manufacturer's standard panels complying with the following:

1. Ribbed Roof Panels: Similar to "SSR" Standing Seam Panels by Varco-Pruden or approved equivalent. Fabricate from metallic-coated steel sheets prepainted with coil coating, factory formed to provide 16-inch coverage; with 3-inch-high (including seam), raised trapezoidal major ribs at panel edges, and intermediate stiffening ribs symmetrically spaced between major ribs for full length of panel. Comply with the following:
   a. Material: Galvalume steel.
   b. Metal Thickness: 22-gauge.
   c. Joint Type: As standard with manufacturer.
   d. Clip System: Concealed clips with movable tabs to accommodate thermal movement.

B. Roof Panel Accessories: Provide components required for a complete roof panel assembly including trim, copings, fascia, mullions, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of roof panels, unless otherwise indicated.

1. Closures: Provide closures at eave and ridge, fabricated of same metal as roof panels.

2. Clips: Minimum 0.0625-inch- thick, stainless-steel panel clips designed to withstand negative-load requirements.

3. Cleats: Mechanically seamed cleats formed from minimum 0.0250-inch-thick, stainless-steel sheet.

4. Thermal Spacer Blocks: Where panels attach directly to purlins, provide 1-inch thick, thermal spacer blocks; fabricated from extruded polystyrene.

5. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

C. Exterior Finish: Apply the following coil coating to roof panels and accessories:

1. KXL System: Manufacturer's standard thermocured system consisting of specially formulated inhibitive primer and PVDC color topcoat containing not less than 70 percent Kynar® 500 by weight, with a total minimum dry film thickness of 1 mil and 30 percent reflective gloss when tested according to ASTM D 523.
   a. Durability: Provide coating field tested under normal range of weather conditions for a minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D 4214; and without fading in excess of five Hunter units.

2. Colors, Textures, and Glosses: To be selected by Owner from manufacturer's full range for these characteristics.

2.08 WALL PANELS

A. Uninsulated Wall Panels: Provide manufacturer's standard panels complying with the following:

1. Wall Panels shall be 24 gage panels (Panel Rib) with ribs not more than 1 ¼" deep spaced not more than 12 inches on center to be fastened to girts in ribbed area such that fasteners are semi-concealed. Panels shall be furnished up to 40 ft in length to minimze end laps. Material shall be 50 ksi minimum yield strength. Panels shall have embossed finish.

B. Wall Panel Accessories: Provide components required for a complete wall panel assembly, including trim, copings, mullions, sills, corner units, clips, seam covers, battens, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

1. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

C. Exposed Finish for Exterior Panels: Apply the following coil coating:

1. KXL System: Manufacturer's standard, thermocured system consisting of specially formulated inhibitive primer and PVDC color topcoat containing not less than 70 percent Kynar® 500 by weight, with a total minimum dry film thickness of 1 mil and 30 percent reflective gloss when tested according to ASTM D 523.
   a. Durability: Provide coating field tested under normal range of weather conditions for a minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D 4214; and without fading in excess of five Hunter units.

2. Colors, Textures, and Glosses: To be selected by Owner from manufacturer's full range for these characteristics.

2.10 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer, and complying with the following:

1. Provide sheet metal accessories of same material and in same finish as roof and wall panels, unless otherwise indicated.

B. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of roof or wall sheets by means of plastic caps or factory-applied coating. Comply with the following:

1. Fasteners for Roof and Wall Panels: Self-drilling or self-tapping 410 stainless steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of panels.

2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.

3. Blind Fasteners: High-strength aluminum rivets.

C. Flashing and Trim: Form from 0.0179-inch- thick, aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, wall to canopy connections, lean-to to wall connections, eaves, rakes, corners, bases, framed openings, ridges, fascia, and fillers. Finish flashing and trim with same finish system as adjacent roof or wall panels.

D. Gutters: Form from 0.0179-inch- thick, aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch long sections, sized according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced 36 inches o.c., fabricated from same metal as gutters. Provide bronze, copper, or aluminum wire ball strainers at outlets. Finish gutters to match roof fascia and rake trim.

E. Downspouts: Form from 0.0179-inch- thick, aluminum-zinc alloy-coated steel sheet prepainted with coil coating; in 10-foot- long sections, complete with formed elbows and offsets. Finish downspouts to match wall panels.

F. Closures: Closed-cell, laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match roof and wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

G. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

2.11 FINISHES, GENERAL

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

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

C. Provide paint finish for all structure exposed to view on the interior of the structure.

2.12 SOURCE QUALITY CONTROL

A. Building Supplier will employ an independent testing agency to perform source quality-control testing and special inspections, and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.

2. Allow Owner's testing agency access to places where structural framing is being fabricated or produced. Cooperate with Owner's testing agency and provide samples of materials as may be requested for additional testing and evaluation.

3. Special inspections will not be required when fabrication is performed by a fabricator registered and approved by authorities having jurisdiction to perform such work without special inspection.

B. Correct deficiencies in or remove and replace structural framing that inspections and test reports indicate do not comply with requirements.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with requirements.

D. Shop-bolted connections will be tested and inspected according to RCSC's "Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. Shop-bolted connections will be tested and inspected according to RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Direct-tension indicator gaps will be verified to comply with ASTM F 959, Table 2.

F. In addition to visual inspection, shop welding will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option:

1. Liquid-Penetrant Inspection: ASTM E 165.

2. Magnetic-Particle Inspection: ASTM E 709, performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

3. Radiographic Inspection: ASTM E 94 and ASTM E 142, minimum quality level 2-2T.

4. Ultrasonic Inspection: ASTM E 164.

G. In addition to visual inspection, shop-welded shear connectors will be inspected and tested according to requirements of AWS D1.1 for stud welding and as follows:

1. Bend tests will be performed when visual inspections reveal either less than a continuous 360-degree flash or welding repairs to any shear connector.

2. Tests will be conducted on additional shear connectors when weld fracture occurs on shear connectors already tested, according to requirements of AWS D1.1.

H. Testing agency will report test results promptly and in writing to Contractor and Owner.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of metal building system.

1. For the record, prepare written report, endorsed by Erector, listing conditions detrimental to performance of work.

2. Proceed with erection only after unsatisfactory conditions have been corrected.

B. Before erection proceeds, survey elevations and locations of concrete and masonry bearing surfaces, baseplates, and anchor bolts to receive structural framing. Verify compliance with requirements and metal building system manufacturer's tolerances.

1. Engage land surveyor to perform surveying.

3.02 PREPARATION

A. Clean substrates of substances, including oil, grease, rolling compounds, incompatible primers, and loose mill scale, that impair bond of erection materials.

B. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

3.03 ERECTION

A. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use non-shrinking to obtain uniform bearing and to maintain a level base-line elevation. Moist cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts. Tighten bolts by turn-of-the-nut method.

B. Purlin and Girts: Provide rake or gable purlins with tight fitting closure channels and facings. Locate and space wall girts to suit door and window arrangements and heights. Secure purlins and girts to structural framing and hold rigidly to a straight line by diagonal rods.

C. Bracing: Provide diagonal rod or angel bracing in roof and sidewalls as indicated.

1. Movement resisting frames may be used in lieu of sidewall and bracing to suit manufacturer's standards.

2. Where diaphram strength of roof or wall covering is adequate to resist wind forces, rod or angle bracing will not be required.

3.04 ROOF PANEL INSTALLATION

A. General: Provide roof panels of full length from eave to ridge when possible. Install panels perpendicular to purlins.

1. Field cutting by torch is not permitted.

2. Rigidly fasten eave end of roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels.

3. Provide weatherseal under ridge cap.

4. Flash and seal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.

5. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

6. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.

7. Locate and space fastenings in true vertical and horizontal alignment.

8. Install ridge caps as roof panel work proceeds.

9. Locate panel splices over, but not attached to, structural supports. Stagger panel splices to avoid a four-panel lap splice condition.

B. Standing-Seam Roof Panels: Fasten roof panels to purlins with concealed clips at each standing-seam joint. Install clips over top of insulation at location and spacing determined by manufacturer.

1. Install clips to supports with self-drilling fasteners.

2. Crimp standing seams with manufacturer-approved motorized seamer tool so clip, panel, and factory-applied side-lap sealant are completely engaged.

3. At panel splices, nest panels with minimum 6-inch end lap, sealed with butyl sealant and fastened together by interlocking clamping plates.

3.05 WALL PANEL INSTALLATION

A. General: Provide panels full height of building when possible. Install panels perpendicular to girts.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Install panels with vertical edges plumb. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

2. Unless otherwise indicated, begin panel installation at corners with center of rib lined up with line of framing.

3. Field cutting by torch is not permitted.

4. Align bottom of wall panels and fasten with blind rivets, bolts, or self-tapping screws.

5. Fasten flashing and trim around openings and similar elements with self-tapping screws.

6. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

7. Provide weather-resistant escutcheons for pipe and conduit penetrating exterior walls.

8. Flash and seal wall panels with weather closures under eaves and rakes, along lower panel edges, and at perimeter of all openings.

9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as necessary for waterproofing.

Handle and apply sealant and backup according to sealant manufacturer's written instructions.

10. Use stainless-steel fasteners for exterior and interior applications.

11. Locate and space fastenings in true vertical and horizontal alignment.

B. Uninsulated Panels: Install wall panels on exterior side of girts. Attach panels to supports with fasteners as recommended by manufacturer.

3.07 ACCESSORY INSTALLATION

A. General: Install gutters, downspouts, and other accessories according to manufacturer's written instructions, with positive anchorage to building and weathertight mounting. Coordinate installation with flashings and other components.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3. Separations: Separate metal from incompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Provide elbow at base of downspout to direct water away from building.

2. Tie downspouts to underground drainage system indicated.

E. Pipe Flashing: Form flashing around pipe penetration and roof panels. Fasten and seal to roof panel as recommended by manufacturer.

3.08 ERECTION AND LOCATION TOLERANCES

A. Structural-Steel Erection Tolerances: Comply with erection tolerance limits of AISC S303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Roof Panel Installation Tolerances: Shim and align units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Wall Panel Installation Tolerances: Shim and align units within installed tolerance of 1/4 inch in 20 feet on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.09 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent testing agency to perform field quality-control testing.

B. Special Inspections - Provide special inspections as required by the 2010 Florida Building.

C. Extent and Testing Methodology: Testing and verification procedures will be required of high-strength bolted connections.

1. Bolted connections will be visually inspected.

2. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

3. Field-bolted connections will be tested and verified according to procedures in RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Testing agency will report test results promptly and in writing to Contractor and Owner.

3.10 CLEANING AND PROTECTION

A. Touchup Painting: Immediately after erection, clean, prepare, and prime or reprime welds, bolted connections, and abraded surfaces of prime-painted primary and secondary framing, accessories, and bearing plates.

1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.

2. Apply compatible primer of same type as shop primer used on adjacent surfaces.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded surfaces of shop-painted primary and secondary framing, accessories, and bearing plates are included in Division 9 Section "Painting."

C. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

D. Roof and Wall Panels: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.

1. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 13300 INSTRUMENTATION AND CONTROL, GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The CONTRACTOR shall provide, through the services of a single Control Systems Integrator (CSI), all components, system installation services, as well as all required and specified ancillary services, in connection with the Instrumentation and Control System (ICS).

B. The system shall include all materials, labor, tools, fees, and documentation required to furnish, install, test, and place into operation, a complete and operable ICS as shown and/or specified within this section, related ICS specification sections, and subsections within equipment specifications.

C. The system shall include all measuring elements, signal converters, transmitters, specialty cables, control panels, digital hardware and software, signal and data transmission systems, interconnecting wiring and such accessories as shown, specified, and/or required to provide the functions indicated, whether specifically mentioned or not.

D. The specifications provided within this section shall be applied to all of the Instrumentation and Control specifications listed below as well as additional specifications sections as referenced under paragraph 1.04. The ICS shall be provided as a single and complete system as specified herein and as specified within the following ICS specifications:

1. Section 13310 - Instrumentation and Control, Field Equipment
2. Section 13320 - Instrumentation and Control, Control Enclosures
3. Section 13330 - Instrumentation and Control, SCADA Hardware
4. Section 13390 - Software Functional Descriptions

E. For the purposes of these Specifications the Control Systems Integrator shall be referred to as the CSI. The CSI shall provide programming services for any/all Programmable Logic Controllers (PLCs). The Contractor shall also provide the services of a Citect Certified SCADA System Programmer (SSP) for the required HMI computer system modifications. The CSI may be, but is not required to be, the same as the SSP.

F. The CSI and SSP will jointly be responsible for providing all materials, labor, documentation, etc., including coordination, programming and configuration, startup, and testing services, as necessary to ensure the completed system is fully capable of providing all specified functions, whether provided / programmed by the CSI or programmed by the SSP. Additional clarifications of responsibilities are provided

herein and within related ICS specifications, as it pertains to the relationship between the CSI and the SSP.

G. The CONTRACTOR shall be ultimately responsible for installation of the ICS. However, the CSI will include installation within the scope of his subcontract to provide for installation of the complete system as specified. The CSI shall also coordinate this work with the CONTRACTOR to ensure that the proper type, size, and number of wires with their conduits are provided and installed. This coordination will also ensure that proper electrical power circuits are provided for all components and systems.

H. The CONTRACTOR'S responsibilities, as distinct from the CSI's responsibilities, shall be to provide all additional materials and work necessary to supplement the materials and work provided by the CSI; thereby satisfying all requirements that are within ICS specification sections.

I. The CONTRACTOR shall coordinate structural work, penetrations, painting, etc., as required for installation of a complete ICS. In-line or integrally mounted items (such as flow elements, level sensors, etc.) shall be installed under the supervision of the CSI.

J. The CSI shall be responsible for coordinating interfaces between ICS equipment provided under the ICS specification sections and the equipment provided under other sections of the specifications. The CONTRACTOR shall verify and coordinate space requirements, process equipment power supply and voltage, process equipment control power supply and voltage, compatibility of control signals, details of equipment installation and interconnection. Coordination shall include distribution of approved shop drawings to all vendors, subcontractors, etc., involved in the control interface. Likewise, the CONTRACTOR shall ensure that instrumentation and control devices provided under other sections of the specifications are compatible and of the same manufacturer, quality and characteristics as similar devices specified under the ICS specification sections.

1.02 SCOPE OF WORK

A. This project will provide additions and modifications to the existing Plant SCADA System and ICS, to include a new sodium hypochlorite storage and delivery system. The ICS shall include the ability to monitor and control the new storage tanks, chemical metering pumps, and total chlorine residual analyzer as shown on the drawings and as specified herein and in other related sections.

B. Monitoring and control of the new hypochlorite storage and delivery system shall be accomplished through an existing SCADA control panel (SP-16) located inside the High Service Pump Station Building. The existing SP-16 control panel has an existing network connection to the Plant's existing SCADA system. Panel modifications shall be provided by the CSI to accommodate the new equipment and instruments' Inputs and Outputs (I/O). These modifications shall include additional PLC I/O modules, wiring, surge protection, etc., as shown on the contract drawings and specified herein and as needed to complete the project requirements.

C. A new Sodium Hypochlorite Tanks Fill Station panel shall be provided for tank level indication, high level tank, and level transmitter fault alarms, as specified herein and shown on the drawings.

I. The CONTRACTOR, working in conjunction with the CSI and the SSP, shall be responsible to provide a complete and operational system in full compliance with the specifications and contract drawings. The CSI shall be responsible for the detailed design, field verification, installation, technical oversight, testing, quality assurance and documentation of all technical details involving instrumentation and control for this project. The CSI shall furnish trained personnel on site during any activities requiring installation, calibration, testing or startup of any controls or plant communications.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Division 11 - Equipment

1. Refer to individual product specifications within these sections for additional requirements related to those devices. Instrumentation and control equipment supplied as part of packaged systems shall be integrated into the ICS as specified.

B. Division 13 - Special Construction

1. Refer to individual product specifications within these sections for additional requirements related to those devices. Instrumentation and control equipment supplied as part of packaged systems shall be integrated into the ICS as specified.

C. Division 15 - Mechanical

1. Refer to individual product specifications within these sections for additional requirements related to those devices. Instrumentation and control equipment supplied as part of packaged systems shall be integrated into the ICS as specified.

D. Division 16 - Electrical

1. Where electrical subcomponents are to be provided as part of ICS equipment, but for which there is no specification, provide in accordance with Division 16 - Electrical. These subcomponents shall be compatible and of the same quality and characteristics as similar devices specified under Division 16 - Electrical. If possible the same make and/or model supplied under Division 16 shall be provided.

2. The following work shall be provided under Division 16 - Electrical:

   a. Conduit, raceways, and installation of wire and cable for all instrumentation and control system signal wiring, grounding systems, special cables and network cables except as noted.
   b. Instrumentation and control system signal field wire.
   c. Grounding systems for all ICS equipment.
   d. Mounting of ICS electrical enclosures (i.e. control panels, TVSS boxes, electronic instrumentation, etc.) with exclusion of final measuring

D. This project will provide for the following components, systems or subsystems:

1. Furnish various local process monitoring instrumentation complete with surge protection and signal transmission as specified.

2. Furnish and install new equipment including existing control panel modifications and additional PLC I/O modules to provide all specified I/O signals and functions.

3. Furnish TVSS for instrumentation and control panels as specified.

4. Provide programming for the existing PLC (SP-16) control panel, located in the HSP building, as required and described herein.

5. Provide Citect programming for the existing SCADA system including graphics displays, database tags, communications modifications, alarm system modifications, trending and collection of data within the historian system.

6. Interface with control panels provided by other equipment suppliers under this contract.

7. Furnish spare parts and testing equipment as described herein and other related sections.

8. Provide implementation and testing of the complete system.

9. Furnish training of OWNER personnel.

10. Provide Operations and Maintenance Manuals.

E. The Southwest Water Reclamation Facility (SWWRF) is an existing plant and is required to remain in operation during all construction periods. All work and services provided under this contract shall be scheduled and coordinated with the OWNER to maintain operation at all times.

F. All interruptions to the existing control system shall be at the OWNER's convenience. Each interruption shall have prior approval. Request(s) for control system interruption(s) shall be made at least forty-eight (48) hours in advance.

G. The equipment and instruments provided shall be compatible with the OWNER'S existing Instrumentation and Control System to ensure standardization throughout the Plant. Equipment and instruments, furnished under this contract, shall be of the same instrumentation manufacturer with panel mounted devices of the same type and model as far as possible. The CSI shall be responsible for coordinating with other system suppliers to ensure compatibility and standardization of all equipment.

H. All equipment and instruments removed by the CONTRACTOR during the course of this work shall be salvaged or disposed of offsite at the OWNER'S discretion. Off-site disposal of the existing equipment and instruments shall be the responsibility of the CONTRACTOR.

elements of instrumentation (i.e. flow tubes, sensors in process piping, etc.) which shall be as coordinated by the CONTRACTOR.

1.04 CODES AND STANDARDS

A. The ICS shall comply with the National Electric Code, National Electric Safety Code, OSHA, and with all applicable federal, state, county, municipal, and electrical utility codes and regulations, as well as the Contract Documents. In the event of any conflict between these codes, regulations, and Contract Documents, the most restrictive shall apply.

B. The Instrumentation and Control System shall comply with the following codes and standards as well as any others within the specifications and drawings. In the event of any conflict between these codes, regulations, standards and Contract Documents, the most restrictive shall apply.

1. Applicable state, county, and municipal code requirements.

2. Applicable standards of the National Fire Protection Association (NFPA)

   a. National Electrical Code (NEC)

3. Applicable standards of the Underwriter's Laboratories, Inc. (U.L.)

   a. UL 508 Industrial Control Equipment
   b. UL 508A Industrial Control Panels

4. Applicable standards of the Institute of Electrical and Electronics Engineers (IEEE).

5. Applicable standards of the National Electrical Manufacturers Association (NEMA).

   a. NEMA 250 Enclosures for Electrical Equipment (1000 V Maximum)
   b. NEMA ICS 1 Industrial Control and Systems: General Requirements
   c. NEMA ICS 6 Enclosures for Industrial Control and Systems

6. Applicable standards of the International Society of Automation (ISA)

   a. ISA 5.1 - Instrumentation Symbols and Identification
   b. ISA 5.4 - Instrument Loop Diagrams
   c. ISA 20 - Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves
   d. ISA TR20.00.01 - Specification Forms for Process Measurement and Control Instruments

1.05 SUBMITTALS

A. Submittals shall be provided in accordance with the requirements set forth in Division 1.

B. Every submittal shall have a separate section entitled "Requested Deviations from ICS Specifications" which shall clearly define and explain all requested deviations and

exceptions of the Instrumentation and Control System to this Specification. Only those deviations requests listed in this section will be reviewed.

C. After all changes or corrections resulting from the review of the system supplier's drawings have been made, panels may be built and instrumentation devices may be supplied in accordance with the approved drawings. One set of "as shipped" prints shall be included in the panels when shipped from the system supplier's wiring and assembly shop.

D. The following major list of submittals shall be provided, as a minimum, by the CSI with the exception of the SCADA HMI Software Submittal which shall be provided by the SSP (Citect Certified SCADA Engineer). The SSP shall also provide training, testing, and O&M submittals as noted below. Major submittals are generally listed in the order they are to be provided. Refer to related ICS specification sections and equipment subsections for additional submittals and submittal requirements.

1. Preliminary Design Review Project Plan Submittal
2. Process Instrumentation Submittal
3. SCADA System Hardware and Control Panel Submittal
4. PLC Programming Software Submittal
5. SCADA System Software Submittal (SSP only)
6. Training Submittal (SSP & CSI)
7. Testing Submittal (SSP & CSI)
8. Tools, Supplies, and Spare Parts Lists Submittal
9. Preliminary & Final Operational and Maintenance Manuals (SSP & CSI)

E. Preliminary Design Review/Project Plan Submittal

1. The Project Plan shall provide an overview of the proposed system including system architecture diagrams, the approach to the work, the proposed work schedule indicating milestones and potential meetings, project personnel and organization, details of factory testing and field testing, details of training programs, and a paragraph by paragraph review of the specifications indicating any proposed deviations. The schedule shall illustrate all major project milestones including the following:

    a. Schedule for all subsequent project submittals.
    b. Tentative dates for all project design review meetings.
    c. Schedule of manufacture and staging of all instrumentation and control system equipment.
    d. Schedule for all testing.
    e. Schedule for shipment of all instrumentation and control system equipment and peripheral devices.
    f. Schedule for equipment start up.

g. Schedule for all training.

2. No other submittals will be allowed prior to acceptance of the Project Plan.

F. Process Instrumentation Submittal

1. This submittal shall provide complete documentation of all field devices and other instrument and control equipment not specified to be submitted elsewhere.

a. Provide data sheets for each component listing all model numbers, optional, and ancillary devices that are being provided.

The data sheets shall be provided with an index and proper identification and cross referencing. They shall include but not be limited to the following information.

1) Plant Equipment Number and ISA tag number per the Loop Diagrams.
2) Product (item) name used herein and on the Contract Drawings.
3) Manufacturers complete model number.
4) Location of the device.
5) Input - output characteristics.
6) Range, size, and graduations.
7) Physical size with dimensions, enclosure NEMA classification and mounting details.
8) Materials of construction of all components.
9) Instrument or control device sizing calculations where applicable.
10) Certified calibration data on all flow metering devices.

b. Provide equipment specification sheets which shall fully describe the device, the intended function, how it operates and its physical environmental and performance characteristics. Each data sheet shall have appropriate cross references to loop or equipment identification tags. As a minimum the specification sheets shall include the following:

1) Dimension, rigid-clearances.
2) Mounting or installation details.
3) Connection.
4) Electrical power or air requirements.
5) Materials of construction.
6) Environmental characteristics.
7) Performance characteristics.

c. The submittal shall also contain all planning information, site preparation instructions, grounding and bonding procedures, cabling diagrams, plug identifications, safety precautions or guards, and equipment layouts in order to enable the CONTRACTOR to proceed with the detailed site preparation for all equipment.

G. SCADA System Hardware and Control Panel Submittal

1. Provide detailed drawings covering control panels, consoles and/or enclosures which shall include:

   a. Cabinet assembly and layout drawings to scale. These shall include both front and interior layouts. For existing panels to be refurbished, include details of panel modifications showing new and existing equipment and panel components.
   b. Material, fabrication and painting specifications.
   c. Color selection samples for selection by the Engineer.
   d. Where graphic display panels are required, submit detailed layout to scale, including symbols and line widths, as well as color selection samples and details of fabrication. Half-scale layout will be acceptable.
   e. Heat calculations for control panels consisting of a PLC control system.
   f. Power supply device sizing calculations which includes UPS systems (where applicable).
   g. Panel wiring diagrams showing all power connections to equipment within and on the panel, combined panel power draw requirements (volts, amps), breaker sizes, fuse sizes, and grounding. This wiring diagram shall be in ladder logic format and shall reference the appropriate loop drawing for continuations or details where required. Show all wire numbers and terminal block designations

2. Provide detailed loop diagrams on a single 11-in x 17-in or 8.5-In x 11-in sheet for each monitoring or control loop. The loop diagram shall show all components of the loop both analog, digital, and discrete including all relays, switches, dropping resistors, etc. which are being provided for proper operation. Loop numbers used shall correspond to the loop numbers indicated in the Contract Documents. The format shall be the International Society of Automation, Standard for Instrument Loop Diagrams, ISA-5.4 plus the following requirements:

   a. On each diagram, present a tabular summary of (1) the output capability of the transmitting instrument, (2) the input impedance of each receiving instrument, (3) an estimate of the loop wiring impedance based on wire sizes and approximate length used, (4) the total loop impedance, (5) reserve output capacity.
   b. Show all interconnecting wiring between equipment, panels, terminal junction boxes and field mounted components. The diagrams shall show all components and panel terminal board identification numbers and all wire numbers. This diagram shall include all intermediate terminations between field elements and panels (e.g. terminal junction boxes). The diagrams shall be coordinated with the electrical contractor and shall bear his mark showing this has been done.
   c. Show location of all devices.
   d. Show instrument description showing type, manufacturer, model number, range, set points, and operation (e.g. fail open, open on energize, normally closed, etc.) as applicable.

e. Show all instrument loop power or instrument air requirements back to termination on terminal block or bulkhead, fuse block (including fuse size), etc., as applicable.

3. Provide complete documentation of the proposed hardware (PLCs, communications equipment, peripherals, etc.) including:

a. A system block diagram(s) showing in schematic form, the interconnections between major hardware components such as: control centers, panels, consoles, computer and peripheral devices, telemetry equipment, local digital processors and like equipment. The block diagram shall reflect the total integration of all digital devices in the system and shall reflect any man/machine interface locations. All components shall be clearly identified with appropriate cross references to the location of each.

The diagram shall reference all interconnecting cabling requirements for digital components of the system including any data communication links.

b. Data sheet for each hardware component, listing all model numbers, optional, auxiliary, and ancillary devices that are being provided.

The data sheets shall be provided with an index and proper identification and cross referencing. They shall include but not be limited to the following information.

1) Equipment Number and ISA tag number per the Loop Diagrams (as applicable).
2) Product (item) name used herein and on the Contract Drawings.
3) Manufacturers complete model number.
4) Location of the device.
5) Input - output characteristics.
6) Range, size, and graduations.
7) Physical size with dimensions, enclosure NEMA classification and mounting details.
8) Materials of construction of all components.
9) Power supply device sizing calculations where applicable.

c. Equipment specification sheets which shall fully describe the device, the intended function, how it operates and its physical environmental and performance characteristics. Each data sheet shall have appropriate cross references to loop or equipment identification tags. As a minimum the specification sheets shall include the following:

1) Dimensions and working clearances.
2) Mounting or installation details.
3) Connection diagrams.
4) Electrical power requirements (volts, amps).
5) Materials of construction.
6) Environmental characteristics.
7) Performance characteristics.

d. The submittal shall also contain all planning information, site preparation instructions, grounding and bonding procedures, cabling diagrams, plug identifications, safety precautions or guards, and equipment layouts in order to enable the Contractor to proceed with the detailed site preparation for all equipment.

4. Provide a complete system I/O and termination list for all PLC panels furnished. Each list shall be sorted first by ISA tag name and second by I/O type (i.e. AI, AO, D1, DO, PI, PO. etc.). Each list shall contain as a minimum the following for each active point and spare point:

a. Full ISA instrument tag (or "SPARE").
b. Type of I/O (i.e., DI, DO, AI or AO).
c. I/O terminal point physical location (panel name, rack, slot, point, etc.).
d. I/O point address.
e. Point name and description.
f. Terminal Strip and Number

H. PLC Programming Software Submittal

1. PLC Programming Software submittal shall include the following as a minimum:

a. Existing PLC Program Modifications:

1) Control software (block oriented and/or ladder logic), annotated software program listing, and I/O address mapping.
2) I/O arrangement and wiring diagrams.

b. Control Strategies: Provide control strategy documentation that includes control strategy diagrams (either block oriented logic or ladder logic diagrams, as appropriate) to describe the control of all processes. The control strategy submittals shall contain the following as a minimum:

1) An overall description of the program structure
2) A detailed description of the program and how it will meet the specified control requirements. The written description shall follow the format of the functional control descriptions specified under section 13390.

J. SCADA System Software Submittal

1. Software submittals shall include the following as a minimum:

a. Submit all new SCADA graphic displays required to perform the control and operator interface functions specified herein. Also submit existing Plant SCADA graphic displays which are modified to include the new control system. Displays shall be printouts of actual process and control graphics implemented in the system.

b. Submit graphic displays for review by the Owner and the Engineer at least sixty (60) days prior to commencement of testing.

c. The Contractor shall allow for one (1) major cycle of revisions to the displays prior to testing and one (1) minor cycle of revisions following testing. A cycle of revisions shall be defined as all revisions necessary to complete a single set of changes marked by the Owner and Engineer. Additional corrections shall be performed during start-up as required to accommodate changes required by actual field conditions, at no additional cost to the Owner.

d. Two (2) of the required submittals in each revision cycle shall be full color prints of the entire set of displays. Additional sets may be in black-and-white or gray-scale.

K. Training Submittals

1. Training Plan Submittal: The training plan shall include:

a. Definitions of each course.
b. Specific course attendance.
c. Schedule of training courses including dates, duration, and locations of each class.
d. Resumes of the instructors who will actually conduct the training.

L. Testing Submittals

1. The test plan shall be submitted after all equipment submittals have been approved by the OWNER and/or ENGINEER.

2. The test plan shall demonstrate that the CSI/SSP has designed and configured a system that meets the design specifications. The documents for the test plan shall be structured so that it is easily understood what the inputs are, what the predicted outputs should be, and what the actual outputs are. The test plan should have sign-off and date block for the CSI/SSP, the CONTRACTOR, and the OWNER.

3. The complete test plan should include but not be limited to the following:

a. Test assumptions and methods
b. Test Equipment List
c. Test Personnel Staffing and Qualifications
d. Test Schedule with time allotted for each task
e. System hardware and software summary.
f. Communications test to the various PLCs for Discrete and Analog I/O data transfer.
g. 100 percent I/O point test including all spare points based upon the previously submitted System I/O list.
h. Functional and Control strategy tests.

4. Test Procedures: Submit the procedures proposed to be followed during the test. Procedures shall include test descriptions, forms, and checklists to be

used to control and document the required tests. Testing may not be started until all Testing Submittals have been approved.

5. Test Documentation: Submit a copy of the signed off test procedures upon completion of each required test.

M. Tools, Supplies, and Spare Parts Lists Submittal

1. This submittal shall include a list of all required and recommended spares. The following information shall be provided in table format:

   a. Specification Section
   b. Tag name
   c. Description
   d. Quantity
   e. Manufacturer
   f. Model, part, order number
   g. Storage instructions for all spare parts.
   h. Local distributor and manufacturer contact information. Contact information shall include address, phone number, and website.

N. Operation and Maintenance Manuals

1. Prior to installation of any equipment onsite, preliminary O&M manuals shall have been submitted and approved. No installation of equipment shall be permitted without the Contractor maintaining an updated version of these preliminary O&M manuals onsite for the Owner's and Engineer's use.

2. After all field changes or corrections made during installation and field check out have been completed, then all system supplier documentation, including drawings, shall be revised to reflect the "as installed, corrected and accepted" condition of the system and final record copies of O&M manuals for the system shall be provided to the Owner and Engineer for approval.

3. Final system documentation shall be provided in 3-hole type binders of archival quality (e.g. slant D or elliptical binding, vinyl with metal hinge or extra heavy weight vinyl, etc.) with a binding no larger than three (3) inches. Materials shall be printed on 8.5" x 11" or 11" x 17" tear resistant paper or ring reinforced paper where tear resistant is not available. Drawings shall be either folded to fit within an 8.5" x 11" binder or in an 11" x 17" 3-hole binder. Each binder shall include fifteen percent (15%) spare space for the addition of future material. Tear resistant paper shall be Xerox Never Tear or equal.

4. Final documentation shall also be provided in an electronic format. Electronic documentation shall be organized and provided on CD which shall include all CAD drawings, manuals and word processing documents. Electronic documentation format shall be primarily Adobe .pdf with additional documents provided in AutoCAD, Microsoft Office, HTML or as approved by the Engineer or Owner. Organization of the electronic documentation shall be such as to allow point and click navigation from a table of contents to the particular documents with the ability to return to the table of contents from any location with one mouse click.

5. AutoCAD drawings files shall include all supporting files, symbol libraries and print configurations needed to support future modifications and properly print additional drawing copies.

6. All electronic media (i.e. software, electronic documentation, configuration files/reports, device backups, etc.) shall be provided with three (3) backup copies, each organized into a separate binder. Media storage binders shall include but not be limited to the following:
   a. Table of contents
   b. Archival media holders (e.g. CD, DVD, floppy, tape disk, etc.)
   c. Support contacts (i.e. company, phone, internet link, etc.)
   d. Software system requirements and installation instructions

7. Laminated or water/tear resistant copies of all applicable instrumentation and control system drawings shall be supplied in drawing pocket of each control enclosure after "as installed, corrected, and accepted" revisions have been made to the enclosure.

8. Operation and Maintenance manuals shall include but not be limited to the following:

   a. Manufacturer standard O&M manuals for all equipment and software furnished, minimum of three (3) sets.
   b. Custom O&M information describing the specific configuration of equipment and software, and the operation and maintenance requirements for this particular project. A hard copy of the configuration settings and parameters for all specific field programmable devices supplied under this contract.
   c. The manuals shall contain all illustrations, detailed drawings, wiring diagrams and instructions necessary for installing, operating and maintaining the equipment.
   d. All modifications to manufacturer standard equipment and/or components shall be clearly identified and shown on the drawings and schematics. All information contained therein shall apply specifically to the equipment furnished and shall only include instructions that are applicable.
   e. A functional description of the entire system, with references to drawings and instructions.
   f. A complete "as built" set of all approved shop drawings, which shall reflect all work required to achieve final system acceptance.
   g. A complete list of the equipment supplied, including serial numbers, ranges, configuration parameters and other pertinent data.
   h. Full specifications on each item.
   i. Detailed service, maintenance and operation instructions for each item supplied.
   j. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.
   k. Complete parts lists with stock numbers and name, address and telephone number of the local supplier.
   l. References to manufacturers' standard literature where applicable.

m. Warning notes shall be located throughout the manual where such notes are required to prevent accidents or inadvertent misuse of equipment.

n. The operating instructions shall clearly describe the step by step procedures that must be followed to implement all phases of all operating modes. The instructions shall be in terms understandable and usable by operating personnel and maintenance crews and shall be useful in the training of such personnel.

o. The maintenance instructions shall describe the detailed preventive and corrective procedures required, including environmental requirements during equipment storage and system operation, to keep the System in good operating condition. All hardware maintenance documentation shall make reference to appropriate diagnostics, where applicable, and all necessary wiring diagrams, component drawings and PCB schematic drawings shall be included.

1.06 MEETINGS

A. The CONTRACTOR shall be required to give the OWNER and their representatives, at least two weeks' notice prior to any scheduled meetings. The notice may be shortened by consent.

B. Preliminary Site Testing Meeting: A preliminary site testing meeting shall be conducted by the CONTRACTOR for the OWNER and ENGINEER, to insure site readiness, testing strategies and proper coordination between parties related or involved in testing the ICS. The CONTRACTOR shall be responsible for arranging the on-site meeting after the Site Testing Plan has been approved and no earlier than 3 weeks prior to testing. The ENGINEER must be satisfied that the site is ready and that the testing will be performed to their satisfaction prior to any documented ICS testing being performed. The CONTRACTOR shall arrange for detailed meeting minutes to be recorded, approved, and distributed to meeting attendees. Additional meetings may be required at the discretion of the OWNER and ENGINEER to resolve specific action items not addressed in the preliminary site testing meeting - this work, if needed, shall be provided by the CONTRACTOR at no additional cost to the OWNER. Two weeks prior to the meeting the CONTRACTOR shall submit the following for approval.

1. A proposed list of meeting attendees including organization and phone number.

2. A proposed meeting agenda.

3. A list of personnel to be involved in the testing including their responsibilities, qualifications, and phone numbers.

4. A list of tasks requiring OWNER, ENGINEER, or outside party involvement in testing.

5. A testing schedule that coordinates the ICS testing with the operability of the specific equipment being tested.

1.07 CONTROL SYSTEM INTEGRATOR

A. The Control System Integrator shall be regularly engaged in the detailed design, fabrication, installation and startup of instrumentation and control systems for water and wastewater treatment facilities in the state of Florida. Any CSI that has been subject to litigation or the assessment of liquidated damages for nonperformance on any project within the last five calendar years shall not be acceptable.

B. Where specific manufacturers and/or models of major hardware or software products (PLC, Software, Network Equipment, etc.) are specified to be used on this project, the CSI shall have completed at least one project using that specified hardware or software. As used herein, the term "completed" shall mean that a project has been brought to final completion and final payment has been made.

C. Control System Integrators shall meeting the following minimum qualifications:

1. A minimum of 7 years experience with at least 5 years in water / wastewater projects

2. References for 3 completed projects of like size and application to the project specified herein

3. Project bonding capacity of $2 million

4. UL 508 certified panel shop

5. Electrical contractors license in the project site's state.

6. On staff licensed professional engineer capable of being registered in the state of the project and registered in that state, if required to perform engineering services as specified to implement this project.

D. The listing of acceptable Control System Integrators in this specification in no way relieves the Control System Integrator from meeting the qualifications specified herein. Acceptable Control System Integrators shall be as follows:

1. CEC Controls Company, Inc.: 14555 Barber Ave., Warren, MI, 48088; (586)779-0222; www.ceccontrols.com

2. Revere Control Systems: 2240 Rocky Ridge Road, Birmingham, AL, 35216; (205) 824-0004; www.reverecontrol.com.

3. BCI Technologies; 316 N. John Young Pkwy, Suite #6, Kissimmee, FL 34741; (407)847-8848; www.bcitech.com.

E. The OWNER shall have the right of access to the CSI's facilities and the facilities of their equipment suppliers to inspect materials and parts, witness inspections, tests and work in progress, and examine applicable design documents, records and certifications during any stage of design, fabrication and tests. The CSI and their equipment suppliers shall furnish office space, supplies and services required for these surveillance activities.

1.08 QUALITY ASSURANCE

A. The listing of specific products in this specification in no way relieves the Contractor of furnishing equipment which shall meet the performance and quality criteria specified herein.

B. All equipment and materials shall be new and the products of reputable recognized suppliers having adequate experience in the manufacture of these particular items.

C. For uniformity, only one manufacturer will be accepted for each type of product.

D. All equipment shall be designed for the service intended and shall be of rugged construction, of ample strength for all stresses that may occur during fabrication, transportation, and erection as well as during continuous or intermittent operation. They shall be adequately stayed, braced and anchored and shall be installed in a neat and workmanlike manner. Appearance and safety, as well as utility, shall be given consideration in the design of details.

E. All components and devices installed shall be standard items of industrial grade, unless otherwise noted, which shall be of sturdy and durable construction and be suitable for long, trouble free service.

F. Electronic equipment shall be suitable for the specified environmental conditions.

G. Optional or substituted equipment or both requiring changes in details or dimensions required to maintain all structural, mechanical, electrical, control, operating, maintenance or design features incorporated in these specifications and drawings, shall be made at no additional cost to the OWNER. In the event that the changes are necessary, calculations and drawings showing the proposed revisions shall be submitted for approval. The CONTRACTOR shall coordinate all changes with other affected trades and contracts and pay all additional charges incurred.

1.09 DEFINITIONS AND ABBREVIATIONS

A. The following definitions and abbreviations are used throughout the specifications and drawings when referring to instrumentation and control equipment, functions, and service. Definitions and abbreviations are not listed for those used in common industry practice except where to provide explicit meaning. Refer to ISA, IEEE, and other industry standard references for those not listed herein.

CSI .....Control System Integrator
ICS .....Instrumentation and Control System
OEM.....Other Equipment Supplier
CCS.....Chemical System Supplier
RCW.....Reclaimed Water
OWS.....Operator WorkStation
PID .....Proportional-Integral-Derivative Control
SCADA.....Supervisory Control and Data Acquisition
SSP .....Citect Certified SCADA System Programmer
TVSS.....Transient Voltage Surge Suppression
PLC .....Programmable Logic Controller

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. All materials, equipment, and devices shall, as a minimum, meet the requirements of UL, where UL Standards are established for those items, and the requirements of NFPA-70. All control panels shall comply with the requirements of UL 508A for Industrial Control Panels. All items shall be new and unused unless specified or indicated otherwise.

B. Properly store, adequately protect, and carefully handle equipment and materials to prevent damage before and during installation. Handle, store, and protect equipment and materials in accordance with the manufacturer's recommendations. Replace damaged or defective items.

C. All equipment shall be the latest and proven design. Specifications and drawings call attention to certain features, but do not purport to cover all details entering into design of the instrumentation system. The completed system shall be compatible with functions required and the equipment furnished by the CONTRACTOR.

D. All electrical components of the system shall operate on 120 volt, single phase, 60 Hz power source, except as otherwise noted in the Specifications. Drawings and specifications indicate the energy sources that will be provided. Any other devices necessary to obtain proper operation of the instrumentation and control system from these energy sources shall be furnished with the system.

E. All necessary fuses or switches required by the instrumentation manufacturer for equipment shall be provided with the equipment. All instruments requiring internal power supply shall have internal on-off switches.

F. The mechanical, process, and electrical drawings indicate the approximate locations of field instruments, control panels, systems and equipment as well as field mounted equipment

G. provided by others. The CSI shall examine the mechanical, process and electrical drawings to determine actual size and locations of process connections and wiring requirements for instrumentation and controls furnished under this Contract. The CSI shall inspect all equipment, panels, instrumentation, controls and appurtenances either existing or furnished under other Divisions of the Specifications to determine all requirements to interface same with the ICS. The CONTRACTOR shall coordinate the completion of any required modifications with the associated supplier of the item furnished.

H. Instrumentation equipment and enclosures shall be suitable for ambient conditions specified. All system elements shall operate properly in the presence of telephone lines, power lines, and electrical equipment.

I. Inside control rooms and climate-controlled electrical rooms, the temperature will normally be 20 to 25 degrees C; relative humidity 40 to 80 percent without condensation and the air will be essentially free of corrosive contaminants and moisture. Appropriate air filtering shall be provided to meet environmental conditions (i.e., for dust).

J. Other indoor areas may not be air conditioned/heated; temperatures may range between 0 and 40 degrees C with relative humidity between 40 and 95 percent.

K. Field equipment, including instrumentation and panels, may be subjected to wind, rain, lightning, and corrosives in the environment, with ambient temperatures from -20 to 40 degrees C and relative humidity from 10 to 100 percent. All supports, brackets and interconnecting hardware shall be aluminum, 316 stainless steel, or as shown on the installation detail drawings.

2.02 TOOLS, SUPPLIES, AND SPARE PARTS

A. Provide special tools, other than those normally found in an electronic technician's tool box, required to test, diagnose, calibrate, install, wire, connect, disconnect, assemble and disassemble any digital equipment, instrument, panel, rack, cabinet or console mounted equipment for service and maintenance (i.e., connector pin insertion and removal tools, wire crimping tool, special wrenches, special instrument calibrators, indicator lamp insertion and removal tools, etc.).

B. Provide tools and test equipment together with items such as instruction manuals, carrying/storage cases, unit battery charger where applicable, special tools, calibration fixtures, cord extenders, patch cords and test leads, which are not specified but are necessary for checking field operation of equipment supplied under this Section.

C. The CSI shall provide supplies as needed or as required by the OWNER during the specified warranty period. All fuses consumed during installation, testing, start-up, the system availability demonstration, and the warranty period shall be replaced by the CONTRACTOR.

D. Provide spare parts for items of ICS equipment as recommended by the manufacturer and in accordance with the Contract Documents.

E. Furnish all spares in moisture-proof boxes designed to provide ample protection for their contents. Label all boxes to clearly identify contents and purpose.

F. Refer to individual product specifications for additional requirements specific to those devices.

2.03 SIGNAL TRANSMISSION

A. The CONTRACTOR shall be responsible for providing a signal transmission system free from electrical interference that would be detrimental to the proper functioning of the ICS equipment.

B. The CONTRACTOR shall be responsible for coordinating signal types and transmission requirements between the various parties providing equipment under this Contract. This shall include, but not be limited to, distribution of appropriate shop drawings among the equipment suppliers and subcontractors.

C. The CSI shall provide 24 VDC power supplies for signals and instruments where applicable and as required inside panels, controls, etc. Where two-wire instruments transmit directly to the instrumentation and control system, the CSI shall provide power supplies at the PLC-equipped control panels for those instruments. Where four-wire

instruments with on-board loop power supplies transmit directly to the instrumentation and control system, the CSI shall provide necessary signal isolators or shall otherwise isolate the input from the ICS loop power supply. Similar provisions shall be made when a third element such as a recorder, indicator or single loop controller with integral loop power supply is included in the loop.

D. Analog signal transmission between electric or electronic instruments, controllers, and all equipment and control devices shall be individually isolated, linear 4-20 mA and shall operate at 24 VDC. Signal output from all transmitters and controllers shall be current regulated and shall not be affected by changes in load resistance within the unit's rating. All cable shields shall be grounded at one end only, at the control panel, with terminals bonded to the panel ground bus. Analog signal isolation and/or conversion shall be provided where necessary to interface with instrumentation, equipment controls, panels and appurtenances.

E. Non-standard analog transmission systems such as pulse duration, pulse rate, and voltage regulated shall not be permitted except where specifically noted in the Contract Documents. Where transmitters with nonstandard outputs do occur, their outputs shall be converted to an isolated, linear, 4-20 mA signal.

F. All discrete inputs to equipment and PLC's, from field devices, starters, panels, etc., shall be dry contacts in the field device or equipment, powered from the PLCs, unless specified otherwise.

G. All discrete outputs from local control panels and Control and Information System PLCs, to field devices, starters, panels, etc., shall be 120 VAC / 28 VDC 5A dry contacts. Output contacts may be powered from the field equipment, or powered from 24 VDC / 120 VAC sourced from PLCs cabinet power system, as required to interface with field equipment. Outputs to solenoid valves, horns, and strobe lights shall be 120 VAC, powered from the PLC or control panel unless specified or shown otherwise.

H. Discrete signals between starters, panels, etc. where 120 VAC is utilized shall be clearly identified in the starter, panel, etc. as being powered from a different power supply, than other starter/panel components. Where applicable, warning signs shall be affixed inside the starter, panel, etc., stating that the panel is energized from multiple sources. Output contacts in the starter, panel, etc. which are powered from other locations shall be provided with special tags and/or color coding. Disconnecting terminal strips shall be provided for such contacts. The above requirements shall apply to all starters and panels, regardless of supplier.

2.04 NAMEPLATES

A. All items of equipment listed in the instrument schedule, control panels, and all items of digital hardware shall be identified with nameplates. Each nameplate shall be located so that it is readable from the normal observation position and is clearly associated with the device or devices it identifies. Nameplates shall be positioned so that removal of the device for maintenance and repair shall not disturb the nameplate. Nameplates shall include the equipment identification number and description. Abbreviations of the description shall be subject to the ENGINEER'S approval.

B. Nameplates shall be made of 1/16 inch thick machine engraved laminated phenolic plastic having white numbers and letters not less than 3/16 inch high on a black background.

Nameplates shall be attached to metal equipment by stainless steel screws and to other surfaces by an epoxy based adhesive that is resistant to oil and moisture. In cases where the label cannot be attached by the above methods, it shall be drilled and attached to the associated device by means of stainless steel wire.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The CSI shall provide the CONTRACTOR a periodic written report detailing progress of start-up. This report shall include specific tabulations of devices on which start-up has been completed.

B. Equipment shall be located so that it is accessible for operation and maintenance. The CSI shall examine the Contract Drawings and Shop Drawings for various items of equipment in order to determine the best arrangement for the work as a whole, and shall supervise the installation of ICS equipment.

C. Instrumentation and Control System equipment shall be installed in accordance with the manufacturer's instructions. The locations of equipment, transmitters, alarms and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the ENGINEER during construction. Obtain in the field, all information relevant to the placing of process control work and in case of any interference with other work, proceed as directed by the ENGINEER and furnish all labor and materials necessary to complete the work in an approved manner.

D. The CSI shall investigate each space in the building through which equipment must pass to reach its final location. If necessary, the CSI shall be required to ship his material in sections sized to permit passing through restricted areas in the building. The CSI shall also investigate, and make any field modifications to the allocated space for each cabinet, enclosure and panel, to assure proper space and access (front, rear, side).

E. Two complete sets of approved shop drawings shall be kept at the job site during all on-site construction. Both sets shall be identically marked up to reflect any modifications made during field installation or start-up. All markings shall be verified and initialed by the ENGINEER or his designated representative. Following completion of installation and the operational readiness test, one set of the marked up drawings shall be provided to the ENGINEER, the other retained by the CSI for incorporation of the mark-ups into final as-built documentation.

F. All work shall be in strict accordance with codes and local rulings, should any work be performed contrary to said rulings, ordinances and regulations, the CONTRACTOR shall bear full responsibility for such violations and assume all costs arising there from.

G. Brackets and hangers required for mounting of equipment shall be provided. They shall be installed in a workmanlike manner and not interfere with any other equipment.

H. The CONTRACTOR shall take steps to keep electrical and control enclosures clean and free of contaminants throughout installation. Cleaning after installation is not acceptable. Under no circumstances are electrical and control enclosures to be cleaned using compressed air to blow out dust, causing contaminants to be forced into sensitive electronics.

I. Provisions shall be made to completely capture filings (metal, etc.) when drilling into enclosures, to prevent contamination of electrical equipment.

J. Upon completion of the instrumentation and control work, the CONTRACTOR shall thoroughly clean all soiled surfaces of installed equipment and materials and remove all surplus materials, rubbish, and debris that has accumulated during the construction work. The entire area shall be left neat, clean, and acceptable to the OWNER.

3.02 WIRING AND GROUNDING

A. The following wiring practice guidelines shall be used in order to minimize ground loops, to minimize electromagnetic interference/radio frequency interference (EMI/RFI) to this equipment, and to provide maximum practical immunity from damage resulting from lightning-induced transients.

B. Common wires or conductors shall not be utilized (either within panels or external to panels or for grounding of field devices) for both signal shield or signal grounding and for safety grounds.

C. Exposed wire lengths extending from within shielded signal cables shall be minimized to reduce pick-up of EMI/RFI by signal circuits. Exposed lengths of less than one inch are preferred, and a maximum exposed length of two inches may be permitted where necessary. No splicing of signal wires is permitted.

D. All signal wiring shall be shielded, both within panels and external to panels. Unless otherwise specified, all signal wiring shall be No. 16 AWG stranded tinned two-conductor twisted pair, with 100 percent coverage aluminized Mylar or aluminized polyester shield and tinned copper drain wire.

E. Signal wiring within outdoor or indoor field device enclosures shall conform to the same requirements as panel wiring.

F. The shield on each process instrumentation cable shall be continuous from source to destination, and grounded at one end only. In general, grounding of signal cable shields shall be done at the control panel end. The signal cable for no signal shall share a common cable shield grounding wire with the signal cable shield for any other signal, and shall not share a common grounding wire with any other circuit. The length of no signal cable shield grounding wire shall not exceed two inches, with less than one-inch maximum length preferred.

G. All outdoor instruments and all outdoor enclosures shall be grounded using the practice defined in Section 800.40 of the National Electric Code.

3.03 TESTING, GENERAL REQUIREMENTS

A. The CSI and SSP shall test all equipment hardware and software at the factory prior to shipment. As a minimum, site testing shall include the following:

1. Operational Readiness Testing (ORT).

2. System Acceptance Testing (SAT).

B. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and, upon the system's or subsystem's producing the correct result (effect), the specific test requirement will have been satisfied.

C. All tests shall be conducted in accordance with prior ENGINEER approved procedures, forms, and check lists. Each specific test to be performed shall be described and a space provided after it for sign off by the appropriate party after its satisfactory completion.

D. Copies of these sign off test procedures, forms, and check lists will constitute the required test documentation.

E. Provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment, and data; provide suitable means of simulation. Define these simulation techniques in the test procedures.

F. The CONTRACTOR shall require the CSI and SSP to jointly coordinate all testing with him, all affected Subcontractors, and the OWNER.

G. The ENGINEER reserves the right to test or retest all specified functions whether or not explicitly stated in the prior approved test procedures.

H. The ENGINEER'S decision shall be final regarding the acceptability and completeness of all testing.

I. The CSI and SSP shall furnish the services of technicians, all special calibration and test equipment, and labor to perform the field tests.

J. All functional testing shall be conducted as a joint effort between the CSI and SSP to confirm that the total system functions as designed.

3.04 OPERATIONAL READINESS TESTING (ORT)

A. The entire system shall be certified (inspected, calibrated, tested, and documented) that it is ready for operation. Each specified function shall be verified on a paragraph-by-paragraph, loop-by-loop and site-by-site basis.

B. The OWNER and/or ENGINEER reserve the right to witness any test, inspection, calibration, or start-up activity. Acceptance by the OWNER and/or ENGINEER of any plan, report, or documentation relating to any testing or commissioning activity specified herein, shall not relieve the CONTRACTOR of his responsibility for meeting all specified requirements.

C. The CSI and SSP shall provide the services of factory trained technicians, tools and equipment to field calibrate, test, inspect and adjust each instrument to its specified performance requirement in accordance with manufacturer's specifications and instructions. Any instrument which fails to meet any contract requirements, or any published manufacturer performance specification for functional and operational parameters, shall be repaired or replaced, at the discretion of the ENGINEER, at no cost to the OWNER. The CONTRACTOR shall bear all costs and provide all personnel, equipment and materials necessary to implement all installation tests and inspection activities for equipment specified herein.

D. Each instrument shall be calibrated at 0, 25, 50, 75 and 100 percent of span using test instruments to simulate inputs and read outputs. Test instruments shall be rated to an accuracy of at least five (5) times greater than the specified accuracy of the instrument being calibrated. Where applicable, such test instruments shall have accuracies as set forth by the National Institute for Standards and Technology (NIST).

E. The CSI shall provide a written calibration sheet to the ENGINEER for each instrument, certifying that it has been calibrated to its published specified accuracy. The CONTRACTOR shall submit proposed calibration sheets for various types of instruments for ENGINEER approval prior to the start of calibration. This sheet shall include but not be limited to date, instrument tag numbers, calibration data for the various procedures described herein, name of person performing the calibration, a listing of the published specified accuracy, permissible tolerance at each point of calibration, calibration reading as finally adjusted within tolerance, defect noted, corrective action required and corrections made.

F. If doubt exists as to the correct method for calibrating or checking the calibration of an instrument, the manufacturer's printed recommendations shall be used as an acceptable standard, subject to the approval of the ENGINEER.

G. Upon completion of calibration, devices calibrated hereunder shall not be subjected to sudden movements, accelerations, or shocks, and shall be installed in permanent protected positions not subject to moisture, dirt, and excessive temperature variations. Caution shall be exercised to prevent such devices from being subjected to over-voltage, incorrect voltages, overpressure or incorrect air. Damaged equipment shall be replaced and recalibrated at no cost to the OWNER.

H. After completion of instrumentation installation and calibration, the CSI shall perform a loop check. The CONTRACTOR shall submit final loop test results with all instruments listed in the loop. Loop test results shall be signed by all representatives involved for each loop test.

I. Loop/Component Inspections and Tests: The entire system shall be checked for proper installation, calibrated, and adjusted on a loop-by-loop and

component-by-component basis to ensure that it is in conformance with related submittals and the Contract Documents.

1. The Loop/Component Inspections and Tests shall be implemented using ENGINEER approved forms and check lists.

2. The CONTRACTOR shall require the CSI to maintain the Loop Status Reports and Components Calibration sheets at the job-site and make them available to the ENGINEER/OWNER at any time.

3. These inspections and tests do not require witnessing. However, the ENGINEER will review and initial all Loop Status Sheets and Component Calibration Sheets and spot-check their entries periodically and upon completion of the Operational Readiness Tests. Any deficiencies found shall be corrected.

3.05 SYSTEM ACCEPTANCE TEST (SAT)

A. Successful completion of the operational readiness test, as determined by the OWNER and/or ENGINEER shall be the basis for starting the witnessed system acceptance test. The ENGINEER shall approve the ORT test results and the ENGINEER and OWNER shall be given two weeks' notice prior to the start of the System Acceptance Test.

B. The system acceptance test shall repeat loop and functional testing done during the operational readiness test in order to demonstrate to the OWNER and ENGINEER that the system has been started up, is operating, and is in compliance with these Specifications. Each specified function shall be demonstrated on a paragraph-by-paragraph, loop-by-loop and site-by-site basis.

C. The following documentation shall be made available to the ENGINEER during the test:

1. All Contract Drawings and Specifications, addenda, and change orders.

2. Master copy of the test procedure.

3. One copy of all O&M Manuals shall be made available to the ENGINEER at the job-site both before and during testing.

D. Any malfunction during the tests shall be analyzed, and corrections made by the CSI and/or SSP. The ENGINEER and/or OWNER will determine whether any such malfunctions are sufficiently serious to warrant a repeat of this test.

E. The CSI and SSP shall both be onsite during the SAT, conducting the tests jointly as a complete system.

F. After all functions have been tested and all corrections made, the system shall operate continuously for 15 days without failure before this test will be considered successful.

G. The total availability of the system shall be greater than 99.5 percent during this test period. Availability shall be defined as "Avail. = (Total Time-Down Time,) / (Total Time) x 100%". Down times due to power outages or other factors outside the normal protection devices or back-up power supplies provided, shall not contribute to the availability test times above.

3.06 TRAINING

A. The CSI AND SSP shall provide project specific classroom training at the OWNER'S site or designated location. Training shall be provided for the operation and maintenance of all equipment provided, as well as site specific installation configuration training for the system as a whole.

B. Each student shall be provided with training materials. All training materials shall be provided in hardcopy as well as on a training CD, with all materials in Microsoft Office or Adobe PDF file format. All training CD's shall be updated with final configuration information and resubmitted for approval. Final CD media shall be archival quality.

C. The OWNER reserves the right to video tape any and all training sessions for the purposes of future or refresher training.

D. To facilitate the OWNER'S operations staff scheduling, training shall be conducted in two (2) four-hour sessions, a morning session and an afternoon session. Morning and afternoon sessions will cover the same material on a given day.

E. Maintenance training shall be provided to designated maintenance personnel, so that each component may be maintained without the assistance of outside organizations. The training shall be extensive so that after training, personnel shall be able to identify component malfunctions and repair components to the board/module replacement level. Training shall cover the entire system including controls and field equipment.

F. Refer to related specification sections for additional training requirements.

G. Training sessions shall be carried out to the satisfaction of the OWNER before final acceptance will be provided.

3.07 WARRANTY

A. The warranty period for this system shall be for one year and shall begin upon final acceptance of the complete system by the OWNER. During this warranty period, the CSI shall provide, at no additional cost to the OWNER, the services of a trained, competent, field service engineer who shall arrive on site within 36 hours of notification by the OWNER or ENGINEER, to repair and/or replace any faulty device or equipment supplied by the system supplier as part of this Instrumentation and Control System. All preventive and corrective activities shall be documented with service reports, which shall identify the equipment being serviced, state the condition of the equipment, describe all work performed, and list materials used. A copy of all service reports shall be delivered to the OWNER on or before the next business day.

B. The CSI shall be capable of providing, after the warranty period for this system expires, a 1-year renewable service contract whereby a trained, competent field service ENGINEER shall arrive on site within 36 hours of notification by the OWNER. Information relative to charges for such service and availability of such service shall be submitted to the OWNER and the ENGINEER.

C. Components shall be furnished to the manufacturer's standard for service intended, unless otherwise indicated in the Specifications or on the Contract Drawings.

END OF SECTION

SECTION 13310 INSTRUMENTATION AND CONTROL, FIELD EQUIPMENT

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The CONTRACTOR shall furnish, test, install and place in satisfactory operation all equipment required to provide a complete and operable Instrumentation and Control System (ICS), whether or not specified herein or shown on the Contract Drawings.

B. The Control System Integrator (CSI) shall provide full onsite supervision of all equipment provided under this section by the CSI, where installation is provided by others.

C. All Field Equipment (i.e. primary elements, measuring devices, transmitters, field controllers, chart recorders, indicators, and other instrumentation and accessories) shall be provided with all components necessary for a fully functional device whether or not specifically indicated in the Contract Documents. This may include, but may not be limited to: sample conditioning, sample sink(s), sensors, sensor holder and mounting brackets, transmitter, all required cables, calibration equipment, chemicals, reagents and spare parts.

D. Specialty cables and conduits between sensors/probes and their electronics/transmitters shall be furnished with each instrument. Cables shall be coordinated with the conduit installation and be of sufficient length to not require any splicing. Special cables include any type of cable not specified in Division 16 - Electrical.

E. For the High Service Pump Station (HSP) Total Chlorine Residual monitoring location, the CSI shall provide a pre-assembled back panel which shall include all related instruments in a pre-piped and wired configuration. This will include a terminal junction box for power distribution, analog signal wiring and surge protection. The only requirement after mounting the panel will be to connect the field wiring and process sample piping. The panels will be isolated from the process and drain system by a manual ball valve and will include all pressure and flow limiters, needle valves and bubble traps as required. All equipment shall be wired and piped per the manufacturer's recommendations and requirements.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. In addition to the requirements specified in this section, the requirements of specification Section 13300 - Instrumentation and Controls, General Requirements, and the sections referenced therein shall be applied.

B. Refer to the end of this section, Attachment A, for the Instrumentation Schedule for field instruments required under this contract.

1.03 SUBMITTALS

A. The submittals shall be in accordance with Division 1 and as specified in Section 13300 - Instrumentation and Controls, General Requirements. In addition, the following specific submittals items shall be provided:

1. An ISA specification sheet for each instrument furnished and/or calibrated shall be submitted with the field equipment submittals. The ISA data sheet shall be in accordance with ISA Standards ISA S20 "Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves" and ISA TR20.00.01 "Specification Forms for Process Measurement and Control Instruments".

2. The CSI and the field equipment manufacturer shall review the proposed installation and configuration of all field equipment, prior to submittal for approval, and shall identify any condition which shall require corrective measures. The following as a minimum shall be reviewed for the installation configuration of each instrument:

   a. Listed features
   b. Material of construction
   c. Consideration of process fluid
   d. Environmental conditions
   e. Installation location
   f. Process connections
   g. Ability to perform maintenance

3. Submit in writing in the field equipment submittal, that each piece of equipment is suitable for the proposed installation. Any proposed deviations shall be reviewed by the Engineer prior to execution.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Unless otherwise specified, instruments shall be provided with enclosures to suit the specified environmental conditions. Field-mounted devices shall be rugged and mounted on walls, equipment racks, or pipe stanchions. Where the field equipment's integral enclosure for a specified instrument is not available with the specified environmental rating, the field equipment shall be provided in a control enclosure as specified in Specification Section 13320 - Instrumentation and Controls, Control Enclosures.

B. Where separate elements and transmitters are required, they shall be fully matched, and unless otherwise noted or shown on the Contract Drawings, installed adjacent or near to the sensor, in a readily accessible location. Special cables that are required for interconnection between sensors or probes and transmitters shall be furnished with the instrumentation devices by the associated equipment manufacturer. Special cables shall be of the required length for the equipment locations and conduit routing paths shown on the Contract Drawings. No splicing of cables will be accepted.

C. Electronic equipment shall utilize printed circuitry and shall be coated (tropicalized) to prevent contamination by dust, moisture and fungus. Ambient conditions shall be -15 to 50° C and twenty to ninety-five percent (20% - 95%) relative humidity, unless

otherwise specified. Field mounted equipment and system components shall be designed for installation in dusty, humid and corrosive service conditions.

D. All non-loop-powered instruments and equipment shall be designed to operate on a 60 Hz alternating current power source at a nominal 120 VAC, except where specifically noted. All regulators and power supplies required for compliance with the above shall be provided. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.

E. All analog transmitter and controller outputs shall be isolated, 4-20 mA into a load of 0-750 ohms minimum, unless specifically noted otherwise.

F. Process taps for primary sensors shall be sized to suit each individual installation and the requirements of the instrument served. It is the Contractor's responsibility to ensure that the location, supports, orientation and dimensions of the connections and taps for instrumentation furnished under this Division are such as to provide the proper bracing, the required accuracy of measurement, protection of the sensor from accidental damage, and accessibility for maintenance while the plant is in operation. Isolation valves shall be provided at all process taps.

G. All outdoor external sample/process piping, including valves and appurtenances, shall be insulated with weather-proof insulatio to prevent freezing. Heat taping shall be thermostatically controlled and self-regulating, and shall adjust its heat output to the temperature of the lines.

2.02 TOOLS, SUPPLIES, AND SPARE PARTS

A. Tools, supplies and spare parts shall be provided as specified in Section 13300 - Instrumentation and Controls, General Requirements, and as specified for each equipment item. In addition, the following items shall be provided:

1. All instruments shall be supplied with one (1) years' worth of supplies, including chemicals and reagents, for the calibration, operation and maintenance of the device.

2.03 ACCESSORIES

A. Instrument tubing shall be 1/4 x 0.065-inch seamless, annealed, ASTM A-269 Type 316L stainless steel with Type 316 - 37° stainless steel flared fittings, or Swagelock or Parker-CPI flareless fittings.

B. Diaphragm seals shall be provided to systems as shown on the Contract Drawings, as specified herein and/or for isolation of pressure gauges, switches and transmitters attached to systems containing non-potable water, chemical solutions or corrosive fluids. As a minimum, seals shall be of all 316 stainless steel construction. Diaphragms shall be 316L stainless steel for operating pressures at or above 15 psi, and elastomers for operating pressures below 15 psi. Diaphragm material shall be non-reactive with the process fluid. Refer to the Instrument Schedules for specific materials requirements. Seal shall have fill connection, 1/4-inch NPT valve flush port and capable of disassembly without loss of filler fluid. Where specified, diaphragm seals shall comply with the above requirements, and shall be provided with 316

stainless steel factory filled capillaries. Seals shall be Helicoid Type 100 HA, Mansfield & Green, Ashcroft, or equal.

C. Isolating ring seals shall be provided for sensing elements measuring pressure in solids bearing fluids. For heavy solids/slurry applications, wherever the associated pressure instrument is used for control purposes, or where shown on the Contract Drawings, the sensor body shall be full line size wafer design, with 316 stainless steel housing and assembly flanges, and Buna N flexible cylinder lining for in-line mounting. The wafer shall have through bolt holes or centerline gauge for positive alignment with the associated flanged piping. The captive liquid chamber and associated instrument(s) shall be furnished with threaded drain tap and plug. Isolating ring seals shall be RED Valve Series 40, Ronningen-Petter Iso-Ring, Moyno RKL Series W, or equal.

D. For all other solids bearing fluids, pressure shall be sensed via a 1/2" diameter spool-type isolating ring seal, mounted on a 1/2" pipe nipple at 90 degrees from the process piping. An isolation ball valve shall be provided between the process piping and the ring seal, and a cleanout ball valve shall be provided between the ring seal and the atmosphere. The pressure instrument shall be back or side mounted to the ring seal such that the gauge or readout may be viewed normally. Isolating ring seals for normal solids service shall be Red Valve Series 42, Ronningen-Petter Iso-Spool, or equal.

E. Isolation valves shall be 1/2-inch diameter ball valves with 316 stainless steel body, 316 stainless steel ball.

2.04 TRANSIENT VOLTAGE SURGE SUPPRESSION

A. TVSS shall be supplied for all field equipment power, discrete and analog signals, and communications wires. Refer to Specification Section 13320 - Instrumentation and Controls, Control Enclosures for requirements.

2.05 LEVEL TRANSMITTER, ULTRASONIC TYPE:

A. Ultrasonic transmitters shall be provided for measurement of storage tanks, concrete tanks, and/or as indicated on the Drawings. Equipment shall be provided with features and accessories as described herein and suitable for the application.

B. Ultrasonic level transmitters shall meet the following specifications as a minimum:

1. NEMA 4X enclosure
2. 120VAC, 60Hz input power
3. Process display with keypad for menu driven configuration
4. One (1) isolated 4-20 mA output
5. One (1) alarm relay output for level transmitter fault (Echo loss)
6. Non-volatile memory
7. Accuracy: 0.25 %

C. The CSI shall provide all mounting hardware needed for all applications for this project; and shall coordinate the details of the installation so that the instruments are installed in keeping with the best standard and recommended practices of the manufacturer and conforming to the requirements set forth by the ENGINEER.

D. Level transmitters shall be fully programmable and configurable using a computer and keypad. The final 'As-Built' documentation shall be provided with a tabulation of the Programming Parameters used in each level transmitter so that the initial calibration can be reproduced if a spare transmitter is installed.

E. Level transmitters' conduit connections shall be sealed to prevent damage or corrosion due to vapors or wetness.

F. Ultrasonic Level Transmitters shall be Endress & Hauser Prosonic S FMU90 transmitter with FDU91-RN2AA sensors. Refer to the Instrumentation details for flange mounting requirements.

G. Transmitters shall be installed using the appropriate transducer, suitable for the range and process connection of the installation. The cable provided with the transducer shall be of sufficient length to provide installation without splicing the cable at any point.

H. The CSI shall provide mounting hardware components and appropriate mounting assistance to install and secure the transducers in a manner in keeping with the recommendations of the manufacturer of the equipment and/or in keeping with the general details provided in the drawings. All hardware shall be fabricated from corrosion resistant materials and shall utilize stainless steel hardware. The mounting system shall be secure and permanent and shall allow easy access to the sensor for servicing. All cables shall be installed in suitable rigid conduit with only short lengths of flexible conduit allowed to complete the installation.

I. In cases where the transducer is used to monitor a covered wet well or tank, the transducer shall be installed using a hinged protective enclosure, or an enclosed that is designed to work in conjunction with the tank cover. The enclosure shall be a special corrosion resistant instrument enclosure made of polyurethane, and stainless steel hardware. Enclosures shall be model C-6, as provided by O'Brien Corp, St. Louis, Missouri. The case shall be secured to the slab using heavy anchors over an appropriately sized hole cored through the slab. The enclosure shall also have a hole in the bottom to match the hole in the slab so that the transducer can be easily installed from above. The transducer shall be installed on a heavy aluminum plate which would lie in the bottom of the enclosure and allow the transducer to extend into the cored hole.

J. In cases where the transducer is used to monitor a water storage tank or other similar type of open location, the CSI shall provide a mounting design and mounting hardware to provide an installation which is appropriate for the operation of the device and easily maintained. For tanks, the transducer shall be mounted above the tank or a suitable bracket extending out far enough from the tank sides to receive a strong signal over the entire level range without reflections off the tank sides. The transmitter shall be mounted outside of the wall at a convenient ground-level working height.

2.06 PRESSURE GAUGE:

A. General: Unless otherwise noted or specified, pressure and vacuum gauges shall conform to the following requirements:

B. Mounting Type: Gauges shall be of the stem-mount type unless noted otherwise.

C. Construction: Gauges shall be of the bourdon tube or bellows type with 270 degrees clockwise pointer travel. Dials shall be white face with black numerals. Dial size shall be 4-1/2 inches. Connections for all gauges shall be male 1/2 NPT with square wrench flats. Wetted parts shall be corrosion-resistant to the process fluid shown and unless otherwise specified shall be the manufacturer's best quality standard. The case shall be filled with glycerin and shall be black phenolic. Accuracy shall be ±0.5 percent of span.

D. Chemical Seal: Where specified or shown in the drawings, the gauge, with optional locking device, shall be furnished with a diaphragm seal. The diaphragm seal shall have a 316 stainless steel (minimum) top and bottom housing and a 316 stainless steel diaphragm welded to the top housing. When the process fluid or pressure is not compatible with 316 stainless steel, the manufacturer shall provide a diaphragm seal compatible with the process fluid. The process connection shall be a 3/4-inch threaded connection with a flushing connection. The fill fluid shall be glycerin. A locking device shall be included from the factory on all fluid-filled instruments to prevent inadvertent loosening or removal from the seal.

E. Where no seal is specified the gauge will be supplied with a pressure limiting snubber to protect against surges and pulsations.

F. Manufacturers: The gauges shall be as manufactured by Ashcroft, Wika, McDaniels, U.S. Gauge or approved equal.

G. The diaphragm seals shall be field serviceable for oil filling. Refer to paragraph 2.03 for other requirements and list of approved manufacturers.

2.07 RESIDUAL CHLORINE ANALYZER:

A. The online total residual chlorine analyzer shall measure concentrations of total chlorine residual using the principles of amperometric measurement with temperature compensation.

B. The analyzer shall include but not be limited to the following:

1. Non-corrosive NEMA 4X enclosure
2. 120VAC 60Hz input power
3. Process display with front-panel control buttons for menu driven configuration
4. One (1) 4-20ma output
5. Six (6) user-selectable alarm relay outputs
6. Reagent feed system
7. Equipment mounting panel enclosure, NEMA 4X, 316 stainless steel, with sun

shields

8. Automatic electrode cleaning system
9. One (1) year supply of maintenance/operating parts and reagents

C. Total Residual Chlorine Analyzers shall be Capital Controls, CL500, or approved equal.

2.08 LEVEL SWITCH (MINIATURE FLOAT)

A. Miniature float type level switches shall be supplied for containment flooding alarm. These float switches shall be compatible with the process or chemical that would cause flooding and shall actuate with minimal level change. The float switch that alarm on flooding shall be mounted to detect the alarm condition as soon as possible. Mount switch on containment wall with stainless steel mounting bracket where switches subjected to traffic damage shall be protected by a removable cage.

B. Miniature type level switches for flooding alarms shall be Flowline or equal.

2.09 FLOW REGULATING CONTROL VALVE

A. Flow regulating control valves shall be provided on water quality sample lines where shown on drawings. Flow regulating control valve shall have direct reading scales with a manual control knob for valve operation and position.

B. Accuracy of flow control valve shall be plus or minus 4% with a maximum pressure rating of 50 psi.

C. Flow regulating control valve body shall be molded transparent nylon with process connections of 5/16 OD

D. Flow regulating control valve shall be equal to Dwyer MMA Series Mini-Master or approved equal.

2.10 FLOW SWITCH, VANE TYPE

A. General purpose flow switch for detection of low or no flow in process piping or pump discharge operation by utilizing a magnetically actuated switch.

B. One SPST snap switch contact for remote indication of flow, electrical rating of 5A at 125/250 VAC.

C. Sensor wetted materials and upper body shall be stainless steel.

D. Process connection shall be 1/2-inch NPT for 1/2-inch to 1-1/4 inch lines; 1-1/2-inch for line sizes of 1-1/2-inches or larger.

E. Sensors shall be side mounted in the process piping to prevent sensor interference from less than full piping and fluid particulate settling.

F. Switch shall be W.E. Anderson FLOTECT or approved equal.

2.11 SUNSHIELDS

A. All outdoor mounted transmitters shall be provided with a 316 stainless steel sunshield. Sunshields are to be sized so that the sunshield will extend a minimum of three (3) inches beyond the transmitter enclosure on all sides and to open the transmitter door/cover without restriction.

B. The sunshield shall be sized to include protection for the transmitter and the surge arresting device and all accessory devices.

C. All sunshield and instrument mounting hardware shall be 316 stainless steel.

D. Sunshields shall be designed to withstand regional wind loads.

E. Sunshield design shall be submitted for approval.

PART 3 - EXECUTION

3.01 REQUIREMENTS

A. In addition to the requirements specified in this section, refer to Section 13300 - Instrumentation and Control, General Requirements.

END OF SECTION

SWWRF MARS Chlorination
Manatee County, Florida

Instrumentation Schedule

TAG	SPECIFICATION	DESCRIPTION	SERVICE	RANGE	SUPPIER
LE/LIT-110-1	13310-2.05	Ultrasonic Level Transmitter	NaOCl Storage Tank No. 1 Level	0-10 FT	CSI
LE/LIT-110-2	13310-2.05	Ultrasonic Level Transmitter	NaOCl Storage Tank No. 2 Level	0-10 FT	CSI
AE/AIT-122	13310-2.07	Total Chlorine Analyzer/Transmitter	Effluent Pump Station Residual Chlorine	0-20 mg/l	CSI
LSH-113	13310-2.08	Float Switch	Chlorine Storage Tanks Containment High Level Alarm	EL - TBD	CSI
PE/PI-111	13312-2.06	Pressure Gauge w/ Diaphragm Seal	NaOCl Pump Pump No. 1 Discharge Pressure	PSI	CSS
PE/PI-112	13312-2.06	Pressure Gauge w/ Diaphragm Seal	NaOCl Pump Pump No. 2 Discharge Pressure	PSI	CSS
FE/FI-1109	13310-2.09	Flow Regulating Control Valve/Indicator	Effluent Chlorine Anayzer Sample		CSI
FSH-117	13310-2.10	Flow Switch	Emergency Eyewash Shower		CSI
CSI: Control System Integrator CSS: Chemical System Supplier					

SECTION 13320 INSTRUMENTATION AND CONTROL, CONTROL ENCLOSURES

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The CONTRACTOR shall furnish, modify, test, install and place into satisfactory operation all control enclosures (i.e. field panels, control panels, cabinets, consoles, boxes, etc.) required to provide a complete and operable Instrumentation and Control System (ICS) as specified herein and as shown on the Contract Drawings, even if each needed item is not specifically indicated.

B. The CONTRACTOR shall also be responsible to provide modifications to existing control panels as described herein or as indicated in the PLC Input/Output Schedule Attachment. Modifications to existing control panels shall also conform to the requirements of these specifications.

C. New control enclosures and/or subpanels shall be assembled, wired and tested in the CSI's own facilities, unless specified otherwise.

D. All components and all necessary accessories (e.g. mounting hardware, conditioning equipment, TVSS, fuses, circuit breakers, terminals, ground bars, relays, contactors, starters, indicators, control operators, power supplies, signal conditioning, connectors, digital hardware, etc.) that may be required to complete the system, shall be provided.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. In addition to the requirements specified in this section, the requirements of specification Section 13300 - Instrumentation and Control, General Requirements and the sections referenced therein shall be applied.

B. Instrumentation and Controls Schedules. Refer to Instrumentation Schedule and PLC Input/Output Schedule Attachments for a listing of major equipment, enclosure construction and signal monitoring requirements.

1.03 SUBMITTALS

A. All submittals shall be in accordance with Division 1 and as specified in Section 13300 - Instrumentation and Control, General Requirements. In addition, the following specific submittal items shall be provided.

1. Heat calculations, in relation to heat dissipation and cooling/heating system requirements, shall be submitted for all cabinets containing PLCs, UPSs, VFDs, SCRs, and, at the request of the Engineer, for all cabinets containing sensitive electronic equipment or chemicals.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. All enclosures shall fit within the allocated space shown on the Drawings. The CONTRACTOR shall examine plans and/or field inspect new and existing structures

as required to determine installation requirements and shall coordinate the installation of all enclosures with the OWNER and all affected contractors. The CONTRACTOR shall be responsible for all costs associated with installation of enclosures, including repair of damage to structures (incidental, accidental or unavoidable).

B. A minimum estimated size is shown on the Drawings. The CONTRACTOR shall furnish enclosures of the size and quantity required to house the manufacturers' equipment supplied and all other electrical components installed in the enclosure. In addition, provide useful space and power supply capacity as spare for future expandability to a minimum of one (1) item per item type installed or twenty percent (20%) of quantity of each type item installed, whichever yields the greater spare space.

C. Enclosures (cabinets, panels, boxes, etc.) shall be formed or welded construction, reinforced with Unistrut, Powerstrut or equal to facilitate mounting of internal components or equipment. Sufficient access plates and doors shall be provided to facilitate maintenance and testing of the supplier's equipment. Doors shall be removable. Enclosures with any dimension thirty-six (36) inches or greater shall be provided with removable lifting lugs designed to facilitate safe moving and lifting of the panel during installation. No screws or bolts shall protrude through from the interior enclosure.

D. All steel enclosures shall be free from dirt, grease and burrs, and shall be treated with a phosphatizing metal conditioner (phosphate conversion coating) before painting. All surfaces shall be filled, sanded, and finish coated by spraying a 1-2 mil epoxy prime coat and smooth, level, high grade textured finish between flat and semi-gloss shine. The colors shall be selected by the OWNER from a minimum of six (6) color samples provided. All stainless steel enclosures shall be polished to a No. 4 finish.

E. Enclosures shall be prefabricated cabinets and panels by Hoffman, Rittal or approved equal. The CONTRACTOR may optionally provide enclosures custom fabricated by a reputable panel fabrication shop acceptable to the ENGINEER.

F. Each panel shall incorporate a removable back panel on which control components shall be mounted. Back panels shall be secured to the enclosures with collar studs. All components shall be of the highest industrial quality and securely mounted to the removable back panels with screw and lock washers. Back panels shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any component.

G. All enclosures with any dimension twenty-four (24) inches or larger shall be provided with drawing pockets for as-built panel drawings. One (1) laminated copy of the appropriate panel as-built drawings shall be furnished and left in the pocket of each panel.

H. All enclosures shall be protected from internal corrosion by the use of corrosion-inhibiting vapor capsules as manufactured by Northern Instruments Model Zerust VC, Hoffman Engineering Model A-HCI, or equal.

I. All metallic enclosures with door mounted equipment shall have the door grounded

by means of flexible ground strap.

J. The enclosure and all interior and exterior equipment shall be identified with nameplates. The equipment shall be mounted such that service can occur without removal of other equipment. Panel mounted equipment shall be flush or semi-flush mounted with flat black escutcheons. All equipment shall be accessible such that adjustments can be made while the equipment is in service and operating. All enclosures shall fit within the allocated space as shown on the Contract Drawings.

K. Enclosures shall provide mounting for UPS, power supplies, control equipment, input / output subsystems, panel mounted equipment and appurtenances. Ample space shall be provided between equipment to facilitate servicing and cooling. Enclosures shall be sized to adequately dissipate heat generated by equipment mounted inside the panel. Louvered openings fitted with dust filters near the bottom and top of the cabinet shall be provided for NEMA 12 enclosures. If required, cabinets shall be provided with filtered fans, heat exchangers or air conditioners. Only closed loop cooling systems shall be provided for NEMA 4X cabinets. Cooling systems shall be by the cabinet fabricator, McLean Midwest, Noren Products, or approved equal.

L. Enclosures shall be provided with a main circuit breaker and a circuit breaker on each individual branch circuit distributed from the panel. Main breaker and branch breaker sizes shall be coordinated such that an overload in a branch circuit will trip only the branch breaker but not the main breaker. Circuit breakers shall be provided for the following internal branch circuits distributed within the panel:

1. Receptacles and power strips

2. Lighting

3. UPS

4. HVAC equipment

M. Enclosures shall be provided with 120 volt duplex receptacles for service equipment and fluorescent service lights. Loads not requiring transient voltage surge suppression (i.e. receptacles, lighting, HVAC, branch circuits to remote equipment, etc.) shall be connected ahead of the enclosure TVSS device.

N. Locate equipment, devices, hardware, power supplies, instrumentation and controls, electrical equipment and wiring to be installed inside the enclosures and/or as facial features on the enclosures, so that connections can be easily made and so that there is ample room for servicing each item. Every component in and on the enclosures shall be able to be removed individually without affecting the other components and without the need to move other components. Support and restrain all internally, as well as panel mounted components to prevent any movement.

O. All cabinets and/or enclosures shall be NEMA rated for the environment in which it is to be installed and as noted in the Drawings.

P. Materials and equipment used shall be U.L. approved wherever such approved equipment and materials are available.

Q. Control panels shall be built in accordance with UL508A Industrial Control Panels and NEC Article 409 Industrial Control Panels. Control panels for areas classified as Hazardous shall be built in accordance with UL698 Industrial Control Equipment for Use in Hazardous Locations. Control panels shall be UL508A and/or UL698 labeled and marked as defined in NEC 409.110 with the following:

1. Manufacturer's name and contact information (i.e. address, phone, website, email, etc.).
2. Supply voltage, phase, frequency and full-load current.
3. Short-circuit current rating of the industrial panel based on one of the following:
4. Short-circuit current rating of a listed and labeled assembly
5. Short-circuit current rating established utilizing an approved method
6. Electrical wiring diagram numbers or the index sheet to the electrical wiring diagrams.
7. The enclosure type number (i.e. NEMA 1A, 3R, 12, 4X, 7, 9, etc.)
8. If the industrial control panel is intended as service equipment, it shall be marked to identify it as being suitable for use as service equipment.

R. All work shall be performed in a professional manner and in consideration of allowing ease of future troubleshooting and maintenance. All equipment should be mounted so as to minimize crowding within the panel. All devices shall be mounted and wired in a neat and workmanlike manner. Each component shall be prominently identified with the use of permanent engraved legend plates.

S. Grounding: All suppressors shall be grounded per the suppressor manufacturer's recommendations. Furnish control panels with an integral copper grounding bus for connection of suppressors and other required instrumentation. Provide single-point connection of all grounds to grounding bus using the shortest possible path. Each grounded object shall have a separate connection to the ground bus. Do not connect cable shields to suppressor ground terminal or daisy-chain ground connections. Provide 1-inch wide by 1/8-inch thick copper ground bus as a minimum.

2.02 PANEL ENCLOSURE MATERIAL AND CONSTRUCTION

A. Outdoor Enclosures

1. All outdoor enclosures shall be rated NEMA 4X, constructed of 316 stainless steel with a white powder epoxy coating finish unless specified otherwise. Outdoor enclosures shall have a hinged and gasketed door. Door latches shall be all stainless steel, fast operating clamp assemblies (quick release), which do not require bolts or screws to secure. Gaskets shall be polyurethane.
2. Outdoor panels shall be fitted with pad-lockable latch kits.
3. Outdoor enclosures with internal digital electronics, exterior indicators, or exterior indicator lights shall have external sun shields or sun shades,

constructed of the same materials as the associated enclosure, unless otherwise specified.

4. Outdoor enclosures shall be designed for ambient conditions of -15 to 50°C and twenty to ninety-five percent (20% - 95%) relative humidity, unless otherwise specified. Outdoor enclosures shall be provided with thermostatically controlled space heaters to provide condensation protection.

B. Indoor Enclosures

1. Indoor enclosures located in the same area (i.e. room, etc.) as open process tanks, open process channels, closed process piping or process equipment containing wet liquids or possible airborne powders, shall be rated NEMA 4X, constructed of 316 stainless steel, fiberglass, fiberglass reinforced polyester, or polycarbonate, unless specified otherwise. Enclosures shall have a hinged and gasketed door. Door latches shall be all stainless steel, fast operating clamp assemblies (quick release) which do not require bolts or screws to secure. Gaskets shall be polyurethane.

2. Indoor enclosures located in a dry or environmentally controlled area (i.e. electrical room, etc.) shall be NEMA 12 steel, unless specified otherwise. Enclosures shall have a hinged and gasketed door. Door latches shall be 3 point door latch with handle for all enclosures with a dimension of 24 inches or larger, or otherwise shall be fast operating clamp assemblies which do not require bolts or screws to secure. Gaskets shall be polyurethane.

3. Indoor enclosures in a non-air conditioned space shall be designed for ambient conditions of 0 to 40°C and twenty to ninety-five percent (20% - 95%) relative humidity, unless otherwise specified. Indoor enclosures in an air conditioned space shall be designed for ambient conditions of 20 to 30°C and twenty to eighty-five percent (20% - 85%) relative humidity, unless otherwise specified.

D. Terminals

1. Terminal blocks shall be assembled on non-current carrying galvanized steel DIN mounting rails, securely bolted to the cabinet sub-panel. Terminals shall be of the screw down pressure plate type as manufactured by Allen Bradley, Phoenix Contact, Wieland, Square D, or equal. Power terminal blocks shall be single tier with a minimum rating of 600 volts, 30 amps. Signal terminal blocks shall be single tier with a minimum rating of 600 volts, 20 amps.

2. Fused terminal blocks or miniature thermal circuit breaker terminal blocks shall be supplied for protection and isolation of enclosed equipment, or as specified in the Contract documents. Blown fuse indicators shall be provided and/or tripped breaker status shall be clearly visible. Fused or miniature thermal circuit breaker terminal blocks shall be provided for, but not limited to each of the following:

   a. Each PLC module requiring external power
   b. Each piece of equipment provided with a power supply (integral, internal or external) with the exception of devices with internal fusing plugged into a receptacle.

c. Terminals shall be marked with a black waterproof, permanent, continuous marking strip. One side of each terminal shall be reserved exclusively for field incoming conductors. Common connections and jumpers required for internal wiring shall not be made on the field side of the terminal.

E. Wiring

1. All wiring shall be bundled and run open or enclosed in vented plastic wireway, as required. All conductors run open shall be bundled and bound with nylon cable ties, at regular intervals, with intervals not to exceed 12 inches. Adequately support and restrain all wiring runs to prevent sagging or other movement. Care shall be taken to separate communication, network, electronic signal, AC discrete signal, DC discrete signal and power wiring. Wiring to equipment mounted on doors or where movement of the equipment will take place, shall be installed in nylon spiral wrapping sheaths.

2. Wires shall be color coded as follows:

a. Equipment Ground - GREEN
b. 120 VAC Power Distribution - BLACK
c. 120 VAC Power Neutral - WHITE
d. 120 VAC Control (Internally Powered) - RED
e. 120 VAC Control (Externally Powered) - YELLOW
f. 24 VAC Control - ORANGE
g. DC Power (+) - BLUE
h. DC Power (-) - BLUE/WHITE
i. DC Control - BLUE
j. Analog Signal (+) - BLACK
k. Analog Signal (-) - WHITE

3. All wiring shall comply with accepted standard instrumentation and electrical practices. Field wiring for power, control and signal wires shall comply with Division 16 of the specifications. For each pair of parallel terminal blocks, the field wiring shall be between the blocks.

4. Internal panel wiring shall be as follows:

a. AC power wiring: 14 AWG minimum, stranded copper conductors, THHN/THHW wire rated for 600 volts and 90 °C. For wiring carrying more than 15 amps, use sizes required by NEC.
b. AC control and dc power and control wiring: 16 AWG minimum, stranded copper conductors, THHN/THHW wire rated for 600 volts and 90 °C.
c. Instrument signal wiring: 18 AWG stranded conductors, tinned copper, twisted pair or triad, overall one hundred percent (100%) aluminum foil shield with 20 AWG stranded drain wire, plenum rated 300V 60°C FEP insulated wire with FEP jacket, equal to Belden 88760.
d. All stranded wire shall have a minimum of sixteen (16) strands, except for drain wires.

F. Identification

1. Provide a laminated black nameplate with beveled edges and ½ inch white letters to identify each console, panel or cabinet on the front of the enclosure.

2. Provide laminated, beveled edge, plastic legend plates and nameplates, with 1/4 inch letters, for each front panel mounted device as shown on the Drawings. Legend plates and nameplates shall be the size as shown on the Drawings. Color shall be black lettering on white background except caution/warning nameplates which shall be white lettering on a red background. Attach front panel nameplates with both a permanent adhesive and stainless steel machine screws into tapped holes.

3. Tag all interior instruments and other components with engraved, laminated plastic nameplates with 1/8 inch, minimum, lettering. Legends shall be consistent with wiring and layout drawings. Nameplates shall be attached with permanent adhesive to the panel, near the device or on the device itself or as otherwise approved by the Engineer.

4. Number and label each wire in the systems. Every unique wiring node shall have its own individual unique number. Numbers shall be shown on all submitted drawings. Minimum of three sets of drawings submitted shall include wire numbers. All wires shall be labeled at each termination and junction of the wire and at 30 inch intervals along the wire. All multi-conductor cables shall be labeled at each end and at 30-inch intervals with CBL-XXX and also label each conductor at both ends. Labeling shall be self-laminating white/transparent self-extinguishing vinyl strips (Brady DAT 7 292 or equal) with clear heat shrink tubing over the markers. Length shall be sufficient to provide at least two and one-half (2 ½) wraps. All labels shall be machine-printed with wire and/or cable numbers.

G. Accessories

1. Control operators such as pushbuttons (PB), selector switches (SS), and pilot lights (PL) shall be Allen Bradley 800H, Square D Company Type SK or equal. Control operators shall be 30.5 mm, round, heavy-duty, oil tight NEMA 4X corrosion resistant.

2. Pushbuttons and selector switches shall be non-illuminated, spring release type. Pushbuttons shall include a full guard. Panic stop/alarm pushbuttons shall be red mushroom type with manual-pull release. Pilot lights shall be of the proper control voltage, LED type (indoor) and lamp type (outdoor).

3. Control operators shall have legend plates as specified herein, indicated on the Contract Drawings, or otherwise directed by the Engineer. Legend plates shall be plastic, white field (background) with black lettering. Engraved nameplates shall be securely fastened above each control operator. If adequate space is not available, the nameplate shall be mounted below the operator.

4. Control operators for all equipment shall be as specified herein and of the same type and manufacturer unless otherwise specified or indicated on the Contract Drawings. Modifications to existing panels using control operators and indicators of the same type and manufacturer shall be allowed with

Engineer's approval.

5. Where required to interface between motor control centers, equipment controls, and control panels, interposing relays and associated control wiring circuitry shall be furnished and installed to provide the monitoring and/or control functions specified herein. Interposing relays shall be miniature type with DPDT contacts rated a minimum 10 amp @ 120 VAC, push-to-test button, and status indicator. Relay coils shall be 120/240 VAC or 24 VDC as required. Relays shall be as manufactured by Idec, Square D, Omron, Allen-Bradley or approved equal.

6. Digital process displays shall be provided to indicate rates and readings in digital format and true engineering units. Indicators shall accept a 4-20 mA input signal and shall be programmable through the front panel function keys and push buttons to provide scaling, calibration, options, and accessories. Units shall be 4-digit, 1.2" height minimum, with red LED indication, 120VAC power supply. Process display shall be front-panel mount, NEMA 4X, with operating temperature of 0 to 65 degrees C. Digital Indicators shall be Precision Digital Trident X2, Red Lion, or approved equal.

7. Signal isolators/boosters/converters shall be solid state electronic type with RFI protection. Signal isolators/boosters/converters shall accept a current, voltage, frequency, temperature, or resistance and provide current or voltage dual outputs as shown on the drawings and specified herein. Signal isolators/boosters/converters shall have complete isolation between input circuitry, output circuitry, and power supply, and with provisions for din-rail mount inside the control panel enclosure. Signal isolators/boosters/converters shall be Phoenix Contact, Acromag, or approved equal.

8. Alarm beacon light shall be provided where shown and specified on drawings. Beacon light shall be suitable for outdoor and heavy-duty industrial installation, NEMA 4X, provided with a red LED lens, flashing type. Alarm beacon light shall have a lamp life of 60,000 hours with operating temperature of 31-150 degrees F and power supply of 120VAC. Alarm beacon light shall be Federal Signal Corporation, StreamLine Low Profile steady burning LED light, or approved equal.

9. Alarm horn shall be provided where shown and specified on drawings. Alarm horn shall be panel-mount type, heavy-duty construction, NEMA 4X, with panel mount gasket kit. Horn shall be provided with volume control and an external silence push button. Range of horn shall be up to 200 feet, producing 100dBA at 10 feet. Horn power supply shall be 120VAC. Alarm horn shall be Federal Signal Corporation, Vibratone 350, or approved equal.

H. Power Supplies

1. Each control panel shall be provided with a minimum of one 24 VDC power supply. Power supplies shall be enclosed and sized per the guidelines of UL508 and UL508A. Power supplies shall be Phoenix Contact, Model Quint-PS-X, or approved equal.

2. External PLC power supplies provided for loop and/or PLC power shall be redundant and alarm to the PLC upon failure.

I. Transient Voltage Surge Suppression (TVSS)

1. Transient voltage surge suppressors shall be provided at the following minimum locations:

   a. At any connections between AC power and electrical and electronic equipment, including panels, assemblies and field mounted instruments.
   b. At both ends of all analog signal circuits that have any portion of the circuit extending outside of a protecting building.
   c. At the control panel of all discrete signal circuits that have any portion of the circuit extending outside of the protecting building.
   d. At both ends of all copper-based communications cables that extend outside of a building.
   e. At all specified spare analog inputs and outputs in PLCs and RTUs.

2. These protective devices shall be external to and installed in addition to any protective devices built into the equipment. Power and signal protection shall be installed in either in a NEMA 4X enclosure or in the enclosure that houses the equipment to be protected.

3. All surge arrestors shall be mounted and wired per the manufacturer's recommendations including local grounding for surge energy dissipation. For surge suppressors use No. 8 cable for ground connection or install suppressor directly on ground bus using grounding screw. Provide 1-inch wide by 1/8-inch thick copper ground bus as a minimum.

4. Panel-mounted power circuit protectors shall be provided in all enclosures powered by 120 VAC. The protector shall be a 3-stage hybrid, solid-state power line protector with noise filtering, common mode and normal mode suppression and nanosecond reaction time. The unit shall include a replaceable fuse to remove the load (protected equipment) from the line if the unit is either overloaded or the internal protection fails. TVSS devices shall be Phoenix Contact PT 2-PE/S-120AC/FM or approved equal.

5. Panel-mounted signal circuit protectors shall be made for mounting on a terminal block rail. Each TVSS shall include a moveable grounding link to allow each signal cable shield to be individually grounded to the panel via the mounting rail through the TVSS for that cable without the use of any additional grounding wire or to be isolated from ground at the TVSS. Each mounting rail shall be grounded to the panel by the use of rail mounting screws at approximately one-foot intervals. Protection shall be from line to line and from each line to ground. Protection shall also be from shield to ground where the shield is not grounded at the protector. Each TVSS shall have the ability to protect against surge currents greater than 10,000 amperes. Each TVSS shall add no more than 22 ohms per signal wire to the total signal loop resistance of the analog signal loop in which it is installed. TVSSs shall not introduce error-producing ground loop currents into the instrumentation signal circuits. TVSS devices shall be Phoenix Contact PT 2-PE/S-120AC/FM (120VAC Digital I/O)

and PT1x2-24DC/FM-ST (Analog I/O) or approved equal.

6. Signal circuit TVSS for 2-wire field instruments shall be a conduit connected/pipe nipple type and shall have characteristics equal to the panel mounted devices. Units shall be mounted to a transmitter conduit entry point where available. When not available or practical, then these devices shall be mounted in NEMA 4X enclosures located at the field devices. TVSS devices shall be Phoenix Contact S-PT1-2PE-24DC or approved equal.

7. Signal circuit TVSS for 4-wire field instruments shall be a separate enclosure unit capable of providing protection on both the power and signal side. The unit shall contain the characteristics of the line power protector and signal circuit protectors discussed above. Units shall be enclosed in a manufacturer assembled NEMA 4X polycarbonate enclosure with a clear polycarbonate cover. TVSS devices shall be Phoenix Contact Boxtrab or approved equal.

8. TVSS devices antenna cable signal protection shall be an in-line panel mount type unit rated for 50 Ohms and with dc blocking. Unit shall be rated for the appropriate frequency range and have an insertion loss of 0.1 dB. TVSS device shall be a DEHN 929 045 (DGA AG N) or Polyphasor equivalent.

9. TVSS device specifications and ratings for signal or communications types not defined herein shall be as specified elsewhere or of a type recommended by the manufacturer of the device being protected. TVSS devices shall be Phoenix Contact or DEHN, Inc.

2.03 TOOLS, SUPPLIES, AND SPARE PARTS

A. Tools, supplies, and spare parts shall be provided as specified in Section 13300 - Instrumentation and Control, General Requirements and as specified for each equipment item. In addition, the following items shall be provided.

1. One (1) of each type of panel mounted equipment (i.e., indicators, signal converters, etc.) provided under this Contract.

2. Three (3) of each type of interposing relay provided under this Contract.

3. One (1) of each type of power TVSS device used

4. Five (5) of each type of signal TVSS device used

5. Two (2) of each type of communication TVSS device used.

6. One (1) of each type power supply used.
7. One year supply of corrosion-inhibiting vapor capsules.

PART 3 - EXECUTION

3.01 REQUIREMENTS

A. In addition to the requirements specified in this section, refer to Section 13300 - Instrumentation and Control, General Requirements.

B. Floor mounted enclosures shall be installed on 1/4 inch thick rubber type pads. These pads shall completely cover the area of the base that is against the floor.

C. Keep enclosures clean at all times. Keep enclosures doors closed except when actually working in the enclosure. Protect all equipment during installation, including hole punching for conduit connection. Remove all filings and thread cuttings from enclosures. Careful attention must be paid to provide installations which are both functional and esthetically acceptable.

D. All conduits used in conjunction with control panels or instrumentation of any kind shall be sealed using a suitable duct-sealing compound to minimize the possible damage caused by vapors or wetness. It shall be the responsibility of the CSI to verify that this is accomplished early in the project, so that corrosion damage does not occur during the time of construction.

E. The Contractor shall provide the Engineer a periodic written report detailing construction progress. This report shall include specific tabulations of equipment on which construction/installation has been completed.

F. Equipment shall be located so that it is accessible for operation and maintenance. The CSI shall examine the Contract Drawings and Shop Drawings for various items of equipment in order to determine the best arrangement for the work as a whole and shall supervise the installation of all equipment.

3.02 WIRING AND GROUNDING

A. The following wiring practice guidelines shall be used in order to minimize ground loops, minimize the effects of electromagnetic interference/radio frequency interference (EMI/RFI) and to provide maximum practical immunity from damage resulting from lightning-induced transients.

B. Common wires or conductors shall not be utilized (either within panels or external to panels, or for grounding of field devices) for signal shielding, signal grounding, or safety grounds.

C. Exposed wire lengths extending from within shielded signal cables shall be minimized to reduce pick-up of EMI/RFI by signal circuits. Exposed lengths of less than one inch is preferred with a maximum exposed length of two inches only permitted where necessary. No splicing of signal wires shall be permitted.

D. All signal wiring shall be shielded, both within panels and external to panels. Unless otherwise specified, all signal wiring shall be No. 16 AWG stranded tinned two-conductor twisted pair with 100 percent coverage of aluminized Mylar or aluminized polyester shield and tinned copper drain wire.

E. The shield on each process instrumentation cable shall be continuous from source to destination, and grounded at one end only. In general, grounding of signal cable shields shall be done at the control panel end. No signal cable shall share a common cable shield grounding wire with any other signal cable or other circuit. The exposed length of cable shield grounding wires shall not exceed two inches prior to termination with less than one-inch maximum length preferred.

F. All outdoor instruments and all outdoor enclosures shall be grounded using the practice defined in Section 800.40 of the National Electric Code.

END OF SECTION

SWWRF PLC INPUT/OUTPUT SCHEDULE
MARS CHLORINATION
MANATEE COUNTY, FL

TAGNAME	DESCRIPTION	TYPE	INACTIVE	ACTIVE	UNITS	LOCATION
LIT-110-1	NaOCL STORAGE TANK NO. 1 LEVEL	AI	0	XXX	FEET	SP-16 PLC
XS-110-1	NaOCL STORAGE TANK NO. 1 LEVEL TRANSMITTER FAULT ALARM	DI	NORMAL	ALARM		SP-16 PLC
LIT-110-2	NaOCL STORAGE TANK NO. 2 LEVEL	AI	0	XXX	FEET	SP-16 PLC
XS-110-2	NaOCL STORAGE TANK NO. 2 LEVEL TRANSMITTER FAULT ALARM	DI	NORMAL	ALARM		SP-16 PLC
OL-110	NaOCL STORAGE TANK NO. 1 OR 2 HIGH LEVEL ALARM (BEACON LIGHT)	DO	NORMAL	ALARM		SP-16 PLC
OA-110	NaOCL STORAGE TANK NO. 1 OR 2 HIGH LEVEL ALARM (HORN)	DO	NORMAL	ALARM		SP-16 PLC
SI-111	NaOCL PUMP NO. 1 SPEED FEEDBACK	AI	0	100	%	SP-16 PLC
SC-111	NaOCL PUMP NO. 1 SPEED CONTROL	AO	0	100	%	SP-16 PLC
OL-111-1	NaOCL PUMP NO. 1 IN REMOTE	DI	OFF	REMOTE		SP-16 PLC
OL-111-2	NaOCL PUMP NO. 1 RUN STATUS	DI	OFF	ON		SP-16 PLC
OA-111	NaOCL PUMP NO. 1 FAIL	DI	NORMAL	ALARM		SP-16 PLC
HS-111	NaOCL PUMP NO. 1 CALL TO RUN	DO	STOP	START		SP-16 PLC
SI-112	NaOCL PUMP NO. 2 SPEED FEEDBACK	AI	0	100	%	SP-16 PLC
SC-112	NaOCL PUMP NO. 2 SPEED CONTROL	AO	0	100	%	SP-16 PLC
OL-112-1	NaOCL PUMP NO. 2 IN REMOTE	DI	OFF	REMOTE		SP-16 PLC
OL-112-2	NaOCL PUMP NO. 2 RUN STATUS	DI	OFF	ON		SP-16 PLC
OA-112	NaOCL PUMP NO. 2 FAIL	DI	NORMAL	ALARM		SP-16 PLC
HS-112	NaOCL PUMP NO. 2 CALL TO RUN	DO	STOP	START		SP-16 PLC
AE/AIT-113	NaOCL STORAGE TANKS CONTAINMENT HIGH LEVEL	DI	NORMAL	ALARM		SP-16 PLC
FS-117	EMERGENCY EYE WASH SHOWER ALARM	DI	NORMAL	ALARM		SP-16 PLC
AE/AIT-122	HSP TOTAL CHLORINE RESIDUAL	AI	0	XXX	mg/l	SP-16 PLC

SECTION 13330 INSTRUMENTATION AND CONTROL, SCADA HARDWARE

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The CONTRACTOR shall furnish, test, install and place in satisfactory operation all equipment required to provide a complete and operable Supervisory Control and Data Acquisition (SCADA) system, as specified herein and as shown on the Contract Drawings, even if each needed item is not specifically specified or shown.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. In addition to the requirements specified in this section, the requirements of specification Section 13300 - Instrumentation and Control, General Requirements and the sections referenced therein shall be applied.

B. An Input/Output (I/O) list is included at the end of this section as an attachment for the PLC. For bidding purposes, the I/O list is intended to provide information to the CSI which includes a description of the supplied control system I/O provided under this contract.

1.03 SUBMITTALS

A. All submittals shall be in accordance with Division 1 and as specified in Section 13300 - Instrumentation and Control, General Requirements.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. The SCADA hardware configuration as specified herein, as specified in related sections and as shown on the Contract Drawings depicts overall system configuration requirements. Unless otherwise specified, designs which vary from this concept will be rejected.

B. All discrete and analog data acquisition, pre-processing, storage and process control functions shall be performed at the PLC level.

C. PLC-to-PLC communication protocols shall be Ethernet based.

D. The Controls System Integrator (CSI) shall provide all software, operating systems, network interface, special drivers and network integrations as required and shall perform all configurations, commissioning, troubleshooting and diagnostics required for a complete and functional system.

E. The intent of this section is to provide the components to implement a fully functional SCADA monitoring and control system with an Ethernet-based network, linking all of the plant control equipment and providing for complete monitoring, control and data analysis for the plant operations and process control.

F. Cable systems shall be provided for various requirements, including but not limited to data network, fiber optic, printer, power cables, and others as required. Cables shall be routed in suitable conduits, cable ducts, channels and wire ducts to provide a clean, safe, non-obtrusive and workmanlike installation.

2.02 TOOLS, SUPPLIES, AND SPARE PARTS

A. Tools, supplies and spare parts shall be provided as specified in Section 13300 - Instrumentation and Control, General Requirements, and as specified for each equipment item. In addition, the following items shall be provided.

2.03 TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)

A. Refer to specification section 13320 - Instrumentation and Control, Control Enclosures for TVSS requirements.

B. Provide TVSS protection for all specified spare analog and discrete inputs and outputs.

2.04 PLC MODIFICATIONS (HIGH SERVICE PUMP STATION SP-16 PLC, EXISTING)

A. The Control System Integrator shall furnish Input/Output (I/O) modules, as required, for the existing Allen Bradley SLC5/05 model PLC as specified and shown on the drawings.

B. The existing PLC shall handle the required number of additional process inputs and outputs provided under this contract, plus a minimum of ten percent (10%) pre-wired spares for each I/O type furnished except discrete inputs which shall have a minimum of twenty percent (20%) pre-wired spares.

C. The existing high service pump station SP-16 PLC panel consists of a 13-slot rack with 7 available spare slots. The CSI shall field verify and coordinate with the Owner for the available spare slots and I/O to be used for accommodating the I/O provided under this contract. To assist the CSI, the following list is provided below which includes the existing installed PLC I/O modules quantity, part/model number, and description/type of I/O with quantity of available spare I/O:

QTY	DESCRIPTION / # AVAILABLE SPARE POINTS	PART/MODEL NO.
3	16 Point Digital Input Module / 17 DI Spares	1746-IB16
1	8 Point Digital Output Module / 6 DO Spares	1746-OA8
1	8 Channel Analog Input Module / 4 AI Spares	1746-NI8

D. Additional I/O Modules: Provide the same model number of the listed module types as needed to meet the specified I/O requirements, both new and spare I/O.

E. Analog Output (AO) Module: The analog output module shall be 8 channel analog output module, part/model No. 1746-NO8I (current output).

PART 3 - EXECUTION

3.01 REQUIREMENTS

A. In addition to the requirements specified in this section, refer to Section 13300 - Instrumentation and Control, General Requirements.

END OF SECTION

SECTION 13390 SOFTWARE FUNCTIONAL DESCRIPTIONS

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. In addition to the requirements specified in this section, the requirements of specification Section 13300 - Instrumentation and Control, General Requirements and the sections referenced therein shall be applied.

1.02 SUBMITTALS

A. All submittals shall be in accordance with Division 1 and as specified in Section 13300 - Instrumentation and Control, General Requirements.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Multiple equipment items of similar form and function shall be designed and laid out, to the extent possible, to be the same. In addition, equipment design shall minimize differences in programming between equipment.

B. All I/O specified and/or scheduled within the Contract Documents shall be gathered from their respective process or equipment and brought into the ICS control panels containing PLCs. Where signals are not scheduled but required by process equipment supplied, these signals shall be connected to the ICS at no additional cost. The Contractor shall provide all necessary field equipment, modifications to existing equipment, conduit and wire to provide these signals to the new control panels.

C. Where set points, operating limits, and other control settings are provided by the functional control descriptions, these settings shall be initial settings only and shall be used for assistance in the initial startup of the plant. All such settings shall be fully adjustable and based on actual operating conditions. The SSP and CSI shall make all necessary adjustments to provide smooth, stable operation at no additional cost to the Owner.

D. All set point control shall be by PID control algorithms unless specifically stated otherwise. Where only proportional control is specified, tuning constants shall be used to reduce the Integral and Derivative functions to zero. All set points, sequence times, sequence orders, dead bands, PID tuning parameters, PLC delay timers, variable speed operating range limits and similar control constants shall be accessible and alterable from the Plant SCADA System.

E. Provision shall be made in PLC logic to suppress nuisance alarms and control actions by the use of adjustable time delays and hysteresis deadbands where needed. Initial settings for time delays shall be 10 seconds (range 0-900 seconds). Initial settings for deadbands shall be 5% of span (range 0-100%). In addition, process logic shall be used to suppress any alarms that are not applicable due to associated process or equipment status.

F. All software implementation shall match the existing software format for content functionality. These features shall include, but not be limited to, graphic display layout, color conventions, database tag naming conventions, security level considerations, alarm handling, historical data collection and trending.

2.02 EQUIPMENT CONTROL AND MONITORING

A. Control operators (i.e., H-O-A, H-O-R, L-O-R switches) for equipment shall be provided to operate as follows:

1. HAND = Equipment operates locally. This may be a LOCAL position if other local control operators exist for controlling the equipment.

2. LOCAL = Transfers equipment control to an operator control station at the equipment or to controls local to the panel where the switch is located.

3. OFF = Equipment does not operate

4. AUTO = Equipment is controlled automatically.

5. MAN = Equipment is controlled by manual actions.

6. LEAD / LAG = Selection of equipment for lead/lag roll in control.

7. REMOTE = Equipment is controlled remotely. This is used instead of AUTO when there is remote manual and/or auto control.

8. E-STOP = Stops equipment regardless of control mode.

2.03 SCADA EQUIPMENT CONTROL AND MONITORING

A. Computer Human Machine Interface (HMI) Manual Equipment Control shall be provided for all equipment controlled by the PLC.

B. If present, the local HAND-OFF-REMOTE switches must be placed in REMOTE for operation by the HMI. The following manual controls shall be provided in the HMI as applicable to equipment.

C. Equipment Controls: ON-OFF or ON-OFF-AUTO virtual selector switch where:

1. ON = Equipment shall start and run unless prevented by an interlock as described in the operational description for the equipment. If Variable Speed Drive (VSD) equipped, speed shall be controlled manually by HMI entry.

2. OFF = Equipment shall shutdown and remain off. Latched equipment failures shall be reset.

D. AUTO = Equipment shall be controlled as described in the operation description for the equipment. Valve and Gate Controls: OPEN-CLOSE, OPEN-OFF-CLOSE or OPEN-OFF-CLOSE-AUTO or MAN-AUTO virtual selector switch where:

1. OPEN = Valve or gate shall open.
2. CLOSE = Valve or gate shall close.
3. OFF = Valve or gate does not operate
4. MAN = Modulating valve or gate shall have its position controlled manually by OIT entry.
5. AUTO = Valve or gate shall be controlled as described in the operation description for the equipment.

E. A control program that controls multiple pieces of equipment shall not be prevented from running because not all of the equipment is in REMOTE or AUTO. If equipment within an equipment chain is required to be running for program operation and it is running, then the program shall run and control the other equipment that is in AUTO.

F. Unless specifically stated or shown otherwise all control interfaces (switches, buttons, indications, etc.) described shall be graphical software presentations available at the SCADA Computer System.

G. Unless specifically stated otherwise, all analog values will be recorded historically and presented in a trend format.

2.04 DERIVED ALARMS, INTERLOCKS, AND VARIABLES

A. Instrument failure shall be generated for any instrument which is generating a signal which is less than 3.84 mA or greater than 20.16 mA. The value of failed instrument's signal shall be extended outside of the trimmed to the corresponding span of the signal.

B. Equipment failure shall be generated through the PLC for any drive, motor, etc. for which a run command has been issued but for which the PLC is not receiving a run status signal after an adjustable time delay (0-300 seconds, initial setting: 30 seconds).

C. Fail to Open or Fail to Close alarms shall be generated for any valve or gate that does not reach its commanded position after an adjustable time delay (0-900 seconds, initial setting: 120 seconds).

D. A Ready indication is generated by the piece of equipment placed in Remote or Auto locally and no fault conditions in effect, i.e. the equipment is ready to operate.

E. No Flow alarms shall be generated if no flow is measured after an adjustable time delay while a pump is running and an interlock shall be latched until reset to prevent the pump from continuing to run.

F. No Power Available alarm shall be generated if no generator power is measured or

available after an adjustable time delay while a generator is running.

G. PLC processor status and communications faults shall be monitored and generate alarms.

H. The PLC shall store runtime values for all motorized equipment. Runtimes shall include a value for today, yesterday and cumulative. Values for today and yesterday shall automatically reset at midnight. Adjustable set points for each piece of equipment shall be provided to alarm when the accumulated run-time exceeds the set point.

I. All flows shall be totalized within the PLC and provided with values for today, yesterday and cumulative. Values for today and yesterday shall automatically reset at midnight. Cumulative values will include a minimum of six digits normalized to a logical unit range to prevent excessive rollover. Flow totals shall be historically saved prior to reset. Flow totals associated with a batch process cycle shall be reset after the cycle and the previous cycle's total shall be displayed as well as the current. Batch process cycle flow totals shall not be reset daily.

J. All tank, reservoir and vessel volumes shall be calculated from their levels and displayed. Volume calculations shall account for the vessel shape.

2.05 SODIUM HYPOCHLORITE PUMPING AND STORAGE

A. The Sodium Hypochlorite System consists of two storage tanks and two metering pumps.

B. NaOCl Storage Tank No. 1 and 2 Level - LIT-110-1,2
   1. A new ultrasonic level transmitter will be provided for each storage tank.
   2. Local level indication, high level, and transmitter fault alarms. Beacon light and horn shall be activated on high level. High level set points shall be adjustable via the HMI. Alarm reset for high level and transmitter fault alarms shall be provided via the HMI.
   3. Remote level indication, high level, low level, low-low pump cutoff and transmitter fault alarms.
   4. Tank Select 1/2/Both shall be provided via the HMI, for selection of tank(s) in service. Alarm generation will occur only for tanks selected as in service.

C. Sodium Hypochlorite Metering Pumps - P-111, P-112
   1. The indicated pumps will provide chemical to the reclaimed water Transmission Main.
   2. Each metering pump includes a built-in capability for local and remote operation. In Local mode, the pump includes local start/stop capability and manual speed control. When placed in Auto mode, the control of the pump is transferred to the SCADA system.
   3. From the HMI, each pump will include a Hand-Off-Auto selector. When placed in Hand, the pump will start and the speed will be set using an

operator adjustable manual speed set point. In Off the pump will be prevented from operation.

4. When placed in Auto, the pumps will operate in a Lead/Standby configuration with Pump 1/Pump 2/Auto Alternation and automatic failover operation.
5. The Lead pump will automatically be called to operate when the existing High Service Pump Station (HSP) Flow (FIT-120) is above an operator adjustable set point. The pump speed will be paced based on an operator selected method:
   a. Flow paced only using the existing HSP Flow with an operator adjustable dosing factor.
   b. Flow paced using the existing HSP Flow with an operator adjustable dosing factor with trim provided by the HSP Chlorine Residual (AIT-122) and an operator adjustable residual set point of 1 mg/L.
6. Indications - Pump in remote, run status, fail, fail to operate, speed feedback, accumulate runtime.

2.06 TOTAL CHLORINE RESIDUAL MONITORING & ALARMS

A. Total chlorine residual analyzer water quality panel (CWCP)

1. Local indication at the total chlorine residual analyzer water quality panel (CWCP).
2. Remote indication, high, and low chlorine alarms.

2.07 MISCELLANEOUS ALARMS

A. Containment High Level and Emergency Eyewash Shower, LSH-113, FSH-117

1. Indicate storage tanks containment high level alarm.
2. Indicate emergency eyewash shower in use.

END OF SECTION

DIVISION 16 ELECTRICAL

SECTION 16050 ELECTRICAL - GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, devices, equipment, appurtenances, and incidentals required for a complete electrical system as hereinafter specified and/or shown on the Contract Drawings. This work includes interfacing with and/or completely installing devices and/or equipment furnished under other sections of these Specifications.

B. It is the intent of these Specifications that the electrical system be suitable in every way for the service required. All materials and all work/labor which may be reasonably implied as being incidental to the requirements of this Section shall be furnished at no additional cost to the County.

C. All power interruptions to existing equipment shall be at the County's convenience. Each interruption shall have prior approval. Request(s) for power interruption(s) shall be made at least forty-eight (48) hours in advance.

D. The work shall include complete testing of all electrical components, including wiring.

E. All workmanship shall be of the highest quality. Substandard work will be rejected and it shall be replaced entirely at the Contractor's expense with no cost to the County.

F. It shall be the responsibility of each bidder or his authorized representative to physically visit the job site in order that he may be personally acquainted with the area(s), buildings and/or structures intended for use in the installation/construction under this Specification. The submittal of a proposal/bid by a bidder shall be considered evidence that he has complied with this requirement and accepts all responsibility for a complete knowledge of all factors governing his work. Therefore, failure to comply with this requirement of the Specifications will NOT be grounds for the successful bidder (Contractor) to request approval of change orders and/or additional monetary compensation.

1.02 TEMPORARY ELECTRICAL SERVICE

A. The Contractor shall make the requisite arrangements for securing temporary electrical power for his use in accordance with Section 01510 of these Specifications.

1.03 CODES, INSPECTIONS AND FEES

A. All materials and installations shall be in accordance with the National Electrical Code (latest edition) and the latest editions of all applicable national, state, county and local codes. In particular, wind load and seismic requirements.

B. To the extent that any item is routinely tested and rated by the Underwriter's Laboratories, Inc., that item shall bear the U.L. label. Additionally, all items shall be manufactured to the applicable NEMA standards and appropriate equipment labeled as such.

C. The Contractor shall make the necessary arrangements for obtaining all requisite permits and inspections and pay any applicable fees.

1.04 TESTS

A. The Contractor shall test all items individually and as a system for proper operation.

B. The Contractor shall, at his expense, make all the requisite repairs, adjustments and/or alterations to correct any shortcomings found as a result of the tests performed under Item 1.04.A above.

C. A representative of the County shall be present during all testing. The County shall be notified at least two (2) days prior to any testing.

1.05 SLEEVES AND FORMS FOR OPENINGS

A. Provide fire rated or waterproof (location dependent) conduit sleeves and place all sleeves for conduits penetrating floors, walls, partitions, etc. Locate all necessary areas of penetration for electrical work, install sleeves and form before concrete is poured.

1.06 CUTTING AND PATCHING

A. All cutting and patching shall be done in a thoroughly workmanlike manner - i.e., care shall be taken when cutting not to damage or mar surrounding areas, and when patching to match the original finish as closely as possible while providing a watertight seal. Refer to Item 1.01.E above.

1.07 INTERPRETATION OF DRAWINGS

A. The layouts and arrangements as shown on the Contract Drawings are indicative of the physical arrangements desired; however, they are not intended to restrict the Contractor's freedom to accommodate the exact conditions as found in the field. Any deviations from the arrangements shown must be approved by the County prior to the final placement of the item(s) in question.

B. The Contract Drawings are not intended to show exact locations of conduit runs.

C. Circuit and conduit layouts shown are not intended to indicate the exact installation details. The Contractor shall furnish and install all requisite items, including all fittings, junction boxes, etc., to insure that the electrical system operates in conformance with the Specifications and the specific requirements of an individual piece of equipment.

D. Where circuits are shown as "home-runs", all necessary fittings and boxes shall be provided for a complete conduit installation.

E. All three-phase circuits shall be run in separate conduits unless otherwise shown on the Contract Drawings.

F. Surface mounted items such as panelboards, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between the equipment and the mounting surface.

G. The County shall make the final decision in determining the exact location(s) and mounting height(s) of any item(s) or piece(s) of equipment in question.

H. All connections to equipment shall be made in accordance with the approved shop and manufacturer's drawings, regardless of the number of conductors shown on the Contract Bid Drawings.

I. The Contractor shall coordinate the work of the different trades in order to prevent interferences between conduit(s), piping and other non-electrical equipment. In case any interference develops, an authorized representative of the County shall decide which equipment, conduit(s) or piping must be relocated, regardless of which was installed first. Any such interferences shall be remedied solely at the Contractor's expense without any additional cost to the County.

1.08 EQUIPMENT SIZING AND HANDLING

A. The Contractor shall thoroughly check all entryways, doors, hallways, stairways, buildings and structures through which equipment must be transported to reach its final location.

B. If necessary for safe passage of the equipment, the manufacturer shall be required to ship his material in sections sized to pass through the restricted areas. This requirement holds even if such equipment sizing differs from the manufacturer's standard shipping section.

C. To the extent possible, the equipment shall be kept upright at all times. If equipment has to be tilted for ease of passage through restricted areas, the manufacturer shall provide specific handling instructions as well as any requisite bracing in order to assure both the functional integrity of the equipment and the validity of the equipment warranty.

1.09 SUBMITTALS

A. As specified under Section 01340 of these Specifications, the Contractor shall submit shop drawings and/or manufacturer's cut sheets for approval of all materials, equipment, devices, apparatus, and other items as required by the County.

1. Prior to submittal by the Contractor, all shop drawings shall be checked for accuracy and Contract requirements. Shop drawings shall bear the date checked and shall be accompanied by a statement that the shop drawings have been examined for conformity to the Specifications and Contract Drawings. This statement shall also list all discrepancies with the Specifications and Contract Drawings. Shop drawings not so checked

and noted shall be returned unchecked by the County.

2. The County's check shall be only for conformance with the design concept of the Project and compliance with the Specifications and Contract Drawings. The responsibility for, or the necessity of, furnishing materials and workmanship required by the Specifications and Contract Drawings which may not be indicated on the shop drawings is included under the work of this Section.

3. No material shall be ordered, no equipment manufacturing shall be started, nor shall any shop work/fabrication commence until the County has approved the shop drawings. Any deviation from this requirement of the Specifications shall be entirely at the risk and expense of the Contractor without any additional cost to the County.

B. Record Drawings: As the work progresses, the Contractor shall legibly record all field changes on a set of Contract Drawings. When the project is completed, the Contractor shall furnish the County with a complete set of reproducible "as-built" drawings.

1.10 MANUFACTURER'S SERVICES

A. The Contractor shall arrange for an authorized manufacturer's representative who shall be an experienced field service engineer to be present for the inspection, installation, testing, calibration, adjusting and start-up of any item(s) or piece(s) of equipment as deemed necessary by the County.

B. In addition to the duties of Item 1.10.A above, the manufacturer's representative shall also instruct the County's personnel in the proper operation and maintenance of the item(s) in question.

1.11 MATERIALS

A. All materials used shall be new, unused and as hereinafter specified. Where not specifically called out, all materials shall be of the very best quality of their respective kinds. Unless specifically otherwise approved in writing by the County, only material manufactured in the United States shall be used!

B. Where applicable, all materials and equipment shall conform with the requirements of Item 1.03.B above.

C. Electrical equipment shall at all times during construction be adequately protected against both mechanical injury and damage by water. Electrical equipment shall be stored indoors in dry shelters. Any damaged equipment shall be replaced by the Contractor at his own expense.

D. All items shall be manufactured from the materials specified - substitute materials will NOT be acceptable.

E. Only the specified manufacturer's equipment shall be used unless an "or approved equal" is noted. The County shall be the sole determiner of what constitutes an "approved equal".

1.12 GUARANTEES AND WARRANTIES

A. All items furnished under the Electrical Specifications shall be guaranteed and/or warranted, in writing, against defects in materials, construction and workmanship as specified under Section 01740 of these Specifications.

END OF SECTION

SECTION 16075 IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals shown, specified, and required to furnish and install identification for electrical apparatus and electrical Work.

B. Related Sections:

1. 13300 Instrumentation and Controls General Requirements
2. 16120 Low Voltage Conductors and Cables
3. 16123 Medium Voltage Cables

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. NEC Article 110, Requirements for Electrical Installation.
2. NEC Article 210, Branch Circuits.
3. NEC Article 215, Feeders.
4. NEC Article 504, Intrinsically Safe Systems.
5. NEC Article 700, Emergency Systems.
6. NEC Article 701, Legally Required Standby Systems.
7. NEC Article 702, Optional Standby Systems.
8. 40 CFR 1910.145 (OSHA) - Specification for Accident Prevention Signs and Tags.
9. NFPA 70E, Electrical Safety in the Workplace.

1.03 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings: Submit the following:

   a. Complete description and listing of proposed electrical identification and electrical identification devices for associated equipment or systems.
   b. Conduit and wire identification numbering system and equipment signage.

2. Product Data:

   a. Manufacturer's literature, cut sheets, specifications, dimensions and technical data for all products proposed under this Section.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

A. Engraved Identification Devices (Nameplates and Legend Plates):

1. Nameplates:

a. Laminated thermoset plastic, 1/16-inch thick, engraved condensed block black lettering on white background, square corners, and beveled front edges, or match existing.
b. Size: As required.
c. Letter Size: Minimum 3/16-inch.
d. Nameplates one-inch or less in height shall have one mounting hole at each end. Nameplates greater than one-inch in height shall have mounting holes in the four corners.

2. Legend Plates:

a. Legend plates for pushbuttons, pilot lights, selector switches, and other panel-mounted devices shall be large size with dimensions of approximately 2-7/16 inches wide by 2-13/32 inches tall (Allen Bradley large automotive size), plastic, custom engraved with black letters on white background.

1) Provide standard-size legend plates where devices are mounted on motor control centers and spacing of devices precludes using automotive-size legend plates.

b. Lettering size and line weight shall be the same for all legend plates on the same panel or enclosure. Maximum size shall be 1/4-inch and minimum size shall be 1/8-inch.

B. Safety Signs and Voltage Markers:

1. Provide high voltage signs for equipment operating over 600 volts.
2. High-Voltage Safety Signs for Outdoor Applications:

a. Products and Manufacturers: Provide one of the following:

1) B-120-45471 by Brady.
2) Or approved equal.

b. Unless otherwise shown or indicated, high voltage safety signs shall be not less than 10 inches high by 14 inches wide, of fiberglass reinforced plastic, and shall comply with 40 CFR 1910.145. Signs shall resist fading from exposure to temperature extremes, ultraviolet light, abrasive, and corrosive environments, and shall read, "DANGER - HIGH VOLTAGE - KEEP OUT"
c. Mounting hardware shall be Type 316 stainless steel.

3. High-Voltage Safety Signs for Indoor Applications:

a. Products and Manufacturers: Provide one of the following:

1) B-302-84084 by Brady.
2) Or approved equal.

b. High voltage safety signs for installation on indoor equipment shall be either pressure-sensitive acrylic or vinyl, and shall be not less than 10 inches high by 14 inches wide, shall comply with 40 CFR 1910.145, and shall read, "DANGER - HIGH VOLTAGE - KEEP OUT".

4. Cable Tray Safety Signs:

a. Products and Manufacturers: Provide one of the following:

1) B-302-86139 by Brady.
2) Or approved equal.

b. Cable tray safety signs shall be pressure-sensitive vinyl conforming to 40 CFR 1910.145, 5 inches by 3.5 inches in size, and shall read, "DANGER - HIGH VOLTAGE"

5. Low-Voltage Safety Signs:

a. Products and Manufacturers: Provide one of the following:

1) B-302-86060 by Brady.
2) Or approved equal.

b. Low voltage safety signs shall be pressure-sensitive vinyl complying with 40 CFR 1910.145, five inches by 3.5 inches in size, and shall read, "DANGER - 480 VOLTS".

6. Low-Voltage Markers:

a. Products and Manufacturers: Provide one of the following:

1) CV442xx by Brady.
2) Or approved equal.

b. Low voltage markers shall be either pressure-sensitive vinyl or vinyl cloth with black lettering on orange background and shall read, "120 VOLTS", "208 VOLTS", "120/208 VOLTS", or "240 VOLTS" as required.

C. Arc-flash Safety Signs:

1. Products and Manufacturers: Provide one of the following:

a. Brady.
b. Or approved equal.

2. Warning signs shall be adhesive-backed polyester.
3. Warning signs shall read, "Warning - Arc Flash and Shock Hazard. Appropriate PPE Required. Arc flash warning signs shall indicate the flash protection boundary, incident energy in calories per square centimeter, hazard level, description of required protective clothing, shock hazard, limited approach boundary, restricted approach boundary, prohibited approach boundary, and equipment name.

D. Voltage System Identification Directories:

1. General:

a. Directories shall be laminated thermoset plastic, 1/16-inch thick, engraved block black letters on white background, square corners, and beveled front edges.
b. Directories shall identify all voltage systems within building or structure.
c. Directories shall list the colors that identify ungrounded and grounded conductors of each system.
d. Colors shall be in accordance with Section 26 05 19, Low Voltage Electrical Power Conductors and Cables, Section 26 05 13.23, 15KV Cable, and Section 26 05 13.26, 5KV Cable.
e. Example Directory Text:

Voltage System Identification		
System	**A, B, C**	**Neutral**
277/480	Brown, Orange, Yellow	Gray
120/208	Black, Blue, Red	White

2. Large directories for rooms shall have text height not less than 1/2-inch.
3. Small directories for equipment shall have text height of not less than 1/4-inch.

E. Conduit Labels:

1. Products and Manufacturers: Provide one of the following:

a. B-915-xxxxx by Brady.
b. Or approved equal.

2. Shall be pre-tensioned acrylic/vinyl construction coiled to completely encircle conduit for conduit up through five-inch diameter, or pre-molded to conform to circumference of conduit six-inch diameter and larger.
3. Attach strap-on style for six-inch diameter conduit with stainless steel springs.
4. Shall be blank for use with custom printed labels.
5. Custom Labels:

a. Shall have black lettering on yellow background.
b. Shall not contain abbreviations in legend.

c. Shall be custom printed on continuous tape with permanent adhesive using thermal printer specified below.

F. Wire Identification:

1. Heat Shrinkable Wire and Cable Labeling System:

a. Products and Manufacturers: Provide one of the following:

1) B-341 PS-xxx-2W by Brady.
2) Or approved equal.

b. White heat-shrinkable irradiated polyolefin shrink-on sleeves. Labels shall be thermal printed. Labels shall be not less than two inches wide.

2. Wrap-Around Wire and Cable Labeling System:
a. Products and Manufacturers: Provide one of the following:

1) THT-XX-427 by Brady.
2) Or approved equal.

b. Self-laminating white/transparent self extinguishing vinyl strips. Length shall be sufficient to provide at least 2.5 wraps. Labels shall be thermally printed and not less than two inches wide.

G. Detectable Underground Warning Tape:

1. Products and Manufacturers: Provide one of the following:

a. Indentoline by Brady.
b. Or approved equal.

2. Material: Polyethylene or polyester with detectable metal core and polyester underlaminate.
3. Width: Two inches.
4. Color and Labeling: Yellow or red with permanently imprinted black letters: "CAUTION - Buried Electric Line", repeated continuously over full length of tape.

H. Thermal Printing System:

1. Utilize thermal transfer process to provide non-smearing labels and markers.
2. Wire and Cable Markers:

a. Portable, Products and Manufacturers: Provide one of the following:

1) TLS2200 by Brady.
2) Or approved equal.

b. Desktop, Products and Manufacturers: Provide one of the following:

1) 200M by Brady.
2) Or approved equal.

3. Cable Markers:

a. Portable, Products and Manufacturers: Provide one of the following:

1) Handimark by Brady.
2) Or approved equal.

b. Desktop, Products and Manufacturers: Provide one of the following:

1) Labelizer PLUS by Brady.
2) Or approved equal.

I. Generator System Warning Signs:

1. Generator warning signs shall be labeled in accordance with NEC Article 700, NEC Article 701, or NEC Article 702.
2. Material, Colors, Letters: Plastic with white letters on red background. Letters shall be not less than 3/8-inch high.
3. Attachment: Use stainless steel self-tapping screws.
4. Location warning sign shall read, "WARNING - THIS SITE EQUIPPED WITH A DIESEL DRIVEN STAND-BY GENERATOR LOCATED IN AN ADJACENT ROOM".
5. Generator ground warning sign shall read, "WARNING - GENERATOR GROUNDED CIRCUIT CONDUCTOR IS CONNECTED TO THE GROUNDING ELECTRODE CONDUCTOR IN THIS ENCLOSURE. DO NOT OPERATE GENERATOR WHILE EITHER CONDUCTOR IS DISCONNECTED TO AVOID SEVERE SHOCK HAZARD AND POSSIBLE EQUIPMENT DAMAGE."

2.02 FABRICATION

A. Engraved Identification Devices (Nameplates and Legend Plates):

1. Nameplate and legend plate text is preliminary and subject to change pending final review and approval of nomenclature by ENGINEER after start-up and testing.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide electrical identification in accordance with manufacturer recommendations and as required for proper identification of equipment and materials.

B. Engraved Identification Devices (Nameplates and Legend Plates):

1. Unless otherwise indicated in the Contract Documents, attach permanent nameplates with permanent adhesive and with 3/16-inch diameter, round head, stainless steel machine screws into drilled and tapped holes.
2. Provide nameplate with 1.5-inch high letters to identify each console, cabinet, panel, or enclosure as shown or indicated.
3. Provide nameplates for field-mounted motor starters, disconnect switches, manual starter switches, pushbutton stations, and similar equipment operating components, which shall describe motor or equipment function and circuit number.
4. Provide nameplates with 1/2-inch high letters to identify each junction and terminal box shown or indicated.
5. On switchgear, provide nameplates for each main and feeder circuit including control fuses, and for each indicating light and instrument.

    a. Provide nameplate with 1.5-inch high letters giving switchgear designation, voltage rating, ampere rating, short circuit rating, manufacturer's name, general order number, and item number.
    b. Identify individual door for each compartment with nameplate giving item designation and circuit number.

6. Motor Control Centers:

    a. Provide nameplate with 1.5-inch letters with motor control center designation.
    b. Identify individual door for each unit compartment with nameplate identifying controlled equipment.

7. Except conduit, all electrical appurtenances including lighting panels, convenience outlets, fixtures, and lighting switches, shall be provided with nameplates indicating appropriate circuit breaker number(s).

8. Push Buttons:

    a. Provide legend plates for identification of functions.
    b. Provide nameplates for identification of controlled equipment.
    c. Provide red buttons for stop function.
    d. Provide black buttons for other functions.

9. Pilot Lights:

    a. Provide legend plates for identification of functions.
    b. Provide nameplates for identification of controlled equipment.
    c. Shall have lens colors as shown or indicated. Where no color is indicated, provide the following lens colors:

Color	Legend
Green	Running, Open
Red	Stopped, Closed
Amber	Alarm
Blue	Power
White	Status

10. Selector Switches:

    a. Provide legend plates for identification of functions.
    b. Provide nameplates for identification of controlled equipment.

11. Panel Mounted Instruments:

    a. Provide nameplates for identification of function.

12. Interiors of Cabinets, Consoles, Panels, Terminal Boxes, and Other Enclosures:

    a. Provide nameplates for identification.
    b. Provide each item inside cabinet, console, panel, terminal box, or enclosure with laminated plastic nameplate as shown on approved Shop Drawings and CONTRACTOR"s other submittals. Install nameplates with adhesive.

    c. Interior items requiring nameplates include:

        1) Terminal blocks and strips.
        2) Bus bars.
        3) Relays.
        4) Rear of face-mounted items.
        5) Rear of door-mounted items.
        6) Interior mounted items that require identification when mounted externally.

    d. Circuit Breaker Directory:

        1) Provide engraved laminated plastic directory listing function and load controlled for each circuit breaker within panel used for power distribution.

13. Re-label existing equipment whose designation have changed.

C. Safety Signs and Voltage Markers:

1. Provide safety signs and voltage markers on and around electrical equipment as shown or indicated.
    a. Install rigid safety signs using stainless steel fasteners.
    b. Clean surfaces before applying pressure-sensitive signs and markers.

2. Install high voltage safety signs on all equipment doors providing access to uninsulated conductors, including terminal devices, greater than 600 volts.

3. Provide cable tray safety signs on both sides of cable trays at maximum intervals of 20 feet. Install signs on side rails of tray as acceptable to ENGINEER.

    a. Label cable trays that contain conductors greater than 600 volts with cable tray safety signs.
    b. Cable trays that contain conductors greater than 208 volts and less than 600 volts shall be labeled with low voltage safety signs.
    c. Cable trays that contain conductors of 120/208 volts shall be labeled with low voltage markers.
    d. Do not label cable trays that contain only instrument signal cables.
    e. Label cable trays that contain intrinsically safe wiring or cables in accordance with NEC Article 504.

4. Install low voltage safety signs on equipment doors that provide access to uninsulated 480-volt conductors, including terminal devices.
5. Install low voltage markers on each terminal box, safety disconnect switch, and panelboard installed, modified, or relocated as part of the Work and containing 120/208 volt conductors.

D. Voltage System Identification Directories

1. Provide voltage system identification directories as required by NEC Article 210 and NEC Article 215.
2. Provide in each electrical room voltage system identification directory mounted on wall or door at each entrance to room.
3. For panelboards, switchboards, motor control centers, and other branch circuit or feeder distribution equipment that are not located in electrical rooms, provide voltage system identification directory mounted on equipment.

    a. Directories shall be affixed using epoxy glue. Screws or bolts shall not penetrate equipment enclosures.
    b. Directories shall be readily visible and not obscure labels and other markings on equipment.

E. Arc-flash Safety Signs:

1. Provide arc-flash safety signs as required by NEC Article 110.

2. Provide signs for switchboards, panelboards, motor control centers, and industrial control panels. Provide signs for control panels that contain 480 volt equipment. Provide arc flash warning signs on other equipment where the incident energy is greater than 1.2 calories per square centimeter.

F. Conduit Labels:

1. Provide conduits with conduit labels unless otherwise shown or indicated.

2. Do not label flexible conduit.
3. Do not label exposed single conduit runs of less than 25 feet between local disconnect switches and their associated equipment.
4. Conduit labels shall indicate the following information:

    a. Contract Number: Alphanumeric, three or four digits, as applicable.
    b. Conduit Number: Alphanumeric as shown on the Drawings, as assigned by CONTRACTOR for unlabelled conduits, and in accordance with approved submittals.

5. Conduits that contain intrinsically safe wiring shall have an additional pipe marker provided that has blue letters on white background and reads, "INTRINSICALLY SAFE WIRING".

    a. Install intrinsically safe pipe markers in accordance with NEC Article 504 along entire installation. Spacing between labels shall not exceed 25 feet.

6. Provide conduit labels at the following locations:

    a. Where each conduit enters and exits walls, ceilings, floors, or slabs.
    b. Where conduit enters or exits boxes, cabinets, consoles, panels, or enclosures, except pull boxes and conduit bodies used for pull boxes.
    c. At maximum intervals of 50 feet along length of conduit.

7. Orient conduit labels to be readable.

G. Wire and Cable Identification:

1. Color-coding of insulated conductors shall comply with Section 16120, Wires and Cables, Section 16123, Medium Voltage Cable.
2. Use heat-shrinkable wire labels where wire or cable is terminated. Use wrap-around labels where wire or cable is to be labeled but is not terminated.

3. Do not provide labels for the following:

    a. Bare (uninsulated) conductors, unless otherwise shown or indicated as labeled.

4. Provide wire and cable labels for the following:

    a. New, rerouted, or revised wire or cable.
    b. Insulated conductors.
    d. Wire and cable terminations:

        1) Wire labels shall be applied between 1/2-inch and one inch of completed termination

2) Apply cable labels between 1/2-inch and one inch of cable breakout into individual conductors.

a) Label individual conductors in a cable after breakout as specified for wires.

e. Wire or cable exiting cabinets, consoles, panels, terminal boxes, and enclosures.

1) Label wires or cables within two inches of entrance to conduit.

f. Wire or cable in junction boxes and pull boxes

1) Label wires or cables within two inches of entrance to conduit.

g. Wire and cable installed in cable tray.

1) Wire and cable shall have labels at maximum intervals of 20 feet.

h. Wire and cable installed without termination in electrical manholes.

1) Wire and cable shall have wrap-around labels applied within one foot of exiting manhole.

5. Wire and Cable Identification System:

a. Wire and cable labels shall be imprinted with an identifying designator.

1) Wire and cable extending between two devices or items and that does not undergo a change of function shall be identified by a single unique designator as specified below.

b. Field Wiring:

1) Wire or cable designator shall consist of

a) Three left-most characters shall consist of the Contract number under which wiring or cable was installed.
b) Fourth character from the left shall be an asterisk (*), a plus sign (+) or a hyphen (-). Do not use other punctuation symbols in a wire designator.
c) Remaining characters shall be alphanumeric and make wire designator unique.
d) Numbering shall reflect actual designations used in the Work and shall be documented in record documents.

c. Cabinet, Console, Panel, and Enclosure Wiring, Internal:

1) New Cabinets, Consoles, Panels, and Enclosures:

a) Wire and cable inside cabinets, consoles, panels, and enclosures shall have designators as specified in Section 13300, General Requirements.

6. Modified Cabinets, Consoles, Panels, and Enclosures:

a. New or rerouted wire or cable in existing cabinets, consoles, panels, and enclosures shall be labeled as shown on the Drawings or be assigned a ten-character designator equivalent to field wire designator.

H. Terminal Strip Labeling:

1. Label panel side of terminal to match panel wire number.
2. Label field side of terminal to match field wire number. Terminal number shall not include the Contract number.

I. Generator System Warning Signs:

1. Provide warning signs for generator systems as required by NEC.
2. Install generator location warning sign on or immediately adjacent to service equipment, or to "normal" source disconnecting means when generator is located out of sight of service equipment or disconnecting means.
3. Install generator grounding warning sign on enclosure or immediately adjacent to point where generator neutral is connected to grounding electrode system if connection is made remote from generator.

END OF SECTION

SECTION 16110 CONDUITS AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish and install the conduits, fittings, devices and appurtenances as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

The requirements of Section 01340 and Section 16050 shall be met.

1.03 APPLICATIONS

A. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all wiring shall be run in rigid conduits.

B. Galvanized rigid steel conduits shall be used at all locations aboveground and within structures and buildings except where otherwise shown on the Contract Drawings.

C. Galvanized rigid steel conduits shall be used at all locations for shielded instrumentation and shielded control wiring except where otherwise shown on the Contract Drawings.

D. Schedule 80 PVC conduits shall be used for all underground, under-slab and in-slab applications except where otherwise shown on the Contract Drawings.

E. Schedule 80 PVC conduits shall be used in highly corrosive areas such as chlorine storage areas, digesters, fluoride storage and handling areas, etc.

F. Schedule 40 PVC conduit shall be used in all concrete ductbanks. Provide conduit spacers every 6 feet or less to hold separation of conduits.

G. All conduits of a given type shall be the product of one manufacturer.

H. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all boxes shall be metal.

I. Surface mounted switch, receptacle and control station boxes shall be cast or malleable iron.

J. Devices designated as NEMA Type 4 shall be 316 stainless steel, gasketed.

K. Devices designated as NEMA Type 4X shall be 316 stainless steel, gasketed, except as otherwise shown on the Contract Documents.

L. Combination expansion-deflection fittings shall be used where conduits cross structural expansion joints and at every 100' of exposed conduit run.

M. Electrical Metal Tubing only aloud in interior air-conditioned spaces above ceiling tile.

N. PVC Coated Rigid metal conduit shall be used for floor penetrations through concrete.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rigid Conduit

1. Rigid steel conduit shall be hot-dipped galvanized as manufactured by the Youngstown Sheet and Tube Company, Wheeling-Pittsburg Steel Corp., or approved equal.
2. Rigid PVC conduit shall be Carlon Plus 80 rigid PVC non-metallic conduit (extra heavy wall EPC-80) as manufactured by Carlon, or approved equal.
3. Electrical metallic tubing shall be hot-dipped galvanized steel as manufactured by U.S. Steel Corp., Youngstown Sheet and Tube Company, or approved equal.

B. Liquidtight, Flexible Conduit

1. Liquidtight, flexible metal conduits shall be Sealtite, Type UA, as manufactured by Anaconda, American Flexible Conduit Co., Inc., or approved equal.
2. Liquidtight, flexible non-metallic conduits shall be Carflex Liquidtight Flexible Non-Metallic Conduit as manufactured by Carlon, or approved equal.

C. Rigid Conduit Fittings

1. Rigid Steel Conduit Fittings:
   a. Steel elbows, bends, sweeps, nipples, couplings, etc., shall be hot-dipped galvanized as manufactured by Youngstown Sheet and Tube Company, or approved equal.
   b. Conduit hubs shall be as manufactured by Meyers Electric Products, Inc., or approved equal.
2. Rigid Non-Metallic Conduit Fittings: PVC elbows, bends, sweeps, nipples, couplings, device boxes, etc., shall be Plus 80 fittings as manufactured by Carlon, or approved equal.
3. EMT Conduit Fittings: EMT fittings shall be hot-dipped galvanized steel, rain-tight, concrete tight, compression type, as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.

D. Flexible Conduit Fittings

1. Flexible Metal Conduit Fittings: Fittings used with flexible metal conduit shall be of the screw-in type as manufactured by Thomas and Betts Company, or approved equal.
2. Flexible Non-Metallic Conduit Fittings: Fittings used with flexible non-metallic conduit shall be Carflex Liquidtight Non-metallic Fittings as manufactured by Carlon, or approved equal.

E. Flexible Couplings: Flexible couplings shall be as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.

F. Wall Seals: Conduit wall seals shall be type "WSK" as manufactured by the O.Z. Electrical Manufacturing Company, or approved equal.

G. Expansion Fittings: Combination expansion-deflection fittings shall be type "XD" as manufactured by Crouse-Hinds, or approved equal.

H. Boxes

1. Device Boxes
   a. Flush mounted wall device boxes shall be galvanized pressed steel as manufactured by the Raco Manufacturing Company, or approved equal.
   b. Surfaced mounted wall device boxes shall be cast or malleable iron as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.
   c. Flush mounted in-floor device boxes shall be cast metal, shall be watertight, shall have adjustable cover frames, and shall be as manufactured by Russell & Stoll Company, Steel City Electric, or approved equal.
2. Other Boxes
   a. Terminal boxes, junction boxes, pull boxes, etc., except as otherwise specified and/or shown on the Contract Drawings, shall be hot-dipped galvanized steel.
   b. The boxes shall have continuously welded seams which shall be ground smooth prior to being galvanized.
   c. The box bodies shall be flanged, shall be not less than 14-gauge metal, and shall not have holes or knockouts.
   d. The box covers shall be not less than 12-gauge metal, shall be gasketed, and shall be fastened to the box bodies with stainless steel screws.
   e. The boxes shall be as manufactured by Hoffman Engineering Company, or approved equal.

I. Conduit Mounting Devices: Hangers, rods, channel, backplates, clips, straps, beam clamps, etc., shall be hot-dipped galvanized iron or steel as manufactured by Appleton Electric Company, Thomas and Betts Company, Unistrut Corp., or approved equal.

J. Fixture Support System

1. The fixture support system shall be the channel type and shall be furnished complete with all requisite mounting hardware and appurtenances.
2. The channel, mounting hardware and related appurtenances shall be hot-dipped galvanized steel.
3. The fixture support system shall be as manufactured by the Unistrut Corp., or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. No conduit smaller than 3/4-inch electrical trade size shall be used nor shall either 1-1/4-inch conduit or 3-1/2-inch conduit be used. Minimum size underground, under slab or in-slab shall be 1-inch.

B. No wires shall be pulled until the individual conduit runs are complete in all details. Additionally, each conduit shall be cleaned and reamed and certified clear of all burrs and obstructions before any wire is pulled.

C. The ends of all conduits shall be tightly capped to exclude dust and moisture during construction.

D. For all galvanized steel conduits, the field-cut threads shall be thoroughly cleaned and coated with a cold galvanizing compound which contains 95% pure zinc metal. The galvanizing compound shall be as manufactured by ZRC Products Company, or approved equal. This treatment shall also be used on any nipples, elbows, etc., that are not supplied with galvanized threads.

E. Conduits shall be supported at intervals of 8-feet or less, as required to obtain a rigid installation.

F. Exposed conduits shall be run parallel with and/or perpendicular to the surrounding surface(s). No diagonal runs will be allowed.

G. Single conduits shall be supported by one-hole pipe clamps in combination with one-screw backplates to provide space between the conduits and the mounting surface.

H. Multiple horizontal runs of conduits shall be supported by trapeze type hangers (channel) suspended by threaded rod, 3/8-inch minimum diameter.

I. Multiple vertical runs of conduits shall be supported by structurally mounted channel in combination with conduit clamps.

J. Conduit support devices shall be attached to structural steel by welding or beam or channel clamps as indicated on the Contract Drawings.

K. Conduit support devices shall be attached to concrete surfaces by "spot type" concrete inserts.

L. Conduits terminating in pressed steel boxes shall have double locknuts and insulated bushings.

M. Conduits terminating in gasketed enclosures shall be terminated with conduit hubs.

N. Conduit wall seals, waterproof type, shall be used at all locations where conduits penetrate walls.

O. Liquidtight, flexible conduit - metal or non-metallic as shown on the Contract Drawings - shall be used for all motor terminations and for all connections/terminations where vibration is anticipated.

P. Flexible couplings shall be used in hazardous locations for all motor terminations and for all connections/terminations where vibration is anticipated.

Q. Conduit stubouts for future construction shall be capped at both ends with threaded PVC conduit caps.

R. The cement used for PVC conduit installations shall be as manufactured by Carlon, or approved equal.

S. Galvanized steel conduits entering manholes and/or below grade pull boxes shall be terminated with grounding type bushings which shall be connected to a 5/8-inch by 10-foot long driven ground rod with No. 6 AWG bare copper wire.

T. Galvanized rigid steel conduit shall be used for all risers. The underground portion of the riser and a 12-inch section of the riser immediately above the ground or slab/floor level shall be painted with a bitumastic coating.

U. The use of electrical metallic tubing shall be restricted to low voltage applications (600V or less) in non-process areas where specifically approved by the County on a "per installation" basis - e.g., above suspended ceilings in office areas.

3.02 GUARANTEES AND WARRANTIES

The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16120 LOW VOLTAGE CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install all wires, cables and appurtenances as described hereinafter and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

A. The requirements of Section 01340 and Section 16050 shall be met.

B. Samples of the actual wires and cables proposed for use shall be submitted for approval. There shall be a sample for each size and type of wire and cable proposed for use. The samples shall be of sufficient length to show the maximum rated voltage, insulation type and class, conductor size, the manufacturer's name, trademark or identifying logo, and the U.L. listing number.

C. The wires and cables as approved for use shall be compared with the wires and cables actually installed. If any unapproved wires and cables are installed, they shall be removed and replaced solely at the Contractor's expense with no additional cost to the County.

1.03 APPLICATIONS

A. The wire for lighting and receptacle circuits shall be type THWN-2, stranded.

B. The wire for all power circuits and motor leads shall be type RHW-2 or XHHW-2, stranded.

C. Single conductor wires for control, indication and metering shall be type RHW-2 OR XHHW-2, No. 14 AWG, stranded.

D. Multiconductor control cable shall be No. 14 AWG, stranded.

E. The wire for process instrumentation shall be No. 16 AWG, stranded.

1.04 MINIMUM SIZES

A. Except for control and signal leads, no conductor smaller than No. 12 AWG shall be used.

PART 2 PRODUCTS

2.01 MATERIALS

A. Wire and cables shall be made of annealed, 98% conductivity, soft drawn copper conductors.

B. All conductors shall be stranded except that the uninsulated copper grounding

conductors shall be solid.

2.02 600 VOLT WIRE AND CABLE

A. Type RHW-2, XHHW-2 or THWN-2 (lighting circuits only) insulation shall be used for all 600 Volt wires and cables. The insulation shall be a flame-retardant, heat-resistant thermoplastic, and shall have a nylon, or equivalent, jacket.

B. The 600 Volt wires and cables shall be as manufactured by Anixter, Rome Cable, Southwire, or approved equal.

2.03 INSTRUMENTATION AND CONTROL WIRING

A. Process instrumentation wiring shall be No. 16 AWG tinned stranded twisted pair, 600 Volt, cross-linked polyethylene insulated, individual aluminum tape shielded and over all shielded, XLP/PVC jacketed. Multiconductor cables with individually twisted pairs shall be installed where shown on the Contract Drawings.

B. Multiconductor control cables shall be No. 14 AWG, stranded, 600 Volt, cross-linked polyethylene insulated, PVC jacketed.

C. Instrumentation and control wiring shall be as manufactured by Belden, Alpha, or approved equal.

2.04 VFD CABLE

A. Where indicated on the Contract Drawings, the power connection between the variable frequency drive (VFD) and the associated motor shall utilize a shielded three-conductor plus ground conductor VFD output cable.

B. Shielded motor power cables with #2AWG and smaller conductors shall have an overall polyvinyl chloride jacket, utilize XLPE conductor insulation with 100 percent rated ground conductor, overall foil shield, 85% TC braid and drain wire.

C. Shielded motor power cables with #1AWG and larger conductors shall have an overall polyvinyl chloride jacket, utilize XLPE conductor insulation with three-symmetrical BC grounds, two spiral copper tape shields.

D. Shielded Motor cable shall meet the following requirements:
1. Utilize high-strand tined copper conductors
2. Lower capacitance suitable for longer runs
3. Sunlight and oil resistant
4. Suitable for Class I and II; Division 2 hazardous locations
5. Rated for 90°C temperature for wet or dry locations
6. Pass UL 1685 vertical tray flame test

E. All VFD cables shall be terminated with approved VFD cable connectors and/or termination kits.

F. 600V rated shielded motor power cable shall be:
1. Belden: 29500 Series Cable
2. Lapp Cable: ÖLFLEX®
3. General Cable: CVTC VFD Cable

4. Southwire Armor-X VFD Cable
5. Approved equal

PART 3 EXECUTION

3.01 INSTALLATION

A. Wires and cables shall be sized as shown on the Contract Drawings and/or, where applicable, sized to match existing wiring.

B. All conductors shall be carefully handled to avoid kinks or damage to the insulation.

C. Lubricants or pulling compounds shall be used to facilitate wire pulling. Such lubricants/compounds shall be UL. listed for use with the insulation specified.

D. Pulling:

1. Use insulating types of pulling compounds containing no mineral oil.
2. Pulling tension shall be within limits recommended by wire and cable manufacturer.
3. Use dynamometer where mechanical means are used.
4. Cut off section subject to mechanical means.
5. Limit bending radius to six times overall cable diameter

E. Shielded instrumentation wire shall be installed from terminal to terminal with no splicing at any intermediate point.

F. Shielded instrumentation wire shall be installed in rigid steel conduit and pull boxes that contain only instrumentation cables. Instrumentation cables shall be separated from control cables in manholes.

G. Shielding on instrumentation cables shall be grounded at the transmitter end only.

H. All new wires and cables shall be continuous and without splices between points of connection to equipment terminals. However, the County will permit a splice provided that the length between the connection points exceeds the greatest standard shipping length available from the submitted manufacturer and no other manufacturer acceptable to the County is able to furnish wires or cables of the required length.

I. All 600 volt wire and cable connections shall be made using compression type connectors. Insulated connectors shall be used for all terminations. The connections shall be made so that both the conductivity and the insulation resistance shall be not less than that of the uncut conductor.

J. All wires shall be numbered at both ends and at all intermediate junction points. Screw type terminations shall be made with forked tongue (spade), self-insulated, crimp terminals. All other wire terminations shall be made on appropriate terminal strips.

K. Splices:

1. Where possible, install cable continuous, without splice, from termination to termination.
2. Where required, splice as shown and also where required for cable installation. Splices below grade, in manholes, handholes, and wet locations shall be waterproof.
3. Splices are not allowed in conduits.

L. Identification:

1. Identify conductors in accordance with Section 26 05 53, Identification for Electrical Systems.
2. Identify power conductors by circuit number and phase at each terminal or splice location.
3. Identify control and status wiring using numeral tagging system.

M. Color-code power cables as follows:

1. No. 8 AWG and Smaller: Provide colored conductors.
2. No. 6 AWG and Larger: Apply general purpose, flame retardant tape at each end, wrapped in overlapping turns to cover an area of at least two inches.
3. Colors: Match color scheme in use at the Site. If the Site does not have an existing color scheme, use the following colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts	Grounded Neutral	White
Single-Phase, Three-Wire	One Hot Leg	Black
	Other Hot Leg	Red
208Y/120 Volts	Grounded Neutral	White
Three-Phase, Four-Wire	Phase A	Black
	Phase B	Red
	Phase C	Blue
240/120 Volts	Grounded Neutral	White
Three-Phase, Four-Wire	Phase A	Black
Delta, Center Tap	High (wild) Leg	Orange
Ground on Single-Phase	Phase C	Blue

System	Conductor	Color
480Y/277 Volts	rounded Neutral	Gray
Three-Phase, Four-Wire	Phase A	Brown
	Phase B	Orange
	Phase C	Yellow

3.02 FIELD QUALITY CONTROL TESTS

A. 1. Test each electrical circuit after permanent cables are in place, to demonstrate that circuit and equipment are connected properly and will perform satisfactorily, free from improper grounds and short circuits.

2. Individually test 600-volt cable mechanical connections after installation and before they are put in service, with calibrated torque wrench. Values shall be in accordance with manufacturer's recommendations.

3. Individually test 600-volt cables for insulation resistance between phases and from each phase to ground. Test after cables are installed and before they are put in service, with Megger for one minute at voltage rating recommended by cable manufacturer or in accordance with ANSI/NETA ATS recommendations.

4. Insulation resistance for each conductor shall not be less than value recommended by cable manufacturer. Cables not meeting recommended value or that fail when tested under full load conditions shall be replaced with a new cable for full length.

B. An authorized representative(s) of the County shall witness all testing. The County shall be notified at least two (2) days in advance of the testing.

C. Any faulty conditions and/or shortcomings found during the testing shall be corrected at no cost to the County. However, a retest to demonstrate compliance shall be conducted before any hook-ups or terminations are made. Any such requisite retesting shall be witnessed by an authorized representative(s) of the County.

3.03 GUARANTEES AND WARRANTIES

A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16135 PULL, JUNCTION AND TERMINAL BOXES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install pull, junction, and terminal boxes.

B. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16075, Identification for Electrical Systems.
3. Section 16505, Hangers and Supports for Electrical Systems.

1.02 REFERENCES

A. Standards referenced in this Section are.

1. AASHTO, Standard Specifications for Highway Bridges.
2. UL 886, Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. NEC Article 314, Outlet, Device, Pull and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:

a. Manufacturer's technical information for pull, junction, and terminal boxes proposed for use.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pull, Junction, and Terminal Boxes:

1. General - Applicable to All Boxes:

a. Description and Performance Criteria:

1) Provide pull, junction, and terminal boxes rated at not less than NEMA 12. Boxes shall be appropriate for each location in accordance with NEMA requirements and as required for area classifications specified in Section 26 05 05, General Provisions for Electrical Systems.
2) For flush-mounted pullboxes in slabs or pavement potentially subject to vehicular traffic, boxes and covers shall be constructed for H-20 loading in accordance with AASHTO Standard Specifications for Highway Bridges.

b. Manufacturers: Provide products of one of the following:

1) Appleton Electric Company.
2) Crouse-Hinds Company.
3) Hoffman Engineering Company.
4) Or equal.

c. Materials: Pull boxes embedded in concrete slabs shall be cast iron.
d. Terminal strips and terminal blocks in terminal boxes shall be mounted on terminal box sub-panels.
e. Identification: Boxes shall be identified in accordance with Section 26 05 53, Identification for Electrical Systems.

2. Materials and Construction - Dusty Locations:

a. Material: Welded and galvanized sheet steel of USS gage.
b. Gasket: Oil-resistant gasket.
c. Access: Lift-off hinges and quick-release latches.
d. Material Thickness:

1) Boxes with dimension two feet and smaller shall be 14-gage.
2) Boxes with dimension between two and three feet shall be 12 gage.
3) Boxes with dimension of three feet or more in any direction shall be 10-gage.

3. Materials and Construction - Wet, Corrosive, or Hazardous Locations:

a. Rating:

1) Pull boxes in wet, corrosive, or outdoor areas shall be NEMA 4X.
2) Boxes for areas classified as hazardous locations, where required by NEC, shall be explosion-proof and comply with UL 886.

b. Material:

1) Cast gray iron alloy with hot-dip galvanized finish, or cast

malleable iron bodies and covers.

2) Large boxes not generally available in cast iron construction shall be copper-free aluminum alloy or Type 316 stainless steel, as required by location.

3) In corrosive locations, where the conduit system is PVC-coated, boxes shall be cast metal with factory-applied 40-mil PVC coating, Type 316 stainless steel, or non-metallic thermoplastic or fiberglass reinforced plastic material.

c. Gasket:

1) Provide neoprene gaskets for wet and corrosive locations.
2) Gaskets shall be an approved type designed for the purpose. Improvised gaskets are not acceptable.

d. Access: Stainless steel cover bolts.

e. Features:

1) External mounting lugs.
2) Drilled and tapped conduit holes.
3) Boxes where conduits enter building or structure below grade shall have 1/4-inch drain hole at bottom of the box.
4) Provide threaded connections for explosion proof boxes.

B. Terminal Blocks:

1. Products and Manufacturers: Provide one of the following:

a. Allen-Bradley Company, Bulletin, Model 1492.
b. General Electric Company, Model CR151K.
c. Or equal.

2. Material and Construction:

a. NEMA-rated nylon modular terminal blocks.
b. 600-volt rated.
c. Control and alarm circuit terminals shall be screwed type with permanently affixed numeric identifiers beside each connection.
d. Power terminals shall be copper and rated for the circuit ampacity.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Mount boxes so that sufficient access and working space is provided and maintain clearance of not less than 1/4-inch from walls.

B. Securely fasten boxes to walls or other structural surfaces on which boxes are mounted. Provide independent supports that comply with Section 26 05 29, Hangers and Supports for Electrical Systems, where boxes will not be mounted on walls or other structural surface.

C. Install pull boxes where shown or indicated, and provide pull boxes where one or more of the following conditions exist:

1. Conduit runs containing more than three 90-degree bends.
2. Conduit runs exceeding 200 feet in length.

D. Provide removable, flame-retardant, insulating cable supports in boxes with any dimension exceeding three feet.

E. Field-apply PVC touch-up to scratched PVC boxes damaged during installation. Touch-up work shall be in accordance with manufacturer's recommendations and instructions.

F. Size junction, pull, and terminal boxes in accordance with NEC Article 314 and other Laws and Regulations.

G. Provide terminal blocks in boxes where shown and where cable terminations or splices are required.

END OF SECTION

SECTION 16136 OUTLET BOXES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install outlet boxes for mounting wiring devices and lighting fixtures.

B. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16075, Identification for Electrical Systems.
3. Section 16141, Low-Voltage Receptacles.
4. Section 16142, Snap Switches.
5. Section 16505, Hangers and Supports for Electrical Systems.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Comply wit the following:

1. NEC Article 314, Outlet, Device, Pull and Junction Boxes; Fittings; and Handhole Enclosures.
2. NEC Article 501, Class I locations.
3. UL 514A, Metallic Outlet Boxes.
4. UL 514B, Fittings for Conduit and Outlet Boxes.

1.03 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:

a. Manufacturer's technical information for outlet boxes proposed for use.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Device Boxes:

1. Manufacturers: Provide products of one of the following:

a. Crouse-Hinds Company.
b. Appleton Electric Company.
c. Or equal.

2. Material:

a. In Wet Locations: Cast gray iron alloy or cast malleable iron with zinc electroplate finish, or aluminum bodies consistent with conduit material.
b. In Dusty Locations: Zinc-coated sheet steel or aluminum bodies consistent with conduit material.
c. Where conduit is installed concealed, boxes shall include suitable extension rings and covers, as required.
d. Where used with PVC-coated conduit system, boxes shall include factory applied 40-mil-thick PVC coating.
e. Cast boxes shall be hub-type and include external mounting lugs.
f. Metallic outlet boxes shall comply with UL 514A.
g. Fittings for outlet boxes shall comply with UL 514B.

3. NEMA rating of box shall be as required for area classifications specified in Section 26 05 05, General Provisions for Electrical Systems.

4. Cover Plates:

a. Type 302 stainless steel alloy for indoor finished areas.
b. Plates in corrosive locations shall include factory-applied 40-mil PVC coating.
c. Stainless steel screws and hardware.
d. For receptacle and switch cover plates, comply with Section 26 27 26.13, Low-Voltage Receptacles, and Section 26 27 26.23, Snap Switches.

B. Flexible Fixture Hangers:
1. For Class I, Division 1 Hazardous Areas:

a. Product and Manufacturers: Provide one of the following:

1) Type EFH by Crouse-Hinds.
2) Or equal

b. Materials:

1) Iron alloy with electro-galvanizing and aluminum acrylic paint.
2) Products shall have brass bellows and stainless steel spring.
3) Product shall be capable of 15 degree swing from perpendicular in all directions.
4) Product shall allow fixtures to be pendant-hung in accordance with NEC Article 501.130(A)

2. For Class I, Division 2 Hazardous Areas:

a. Product and Manufacturers: Provide one of the following:

1) Type AHG by Crouse-Hinds.
2) Or equal

b. Materials:

1) Malleable iron top section and removable malleable iron bottom fixture support assembly with electro-galvanizing and aluminum acrylic paint.
2) Include vapor-tight cushion to support fixture stem.
3) Provide neoprene diaphragm to exclude moisture and dirt from conduit system.
4) Provide with manufacturer's neoprene gasket between fixture hanger and box.
5) Product shall be capable of eight-degree swing from perpendicular in all directions, before and after coating.
6) Product shall allow fixtures to be pendant-hung in accordance with NEC Article 501.130 (B).

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Fasten boxes rigidly and neatly to supporting structures.

B. Securely fasten equipment to walls or other surfaces on which materials or equipment is mounted. Provide independent supports complying with Section 26 05 29, Hangers and Supports for Electrical Systems, where boxes are not mounted on walls or other surface capable of supporting the materials or equipment.

C. For units mounted on masonry or concrete walls, provide suitable 1/2-inch spacers to prevent mounting back of box directly against wall.

D. Leave no open conduit holes in boxes. Close unused openings with capped bushings.

E. Label each circuit in boxes and identify each circuit in accordance with Section 26 05 53, Identification for Electrical Systems.

F. Install outlet boxes in accordance with NEC Article 314.

END OF SECTION

SECTION 16137 UNDERGROUND DUCTBANKS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install underground ductbanks.

B. Coordination:

1. Ductbank routing on the Drawings is diagrammatic. Coordinate installation with piping and other Underground Facilities and locate ductbanks clear of interferences.
2. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before underground ductbank Work.
3. Notify other contractors in advance of installing underground ductbanks to provide other contractors with sufficient time for installing items included in their contracts that will be installed with or before underground ductbank Work.

C. Related Sections:

1. Section 02100, 02211, 02220, 02223, Site, Excavations, Trenching and Backfilling
2. Section 03300, Cast-in-Place Concrete.
3. Section 16075, Identification for Electrical Systems.
4. Section 16110, Conduits and Fittings
5. Section 16134, Expansion/Deflection Fittings.
6. Section 16450, Grounding

1.02 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Layouts showing proposed routing of ductbanks and locations of manholes, handholes, and areas of reinforcement.
b. Profiles of ductbanks showing crossings with piping and other Underground Facilities.
c. Typical cross sections for each ductbank.

B. Informational Submittals: Submit the following:

1. Special Procedure Submittals:

a. Installation procedures.

2. Field Quality Control Submittals:

a. Field test report.

C. Closeout Submittals: Submit the following:

1. Record Drawings:
   a. Include actual routing of underground ductbank runs on record documents in accordance with Section 01720, Project Record Documents.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Duct: Provide conduit and fittings in accordance with Section 16110, Rigid Conduits. Conduit types shall be as follows:

1. Schedule 40 PVC conduits for power circuits.
2. Galvanized rigid steel conduits for the following types of circuits: low voltage status, analog, and communication.

B. Backfill: Provide backfill, including select backfill, in accordance with Section 02221.

C. Reinforcing: Provide Ductbank reinforcing in accordance with Section 03300, Cast in Place Concrete.

D. Concrete: Provide ductbank concrete in accordance with Section 03300, Cast-in-Place Concrete.

E. Grounding: Provide ground cable in accordance with Section 6061, Grounding and Bonding for Electrical Systems.

F. Conduit Spacers: Conduit spacers shall be nonmetallic, interlocking type to maintain spacing between conduits. Provide spacers suitable for all conduit types used in multiple sizes.

G. Duct Sealing Compound:

1. Products and Manufacturers: Provide one of the following:
   a. 0-Z/Gedney, Type DUX.
   b. Or equal.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Excavation and Backfilling:

1. Provide excavation and backfilling for ductbank installation in accordance with Section 02221.
2. Do not backfill with material containing large rock, paving materials, cinders, large or sharply angular substances, corrosive material, or other materials that can damage or contribute to corrosion of ducts or cables, or prevent adequate compaction of backfill.

B. Ductbank Layout:

1. Top of ductbank concrete shall be a minimum of 2.0 feet below grade, unless shown or indicated otherwise on the Drawings or Engineer approved.
2. Slope ductbank runs for drainage toward manholes and away from buildings with slope of approximately three inches vertical per 100 feet of run.

C. Ductbank Assembly:

1. Assemble ductbanks using non-magnetic saddles, spacers, and separators. Position separators to provide minimum three-inch concrete separation between outer surfaces of each conduit. Provide side forms for each ductbank.
2. Make bends with sweeps of not less than four-foot radius or five-degree angle couplings.

D. Concrete Placing:

1. Provide minimum four-inch concrete covering on each side, top, and bottom of concrete envelopes around conduits. Concrete covering shall be as shown or indicated on the Drawings.
2. Provide red dye in concrete for easy identification during subsequent excavation; all concrete in entire ductbank, including top and bottom, shall be dyed.
3. Firmly fix conduits in place during concrete placing. Carefully place and vibrate concrete to fill spaces between conduits.

E. Conduit Transitions:

1. Conduit installations shall be watertight throughout entire length of ductbank.
2. Transition from non-metallic to galvanized rigid steel conduit where ductbanks enter structure walls and slabs.
3. Terminate conduits in insulated grounding bushings.
4. Continue conduits inside buildings in accordance with Section 26 05 33.13, Rigid Conduits, and as shown or indicated in the Contract Documents.
5. If ducts are not concrete-encased, provide expansion and deflection fittings in accordance with Section 26 05 33.26, Expansion/Deflection Fittings.
6. Plug and seal empty spare conduits entering structures. Conduits in use entering structures shall be sealed watertight with duct sealing compound.

F. Ductbank Reinforcing:

1. Provide reinforcing for all ductbanks:
2. Install ductbank reinforcement as shown or indicated on the Drawings.
3. Provide minimum of 2" and maximum clearance of 4 inches from bars to edge of concrete encasement.

G. Connections to Structures:

1. Firmly anchor ductbanks to structure walls or slabs. Epoxy-grout ductbank rebar into structure concrete to eliminate sheer forces between ductbank and structure wall concrete.
2. Ductbank penetrations through structure walls shall be watertight.

H. Grounding:

1. Provide bare stranded copper ductbank ground cable in each ductbank envelope. Make ground electrically continuous throughout entire ductbank system.
2. Connect ground cable to building and station ground grid or to equipment ground buses. Also, connect ground cable to steel conduit extensions of underground ductbank system.
3. Provide ground clamp and bonding of each steel conduit extension to maintain continuity of ground system.
4. Terminate ground cable at last manhole or handhole for outlying structures.

H. Detectable Underground Warning Tape:

1. Provide detectable underground warning tapes complying with Section 16075, Identification for Electrical Systems, over the full length of each underground ductbank.
2. Install warning tapes approximately 12 inches below grade.
3. Provide multiple tapes across the width of each ductbank. Locate center of a warning tape above each edge of ductbank, and at intervals across top width of ductbank so that clear space between tapes does not exceed six inches.

J. Reused Existing Ducts:

1. Pull rag swab through duct to remove water and to clean conduits prior to installing new cable.
2. Repeat swabbing until all foreign material is removed.
3. Pull mandrel through duct, if necessary, to remove obstructions.

END OF SECTION

SECTION 16138 MANHOLES AND HANDHOLES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. Provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install manholes and handholes for electrical systems Work.

B. Coordination:

1. Coordinate manhole and handhole installation with piping, sheeting other excavation supports, and other Underground Facilities, and locate clear of interferences.
2. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before manhole and handhole for electrical systems Work.

3. Notify other contractors in advance of installing manholes and handholes for electrical systems to provide other contractors with sufficient time for installing items included in their contracts that will be installed with or before manhole and handhole for electrical systems Work.

C. Related Sections:

2. Section 03200, Concrete Reinforcing.
3. Section 03300, Cast-in-Place Concrete.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. AASHTO, Specifications for Highway Bridges.
2. ANSI A14.3, Fixed Ladders - Safety Requirements.
3. ANSI/SCTE 77, Specification for Underground Enclosure Integrity.
4. ASTM A48/A48M, Specification for Gray Iron Castings.
5. ASTM A615/A615M, Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
6. ASTM C478, Specification for Precast Reinforced Concrete Manhole Sections
7. ASTM C1028, Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
8. ASTM D4101, Specification for Polypropylene Injection and Extrusion Materials

1.03 QUALITY ASSURANCE

A. Component Supply and Compatibility:

1. Obtain all manholes and handholes furnished under this Section from a single Supplier, unless otherwise acceptable to ENGINEER.
2. Manhole and handhole Supplier shall review and approve the Shop Drawing submittals for the manholes and handholes furnished.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Manholes: Plan and section drawings showing arrangement of each manhole, including interior and exterior dimensions, elevations, location of manhole wall penetrations, details of typical openings, jointing, inserts, and reinforcing.
b. Handholes: Submit schedule of handholes to be furnished and dimensions and pertinent data for each.
c. Castings:

1) Schedule of casting types and models to be furnished, with dimensional data and other pertinent data for each.
2) Fabrication and erection of all frame and cover assemblies. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items. Provide setting drawings for location and installation of castings and anchorage devices.
3) Where Site-specific castings are specified with unique lettering on manhole or handhole cover, provide Shop Drawing for castings indicating appropriate detail to indicate conformance to the Contract Documents.

d. Layout of Manhole Electrical Systems: Where manholes have extensive electrical systems and supports for electrical systems, submit for each plans, sections, and details indicating proposed layout of such materials and equipment in each manhole.

2. Product Data:

a. Manufacturer's technical information, specifications, and literature for manholes, handholes, castings, and accessories proposed for use.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Material and Construction:

1. Material shall be precast or cast-in-place reinforced concrete. Reinforcing shall be in accordance with Section 03300, Concrete Reinforcing. Concrete shall be in accordance with Section 03300, Cast-in-Place Concrete.
2. Provide minimum interior dimensions as shown or indicated. Provide a 12-inch by 12-inch by six-inch deep sump in manhole floor

3. Duct entrances shall be sized and located to suit the ductbanks.

4. Precast Manholes:

   a. Except where otherwise specified, precast manhole components shall consist of reinforced concrete pipe sections specially designed and constructed for use as manholes and manufactured in accordance with ASTM C478, except as modified in this Section.

   b. Precast, reinforced concrete manhole bases, riser sections, flat slabs, and other components shall be manufactured by wet-cast methods, using forms that provide smooth surfaces free of irregularities, honeycombing, and other imperfections.

   c. Joints between manhole components shall be tongue-and-groove type employing a single, continuous rubber O-ring gasket. Circumferential and longitudinal steel reinforcing shall extend into bell and spigot ends of joint without breaking steel continuity. Joints between base sections, riser sections, and top slabs of manholes six feet in diameter and less shall be rubber and concrete joints. Joints for manhole components greater than six-foot diameter shall have steel bell and spigot rings.
   d. Precast manhole components shall:

      1) have sufficient strength to withstand loads imposed upon them; and
      2) be constructed for minimum earth cover loading of 130 pounds per cubic foot, AASHTO H-20 wheel loading, and an allowance of 30 percent in roadways and 15 percent in rights-of-way for impact.
      3) Manhole bases shall have two cages of reinforcing steel in the walls, each reinforcing cage shall be of area equal to that required in the riser sections.
      4) Wall thickness shall be not less than five inches.
      5) Concrete top slabs shall be not less than eight inches thick.

   e. Lifting holes, when provided, shall be tapered. Not more than two lifting holes shall be cast into each section. Provide tapered, solid rubber plugs to seal lifting holes. Lifting holes shall be made to be sealed by plugs driven from the outside face of section only.
   f. Point of intersection (P.I.) of ductbank centerlines shall be marked with 1/4-inch diameter steel pin firmly enclosed in floor of each manhole base and protruding approximately one-inch above finished floor of base.

g. Mark date of manufacture and name or trademark of manufacturer on inside of manhole barrel.
h. Barrel of manhole shall be constructed of various lengths of riser pipe manufactured in increments of one foot to provide correct height with the fewest joints. Provide not less than one foot clear between openings in barrel of manholes for ductbanks or other penetrations and the nearest joint. Provide special manhole base or riser sections as required.
i. Provide at top of manhole barrel a precast or cast-in-place slab, or precast eccentric cone, as shown or approved, to receive manhole frame and cover.

B. Accessories:

1. Frames and Covers:

a. Manufacturers: Provide products of one of the following:

1) Neenah Foundry Company.
2) Campbell Foundry Company.
3) Old Castle
4) Or approved equal

b. Material: Cast iron complying with ASTM A48/A48M, Class 30A.
c. Covers: Watertight, sealed type marked "ELECTRICAL" in raised two-inch letters. Identify covers as shown or indicated on the Drawings.
d. Grout the frame to the manhole or handhole.

2. Frames and Covers:

a. Manufacturers: Provide products of one of the following:

1) Neenah Foundry Company.
2) Campbell Foundry Company.
3) Old Castle
4) Or approved equal

b. Material: Covers and frames shall be cast aluminum alloy, rated for AASHTO H-20 loading.
c. Covers: Watertight, sealed type marked "ELECTRICAL" in raised two-inch letters. Identify covers as shown or indicated on the Drawings.
d. Grout the frame to the manhole or handhole.

3. Pulling Irons:

a. Products and Manufacturers: Provide one of the following:

1) Catalog No. 8119 by A.B. Chance Company.
2) Catalog No. DU2T3 by McGraw Edison Company.
3) Or approved equal

b. Material: Galvanized steel.
c. Cast in the wall opposite to centerline of each incoming ductbank and 12 inches below centerline of bottom line of ducts.

4. Cable Racks:

a. Products and Manufacturers: Provide one of the following:

1) Catalog No. J5125 by MacLean Power Systems.
2) Catalog No. C203-1125 by A.B. Chance Company.
3) Or approved equal

b. Material: Galvanized steel.
c. Cable racks shall adequately support cables with space allowed for future cables.
d. Each rack shall be a vertical assembly of two-foot cable racks extending from within six inches of manhole roof slab to within six inches of manhole floor.

4. Cable Hooks:

a. Products and Manufacturers: Provide one of the following:

1) Catalog No. J5132A by MacLean Power Systems.
2) Catalog No. C203-1132 by A.B. Chance Company.
3) Or approved equal

b. Material: Galvanized steel.
c. Length: 7.5-inch minimum.

5. Insulators:

a. Products and Manufacturers: Provide one of the following:

1) Catalog No. J5122 by MacLean Power Systems.
2) Catalog No. C203-1120 by A.B. Chance Company.
3) Or approved equal.

i. Material: Porcelain.

6. Manhole Steps - Polypropylene

a. Products and Manufacturers: Provide one of the following:
1) P-14938, by Lane International.
2) Or approved equal.

b. Material: Polypropylene complying with ASTM D4101 with 1/2-inch diameter Grade 60 steel reinforcing bar complying with ASTM A615/A615M.
c. Color: Black

d. Provide manhole steps as shown or indicated. Manhole steps shall have raised treads and comply with ANSI A14.3, ASTM C478, and OSHA requirements.
e. Steps shall be 15.25 inches wide and, when installed, protrude from manhole wall by six inches.
f. Space steps uniformly at a maximum of 12 inches on centers, and project evenly from manhole or chamber walls.

6. Manhole Steps - Aluminum:

a. Products and Manufacturers: Provide one of the following:

1) R-1982-W, by Neenah Foundry Company.
2) Part No. FR14-OR, by Washington Aluminum Company
3) Aluminum manhole step by Campbell Foundry Company.
4) Or approved equal.

b. Material: Extruded aluminum.
c. Provide manhole steps as shown or indicated. Comply with ANSI A14.3 and OSHA requirements
d. Space steps uniformly at maximum of 12 inches on centers, and project evenly from manhole or chamber walls.

.2.02 SMALL HANDHOLES

A. Material and Construction:

1. Manufacturer: Provide products of one of the following:

a. Strongwell Quazite
b. Old Castle
b. Or approved equal

2. Material: Precast polymer concrete.
3. Duct entrances sized and located to suit ductbanks.
4. Enclosures and covers shall be UL-listed.

5. Enclosures, boxes, and covers shall comply with test provisions of ANSI/SCTE 77 for Tier 15 & 22 applications.
6. Covers shall have coefficient of friction of not less than 0.50, in accordance with ASTM C1028.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Excavation and Backfill:

1. Provide manholes and handholes for electrical systems where shown or indicated and verify at the Site the required locations.
2. Perform excavation and filling required for installing manholes and handholes for electrical systems, in accordance with Section 02220.
3. Provide manholes and handholes on granular subbase course as shown or indicated. If not shown, provide layer of compacted select fill not less than six inches deep on which manhole or handhole for electrical systems will be installed.
4. Carefully set, level, and align at proper grade manhole bases and handholes.

B. Precast Manholes:

1. Set manhole sections vertical with steps and sections in true alignment. Butter the base of each bell or groove end at joints between components with one-to-two proportion cement-sand mortar to provide uniform bearing between components. Seal joints with cement mortar inside and out and trowel smooth to contour of wall surface. Raised or rough joint finishes are unacceptable.
2. Install sections, joints, and gaskets in accordance with manufacturer's recommendations.
3. Tightly seal each lifting hole with solid rubber plug driven into hole from outside of barrel; fill remaining void with one-to-two proportion cement-sand mortar.

C. Manhole and handhole structures shall be watertight. Provide foam sealant to seal all penetrations into manholes and handholes for electrical systems.

D. Cable Supports in Manholes:

1. Attach cable racks with three-inch by 3/8-inch diameter "tamp-in" studs mounted in one-inch holes drilled into walls of manholes in absence of inserts. Provide PVC coating on racks.
2. Provide cable hooks to support each cable on each rack along the cable run within manholes. Provide PVC coating on hooks.
3. Individually support each cable at each hook on porcelain insulators. Provide sufficient slack for each cable.
4. Securely tie each cable in place at each insulator block to prevent excessive movement of insulators, cables, or fireproof tape. Tie cables with non-metallic 3/4-inch strapping tape manufactured by 3M or equal, or tie down with nylon straps.

E. Grounding:

1. Provide 3/4-inch by 10-foot copper-clad ground rod for each manhole.
2. Bond all exposed metal manhole accessories and concrete reinforcing rods with No. 4 AWG minimum bare copper wire and connect to ground rod and to the ductbank ground cable.

F. Metal Pull Box:

1. Provide NEMA 4X, stainless steel, wall-mounted pull box inside each manhole and handhole for electrical systems where analog signal cables are mixed with power cables.
2. Route conduits for analog cables directly into and out of metal pull box so that analog cables are not exposed.

G. Grade Rings:

1. Provide grade rings for manholes when required to adjust cover to proper grade. Construct grade ring on manhole roof slab or cone section on which manhole frame and cover will be placed.
2. Height of grade ring shall be as required to bring frame to proper grade and shall not exceed 12 inches in height.

H. Grading at Manholes and Handholes:

1. Unpaved Areas:

   a. Install manholes and handholes in unpaved areas as shown or directed by ENGINEER to rim elevation higher than finished grade.
   b. Grade the ground surface to drain away from manholes and handholes.
   c. Provide fill around manholes and handholes to level of upper rim of manhole or handhole frame, and evenly grade the surface to a one (vertical)-to-five (horizontal) slope to surrounding grade, unless otherwise shown or directed by ENGINEER.

2. Paved or Travelled Areas:

   a. Install manholes and handholes in paved or travelled areas to meet final grade of paved or concrete surface.
   b. In paved areas in state or county highways or municipal streets or roads, manholes and handholes shall be 1/2-inch below elevation of final surface course (also known as top course or wearing course) of pavement.
   c. Manholes and handholes shall not project above finished roadway pavement.

3. CONTRACTOR shall be solely responsible for proper height of manholes and handholes necessary to reach final grade. ENGINEER's review of Shop Drawings and other submittals for manholes and handholes is general in nature. Provide random-length precast manhole riser sections to adjust manholes to accommodate field conditions for final grading and final elevations.

3.03 FIELD QUALITY CONTROL

A. Watertightness:

1. Manholes and handholes for electrical systems shall be free of visible leakage. Inspect each manhole and handhole accompanied by ENGINEER, and repair leaks.

END OF SECTION

SECTION 16141 LOW VOLTAGE RECEPTACLES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install low-voltage receptacles.

B. Related Sections:

1. Section 26 05 05, General Provisions for Electrical Systems.
2. Section 26 05 53, Identification for Electrical Systems.
3. Section 26 05 33.36, Outlet Boxes.

A. Standards referenced in this Section are:

1. UL 498, Standard for Attachment Plugs and Receptacles.
2. UL 514D, Cover Plates for Flush-Mounted Wiring Devices.
3. UL 943, Standard for Ground-Fault Circuit-Interrupters.
4. UL 1010, Standard for Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations.
5. UL 1449, Standard for Surge Protective Devices.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. Americans with Disabilities Act.
2. NEC Article 406, Receptacles, Cord Connectors, and Attachment Plugs (Caps).

1.03 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data: Manufacturer's technical information for receptacles and cover plates proposed for use.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Receptacles:

1. Grounding receptacle, two-pole, three-wire, NEMA 5-20R configuration, ivory color.

a. Single:

1) Products and Manufacturers: Provide one of the following:

a) HBL5361I by Hubbell, Inc.
b) 5361-I by Pass & Seymour.
c) Or equal.

b. Duplex:

1) Products and Manufacturers: Provide one of the following:

a) HBL5362I by Hubbell, Inc.
b) PS5362-I by Pass & Seymour.
c) Or equal.

c. Weather-resistant Duplex:

1) UL-listed as weather-resistant.
2) Products and Manufacturers: Provide one of the following:

a) HBL5362IWR by Hubbell, Inc.
b) WR5362-I by Pass & Seymour.
c) Or equal.

2. Corrosion-resistant grounding receptacle, two-pole, three-wire, yellow color.

a. Single, 125-volt, 20 ampere, NEMA 5-20R configuration:

1) Products and Manufacturers: Provide one of the following:

a) HBL53CM61 by Hubbell, Inc.
b) CR6301 by Pass & Seymour.
c) Or equal.

b. Duplex, 125-volt, 20 ampere, NEMA 5-20R configuration:

1) Products and Manufacturers: Provide one of the following:

a) HBL53CM62 by Hubbell, Inc.
b) CR6300 by Pass & Seymour.
c) Or equal.

c. Single, 125-volt, 30 ampere, NEMA 5-30 configuration:

1) Products and Manufacturers: Provide one of the following:

a) HBL9308 by Hubbell, Inc.
b) 3802 by Pass & Seymour.

c) Or equal.

2. Grounding receptacle, two-pole, three-wire, 250-volt, 20 ampere, NEMA 6-20 configuration, brown color.

a. Single:

1) Products and Manufacturers: Provide one of the following:

a) HBL5461 by Hubbell, Inc.
b) 5871 by Pass & Seymour.
c) Or equal.

b. Duplex:

1) Products and Manufacturers: Provide one of the following:
a) HBL5462 by Hubbell, Inc.
b) 5862 by Pass & Seymour.
c) Or equal.

4. Provide Type 302 stainless steel cover-plate conforming to UL 514D. Provide weatherproof-while-in-use cover where shown on the Drawings as "WP" or "WPU", and provide where receptacles are located in wet or corrosive location.
5. Receptacles shall comply with UL 498.

B. Receptacles for Hazardous Locations:

1. Material: Factory-sealed receptacle suitable for installation in Class I, Group D hazardous locations. Copper-free aluminum receptacle and cover with cast gray iron alloy or cast malleable iron mounting box with zinc electroplate finish. Receptacle rated at 20 amperes, 125 to 250 volts AC, two-wire, and three-pole. Provide matching plug for each receptacle.
2. Receptacles for hazardous locations shall conform to UL 1010.
3. Products and Manufacturers: Provide one of the following:

a. Series CPS by Crouse-Hinds Company.
b. Type CPS by Appleton Electric Company.
c. Or equal.

C. Ground Fault Interrupting Receptacles:

1. Duplex grounding receptacle, two-pole, three-wire, NEMA 5-20R configuration, 125-volt AC, 20 amperes, gray color with ground fault circuit interrupting (GFCI) protection.
2. Ground fault interrupting receptacles shall comply with UL 943.
3. Provide Type 302 stainless steel cover-plate conforming to UL 514D. Provide weatherproof-while-in-use cover where shown on the Drawings as "WP" or "WPU", and provide where located in wet or corrosive location.

4. Products and Manufacturers: Provide one of the following:

   a. GFR5362SGY by Hubbell, Inc.
   b. 2091-GRY by Pass & Seymour.
   c. Or equal.

5. Weather-resistant Ground Fault Interrupting Receptacles

   a. Products and Manufacturers: Provide one of the following:
      1) 2095TRWRGRY by Pass & Seymour.
      2) Or equal.

C. Surge Suppression Receptacles:

1. Duplex grounding, surge suppression receptacle, two-pole, three-wire, NEMA 5-20R configuration 125-volt AC, 20 amperes, blue color, capable of absorbing transient surge of 6,000 volts minimum. Receptacle shall include power-on indicator light.
2. Surge suppression receptacles shall comply with UL 1449.
3. Provide Type 302 stainless steel cover-plate conforming to UL 514D. Provide weatherproof-while-in-use cover when shown on the Drawings as "WP" or "WPU", and provide where located in a wet or corrosive location.
4. Products and Manufacturers: Provide one of the following:

   a. HBL5362SA by Hubbell, Inc.
   b. 5362BLSP by Pass & Seymour.
   c. 5380-GY by Leviton Manufacturing Company.
   d. Or equal.

E. Weatherproof Covers:

1. Where receptacles are installed in damp locations as defined in area classification portion of Section 26 05 05, General Provisions for Electrical Systems, provide receptacles as specified in Paragraphs 2.1.A through 2.1.D of this Section, as applicable, with weatherproof covers as specified below.
2. Provide covers that are UL-listed weatherproof and suitable for use in damp locations in accordance with NEC 406.

3. Material:

   a. Gasketed spring door type for wet and corrosive locations. Plates in corrosive locations shall have factory-applied 40-mil PVC coating.
   b. Stainless steel screws and hardware.

4. Products and Manufacturers: Provide one of the following:

   a. Hubbell, Inc.
   b. Crouse-Hinds Company.
   c. Appleton Electric Company.
   d. Or equal.

F. Weatherproof-While-in-Use Covers:

1. Where receptacles are shown on the Drawings as "WP" or "WPU", and where receptacles are installed in wet locations as defined in area classification portion of Section 26 05 05, General Provisions for Electrical Systems, provide receptacles as specified in Paragraphs 2.1.A through 2.1.D of this Section, as applicable, with weatherproof-while-in-use covers as specified below.

2. Provide covers that are UL-listed, weatherproof while receptacle is in use, and are of ultraviolet-resistant construction suitable for outdoor use in accordance with NEC 406.

3. Material:

   a. Non-metallic box with hinged, non-metallic cover.
   b. Sealing gaskets between box and cover.
   c. Stainless steel screws and hardware.
   d. Color: Gray finish

4. Products and Manufacturers: Provide one of the following:

   a. TayMac Corporation.
   b. Pass and Seymour Type WIU
   c. Or equal.

G. Power Receptacles: 480-volt interlocked receptacle with enclosed safety switch service outlet. Provide service outlets, quantity as shown or indicated, for portable equipment.

1. Material: Copper-free aluminum enclosures with operating handle NEMA 4, with gasketed, hinged door.
2. Switch: Heavy duty, three-pole, with visible blades, quick make-a-break mechanism with reinforced, positive-pressure-type blade and fuse clips. Switch shall be mechanically interlocked with receptacle. Switch cannot be closed until plug is fully inserted and plug cannot be withdrawn or inserted unless switch is open.
3. Receptacle: Single ground receptacle, three-wire, four-pole, 600-volt, (--1--) amp. Provide two matching plugs.

   a. Products and Manufacturers: Provide one of the following:

      1) Type WSR, and Type APS plugs by Crouse-Hinds Company.
      2) Or equal.

H. Power and Special Receptacles: Provide receptacles with number of poles and voltage and current rating as shown or indicated. Coordinate with equipment plugs. Provide matching plug for each receptacle.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Non-hazardous Locations: Install receptacles at locations shown, in outlet or device boxes in accordance with Section 26 05 33.36, Outlet Boxes.

B. Hazardous Locations: Install receptacles in rigid metallic conduit systems.

C. Install receptacles with ground pole in the down position.

D. Mount receptacles 18 inches above finished floor in non-hazardous locations and 4.5 feet above finished floor in hazardous locations, in accordance with the Americans with Disability Act, unless otherwise shown or indicated in the Contract Documents.

E. Mount receptacles 18 inches above finished floor in non-hazardous locations and 4.5 feet above finished floor in hazardous locations, unless otherwise shown or indicated in the Contract Documents.

F. Install in conformance with Laws and Regulations.

G. Identification:

1. Identify each conductor with circuit number and lighting panel number in accordance with Section 26 05 53, Identification for Electrical Systems.
2. Identify each receptacle with permanent phenolic tag. Tags shall include circuit number and lighting panel number.

END OF SECTION

SECTION 16142 SNAP SWITCHES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install snap switches for lighting and other systems.

B. Related Sections:

1. Section 16075, Identification for Electrical Systems
2. Section 16136, Outlet Boxes.

1.02 REFERENCES

A. Standards referenced in this Section are listed below:

1. UL 20, General Use Snap Switches.

2. UL 894, Switches for Use in Hazardous (Classified) Locations.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements

1. Americans with Disabilities Act

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data: Manufacturer's technical information for switches proposed for use.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Switches for Non-Hazardous Locations:

1. Single pole AC toggle switch, quiet type, 120/277-volt AC, 20 amperes, Ivory, specification grade.

a. Products and Manufacturers: Provide one of the following:

1) Catalog No. 1221-I, by Harvey Hubbel, Inc.
2) Catalog No. 1991-I, by Arrow-Hart, Inc.

3) Catalog No. 20AC1-I, by Pass & Seymour
4) Or equal.

2. Single pole, three-way AC toggle switch, quiet type, 120/277-volt AC, 20 amperes, Ivory, specification grade.

a. Products and Manufacturers: Provide one of the following:

1) Catalog No. 1223-I, by Harvey Hubbell, Inc.
2) Catalog No. 1993-I, by Arrow-Hart, Inc.
3) Catalog No. 20AC3-I, by Pass & Seymour
4) Or equal.

3. Two-pole AC toggle switch, quiet type, 120/277-volt AC, 20 amperes, Ivory, specification grade.

a. Products and Manufacturers: Provide one of the following:

1) Catalog No. 1222-I, by Harvey Hubbel, Inc.
2) Catalog No. 1992-I, by Arrow-Hart, Inc.
3) Catalog No. 20AC2-I, by Pass & Seymour
4) Or equal.

4. Switches in non-hazardous areas shall be UL-listed in accordance with UL 20.

B. Switches for Hazardous Locations:

1. Material: Factory sealed tumbler switch suitable for installation in Class I, Group D hazardous locations. Cast gray iron alloy or cast malleable iron body and cover with zinc electroplate finish. Switch rated at 20 amperes, 120/277-volt AC.

2. Switches in hazardous areas shall be UL-listed in accordance with UL 894.
3. Products and Manufacturers: Provide one of the following:

a. Series EDS by Crouse-Hinds Company.
b. Type EDS by Appleton Electric Company.
c. Or equal.

C. Switch Covers:

1. Indoor covers shall be Type 304 stainless steel.
2. Outdoor, wet, or corrosive location covers shall be weatherproof and corrosion resistant.

D. Key Operated On-Off Switches:

1. Key operated switches shall be complete with legend plate and NEMA 4 enclosure and two keys for each switch.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install switches at locations as shown or indicated in the Contract Documents in outlet or device boxes, in accordance with Section 26 05 33.36, Outlet Boxes.

B. Mount wall switches 4.0 feet above finished floor, in accordance with the Americans with Disability Act, unless otherwise noted.

C. Mount wall switches 4.0 feet above finished floor unless otherwise noted.

D. Identify each conductor with circuit number and lighting panel number. Identification shall be in accordance with Section 26 05 53, Identification for Electrical Systems.

END OF SECTION

SECTION 16143 DISCONNECT SWITCHES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install disconnect switches.

B. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16075, Identification for Electrical Systems.
3. Section 16142, Snap Switches.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. UL 98, Enclosed and Dead-Front Switches.
2. NEMA KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
3. NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. NEC Article 404, Switches.
2. Disconnect switches shall bear the UL label.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Listing of each switch to be furnished, including location, rating, and NEMA enclosure type for each.

2. Product Data:

a. Manufacturer's technical information for disconnect switches proposed for use.

B. Maintenance Material Submittals: Submit the following:

1. Extra Stock Materials:

a. Furnish one set of spare fuses for each fused disconnect switch to be installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Provide products of one of the following:

1. Cutler-Hammer.
2. Square-D Company.
3. General Electric Company.

2.02 MATERIALS

A. Service Disconnect Switches:

1. Type: Fused, heavy-duty, single throw, quick-make, quick-break mechanism, visible blades in "OFF" position and safety handle.
2. Rating: Voltage, current and short circuit ratings and number of poles as shown or indicated on the Drawings. Switch shall bear UL label indicating suitability for use as service equipment and shall comply with UL 98, NEMA KS 1, and NEMA 250.

B. Single Throw, Circuit Disconnect Switches:

1. Type: Fused or unfused, horsepower rated, heavy-duty, single throw, quick- make, quick-break mechanism, visible blades in the "OFF" position and safety handle.
2. Rating: Voltage and current ratings and number of poles as required for motor or equipment circuits being disconnected. Switches shall bear a UL label and shall comply with the requirements of UL 98, NEMA KS 1 and NEMA 250.

C. Double Throw Safety Switches:

1. Type: Unfused, double throw with center "OFF" position, quick-make, quick-break mechanism, visible blades in the "OFF" position, and safety handle.
2. Rating: Voltage and current ratings and number of poles as required for circuits being disconnected. Switches shall bear UL label and shall comply with UL 98, NEMA KS 1, and NEMA 250.

D. Disconnect Switches for 120-volt, Single-phase Circuits:

1. Refer to Section 26 27 26.23, Snap Switches.

E. Enclosures: NEMA rating shall be as required for area classifications specified in Section 26 05 05, General Provisions for Electrical Systems.

F. Identification:

1. Identify enclosures in accordance with Section 26 05 53, Identification for Electrical Systems.
2. Provide nameplate to identify the equipment served by disconnect switch and associated source of power.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed Install equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

B. Securely fasten equipment to walls or other structural supports on which they are mounted. Provide independent stainless steel supports where no wall or other structural surface exists. Mount disconnect enclosures at a height not exceeding six feet.

C. Provide suitable 1/4-inch spacers to prevent mounting enclosure directly against walls with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

B. Securely fasten equipment to walls or other structural supports on which they are mounted. Provide independent stainless steel supports where no wall or other structural surface exists. Mount disconnect enclosures at a height not exceeding six feet.

C. Provide suitable 1/4-inch spacers to prevent mounting enclosure directly against walls.

END OF SECTION

SECTION 16289 SURGE PROTECTIVE DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install surge protective devices (SPD).
2. SPDs furnished under this Section shall be ANSI/UL 1449 Type 2 integrating both surge suppression and high-frequency noise filtering suitable for use on low-voltage distribution systems.

B. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16272, Secondary Unit Substations.
3. Section 16423, Motor Control Centers.
4. Section 16442, Panelboards.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ANSI/UL 1449, Surge Protective Devices.
2. IEEE C62.11, Metal-Oxide Surge Arresters for AC Power Circuits (>1 kV)
3. IEEE C62.41, Recommended Practice on Surge Voltages in Low-voltage AC Power Circuits.
4. IEEE C62.45, Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1,000 V and Less) AC Power Circuits.
5. UL 1283, Electromagnetic Interference Filters.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Shall have at least five years experience manufacturing and servicing products substantially similar to those required and shall be able to submit documentation of at least five installations in satisfactory operation for at least five years each.

B. Component Supply and Compatibility:

1. Obtain all products included in this Section regardless of component manufacturer from a single SPD manufacturer.
2. SPD manufacturer shall review and approve or prepare all Shop Drawings and other submittals for all components furnished under this Section.
3. Components shall be suitable for the specified service conditions and shall be integrated into overall assembly by SPD manufacturer.

C. Regulatory Requirements: Comply with the following:

1. NEC 110.9, Requirements for Electrical Installations, Interrupting Rating.
2. NEC 240.21, Overcurrent Protection, Location in Circuit.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

   a. Electrical and mechanical drawings for each type of unit, showing electrical ratings, dimensions, mounting provisions, connection details, and layout diagrams.
   b. Components list and nameplate schedule.
   c. Summary sheets with schedules of equipment.

2. Product Data:

   a. Manufacturer's technical information, including catalog information.
   b. Manufacturer's technical specifications with assembly and component ratings.

B. Informational Submittals: Submit the following:

1. Certifications:
   a. Certification that SPD devices comply with standards referenced in this Section.

2. Source Quality Control Submittals:

   a. Report of results of testing and inspections performed at manufacturer's shop.

3. Supplier Reports:

   a. Submit written report of results of each visit to Site by Supplier's service technician, including purpose and time of visit, tasks performed, and results obtained. Submit within two days of completion of visit to the Site.

4. Qualifications Statements:

   a. Manufacture, when requested by ENGINEER.

C. Closeout Submittals: Submit the Following

1. Operations and Maintenance Data:

   a. Submit in accordance with Section 01 78 23, Operations and Maintenance Data.

b. Include acceptable test reports, maintenance data and schedules, description of operation, wiring diagrams, and list of spare parts recommended for one year of operation with current price list.

2. Warranty Documentation: Submit example warranty at time of shipment of the equipment. Include final warranty accepted by ENGINEER in the operations and maintenance manual for the equipment.

1.05 DELIVERY, STORAGE, AND HANDLING.

A. Delivery:

1. Upon delivery, check for evidence of water that may have entered equipment during transit.

B. Storage:

1. Store SPD equipment in a clean, dry location with controls for uniform temperature and humidity. Protect equipment with coverings and maintain environmental controls.
2. Protect equipment from corrosion and deterioration.

1.06 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive OWNER of other rights or remedies OWNER may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by CONTRACTOR under the Contract Documents. The obligations of CONTRACTOR under the Contract Documents shall not be limited in any way by the provisions of the specified special warranty.

C. Special Warranty on Materials and Equipment:

1. Provide manufacturer's written warranty, running to the benefit of OWNER, agreeing to correct, or at option of OWNER, remove or replace materials or equipment specified in this Section found to be defective during a period of five years after the date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Provide equipment of one of the following:

1. General Electric.
2. Schneider Electric/Square-D Company.
3. Eaton/Cutler-Hammer.
4. Or equal.

2.02 EQUIPMENT

A. General:

1. SPD shall be modular, high-energy, parallel design with fast-acting transient voltage suppression using metal oxide varistors. Equipment shall provide noise attenuation with electromagnetic interference filter.

2. SPD shall comply with requirements of the following:

   a. ANSI/UL 1449.
   b. UL 1283.
   c. IEEE C62.11, IEEE C62.41 and IEEE C62.45.

3. SPD shall be suitable for operation under the following environmental conditions:

   a. Relative Humidity: Zero to 95 percent, non-condensing.
   b. Frequency: 47 to 63 Hertz.
   c. Temperature: Zero to 149 degrees F.

4. SPD operating voltage and IEEE C62.41 and IEEE C62.45 Category A, B, and C application environments shall be suitable for the associated SPD location(s) shown or indicated on the Drawings.

5. SPD shall be suitable for internal and external mounting. Where shown on the Drawings, SPD shall be factory-mounted and integrated into distribution equipment specified under the following Sections:

   a. Section 16050, General Provisions for Electrical Systems.
   b. Section 16272, Secondary Unit Substations.
   c. Section 16423, Motor Control Centers.
   d. Section 16442, Panelboards.

B. SPD shall include a surge suppression path for each mode as required for the system configuration shown on the Drawings. Each mode shall be individually fused and equipped with thermal cutouts. SPD short-circuit rating shall be 200 kA. Protection modes shall include, to the extent applicable, the following:

   1. Line-to-line.
   2. Line-to-neutral.
   3. Line-to-ground.
   4. Neutral-to-ground.

C. SPD shall include electromagnetic interference/radio frequency interference (EMI/RFI) noise rejection filter with attenuation up to 30 dB from 10 kHz to 100 MHz.

D. SPDs and components in the operating path shall have maximum continuous operating voltage greater than 115 percent of nominal system operating voltage.

E. ANSI/UL 1449 minimum withstand rating shall be 20 kA per pole, and ANSI/UL 1449 voltage protection rating for SPD shall not exceed the following:

Modes	208Y/120	480Y/277
L-N,L-G, N-G	800	1200
L-L	1200	2000

F. SPD surge capacity based upon IEEE C62.41 location category shall, as a minimum, be the following:

Category	Application	Per Phase	Per Mode
C	Service entrance	240 kA	120 kA
B	High exposure locations (distribution equipment)	160 kA	80 kA
A	Branch locations	120 kA	60 kA

2.03 ACCESSORIES

A. Provide SPD equipped with the following accessories:

1. Surge counter with display for indicating the number of surges detected.
2. LED indicators for monitoring device status.
3. Audible alarm and silence switch for indicating an inoperative condition.
4. Dry contacts, "Form C", for remote annunciation of unit status.
5. Indicators, counter, alarm, and silence switch shall be visible and accessible from front of the SPD. When SPD is integral to switchgear, motor control center, panelboard, or other equipment, indicators, counter, alarm, and silence switch shall be visible and accessible from front of the equipment in which the SPD is installed.

2.04 SOURCE QUALITY CONTROL

A. Perform manufacturer's standard factory tests on equipment. Tests shall be in accordance with IEEE C62.45 and ANSI/UL 1449.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install SPD at locations shown on the Drawings in accordance with equipment manufacturer's recommendations, Laws, and Regulations, and the Contract Documents.

B. Conductor length between suppressor and connection point shall be as short and as straight as possible.

END OF SECTION

SECTION 16442 PANELBOARDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install panelboards.

B. Related Sections:

1. Section 16050, Electrical - General Provisions.
2. Section 16075, Identification for Electrical Systems.
3. Section 16271, Dry-Type Low-Voltage Distribution Transformers
4. Section 16289, Surge Protective Devices.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. NEMA PB 1, Panelboards.
2. UL 67, Panelboards.

1.03 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Listing of panelboards to be furnished with identification of their proposed location, and all electrical characteristics, including number and rating of branch circuit breakers and enclosure type.

2. Product Data:

a. Manufacturer's technical information for panelboards proposed for use, including product literature and specifications. Indicate options and features to be provided.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements; Comply with the following:

1. NEC Article 408, Switchboards and Panelboards.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Packing:

a. Inspect prior to packing to assure that assemblies and components are complete and undamaged.
b. Protect mating connections.
c. Cover all openings into enclosures with-vapor inhibiting, water-repellent material.

2. Deliver materials and equipment to Site to ensure uninterrupted progress of the Work. Deliver anchorage materials to be embedded in concrete in ample time to prevent delaying the Work. Upon deliver, check materials and equipment for evidence of water that may have entered equipment during transit.

3. Comply with Div. 1, Product Delivery Requirements.

B. Storage and Protection:

1. Store panelboards in a clean, dry location with controls for uniform temperature and humidity. Protect equipment with coverings and maintain environmental controls.
2. Comply with Section 01620, Product Storage and Handling Requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Panelboards:

1. Manufacturers: Provide products of one of the following:

a. Schneider Electric/Square D Company.
b. Eaton/Cutler-Hammer.
c. General Electric Company.

2. Rating: Voltage rating, current rating, number of phases, number of wires and number of poles as shown or indicated on the Drawings.
3. Circuit Breakers: Molded case, bolt-in thermal magnetic type with number of poles and trip ratings as shown or indicated. Where indicated on the Drawings, circuit breakers shall be ground fault circuit interrupting type equipped with solid state sensing and five-milliamp sensitivity.
4. Circuit breakers for 480-volt panelboards shall have minimum interrupting rating of 14,000 ampere RMS symmetrical, unless otherwise indicated on the Drawings. Circuit breakers for other panelboards shall have minimum interrupting rating of 10,000 ampere RMS symmetrical, unless otherwise indicated on the Drawings.
5. Bus Bars: Bus bars shall be 98 percent conductivity copper. Four-wire panel-boards shall have solid neutral bar. Each panel shall have ground bus bar.
6. Main: Panelboards shall have main circuit breaker, unless the Drawings specifically indicate main lugs only.
7. Connect branch circuit breakers for sequence phasing.
8. .Enclosures: Panel enclosures shall be as required for the area classifications indicated in Section 16050, General Provisions for Electrical Systems, unless otherwise indicated on the Drawings.

9. Construction: Code-grade steel, ample gutter space, flush door, flush snap latch and lock. Panelboards shall comply with NEMA PB 1 and UL 67.
10. Trim: Surface or flush as required.
11. Directory: Typed or computer-printed card, with transparent protective cover in frame on back of door giving circuit numbers and area or equipment served.
12. Identification: Identify panelboards in accordance with Section 16075, Identification for Electrical Systems. Identification shall indicate panel number and voltage.
13. Directory of Existing Panelboards: When adding or removing breakers or loads from existing panelboards, provide a new typed or computer-generated directory card, indicating the circuit numbers and equipment served.
14. Provide surge protective device in accordance with Section 16289, Surge Protective Devices, for each panelboard shown or indicated on the Drawings. Surge protective device shall be included and factory-mounted within panelboard by panelboard manufacturer. Surge protective device monitoring and display shall be visible from front of panelboard.

B. Integrated Panelboard and Transformer:

1. Products and Manufacturers: Provide products of one of the following:

   a. Mini-Power Zone by Schneider Electric/Square D Company.
   b. Mini-Power Center by Eaton/Cutler-Hammer.
   c. Panel Tran by Acme Electric Corporation.
   d. Or equal.

2. General: Unit shall consist of encapsulated dry-type transformer, primary and secondary main circuit breakers, and secondary panelboard all in one enclosure.
3. Transformer Rating: Transformer portion shall comply with Section 16271, Dry-type Low-Voltage Distribution Transformers. KVA, primary voltage, secondary voltage, frequency and number of phases shall be as shown or indicated on the Drawings.
4. Branch Circuits: Molded case circuit breakers, plug-in thermal magnetic type with number of poles and trip ratings as shown or indicated on the Drawings.
5. Enclosure: Enclosures shall be as required for the area classifications indicated in Section 16050, General Provisions for Electrical Systems, unless otherwise indicated on the Drawings.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Mounting: Install panelboards at locations shown or indicated. Set cabinets so that top branch circuit breaker is not over six feet above the floor.

B. Directory: Complete typewritten or computer-printed directory indicating items controlled by each circuit breaker and the size of feeder serving the panel.

C. Arrange circuits to balance the loads on the panelboards.

D. Identify panelboards in accordance with Section 16075, Identification for Electrical Systems.

E. Install in accordance with Laws and Regulations, manufacturer's recommendations, and the Contract Documents. Verify proper installation prior to energizing panelboards.

END OF SECTION

SECTION 16450 GROUNDING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install a complete grounding system in strict accordance with Article 250 of the National Electrical Code and/or as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

A. The requirements of Section 01340 and Section 16050 shall be met.

B. Test results as indicated in 3.02 C shall be submitted.

PART 2 PRODUCTS

2.01 MATERIALS

A. Ground Rods: The ground rods shall be solid copper or copper-clad steel having a diameter of 5/8-inch and a length of 10-feet. The ground rods shall be as manufactured by Copperweld, or approved equal.

B. Grounding Conductors

1. All grounding conductors shall be copper. Aluminum or copper-clad aluminum grounding conductors will not be allowed.
2. The grounding conductors shall be sized in accordance with the latest edition of the National Electrical Code, Table 250-94 or Table 250-95, whichever is applicable to the particular grounding conductor.

C. Ground Rod Clamps: The ground rod clamps shall be malleable iron or cast bronze fittings suitable for use with copper conductors. The ground rod clamps shall be as manufactured by Bridgeport Fittings, Inc.; ITT Blackburn, Inc.; or approved equal.

D. Dissimilar Metals Junctions: Connections between different metals shall be sealed using NO-OXIDE paint, Grade A, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Wherever possible, the Contractor shall connect to an existing plant, area or building grounding grid. Where no such grounding grid exists, the Contractor shall provide grounding as hereinafter specified and/or as shown on the Contract Drawings.

B. Building grounding grid conductors shall be embedded in backfill material around the structures.

C. All underground conductors shall be laid slack and, where exposed to mechanical injury, shall be protected by pipes or other substantial guards. If guards are iron pipe or other magnetic material, conductors shall be electrically connected to both ends of the guard.

D. Grounding electrodes shall be driven as required. Where rock is encountered, grounding plates may be used in lieu of grounding rods.

E. All equipment enclosures, motor and transformer frames, conduit systems, cable armor, exposed structural steel and similar items as required by Article 250 of the NEC shall be grounded.

F. All steel building columns shall be bonded together and connected to the building ground grid.

G. Exposed connections shall be made utilizing approved grounding clamps. Buried connections shall be Cadweld, or approved equal, welding process.

H. The ground bus of service entrance equipment shall be connected to the plant, area or building ground grid, whichever is applicable.

I. For reasons of mechanical strength, grounding conductors extending from the plant, area or building grounding grid or service entrance ground bus, whichever is applicable, to the ground buses of motor control centers and/or unit substations shall be No. 1/0 AWG bare copper.

J. Lighting transformer neutrals shall be grounded to the nearest grounding electrode.

K. Conduits stubbed-up below a motor control center shall be fitted with insulated grounding bushings and connected to the motor control center ground bus. Boxes mounted below motor control centers shall be bonded to the motor control center ground bus. The grounding wire shall be sized in accordance with Table 250-95 of the National Electrical Code, except that a minimum No. 12 AWG shall be used.

L. Motors shall be grounded in accordance with Section 16150, Item 3.01.A of these Specifications.

M. The Contractor shall exercise care to insure good ground continuity, in particular between conduits and equipment frames and enclosures. Where necessary, jumper wires shall be installed.

3.02 TESTS

A. The Contractor shall test the ground resistance of the system. The Contractor shall provide all test equipment of which the County shall have approval.

B. The dry season resistance of the system shall not exceed five (5) ohms. If a single driven rod does not produce this value, the Contractor shall drive additional rods and/or take other measures as directed by the County without any cost to the County.

C. The Contractor shall furnish to the County three (3) copies of the test report certifying that the system is in compliance with the ohmic value requirement. The certified test report shall include, but not necessarily be limited to, the following:

1. Description of the test.
2. Type of test equipment used.
3. Moisture content of the soil.
4. Date and time of the test.
5. Resistance measurement of each rod cluster.
6. Name of individual(s) performing the test.
7. Contractor's certification stamp or seal.

3.03 GUARANTEES AND WARRANTIES

A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16501 LIGHTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install lighting fixtures and associated controls.

B. Coordination:

1. Coordinate location of fixtures with piping, ductwork, openings, and other systems and equipment and locate clear of interferences.
2. Coordinate fixtures to be mounted in hung ceilings with the ceiling suspension system proposed.

C. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16075, Identification for Electrical Systems.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. UL 844, Luminaires for Use in Hazardous (Classified) Locations.
2. UL 935, Safety of Fluorescent Lamp Ballasts.
3. UL 1029, Safety of High-Intensity- Discharge Lamp Ballasts.
4. UL 1598, Safety of Luminaires.
5. UL 8750, Safety of LED Lighting

1.03 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. NEC Article 410, Luminaires, Lamp holders, and Lamps.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

   a. Schedule of light fixtures to be furnished, indicating fixture type and location for each.
   b. Customized wiring diagrams.

2. Product Data:

a. Manufacturer's technical information, specifications, standard wiring diagrams, and catalog cuts for lighting fixtures proposed.
b. Fixture construction details.
c. ETL photometric and isocandle curves for each fixture proposed.
d. Verification that recessed fixtures to be mounted in hung ceilings are compatible with ceiling suspension system proposed.

B. Informational Submittals: Submit the following:

1. Manufacturer's Instructions:

a. Instructions and recommendations for handling, storing, and protecting the equipment.
b. Installation instructions for for the equipment, including setting drawings, templates, and directions and tolerances for installing anchorage devices.

C. Maintenance Material Submittals: Submit the following:

1. Spare Parts and Extra Stock Materials: Furnish spare parts for each type of unit required as indicated in Part 2 of this Section.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Upon delivery, inspect equipment for evidence of water that may have entered equipment during transit.

B. Storage:

1. Store lighting fixtures, controls, related materials and equipment in clean, dry location with controls for uniform temperature and humidity. Protect materials and equipment with coverings and maintain environmental controls.
2. Store materials and equipment for easy access for inspection and identification. Keep materials and equipment off ground, using pallets, platforms, or other supports. Protect materials and equipment from corrosion and deterioration.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Type: Lighting fixtures required shall be in accordance with the Lighting Fixture Schedule on the Drawings. Fixtures shall be complete with supports, ballasts, lamps, and incidentals, as required.

B. Fixtures in hazardous locations shall be listed in accordance with UL 1598 and UL 844.

C. Lamps:

1. Fluorescent: Fluorescent lamps shall be toxic characteristic leaching procedure (TCLP) compliant for low mercury content. Linear fluorescent lamps shall be T8, energy-efficient, extended life type. Compact fluorescent lamps shall be long-life, energy-efficient type.
2. High Pressure Sodium: Shall be TCLP-compliant for low mercury content. Lamps shall be clear with high-efficacy and lumen maintenance.
3. Metal Halide: Shall be fabricated for low mercury content and be TCLP-compliant when available. Lamps shall be clear-pulse, start type with high-efficacy and lumen maintenance.
4. Incandescent: Inside-frosted.
5. Spare Parts and Extra Stock Materials: Ten percent spare lamps of each type and wattage.

D. Ballasts:

1. Fluorescent: UL 935 listed, high power factor, energy-efficient type, equipped with thermal protectors (Type "P" ballast), compatible with lamps installed. Indoor two-lamp fluorescent ballasts shall be electronic type with total harmonic distortion of less than 20 percent. Ballast factor shall be 0.85 minimum with total of less than 61 watts input. Provide cold weather type ballast where indicated in the Lighting Fixture Schedule.
2. High Intensity Discharge: UL 1029 listed, high power factor, constant wattage, stabilized autotransformer with line starting current the same or less than operating current.
3. Ballasts sound level shall be 30 decibels or less, sound rating "A".
4. Ballasts shall be Edison Testing Laboratories (ETL) listed and Certified Ballast Manufacturer Association, CMB-certified.
5. For fixtures utilizing double-ended lamps, provide fixture disconnecting means within the fixture.
6. Spare Parts and Extra Stock Materials: Ten percent spare ballasts of each type and quantity, but not less than one.

E. Fixtures located in area identified as hazardous in Section 26 05 05, General Provisions for Electrical Systems, shall each be approved as a complete assembly, shall be clearly marked to indicate maximum wattage of lamps for which they are approved, and be protected against physical damage by suitable guards.

F. Hardware: Provide necessary hangers, supports, conduit adaptors, reducers, hooks, brackets, and other hardware required for safe fixture mounting. Hardware shall have protective, non-corrosive finish.

G. Outdoor Fixtures: Provide each fixture to be installed outdoors with cut-off lens to reduce the fixture's light pollution emissions.

H. Time Switch:

1. Type: Astronomic dial time switch with day-omitting device.
2. Products and Manufacturers: Provide of one of the following:

    a. Z Series by Tork Time Controls, Inc.
    b. Or equal.

3. Timing Motor: Heavy-duty, synchronous, self-starting, high torque, 120-volt or 277-volt, 60 Hertz, as shown on the Drawings.
4. Capacity: 40 amps per pole at 277 volts.
5. Dial: 24-hour rotation, with gear to provide one revolution per year that automatically raises the "ON" and "OFF" settings each day according to seasonal changes of sunset and sunrise.
6. Reserve Power: Spring driven reserve sufficient to operate time switch contacts for not less than 30 hours after power failure. On restoration of power, time switch shall transfer to synchronous motor drive and automatically rewind reserve.

I. Lighting Contactor and Controls:

1. Provide a lighting contactor and control system for control of each area where shown on the Drawings.
2. Product and Manufacturer: Provide products of one of the following:

    a. Type SM03 by Square D Company.
    b. Or equal.

3. System shall include:

    a. Enclosure sized as required, complete with input control fuse and screw type terminal blocks rated 300-volt, 20-amp quantity for all circuits, unless indicated otherwise on the Drawings.
    b. Single coil, electrically-operated, mechanically-held contactor. Contactor shall be rated 30-amp, 600-volt, with 120-volt operating coil, unless indicated otherwise on the Drawings. Number of poles shall be as shown on the Drawings. Provide multiple contactors when necessary.
    c. Where lighting contactors are controlled by photocell, provide a 120-volt, two-pole control relay, enclosure mounted to convert the two-wire photocell control to three-wire control required by contactor. Control shall include a cover mounted on-off-auto selector switch for "manual" or "auto" selection of operation. In "auto" position, contactor shall respond to photocell.
    d. Enclosure: As required for area classification per Section 26 05 05, General Provisions for Electrical Systems.
    e. Identify panel in compliance with Section 26 0 53, Identification for Electrical Systems.

J. Photocell:

1. Products and Manufacturers: Provide one of the following:

    a. 2100 Series by Tork Time Controls, Inc.
    b. Or equal.

2. Cadmium sulfide hermetically-sealed cell, fully temperature compensated, with time delay of not less than 15 seconds to prevent false switching.
3. Built-in fail safe light level selector, adjustable within limits of two to 50 foot-candles and factory set at 25 foot-candles.

K. Fixture-Lowering Hanger System:

1. General:

   a. Provide corrosion-resistant system that lowers fixtures to ground level to allow maintenance on fixtures. Provide lowering hanger system for each fixture as shown on the Drawings.

2. Products and Manufacturers: Provide one of the following:
   a. Thompson Hangers, by Joslyn Hi-Voltage Corp.
   b. Or equal.

3. System:

   a. Upper or fixed housing of lowering devices shall contain:

      1) Attached pulley.
      2) Single point latching mechanism.
      3) Guide.
      4) Upper or socket electrical contacts.

   b. Lower or moveable housing of lowering devices shall contain:

      1) Operating line termination.
      2) Positioning stem and lower half of latch assembly.
      3) Lower electrical contacts.
      4) Fixture adapter.

   c. Fixtures shall be lowered on a guide line to allow operation of system in adverse weather and with structural clearance. Angles of the guide line to the structure shall be in accordance with to lowering device manufacturer's instructions.
   d. Operating line shall be high-strength/high-flexibility stainless steel and supplied by the lowering device manufacturer.
   e. Each operating line shall be encased in conduit where lower than eight feet above finished floor.
   f. Non-hanger termination shall be of enclosed and surface mounted design.
   g. Pulleys shall be supplied by hanger manufacturer as required to prevent excessive cable sag and allow lateral offsets between fixture location and cable termination.
   h. Provide portable manual winch.

4. Electrical:

   a. Contact material shall be silver-impregnated/silver-plated plate copper. Contacts shall use ball and socket design for ease of alignment and to allow for residual building vibration and movement.
   b. Contact pressure shall be supplied by springs remote from current conductors and shall not be part of current-carrying path.
   c. Termination of wiring shall be to crimp connectors.

d. Provide electrical insulation of contacts by porcelain standoffs.
e. Lowering device shall be make-and-break rated, UL-approved, as follows:

1) 250 vac: 30 amps
2) 600 vac: 15 amps
3) 250 vdc: 10 amps

f. Lowering device shall have eight contacts rated at 120 vac, 15 amps.

5. Mechanical:

a. System loading capacity: 200 pounds.
b. Manual or power winch operation.
c. Housing manufactured with copper-free or low copper content cast aluminum.
d. Operation shall be slow pull/quick release method.
e. Maintenance-free design.
f. Latching means shall be single point centered design to facilitate even wear over life of hangar.
g. Provide a tag line to facilitate lateral movement over inaccessible spaces. Tag line shall consist of the following parts by hanger manufacturer:

1) Termination kit for wall.
2) Manual winch.
3) Operating cable.
4) Pulley for upper mounting.

L. Motion/Occupancy Sensor:

1. Products and Manufacturers: Provide one of the following:

a. Leviton, Motion Sensor Field-of-View PR 150-1LW
b. Or equal.

2. Adjustable time delay interval of 15 seconds to 15 minutes.
3. Equipped with passive infrared (PIR) sensing technology.

2.02 LIGHT EMITTING DIODE (LED) LIGHTING

The LED Fixture shall consist of a LED Luminaire Assembly, LED Driver and mounting hardware.

A. LED Lighting Fixture. LED Fixture requirements are as described below:

1. The input to the LED Lighting Fixture shall be 120 to 277VAC (±10%), 60HZ or as indicated in the Contract Document.

2. Correlated Color Temperature (CCT) shall be minimum 4000K or as indicated in the Contract Document.

3. Color Rendering Index (CRI) shall be ≥70.

4. A minimum of 50,000 operating hours before reaching the L70 lumen output degradations point without catastrophic failure, or as indicated in the Contract Document.

5. Conform with UL 8750.

6. Compliance to FCC CFR Section 15.

B. LED Luminaire Assembly Luminaire Assembly requirements as described below:

1. Definition: Luminaire Assembly is the LED assembly without LED driver.

2. Input voltage shall be 24VDC, 36VDC or as indicated in the Contract Document.

3. CCT, CRI, Minimum life and UL conformity requirements are as defined in above article LED Lighting Fixture.

C. LED Driver LED: Driver requirements are as described below:

1. Must operate input voltage between 120VAC to 277VAC (±10%).

2. Operating frequency must be 60Hz.

3. Must be rated to operate between -40ºC to +50ºC.

4. Must have a minimum efficiency of 85%.

5. Self protected including short circuit protection.

6. Compliance to FCC CFR Section 15

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. General:

1. Fixture mounting heights and locations indicated on the Drawings are approximate and are subject to revision in the field where necessary to clear conflicts and obstructions.
2. Mounting Heights: Mounting heights or elevations are to bottom of fixture or to centerline of device.

3. Install fixtures in accordance with Laws and Regulations, the Contract Documents, and manufacturer instructions and recommendations.
4. Mount fixtures so that sufficient access is available for ready and safe maintenance.
5. Securely fasten equipment to walls or other surfaces on which equipment is mounted.

B. Suspended Fixtures:

1. Pendant-mount using 1/2-inch diameter conduit stems.
2. Ground to outlet box.
3. Attach mounting to building structure with expansion anchors.
4. Fixtures shall not be dependent on the outlet box cover screws for support.

C. Surface Mounted Fixtures:

1. Attach to appropriate outlet box.
2. Attach to surface using fasteners and sealing washers when mounting fixture in damp or wet locations.

D. Boxes and Fixtures:

1. For units mounted against masonry or concrete walls, provide suitable 1/4-inch spacers to prevent mounting back of box directly against wall.
2. Bolt units rigidly to building with expansion anchors, toggle bolts, hangers, or Unistrut.
3. Do not install boxes with open conduit holes.
4. Cable each circuit and identify with tag.

E. Re-lamp all fluorescent fixtures provided under this Contract with new lamps following Substantial Completion.

F. Mount photocells as shown and adjust foot-candle setting for proper dusk and dawn photo-control. Provide wiring in conduit from photocell to controls.

G. Fixture Lowering System:

1. Hangers shall be plumb.
2. Provide adequate clearance between operating line and structural members, pipes, ducts, and other equipment and devices to avoid interference.
3. Conduit runs enclosing operating lines shall be straight with no offset bends.

3.03 SCHEDULES

A. The supplements listed below, following the "End of Section" designation, are a part of this Section:

1. Schedules:

a. Table 16501-A, Lighting Fixture Schedule.

END OF SECTION

TABLE 16501-A

LIGHTING FIXTURE SCHEDULE

Type	Description	Manufacturer and Model No.
(--1--)	(--2--)	(--3--)

SECTION C
BID SUMMARY

C.01 MINIMUM QUALIFICATIONS OF BIDDERS

No person who is not certified or registered as a **Underground Utility OR General Contractor** pursuant to Chapter 489, Florida Statutes, on the day the bid is submitted, and who has continuously held that certification or registration for a period of at least three (3) consecutive years immediately prior to the day the bid is submitted, may be qualified to bid on this Work. In the event that a bidder is a business organization, including a partnership, corporation, business trust or other legal entity as set forth in Section 489.119(2), Florida Statutes, then the bidder shall only be qualified to bid on this Work if: 1) the bidder (the business organization) is on the day the bid is submitted, and for at least three (3) consecutive years immediately prior to the day the bid is submitted has been, in continuous existence, properly licensed and registered as required by Florida law; and 2) the bidder, on the day the bid is submitted, has a certified or registered Qualifying Agent, as required by Section 489.119, Florida Statutes, and that Qualifying Agent has been the same Qualifying Agent of the bidder for a period of at least three (3) consecutive years immediately prior to the day the bid is submitted.

C.02 BASIS OF AWARD

Award shall be to the lowest, responsive, responsible bidder meeting specifications and having the lowest total offer for **Bid "A"**, or the lowest total offer for **Bid "B"**, for the requirements listed on the Bid Form for the Work as set forth in this IFB. Bid prices shall include costs for furnishing all labor, equipment and/or materials for the completion of the Work in accordance with and in the manner set forth and described in the IFB documents to Owner's satisfaction within the prescribed time.

Two schedules for completion of Work shall be considered. Each bid for completion by the specified stated time shall be offered as a separate "total offer". Owner has the sole authority to select the bid based on the completion time which is in the best interest of Owner. Only one award shall be made.

NOTE: Inspection of the site is a pre-requisite to be considered for award of this bid.

In evaluating bids, Owner shall consider the qualifications of the bidders; and if required, may also consider the qualifications of the Subcontractors, suppliers, and other persons and organizations proposed. Owner may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work.

Whenever two or more bids are equal with respect to price, the bid received from a local business shall be given preference in award.

Whenever two or more bids are equal with respect to price, and all other evaluative factors are otherwise equal, including local preference policies, if the company provides documented environmentally preferable "green" products, materials, or supplies, they shall be given preference in award.

Whenever two or more bids which are equal with respect to price are received, and neither of these bids are from a local business, and neither of these bids provides documented "green" products, the award shall be determined by a chance drawing, coin toss, or similar tie-breaking method conducted by the Purchasing Division and open to the public.

END OF SECTION C

BID FORM

For: IFB#15-2606-OV
MARS Chlorination System at the Southwest Water Reclamation Facility (SWWRF)
5101 65th Street West, Bradenton, FL 34210
Project No.: 6082190 6.2

Total Offer (Bid "A"): _____
Based on a completion time of 280 calendar days
Total Offer (Bid "B"): _____
Based on a completion time of 220 calendar days

We, the undersigned, hereby declare that we have carefully reviewed the IFB Documents in their entirety and with full knowledge and understanding of the aforementioned herewith submit this quote, completely meeting each and every specification, term, and condition contained therein.

Two schedules for completion of the Work shall be considered. Each bid for completion by the specified stated time shall be offered as a separate "total offer". County has the sole authority to select the bid based on the completion time which is in the best interest of County. Only one award shall be made.

As bidder, we understand that the IFB documents, in its entirety, including but not limited to, all specifications, terms, and conditions shall be made a part of any resulting Agreement between Manatee County and the successful bidder. Failure to comply shall result in Agreement default, whereupon, the defaulting successful bidder shall be required to pay for any and all re-procurement costs, damages, and attorney fees as incurred by County, and agrees to forfeit his/her bid bond.

Communications concerning this bid shall be addressed as follows: **(Complete all fields)**

Bidder's Name: _____

Mailing Address: _____

Telephone: ( ) _____ Fax: ( ) _____

Email Address: _____

I, _____ on [date(s)] **_____ attest that I have visited the project site(s) to familiarize myself with the full scope of work required for the bid.**

Acknowledge Addendum No.____ Dated: _____ Acknowledge Addendum No._____ Dated: _____
Acknowledge Addendum No.____ Dated: _____ Acknowledge Addendum No._____ Dated: _____
Acknowledge Addendum No.____ Dated: _____ Acknowledge Addendum No._____ Dated: _____

Authorized Signature(s): _____

Name and Title of Above Signer(s): _____

Date: _____

BID FORM
(Submit in Duplicate)

IFB#15-2606-OV

MARS Chlorination System at the Southwest Water Reclamation Facility (SWWRF)
(Project No.: 6082190)

BID "A" Based on Completion time of 280 Calendar Days

ITEM #	DESCRIPTION	U/M	QTY.	BID PRICE PER UNIT	TOTAL BID PRICE
1	Mobilization & Demobilization	LS	1	$	$
2	Chlorination Structure	LS	1	$	$
3	Site Work and Yard Piping	LS	1	$	$
4	Sodium Hypochlorite Tanks	LS	1	$	$
5	Chemical Feed System and Residual Analyzer	LS	1	$	$
6	Instrumentation and Controls	LS	1	$	$
7	Electrical	LS	1	$	$
8	Allowance for SCADA Programming	LS	1	$	$
	TOTAL BASE BID - Based on Completion Time of 280 Calendar Days				$
9	**CONTRACT CONTINGENCY WORK (Used only with County Approval)**		10% OF TOTAL BASE BID		$
	TOTAL OFFER(Including Contract Contingency Work) MARS Chlorination System at the SWWRF, based on Bid "A" 280 calendar days completion				$

Bidder:_____

Authorized Signature:_____ Bid "A"

BID FORM
(Submit in Duplicate)

IFB#15-2606-OV

MARS Chlorination System at the Southwest Water Reclamation Facility (SWWRF)
(Project No.: 6082190)

BID "B" Based on Completion time of 220 Calendar Days

ITEM #	DESCRIPTION	U/M	QTY.	BID PRICE PER UNIT	TOTAL BID PRICE
1	Mobilization & Demobilization	LS	1	$	$
2	Chlorination Structure	LS	1	$	$
3	Site Work and Yard Piping	LS	1	$	$
4	Sodium Hypochlorite Tanks	LS	1	$	$
5	Chemical Feed System and Residual Analyzer	LS	1	$	$
6	Instrumentation and Controls	LS	1	$	$
7	Electrical	LS	1	$	$
8	Citect Software Programming and Configuration	LS	1	$	$
	TOTAL BASE BID - Based on Completion Time of 220 Calendar Days				$
9	**CONTRACT CONTINGENCY WORK (Used only with County Approval)**		10% OF TOTAL BASE BID		$
	TOTAL OFFER(Including Contract Contingency Work) MARS Chlorination System at the SWWRF, based on Bid "B" 220 calendar days completion				$

Bidder:_____

Authorized Signature:_____ Bid "B"

MAILING LABEL

Cut along the outside border and affix this label to your sealed bid envelope to identify it as a "Sealed Bid". Be sure to include the name of the company submitting the bid and the bid due date and time where requested.

MAILING LABEL TO AFFIX TO OUTSIDE OF SEALED BID PACKAGE:

BIDDER: _____

INVITATION FOR BID No.: IFB#15-2606-OV

BID TITLE: MARS Chlorination System at the Southwest Water Reclamation Facility (SWWRF)

DUE DATE/TIME: October 13, 2015 at 3:00 PM

SECTION D
IFB#15-2606-OV
MARS Chlorination System at the Southwest Water Reclamation Facility (SWWRF)
INSURANCE AND BONDING REQUIREMENTS

The successful bidder will not commence Work under the resulting Agreement until all insurance under this section, and such insurance coverage as might be required by Owner, has been obtained. The successful bidder shall obtain, and submit to the Purchasing Division within ten (10) calendar days from the date of notice of intent to award, at his expense, the following minimum amounts of insurance (inclusive of any amounts provided by an umbrella or excess policy):

Insurance / Bond Type	**Required Limits**
1. ☒ Automobile Liability:	Bodily Injury and Property Damage, Owned/Non-Owned/Hired; Automobile included $ 1,000,000 each occurrence $ 2,000,000 aggregate *This policy shall contain severability of interests' provisions.*
2. ☒ Commercial General Liability: (Occurrence Form - patterned after the current ISO form)	Bodily Injury and Property Damage $ 1,000,000 single limit per occurrence; $ 2,000,000 aggregate This shall include Premises and Operations; Independent Contractors; Products and Completed Operations and Contractual Liability. *This policy shall contain severability of interests' provisions.*
3. ☒ Employer's Liability:	$ 100,000 single limit per occurrence
4. ☒ Worker's Compensation:	Statutory Limits of Chapter 440, Florida Statutes, and all Federal Government Statutory Limits & Requirements
5. ☒ Other Insurance, as noted:	a. ☐ Aircraft Liability $ _____ per occurrence Coverage shall be carried in limits of not less than $5,000,000 each occurrence if applicable to the completion of the services under this Agreement. b. ☐ Installation Floater $ _____ If the resulting Agreement **does not** include construction of or additions to above ground building or structures, but does involve the installation of machinery or equipment, successful bidder shall provide an **"Installation Floater"** with the minimum amount of insurance to be 100% of the value of such addition(s), building(s), or structure(s). c. ☐ Maritime Coverage (Jones Act) $ _____ per occurrence Coverage shall be maintained where applicable to the

Insurance / Bond Type	Required Limits
	completion of the Work.
	d. ☐ Pollution $ _____ per occurrence e. ☐ Professional Liability $ _____ per claim and in the aggregate • $1,000,000 per claim and in the aggregate • $2,000,000 per claim and in the aggregate f. ☐ Project Professional Liability $ _____ per occurrence g. ☒ Property Insurance $522,200.00 If the resulting Agreement includes construction of or additions to above ground buildings or structures, bidder shall provide **"Builder's Risk"** insurance with the minimum amount of insurance to be 100% of the value of such addition(s), building(s), or structure(s). *To the extent that property damage is covered by commercial insurance, Owner and successful bidder agree to waive all subrogation rights against each other, except such rights as they may have to the proceeds of such insurance. Successful bidder shall require a similar waiver of subrogation from each of its bidder personnel and sub-consultants, to include Special Consultants; successful bidder shall provide satisfactory written confirmation to Owner of these additional waivers.* h. ☐ U.S. Longshoreman's and Harborworker's Act Coverage shall be maintained where applicable to the completion of the Work. i. ☐ Valuable Papers Insurance $ _____ per occurrence j. ☐ Watercraft $ _____ per occurrence
6. ☒ Bid Bond:	Bid bond shall be submitted by bidder for 5% of the total amount of the bid.
7. ☒ Payment and Performance Bond:	Payment and Performance Bond shall be submitted by bidder for 100% of the award amount. $ _____

Reviewed by Risk: Linda D. Klasing

INSURANCE REQUIREMENTS

The amounts and types of insurance coverage shall conform to the minimum requirements set forth in this Exhibit, with the use of Insurance Services Office (ISO) forms and endorsements or their equivalents. If successful bidder has any self-insured retentions or deductibles under any of the listed minimum required coverage, successful bidder must identify on the certificate of insurance the nature and amount of such self-insured retentions or deductibles and provide satisfactory evidence of financial responsibility for such obligations. All self-insured retentions or deductibles will be successful bidder's sole responsibility.

Nothing herein shall in any manner create any liability of Owner in connection with any claim against the successful bidder for labor, services, or materials, or of Subcontractors; and nothing herein shall limit the liability of the successful bidder or successful bidder's sureties to Owner or to any workers, suppliers, material men or employees in relation to the resulting Agreement.

Builder's Risk Coverage. The successful bidder shall procure and maintain during the entire course of the Work a builder's risk policy, completed value form, insured to provide coverage on an all risk basis, including coverage for off-site stored materials and including coverage for theft. This coverage shall not be lapsed or cancelled because of partial Acceptance by the Owner prior to final Acceptance of the Project. Successful bidder shall recommend to Owner any additions to the Project Costs resulting from any casualty described in Article XII General Conditions of the Construction Agreement, including those costs, expenses and other charges (including normal and ordinary compensation to the successful bidder) necessary for reconstruction of the Project substantially in accordance with the Project Plans and Specifications. The nature, level and type of builder's risk coverage (including completed value or replacement cost coverage) shall be determined by Owner through insurers selected by successful bidder and approved by Owner.

Excess Policy or Umbrella. An excess policy or umbrella may be used to cover limits over and above Commercial General Liability.

Subcontractor's Public Liability and Property Damage Insurance. The successful bidder shall require each Subcontractor to procure and maintain during the term of the subcontract, insurance of the type specified above, or insure the activities of Subcontractors in its policy, as approved by Owner prior to performance of any services. The levels of coverage as set forth in the table above may be adjusted to require a reduced level of coverage consistent with the scope of Work to be provided by that particular Subcontractor. Any reduction in the levels of insurance coverage required by the successful bidder's standard form of subcontract shall be approved by the Owner.

Waiver of Subrogation. Owner and successful bidder waive against each other and the Owner's separate Vendors, Contractors, Design Consultants, Subcontractors agents and employees of each and all of them, all damages covered by property insurance provided herein, except such rights as they may have to the proceeds of such insurance. The successful bidder and Owner shall, where appropriate, require similar waivers of subrogation from the Owner's separate Vendors, Design Consultants and Subcontractors and shall require each of them to include similar waivers in their contracts.

Worker's Compensation Insurance. The successful bidder shall procure and maintain during the term of the Contract Documents, workers' compensation insurance for all its employees connected with the Work and shall require all Subcontractors similarly to provide workers' compensation insurance for all their employees unless such employees are covered by the protection afforded by successful bidder. Such insurance shall comply with the Florida Workers' Compensation Law. The successful bidder shall provide adequate insurance, satisfactory to Owner, for the protection of employees not otherwise protected.

By way of its submission of a bid hereto, bidder:

a. Represents that bidder maintains, and will maintain during the term of any Agreement arising from this solicitation, all insurance coverage required herein from responsible companies duly authorized to do business under the laws of the State of Florida that hold a rating of "A-" or better by Best's Key Guide, latest edition, and are deemed acceptable to Owner as set forth in this solicitation.

b. Agrees that insurance, as specified herein, shall remain in force and effect without interruption from the date of commencement of the Work throughout the duration of the Project, and shall remain in effect for at least two (2) years after the termination of the Contract Documents.

c. Agrees that if the initial or any subsequently issued certificate of insurance expires prior to completion of the Work, successful bidder shall furnish to Owner renewal or replacement certificate(s) of insurance no later than ten (10) calendar days after the expiration date on the certificate. Failure of successful bidder to provide Owner with such renewal certificate(s) shall be considered justification for Owner to terminate any and all Agreements.

d. Agrees that bidder and/or its insurance carrier shall provide thirty (30) days written notice to Owner of policy cancellation or non-renewal on the part of the insurance carrier or the successful bidder. Successful bidder shall also notify Owner, in a like manner, within twenty-four (24) hours after receipt, of any notices of expiration, cancellation, non-renewal or material change in coverage or limits received by successful bidder from its insurer and nothing contained herein shall relieve successful bidder of this requirement to provide notice. In the event of a reduction in the aggregate limit of any policy to be provided by successful bidder hereunder, successful bidder shall immediately take steps to have the aggregate limit reinstated to the full extent permitted under such policy.

e. Agrees that failure of successful bidder to obtain and maintain proper amounts of insurance at all times as called for herein shall constitute a material breach of the resulting Agreement, which may result in immediate termination.

f. Agrees that, should at any time the successful bidder not maintain the insurance coverage(s) required herein, Owner may terminate the Agreement or at its sole discretion shall be authorized to purchase such coverage(s) and charge successful bidder for such coverage(s) purchased. If successful bidder fails to reimburse Owner for such costs within thirty (30) days after demand, Owner has the right to offset these costs from any amount due successful bidder under this Agreement or any other agreement between Owner and successful bidder. Owner shall be under no obligation to purchase such insurance, nor shall it be responsible for the coverage(s) purchased or the insurance companies used. The decision of Owner to purchase such insurance coverage(s) shall in no way be construed to be a waiver of any of its rights under the Contract Documents.

g. Agrees to provide, upon request, the entire and complete insurance policies required herein.

h. The payment of deductibles for insurance required of the successful bidder by the Contract Documents shall be the sole responsibility of the successful bidder.

Certificate of Insurance Requirements:

a. Certificates of insurance in duplicate evidencing the insurance coverage specified herein shall be filed with the Purchasing Division before operations are begun. The required certificates of insurance shall name the types of policy, policy number, date of expiration, amount of coverage, companies affording coverage, and also shall refer specifically to the bid number and title of the Project, and must read: For any and all work performed on behalf of Manatee County.

b. **Additional Insured:** The Automobile Liability and Commercial General Liability policies provided by the successful bidder to meet the requirements of this IFB shall name Manatee County, Board of County Commissioners, as an additional insured as to the operations of the successful bidder under this IFB and shall contain severability of interests provisions.

c. In order for the certificate of insurance to be accepted it **must** comply with the following:

1. The "Certificate Holder" shall be:
   Manatee County
   Board of County Commissioners
   Bradenton, FL
   IFB# insert IFB #, insert IFB title
   For any and all work performed on behalf of Manatee County.

2. Certificate shall be mailed to:
   Manatee County Purchasing Division
   1112 Manatee Avenue West, Suite 803
   Bradenton, FL 34205
   Attn: insert name, insert title

BONDING REQUIREMENTS

Bid Bond/Certified Check. By submitting a bid to this IFB, the bidder agrees should the bidder's bid be accepted, **to execute the form of Agreement and present the same to Manatee County for approval within ten (10) calendar days after notice of intent to award.** The bidder further agrees that failure to execute and deliver said form of Agreement **within ten (10) calendar days** will result in damages to Manatee County and as guarantee of payment of same a bid bond/certified check shall be enclosed within the submitted sealed bid in the amount of five (5%) percent of the total amount of the bid. The bidder further agrees that in case the bidder fails to enter into an Agreement, as prescribed by Manatee County, the bid bond/certified check accompanying the bid shall be forfeited to Manatee County as agreed liquidated damages. If Owner enters into an Agreement with a bidder, or if Owner rejects any and/or all bids, accompanying bond will be promptly returned.

Payment and Performance Bonds. Prior to commencing Work, the successful bidder shall obtain, for the benefit of and directed to Owner, a Payment and Performance Bond satisfying the requirements of Section 255.05, Florida Statutes, covering the faithful performance by the successful bidder of its obligation under the Contract Documents, including but not limited to the construction of the Project on the Project Site and the payment and obligations arising thereunder, including all payments to Subcontractors, laborers, and materialmen. The surety selected by the successful bidder to provide the Payment and Performance Bond shall be approved by Owner prior to issuance of such Bond, which approval shall not be unreasonably withheld or delayed provided that surety is rated A- or better by Best's Key Guide, latest edition.

Failure to provide the required bonds on the prescribed form may result in successful bidder being deemed nonresponsive. Bonds must be in the form prescribed in Section 255.05, Florida Statutes, and must not contain notice, demand or other terms and conditions, including informal pre-claim meetings, not provided for in Section 255.05, Florida Statutes.

Surety of such bonds shall be in an amount equal to 100% of the Contract Price issued by a duly authorized and nationally recognized surety company, authorized to do business in the State of Florida, satisfactory to Owner. Surety shall be rated as "A-" or better by Best's Key Guide, latest edition. The attorney-in-fact who signs the bonds must file with the bonds, a certificate and effective dated copy of power-of-attorney. Payment and Performance Bonds shall be issued to Manatee County, a political subdivision of the State of Florida, **within ten (10) calendar days after notice of intent to award**.

In addition, pursuant to Section 255.05(1)(b), Florida Statutes, prior to commencing Work, the successful bidder shall be responsible and bear all costs associated to record the Payment and Performance Bond with the Manatee County Clerk of the Circuit Court. A certified copy of said recording shall be furnished to the Purchasing Division upon filing. Pursuant to Section 255.05(1)(b), Florida Statutes, Owner will make no payment to the successful bidder until the successful bidder has complied with this paragraph.

Furnishing Payment and Performance Bonds shall be requisite to execution of an Agreement with Owner. Said Payment and Performance Bonds will remain in force for the duration of the Agreement with the premiums paid by the successful bidder. Failure of the successful bidder to execute such Agreement and to supply the required bonds shall be just cause for cancellation of the award. Owner may then contract with the next lowest, responsive and responsible bidder or re-advertise this IFB. If another bidder is accepted, and notice given within ninety (90) days after the opening of the bids, this Acceptance shall bind the bidder as though they were originally the successful bidder.

Failure of Owner at any time to require performance by the successful bidder of any provisions set out in the resulting Agreement will in no way affect the right of Owner, thereafter, to enforce those provisions.

BIDDER'S INSURANCE STATEMENT

THE UNDERSIGNED hereto have read and understand the aforementioned insurance requirements of this IFB and note that the evidence of insurability shall be required within ten (10) days from the date of notice of intent to award.

Bidder Name: _____ Date: _____

Bidder's Signature: _____

Print Name: _____

Insurance Agency: _____

Agent Name: _____ Agent Phone: _____

Please return this completed and signed statement with your bid.

ATTACHMENT A (IFB#15-2606-OV)

BIDDER'S QUESTIONNAIRE

(Submit in Duplicate)

The bidder warrants the truth and accuracy of all statements and answers herein contained. (Attach additional pages if necessary.)

THIS QUESTIONNAIRE MUST BE COMPLETED AND SUBMITTED WITH YOUR BID

1. Contact Information:

   FEIN #: _____

   License #: _____
   License Issued to: _____
   Date License Issued (MM/DD/YR): _____
   Company Name: _____
   Physical Address: _____
   City: _____ State of Incorporation: _____ Zip Code: _____
   Phone Number: (___) _____ Fax Number: (___) _____
   Email address: _____

2. Bidding as: an individual __; a partnership __; a corporation __; a joint venture __

3. If a partnership, list names and addresses of partners; if a corporation, list names of officers, directors, shareholders, and state of incorporation; if joint venture, list names and address of ventures' and the same if any venture are a corporation for each such corporation, partnership, or joint venture:

   _____
   _____
   _____
   _____

4. Bidder is authorized to do business in the State of Florida: ☐ Yes ☐ No

   For how many years? _____

5. Your organization has been in business (under this firm's name) as a

   _____

   Is this firm in bankruptcy? _____

6. Attach a list of projects where this specific type of Work was performed.

BIDDER: _____

7. Is this firm currently contemplating or in litigation? Provide summary details.

_____

_____

_____

8. Have you ever been assessed liquidated damages under a contract during the past five (5) years? If so, state when, where (contact name, address and phone number) and why.

_____

_____

_____

9. Have you ever failed to complete Work awarded to you? Or failed to complete projects within contract time? If so, state when, where (contact name, address, phone number) and why.

_____

_____

_____

10. Have you ever been debarred or prohibited from providing a bid to a governmental entity? If yes, name the entity and describe the circumstances.

_____

_____

_____

11. Will you subcontract any part of this Work? If so, describe which portion(s) and to whom.

_____

_____

_____

BIDDER: _____

12. If any, list MBE/DBE (with Agreement amount) to be utilized:

_____

_____

_____

13. What equipment do you own to accomplish this Work? (A listing may be attached)

_____

_____

_____

14. What equipment will you purchase/rent for the Work? (Specify which)

_____

_____

_____

15. List the following in connection with the surety which is providing the bond(s):

Surety's Name: _____

Address: _____

_____

Name, address, phone number and email of surety's resident agent for service of process in Florida:

Agent's Name: _____

Address: _____

_____

Phone: _____

Email: _____

BIDDER: _____

ATTACHMENT B

PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES CERTIFICATION

SWORN STATEMENT PURSUANT TO ARTICLE V, MANATEE COUNTY PROCUREMENT CODE

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

This sworn statement is submitted to the Manatee County Board of County Commissioners by

_____

[Print individual's name and title]

____ for _____[Print name of entity submitting sworn statement]

whose business address is _____

and (if applicable) its Federal Employer Identification Number (FEIN) is _____. If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____.

I understand that no person or entity shall be awarded or receive an Owner's Agreement for public improvements, procurement of goods or services (including professional services) or an Owner's lease, franchise, concession or management agreement, or shall receive a grant of Owner's monies unless such person or entity has submitted a written certification to Owner that it has not:

(1) been convicted of bribery or attempting to bribe a public officer or employee of Manatee County, the State of Florida, or any other public entity, including, but not limited to the Government of the United States, any state, or any local government authority in the United States, in that officer's or employee's official capacity; or

(2) been convicted of an agreement or collusion among bidders or prospective bidders in restraint of freedom of competition, by agreement to bid a fixed price, or otherwise; or

(3) been convicted of a violation of an environmental law that, in the sole opinion of Owner's Purchasing Official, reflects negatively upon the ability of the person or entity to conduct business in a responsible manner; or

(4) made an admission of guilt of such conduct described in items (1), (2) or (3) above, which is a matter of record, but has not been prosecuted for such conduct, or has made an admission of guilt of such conduct, which is a matter of record, pursuant to formal prosecution. An admission of guilt shall be construed to include a plea of nolo contendere; or

(5) where an officer, official, agent or employee of a business entity has been convicted of or has admitted guilt to any of the crimes set forth above on behalf of such an entity and pursuant to the direction or authorization of an official thereof (including the person committing the offense, if he is an official of the business entity), the business shall be chargeable with the conduct herein above set forth. A business entity shall be chargeable with the conduct of an affiliated entity, whether wholly owned, partially owned, or one which has common ownership or a common Board of Directors. For purposes of this Form, business entities are affiliated if, directly or indirectly, one business entity controls or has the power to control another business entity, or if an individual or group of individuals controls or has the power to control both entities. Indicia of control shall include, without limitation, interlocking management or ownership, identity of interests among family members, shared organization of a business entity following the ineligibility of a business entity under this Article, or using substantially the same management, ownership or principles as the ineligible entity.

(Continued)

Any person or entity who claims that this Article is inapplicable to him/her/it because a conviction or judgment has been reversed by a court of competent jurisdiction shall prove the same with documentation satisfactory to Owner's Purchasing Official. Upon presentation of such satisfactory proof, the person or entity shall be allowed to contract with Owner.

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR MANATEE COUNTY IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT ANY AGREEMENT OR BUSINESS TRANSACTION SHALL PROVIDE FOR SUSPENSION OF PAYMENTS, OR TERMINATION, OR BOTH, IF THE CONTRACTING OFFICER OR COUNTY ADMINISTRATOR DETERMINES THAT **SUCH PERSON OR ENTITY HAS MADE FALSE CERTIFICATION.**

_____
[Signature]

STATE OF FLORIDA
COUNTY OF _____

Sworn to and subscribed before me this ____ day of _____, 20_____ by _____

Personally known _____ OR Produced identification _____
[Type of identification]

_____ My commission expires _____
Notary Public Signature

_____
[Print, type or stamp Commissioned name of Notary Public]

Signatory Requirement - In the case of a business entity other than a partnership or a corporation, this affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, this affidavit shall be executed by the general partner(s). In the case of a corporation, this affidavit shall be executed by the corporate president.

ATTACHMENT C

SWORN STATEMENT

THE FLORIDA TRENCH SAFETY ACT

THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR BY AN OFFICER AUTHORIZED TO ADMINISTER OATHS.

1. This Sworn Statement is submitted with **IFB NO.15-2606-OV**
2. This Sworn Statement is submitted by_____ whose business address is_____ and, if applicable, its Federal Employer Identification Number (FEIN) is_____. If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement _____.
3. Name of individual signing this Sworn Statement is: _____, Whose relationship to the above entity is: _____.
4. The Trench Safety Standards that will be in effect during the construction of this project shall include, but are not limited to: Laws of Florida, Chapters 90-96, TRENCH SAFETY ACT, and OSHA RULES AND REGULATIONS 29 CFR 1926.650 Subpart P, effective October 1, 1990.
5. The undersigned assures that the entity will comply with the applicable Trench Safety Standards and agrees to indemnify and hold harmless Owner and Engineer, and any of their agents or employees from any claims arising from the failure to comply with said standard.
6. The undersigned has appropriated the following costs for compliance with the applicable standards:

Trench Safety Measure (Description)	Units of Measure (LF, SY)	Unit Quantity	Unit Cost	Extended Cost
a. _____	_____	_____	$_____	_____
b. _____	_____	_____	$_____	_____
c. _____	_____	_____	$_____	_____
d. _____	_____	_____	$_____	_____

7. The undersigned intends to comply with these standards by instituting the following procedures:

_____

_____

_____

THE UNDERSIGNED, in submitting this bid, represents that they have reviewed and considered all available geotechnical information and made such other investigations and tests as they may deem necessary to adequately design the trench safety system(s) to be utilized on this project.

_____

(AUTHORIZED SIGNATURE / TITLE)

SWORN to and subscribed before me this _____ day of _____, 20_____.

(Impress official seal)

Notary Public, State of Florida: _____

My commission expires: _____

Angelina M. Colonneso
CLERK AD INTERIM OF THE CIRCUIT COURT AND COMPTROLLER OF MANATEE COUNTY
1115 Manatee Avenue West, Bradenton, Florida 34205 - Phone (941) 749-1800 – Fax (941) 741-4082
P.O. Box 25400, Bradenton, Florida 34206 - www.manateeclerk.com

ATTACHMENT D: E PAYABLES APPLICATION

Company name_____

Contact person_____

Phone number_____

Email Address_____

FINANCE USE ONLY

Open orders: YES or NO

PEID _____

CREATE DATE _____

CONFIRMED WITH _____
Name and phone number

IFAS _____

BANK _____

INITIALS_____

Return completed form to:

Via email to: lori.bryan@manateeclerk.com

Via fax to: (941) 741-4011

Via mail:

PO Box 1000

Bradenton, Fl 34206

Florida Department of Environmental Protection

Southwest District Office
13051 North Telecom Parkway
Temple Terrace, FL 33637-0926

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

Florida Department of Environmental Protection

Southwest District Office
13051 North Telecom Parkway
Temple Terrace, FL 33637-0926

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

July 22, 2015

Manatee County
c/o Mike Gore
4410 66th Street W
Bradenton, FL, 34210
mike.gore@mymanatee.org

Dear Mr. Gore:

Enclosed is the Environmental Resource Permit, DEP Project No. 41-0297915-002, issued pursuant to Part IV of Chapter 373, Florida Statutes, and Title 62, Florida Administrative Code.

Appeal rights for you and for any affected third party are described in the text of the permit along with conditions that must be met when authorized activities are undertaken.

You, as the applicant, are responsible for all aspects of permit compliance. You should therefore review this permit document carefully to ensure compliance with the general conditions and specific conditions contained herein.

Please be aware of permit General Condition number 4, which states, "At least 48 hours prior to beginning the authorized activities, the permittee shall submit to the Agency a fully executed Form 62-330.350(1), "Construction Commencement Notice"."

If you have any questions about this document, please contact me at ryan.p.martin@dep.state.fl.us or (813) 470-5944.

Thank you for your participation in the permit process and in managing the natural resources of the State of Florida.

Sincerely,

Ryan P. Martin
Engineering Specialist IV
Permitting and Waste Cleanup Program

cc: Curtis R. Burkett, P.E., McKim & Creed, Inc., cburkett@mckimcreed.com
Blake Peters, P.E., McKim & Creed, Inc., bpeters@mckimcreed.com
Mike Nixon, P.E., McKim & Creed, Inc., mnixon@mckimcreed.com

Enclosure: Environmental Resource Permit with Attachments (27 Pages)

Florida Department of Environmental Protection

Southwest District Office
13051 North Telecom Parkway
Temple Terrace, FL 33637-0926

Permittee/Authorized Entity:
Manatee County
c/o Mike Gore
4410 66th Street W
Bradenton, FL 34210-2606

Manatee County – MARS Chlorination System at the SWWRF

Authorized Agent:
McKim & Creed, Inc.
c/o Blake Peters, P.E.
378 Interstate Court
Sarasota, FL 34240-9495

Individual Environmental Resource Permit

State-owned Submerged Lands Authorization – Not Applicable

U.S. Army Corps of Engineers Authorization – Separate Corps Authorization Not Required

Permit No.: 41-0297915-002

Permit Issuance Date: July 22, 2015
Permit Construction Phase Expiration Date: July 22, 2020

Florida Department of Environmental Protection

Southwest District Office
13051 North Telecom Parkway
Temple Terrace, FL 33637-0926

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

Environmental Resource Permit

Permittee: Manatee County
Permit No: 41-0297915-002

PROJECT LOCATION

The activities authorized by this permit are located at 5105 65th Street W, Bradenton, Florida 34210 2628, in Section 8, Township 35 South, Range 17 East, in Manatee County, at lat 27^0 27' 21.2047"/long 82^0 37' 35.5259".

PROJECT DESCRIPTION

The permittee is authorized to construct a 1,262-square-foot chlorine system building with associated yard piping and a 1,571-square-foot pull-off access area. The project will use the existing stormwater treatment facility to treat and attenuate stormwater runoff from the site improvements. The existing stormwater management system (SWMS) has adequate excess capacity to meet this requirement. The existing SWMS will provide the water quality treatment and attenuation volume to meet both FDEP and Manatee County stormwater criteria. The existing pond has excess capacity due to a previous permit modification (SWFWMD ERP #44035177.00 – 1st 10 MG Storage Tank Project). Under this project, the tank runoff was re-directed to the inside of the tank. By routing runoff that fell on the roof of the tank to the inside of the tank, the impervious area that makes up the footprint of the tank is effectively removed from the contributing area of the existing pond. This modification freed up additional capacity in the stormwater pond to allow additional impervious areas to be developed within the basin. The proposed chlorination building includes a simple roof drain collection system that routes the roof runoff to the ground surface. The roof runoff will sheet flow across the site and into the existing stormwater collection system. Once runoff has reached the collection system, it is allowed to flow to the existing stormwater pond which is not being modified for this project. Provided calculations verify that adequate treatment and attenuation will remain. Authorized activities are depicted on the attached exhibits.

AUTHORIZATIONS

Environmental Resource Permit
The Department has determined that the activity qualifies for an Environmental Resource Permit. Therefore, the Environmental Resource Permit is hereby granted, pursuant to Part IV of Chapter 373, Florida Statutes (F.S.), and Chapter 62-330, Florida Administrative Code (F.A.C.).

Sovereignty Submerged Lands Authorization
As staff to the Board of Trustees of the Internal Improvement Trust Fund (Board of Trustees), the Department has determined the activity is not on submerged lands owned by the State of Florida. Therefore, your project is not subject to the requirements of Chapter 253, F.S., or Rule 18-21, F.A.C.

Federal Authorization
Your proposed activity as outlined on your application and attached drawings has been reviewed for compliance with the State Programmatic General Permit IV-R1 and it has been determined to not be within the jurisdiction of the Corps. No further permitting for these activities is required by the Corps.

Authority for review - an agreement with the USACOE entitled "Coordination Agreement Between the U. S. Army Corps of Engineers (Jacksonville District) and the Florida Department of Environmental Protection, or Duly Authorized Designee, State Programmatic General Permit", Section 10 of the Rivers and Harbor Act of 1899, and Section 404 of the Clean Water Act.

Coastal Zone Management
Issuance of this authorization also constitutes a finding of consistency with Florida's Coastal Zone Management Program, as required by Section 307 of the Coastal Zone Management Act.

Water Quality Certification
This permit also constitutes a water quality certification under Section 401 of the Clean Water Act, 33 U.S.C. 1341.

Other Authorizations
You are advised that authorizations or permits for this activity may be required by other federal, state, regional, or local entities including but not limited to local governments or municipalities. This permit does not relieve you from the requirements to obtain all other required permits or authorizations.

The activity described may be conducted only in accordance with the terms, conditions and attachments contained in this document. Issuance and granting of the permit and authorizations herein do not infer, nor guarantee, nor imply that future permits, authorizations, or modifications will be granted by the Department.

PERMIT CONDITIONS
The activities described must be conducted in accordance with:

- **The Specific Conditions**
- **The General Conditions**
- **The limits, conditions and locations of work shown in the attached drawings**
- **The term limits of this authorization**

You are advised to read and understand these conditions and drawings prior to beginning the authorized activities, and to ensure the work is conducted in conformance with all the terms, conditions, and drawings herein. If you are using a contractor, the contractor also should read and understand these conditions and drawings prior to beginning any activity. Failure to comply with these conditions, including any mitigation requirements, shall be grounds for the Department to revoke the permit and authorization and to take appropriate enforcement action. Operation of the facility is not authorized except when determined to be in conformance with all applicable rules and this permit, as described.

SPECIFIC CONDITIONS

1. Submittals required herein (e.g., progress reports, as-built drawings, etc.) shall include the permittee's name and permit number 41-0297915-002 and shall be directed by e-mail to SW_ERP@dep.state.fl.us with a subject line of "Compliance: permit number 41-0297915-002", or by mail to:

   Department of Environmental Protection
   Southwest District

ATTN: ERP Compliance Assurance
13051 North Telecom Parkway
Temple Terrace, FL 33637-0926

2. The work authorized by this permit shall not be conducted on any property, other than that owned by the permittee, without the prior written approval of that property owner.

3. In the event the permittee files for bankruptcy prior to completion of work permitted and required by this permit, the permittee must notify the Department within 30 days of filing. The notification shall identify the bankruptcy court and case number and shall include a copy of the bankruptcy petition.

SPECIFIC CONDITIONS - PRIOR TO ANY CONSTRUCTION

4. Best management practices for erosion control shall be implemented prior to construction commencement and shall be maintained at all times during construction to prevent siltation and turbid discharges in excess of State water quality standards (>29 NTU's above background, pursuant to Rule 62-302, F.A.C.). Methods may include, but are not limited to the use of staked hay bales, staked filter cloth, sodding, seeding, staged construction and the installation of turbidity screens around the immediate project site. Erosion control methods shall be implemented as depicted in Sheet C-0.2 of the attached permit drawings.

SPECIFIC CONDITIONS – CONSTRUCTION ACTIVITIES

5. Wetland areas or waterbodies that are outside the specific limits of construction authorized by this permit, must be protected from erosion, sedimentation, siltation, scouring, excess turbidity, and/or dewatering. There shall be no discharge in violation of the water quality standards in Chapter 62-302, F.A.C. Turbidity/erosion controls shall be installed prior to clearing, excavation or placement of fill material, shall be maintained until construction is completed, disturbed areas are stabilized, and turbidity levels have fallen to less than 29 NTU's above background ambient background. The turbidity and erosion control devices shall be removed within 14 days once these conditions are met.

6. Areas of exposed soils shall be isolated from wetlands or other surface waters to prevent erosion and deposition of these soils into wetlands or other surface waters during construction and operation of permitted activities.

7. The permittee shall be responsible for ensuring erosion control devices/procedures are inspected and maintained daily during all phases of construction authorized by this permit until areas disturbed during construction are sufficiently stabilized to prevent erosion, siltation, and turbid discharges.

8. This permit does not authorize the installation of water, sewer, cable or utility lines within wetlands or waterbodies.

SPECIFIC CONDITIONS- CONSTRUCTION COMPLETION

(The permittee shall comply with the following conditions prior to the transfer to operation phase of the facility. All documentation required below shall be included with the permittee's request to transfer the project to the operation phase [Form No. 62-330.310(2), F.A.C.].)

9. The permittee shall submit one set of signed, dated and sealed as-built drawings to the Department via email at SW_ERP@dep.state.fl.us for review and approval within 30 days of completion of

construction. (Please contact the Department for files that are too large to email for alternative means of submitting electronically.) The as-built drawings shall be based on the Department permitted construction drawings and any pertinent specific conditions, which should be revised to reflect changes made during construction. Both the original design and constructed elevations must be clearly shown. The plans must be clearly labeled as "as-built" or "record" drawings. Surveyed dimensions and elevations required shall be verified and signed, dated and sealed by a Florida registered professional. *As-builts shall be submitted to the Department regardless of whether or not deviations are present.*

The following information shall be verified on the as-built drawings from the engineering drawings signed and sealed by Blake R. Peters, P.E., #64429, on June 23, 2015:

Plan View/ Cross Section Name	Drawing Number
Proposed Site Plan	C-0.2

SPECIFIC CONDITIONS – MONITORING/REPORTING REQUIREMENTS

10. The SWMS conveyance pipes shall be maintained and kept free of blockage. Ponds must be kept free of obstructions or blockage by sediment. Any scouring or erosion at these locations must be repaired.

11. All ditches and swales from the point at which they receive runoff from the project area and through their entire downstream length shall be well maintained and stabilized to ensure that they are not subject to erosion.

12. The permitted SWMS shall only be used for the purpose of controlling surface water runoff from the site, and shall not be used to dispose of or store any solid/liquid waste or products generated or used during operation or construction of the facility.

13. The permittee shall notify the Department of any sinkhole development in the SWMS within 24 hours after discovery, and must submit a detailed sinkhole evaluation and repair plan for approval by the Department within 30 days of discovery.

14. The operation and maintenance entity shall provide for the inspection of the permitted project after conversion of the permit to the operation and maintenance phase. For systems utilizing retention or wet detention, the inspections shall be performed five (5) years after operation is authorized and every five (5) years thereafter.

    The operation and maintenance entity must maintain a record of each inspection, including the date of inspection, the name and contact information of the inspector, whether the system was functioning as designed and permitted, and make such record available upon request of the District.

    Within 30 days of any failure of a stormwater management system or deviation from the permit, an inspection report shall be submitted using Form 62-330.311(1), "Operation and Maintenance Inspection Certification" describing the remedial actions taken to resolve the failure or deviation.

GENERAL CONDITIONS FOR INDIVIDUAL PERMITS

The following general conditions are binding on all individual permits issued under chapter 62-330, F.A.C., except where the conditions are not applicable to the authorized activity, or where the conditions must be modified to accommodate project-specific conditions.

1. All activities shall be implemented following the plans, specifications and performance criteria approved by this permit. Any deviations must be authorized in a permit modification in accordance with Rule 62-330.315, F.A.C. Any deviations that are not so authorized may subject the permittee to enforcement action and revocation of the permit under Chapter 373, F.S.

2. A complete copy of this permit shall be kept at the work site of the permitted activity during the construction phase, and shall be available for review at the work site upon request by the Agency staff. The permittee shall require the contractor to review the complete permit prior to beginning construction.

3. Activities shall be conducted in a manner that does not cause or contribute to violations of state water quality standards. Performance-based erosion and sediment control best management practices shall be installed immediately prior to, and be maintained during and after construction as needed, to prevent adverse impacts to the water resources and adjacent lands. Such practices shall be in accordance with the *State of Florida Erosion and Sediment Control Designer and Reviewer Manual (Florida Department of Environmental Protection and Florida Department of Transportation June 2007)*, and the *Florida Stormwater Erosion and Sedimentation Control Inspector's Manual (Florida Department of Environmental Protection, Nonpoint Source Management Section, Tallahassee, Florida, July 2008)*, which are both incorporated by reference in subparagraph 62-330.050(9)(b)5., F.A.C., unless a project-specific erosion and sediment control plan is approved or other water quality control measures are required as part of the permit.

4. At least 48 hours prior to beginning the authorized activities, the permittee shall submit to the Agency a fully executed Form 62-330.350(1), "Construction Commencement Notice," [October 1, 2013], which is incorporated by reference in paragraph 62-330.350(1)(d), F.A.C., indicating the expected start and completion dates. A copy of this form may be obtained from the Agency, as described in subsection 62-330.010(5), F.A.C. If available, an Agency website that fulfills this notification requirement may be used in lieu of the form.

5. Unless the permit is transferred under Rule 62-330.340, F.A.C., or transferred to an operating entity under Rule 62-330.310, F.A.C., the permittee is liable to comply with the plans, terms and conditions of the permit for the life of the project or activity.

6. Within 30 days after completing construction of the entire project, or any independent portion of the project, the permittee shall provide the following to the Agency, as applicable:
   a. For an individual, private single-family residential dwelling unit, duplex, triplex, or quadruplex – "Construction Completion and Inspection Certification for Activities Associated With a Private Single-Family Dwelling Unit" [Form 62-330.310(3)]; or
   b. For all other activities – "As-Built Certification and Request for Conversion to Operational Phase" [Form 62-330.310(1)].
   c. If available, an Agency website that fulfills this certification requirement may be used in lieu of the form.

7. If the final operation and maintenance entity is a third party:
   a. Prior to sales of any lot or unit served by the activity and within one year of permit issuance, or within 30 days of as- built certification, whichever comes first, the permittee shall submit, as applicable, a copy of the operation and maintenance documents (see sections 12.3 thru 12.3.3 of Volume I) as filed with the Department of State, Division of Corporations and a copy of any easement, plat, or deed restriction needed to operate or maintain the project, as recorded with the Clerk of the Court in the County in which the activity is located.

b. Within 30 days of submittal of the as- built certification, the permittee shall submit "Request for Transfer of Environmental Resource Permit to the Perpetual Operation Entity" [Form 62-330.310(2)] to transfer the permit to the operation and maintenance entity, along with the documentation requested in the form. If available, an Agency website that fulfills this transfer requirement may be used in lieu of the form.

8. The permittee shall notify the Agency in writing of changes required by any other regulatory agency that require changes to the permitted activity, and any required modification of this permit must be obtained prior to implementing the changes.

9. This permit does not:
   a. Convey to the permittee any property rights or privileges, or any other rights or privileges other than those specified herein or in Chapter 62-330, F.A.C.;
   b. Convey to the permittee or create in the permittee any interest in real property;
   c. Relieve the permittee from the need to obtain and comply with any other required federal, state, and local authorization, law, rule, or ordinance; or
   d. Authorize any entrance upon or work on property that is not owned, held in easement, or controlled by the permittee.

10. Prior to conducting any activities on state-owned submerged lands or other lands of the state, title to which is vested in the Board of Trustees of the Internal Improvement Trust Fund, the permittee must receive all necessary approvals and authorizations under Chapters 253 and 258, F.S. Written authorization that requires formal execution by the Board of Trustees of the Internal Improvement Trust Fund shall not be considered received until it has been fully executed.

11. The permittee shall hold and save the Agency harmless from any and all damages, claims, or liabilities that may arise by reason of the construction, alteration, operation, maintenance, removal, abandonment or use of any project authorized by the permit.

12. The permittee shall notify the Agency in writing:
   a. Immediately if any previously submitted information is discovered to be inaccurate; and
   b. Within 30 days of any conveyance or division of ownership or control of the property or the system, other than conveyance via a long-term lease, and the new owner shall request transfer of the permit in accordance with Rule 62-330.340, F.A.C. This does not apply to the sale of lots or units in residential or commercial subdivisions or condominiums where the stormwater management system has been completed and converted to the operation phase.

13. Upon reasonable notice to the permittee, Agency staff with proper identification shall have permission to enter, inspect, sample and test the project or activities to ensure conformity with the plans and specifications authorized in the permit.

14. If any prehistoric or historic artifacts, such as pottery or ceramics, stone tools or metal implements, dugout canoes, or any other physical remains that could be associated with Native American cultures, or early colonial or American settlement are encountered at any time within the project site area, work involving subsurface disturbance in the immediate vicinity of such discoveries shall cease. The permittee or other designee shall contact the Florida Department of State, Division of Historical Resources, Compliance and Review Section, at (850) 245-6333 or (800) 847-7278, as well as the appropriate permitting agency office. Such subsurface work shall not resume without verbal or written authorization from the Division of Historical Resources. If unmarked human remains are encountered, all work shall stop immediately and notification shall be provided in accordance with Section 872.05, F.S.

15. Any delineation of the extent of a wetland or other surface water submitted as part of the permit application, including plans or other supporting documentation, shall not be considered binding unless a specific condition of this permit or a formal determination under Rule 62-330.201, F.A.C., provides otherwise.

16. The permittee shall provide routine maintenance of all components of the stormwater management system to remove trapped sediments and debris. Removed materials shall be disposed of in a landfill or other uplands in a manner that does not require a permit under Chapter 62-330, F.A.C., or cause violations of state water quality standards.

17. This permit is issued based on the applicant's submitted information that reasonably demonstrates that adverse water resource-related impacts will not be caused by the completed permit activity. If any adverse impacts result, the Agency will require the permittee to eliminate the cause, obtain any necessary permit modification, and take any necessary corrective actions to resolve the adverse impacts.

18. A Recorded Notice of Environmental Resource Permit may be recorded in the county public records in accordance with subsection 62-330.090(7), F.A.C. Such notice is not an encumbrance upon the property.

NOTICE OF RIGHTS

This action is final and effective on the date filed with the Clerk of the Department unless a petition for an administrative hearing is timely filed under Sections 120.569 and 120.57, F.S., before the deadline for filing a petition. On the filing of a timely and sufficient petition, this action will not be final and effective until further order of the Department. Because the administrative hearing process is designed to formulate final agency action, the hearing process may result in a modification of the agency action or even denial of the application.

Petition for Administrative Hearing

A person whose substantial interests are affected by the Department's action may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, F.S. Pursuant to Rule 28-106.201, F.A.C., a petition for an administrative hearing must contain the following information:

(a) The name and address of each agency affected and each agency's file or identification number, if known;
(b) The name, address, any email address, any facsimile number, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests are or will be affected by the agency determination;
(c) A statement of when and how the petitioner received notice of the agency decision;
(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
(e) A concise statement of the ultimate facts alleged, including the specific facts that the petitioner contends warrant reversal or modification of the agency's proposed action;
(f) A statement of the specific rules or statutes that the petitioner contends require reversal or modification of the agency's proposed action, including an explanation of how the alleged facts relate to the specific rules or statutes; and
(g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wishes the agency to take with respect to the agency's proposed action.

The petition must be filed (received by the Clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. Also, a copy of the petition shall be mailed to the applicant at the address indicated above at the time of filing.

Time Period for Filing a Petition

In accordance with Rule 62-110.106(3), F.A.C., petitions for an administrative hearing by the applicant must be filed within 21 days of receipt of this written notice. Petitions filed by any persons other than the applicant, and other than those entitled to written notice under Section 120.60(3), F.S., must be filed within 21 days of publication of the notice or within 21 days of receipt of the written notice, whichever occurs first. Under Section 120.60(3), F.S., however, any person who has asked the Department for notice of agency action may file a petition within 21 days of receipt of such notice, regardless of the date of publication. The failure to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, F.A.C.

Extension of Time

Under Rule 62-110.106(4), F.A.C., a person whose substantial interests are affected by the Department's action may also request an extension of time to file a petition for an administrative hearing. The Department may, for good cause shown, grant the request for an extension of time. Requests for extension of time must be filed with the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, before the applicable deadline for filing a petition for an administrative hearing. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

Mediation

Mediation is not available in this proceeding.

FLAWAC Review

The applicant, or any party within the meaning of Section 373.114(1)(a) or 373.4275, F.S., may also seek appellate review of this order before the Land and Water Adjudicatory Commission under Section 373.114(1) or 373.4275, F.S. Requests for review before the Land and Water Adjudicatory Commission must be filed with the Secretary of the Commission and served on the Department within 20 days from the date when this order is filed with the Clerk of the Department.

Judicial Review

Once this decision becomes final, any party to this action has the right to seek judicial review pursuant to Section 120.68, F.S., by filing a Notice of Appeal pursuant to Rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, M.S. 35, Tallahassee, Florida 32399-3000; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this action is filed with the Clerk of the Department.

Executed in Hillsborough County, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Kelley M. Boatwright
Program Administrator
Permitting and Waste Cleanup Program
Southwest District

Attachments:
Project Drawings and Design Specs. (10 Pages)
Construction Commencement Notice/Form 62-330.350(1)
As-built Certification and Request for Conversion to Operational Phase/Form 62-330.310(1)
Request for Transfer to the Perpetual Operation Entity/Form 62-330.310(2)
Request to Transfer Permit/Form 62-330.340(1)
Operation and Maintenance Inspection Certification/Form 62-330.311(1)

Copies furnished to:
Curtis R. Burkett, P.E., McKim & Creed, Inc., cburkett@mckimcreed.com
Blake Peters, P.E., McKim & Creed, Inc., bpeters@mckimcreed.com
Mike Nixon, P.E., McKim & Creed, Inc., mnixon@mckimcreed.com

CERTIFICATE OF SERVICE

The undersigned hereby certifies that this permit, including all copies, were mailed before the close of business on **July 22, 2015**, to the above listed persons.

FILING AND ACKNOWLEDGMENT

FILED, on this date, under 120.52(7) of the
Florida Statutes, with the designated Department Clerk,
receipt of which is hereby acknowledged.

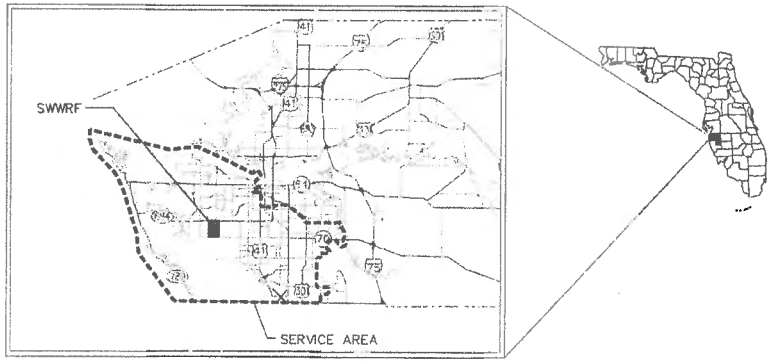
Cynthia Gracious July 22, 2015
Clerk Date

MARS CHLORINATION AT THE SWWRF

COUNTY PROJECT #12-0588BG
ISSUE FOR PERMIT
MAY 2015

Manatee County
FLORIDA

MANATEE COUNTY, FLORIDA



PROJECT VICINITY MAP

McKIM&CREED
370 Interstate Court
Sarasota, FL 34240
Phone: (941)379-3404, Fax. (941)379-3530
CA Lic. No. 29588
www.mckimcreed.com

BLAKE R. PETERS
LICENSE
No. 64429
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

BLAKE PETERS P.E.
No. 64429

COVER | ISSUE FOR PERMIT | MAY 2015 | MARS CHLORINATION AT THE SWWRF 1024-0168

GENERAL NOTES:

1. THESE PLANS ARE SOLELY TO ASSIST THE CONTRACTOR IN ASSESSING THE NATURE AND EXTENT OF THE EXISTING CONDITIONS WHICH MAY BE ENCOUNTERED DURING THE COURSE OF THE WORK. CONTRACTORS ARE DIRECTED, TO CONDUCT WHATEVER INVESTIGATION THEY DEEM NECESSARY, PRIOR TO BIDDING, TO DETERMINE THE ACTUAL CONDITIONS THAT WILL BE ENCOUNTERED.
2. LOCATIONS, ELEVATIONS AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN BASED ON THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THESE PLANS BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT. THE CONTRACTOR SHALL VERIFY, PRIOR TO CONSTRUCTION, THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES (WHETHER OR NOT SHOWN ON THE PLANS) AFFECTING HIS WORK.
3. THE CONTRACTOR SHALL REVIEW AND VERIFY ALL DIMENSIONS ON THE PLANS AND REVIEW ALL FIELD CONDITIONS THAT MAY AFFECT CONSTRUCTION. SHOULD DISCREPANCIES OCCUR, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO OBTAIN WRITTEN CLARIFICATION BEFORE COMMENCING WITH CONSTRUCTION.
4. THE CONTRACTOR SHALL PROTECT ALL EXISTING STRUCTURES, STORM DRAINS, SEWERS, UTILITIES, AND OTHER FACILITIES IN THE CONSTRUCTION AREA. THE CONTRACTOR SHALL REPAIR ANY DAMAGES DUE TO HIS CONSTRUCTION ACTIVITIES AT NO ADDITIONAL COST TO THE OWNER.
5. WHERE IT IS NECESSARY TO DEFLECT PIPE EITHER HORIZONTALLY OR VERTICALLY, PIPE JOINT DEFLECTION SHALL NOT EXCEED 75%% OF THE MANUFACTURERS' MAXIMUM RECOMMENDED DEFLECTION.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF THE EXISTING DRAINAGE SYSTEM WITHIN THE LIMITS OF THE PROJECT AREA FOR THE DURATION OF THE PROJECT.
7. THE CONTRACTOR SHALL PROVIDE CERTIFIED RECORD DRAWINGS AS OUTLINED IN THE SPECIFICATIONS. RED-LINE DRAWINGS SHALL BE CURRENT WITH EACH PAY APPLICATION SUBMITTED AND WILL BE CHECKED AS PART OF THE PAY APPLICATION REVIEW PROCESS. PAYMENT WILL NOT BE MADE TO CONTRACTOR WITHOUT APPROVED RED-LINE DRAWINGS.
8. FIELD CONDITIONS MAY NECESSITATE ALIGNMENT AND GRADE DEVIATION OF THE PROPOSED PIPELINES TO AVOID CONFLICTS. NO ADDITIONAL PAYMENT SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE OWNER AND THE OWNER'S ENGINEER.
9. THE CONTRACTOR SHALL INCLUDE IN HIS BID: BY-PASS PUMPING FACILITIES, PUMPS, FITTINGS, LABOR, ETC. AS NECESSARY, BASED ON METHOD AND SEQUENCE OF CONSTRUCTION TO COMPLETE ALL WORK WHILE MAINTAINING THE EXISTING OPERATIONS AT ALL TIMES.
10. ALL PROPOSED WORK SHALL BE COORDINATED WITH MANATEE COUNTY UTILITIES DEPARTMENT
11. THE CONTRACTOR SHALL FURNISH SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL OF ALL PIPE CONNECTIONS, TRANSITIONS, AND SPECIALS PRIOR TO FABRICATION OR DELIVERY TO THE JOB SITE.
12. CONNECTIONS TO EXISTING FACILITIES SHALL BE ACCOMPLISHED IN A NEAT WORKMANLIKE MANNER. WHEN FIELD CONDITIONS INDICATE ANY VARIANCE FROM DETAILED METHODS, THE CONTRACTOR SHALL PROVIDE COMPREHENSIVE AND DETAILED DRAWINGS FOR OWNER REVIEW AND APPROVAL PRIOR TO MAKING THE CONNECTIONS.
13. UNLESS OTHERWISE INDICATED OR APPROVED, ALL BELOW GROUND DUCTILE IRON PIPE SHALL HAVE PUSH-ON OR MECHANICAL JOINTS, AND ALL ABOVE GROUND DUCTILE IRON PIPE SHALL HAVE FLANGED JOINTS. ALL JOINTS SHALL BE FULLY RESTRAINED.
14. ALL PIPELINES SHALL HAVE A MINIMUM COVER OF 36" BELOW EXISTING GRADE UNLESS OTHERWISE NOTED OR DIRECTED.
15. WATER SHALL NOT BE PERMITTED IN EXCAVATIONS AND TRENCHES DURING CONSTRUCTION. DEWATERING IS REQUIRED TO A MINIMUM OF 18" BELOW BOTTOM OF EXCAVATION.
16. THE CONTRACTOR SHALL NOT ALLOW ANY DISCHARGE OF RECLAIMED WATER TO LANDS AND/OR ADJACENT WATER BODIES OR STORM DRAINS. ANY LEAKAGE MUST BE CONTAINED AND TRANSFERRED BY THE CONTRACTOR.
17. ALL BELOW-GRADE FITTINGS SHALL BE MECHANICAL JOINT DUCTILE IRON WITH CEMENT LINING FOR ALL PIPE 4-INCHES AND GREATER IN DIAMETER.
18. ALL EXPOSED PIPING SHALL BE PAINTED WITH DESIGNATED COLORS ASSOCIATED WITH THEIR USAGE AS PROVIDED IN THE SPECIFICATIONS.
19. ALL NEW PIPELINES SHALL BE FLUSHED, PRESSURE TESTED, AND APPROVED PRIOR TO TIE-INS TO EXISTING FACILITIES. THE CONTRACTOR WILL BE ALLOWED TO USE TEMPORARY PLUGS FOR PRESSURE TESTING.
20. ALL CONCRETE THRUST BLOCKS INSTALLED FOR TESTING PURPOSES AND NOT REQUIRED FOR THE PIPELINE SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR PRIOR TO FINAL ACCEPTANCE.
21. CONTRACTOR SHALL MAINTAIN A CLEAR PATH FOR ALL SURFACE WATER DRAINAGE STRUCTURES AND DITCHES DURING ALL PHASES OF CONSTRUCTION.THE CONTRACTOR SHALL BE REQUIRED TO INSTALL ALL EROSION, SEDIMENT AND TURBIDITY CONTROL MEASURES PRIOR TO CONSTRUCTION OF ANY COMPONENTS ASSOCIATED WITH THE PROJECT. SEDIMENT CONTROL INCLUDES SILT DAMS,TRAPS, EROSION PROTECTION, AND ANY OTHER APPURTENANCES NEEDED BUT NOT NECESSARILY SHOWN ON THESE DRAWINGS
22. CONTRACTOR SHALL PROVIDE PROTECTIVE MATTING, FUEL CONTAINMENT AND ALL OTHER MATERIALS, EQUIPMENT AND LABOR TO PROTECT THE STAGING AREA DURING CONSTRUCTION.
23. CONTRACTOR SHALL, PRIOR TO BEGINNING CONSTRUCTION, SUBMIT A "FUELING SPILL PREVENTION PLAN" THAT SHALL CLEARLY INDICATE HOW FUEL SPILLS WILL BE PREVENTED WHEN FUELING BOTH WITHIN AND OUTSIDE OF THE STAGING AREA.
24. CONTRACTOR SHALL SUBMIT A DEWATERING PLAN FOR APPROVAL PRIOR TO BEGINNING CONSTRUCTION. DEWATERING SHALL BE CONDUCTED IN ACCORDANCE WITH THE BMPS IDENTIFIED IN CHAPTER 4, 4.40 "DEWATERING" OF "THE FLORIDA STORMWATER EROSION AND SEDIMENTATION CONTROL INSPECTOR'S MANUAL".
25. CONTRACTOR SHALL COORDINATE THE WORK SUCH THAT THE PLANT SHALL STAY IN OPERATION AT ALL TIMES.
26. LINE INACTIVATIONS SHALL BE CONDUCTED AT OFF PEAK TIMES AS DICTATED BY PLANT OPERATIONS STAFF.
27. ALL WORK, EQUIPMENT AND MATERIALS SHALL MEET OR EXCEED CURRENT MANATEE COUNTY STANDARDS UNLESS OTHERWISE NOTED HEREIN OR IN TECHNICAL SPECIFICATIONS.

RESTORATION AND MISCELLANEOUS NOTES

1. THE CONTRACTOR SHALL PROVIDE AN ASPHALT PATCH FOR TRENCH AREAS CONSTRUCTED IN EXISTING ROADWAYS. ADJUST ALL CASTINGS TO MATCH NEW PAVEMENT SURFACE.
2. THE CONTRACTOR SHALL REPLACE ALL EXISTING PAVING, STABILIZED EARTH, CURBS, SIDEWALKS, FENCES, LANDSCAPING AND OTHER IMPROVEMENTS WITH THE SAME OR BETTER TYPE OF MATERIAL THAT WAS REMOVED DURING CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
3. ALL RESTORATION WORK PERFORMED THROUGHOUT THE PROJECT SHALL CONFORM TO EXISTING LINES AND GRADES UNLESS OTHERWISE NOTED.
4. ALL EXISTING FENCES DISTURBED DURING CONSTRUCTION SHALL BE REPLACED AND REINSTALLED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER UNLESS SHOWN TO BE REMOVED ON CONSTRUCTION PLANS.
5. LIMITS OF PROPOSED ROADWAY OVERLAY SHOWN ARE APPROXIMATE. CONTRACTOR SHALL OVERLAY ALL DISTURBED AREAS OF ACCESS ROAD AS PART OF THIS PROJECT.
6. CONTRACTOR SHALL RESTORE ALL IRRIGATION SYSTEM COMPONENTS TO PRE-CONSTRUCTION CONDITIONS
7. CONTRACTOR SHALL RESTORE GRADE TO PRECONSTRUCTION ELEVATIONS UNLESS OTHERWISE NOTED.

SURVEY NOTES

1. ELEVATIONS SHOWN ON THE PLANS REFERENCE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (N.G.V.D. - 1929). HORIZONTAL DATUM IS NORTH AMERICAN DATUM 1983/1990 ADJUSTED STATE PLANE COORDINATE SYSTEM (SPCS).
2. CONTRACTOR SHALL EMPLOY A PROFESSIONAL SURVEYOR, LICENSED IN THE STATE OF FLORIDA TO PERFORM CONSTRUCTION STAKING IN ACCORDANCE WITH RULE 61G17-6.004(3) OF THE FLORIDA ADMINISTRATIVE CODE.
3. THE LOCATIONS AND ELEVATIONS OF ALL EXISTING FACILITIES SHOWN WITHIN THE LIMITS OF CONSTRUCTION ARE PROVIDED BY URS AND THE 100% PLANS DATED JANUARY 2012 AS PART OF THE SECOND 10 MG RECLAIMED WATER STORAGE TANK AND HIGH SERVICE PUMP STATION AT THE SOUTHWEST WATER RECLAMATION FACILITY PROJECT PREPARED BY URS CORPORATION.

UTILITY NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE FOLLOWING JURISDICTIONAL BODIES AND UTILITY COMPANIES:

CALL LOCAL PUBLIC UTILITY NOTIFICATION CENTER

MANATEE COUNTY TRANSPORTATION DEPT. GENE RIGGS 2904 12TH STREET COURT E. BRADENTON, FL 34208 (941) 708-7506 Ext. 7301	VERIZON FLORIDA, INC. DON DURDEN 1701 RINGLING BLVD SARASOTA, FL 34236 (941) 952-5616
MANATEE COUNTY UTILITIES OPERATIONS BOB CROUCH 4422-C 66TH STREET W. BRADENTON, FL 34210 (941) 792-8811 Ext 5075	BRIGHTHOUSE NETWORK, LLC WALTER KROL 5413 S.R. 64 E BRADENTON, FL 34208 (941) 748-3816 Ext. 24053
FLORIDA POWER AND LIGHT LARRY RUSSO 125 12TH AVENUE EAST BRADENTON, FL 34208 (941) 723-4424	TECO/PEOPLES GAS TED FELEGY 8261 VICO CT SARASOTA, FL 34240 (941) 342-4026

2. ALL BELOW GROUND DUCTILE IRON PIPE SHALL BE ENCASED IN A POLYETHYLENE WRAP IN ACCORDANCE WITH AWWA STANDARDS.
3. ALL VALVE BOXES AND COVERS SHALL BE PAINTED TO INDICATE THEIR TYPE OF SERVICE.
4. ADJUST ALL EXISTING MANHOLE FRAMES AND COVERS AND VALVE BOXES TO MATCH FINAL GRADE.

STORM DRAINAGE NOTES:

1. THE CONTRACTOR SHALL PHYSICALLY LOCATE EXISTING STORM INFRASTRUCTURE AT THE PROPOSED CONNECTIONS TO THE EXISTING INFRASTRUCTURE TO VERIFY THE SIZE, MATERIAL, LOCATION, ELEVATION, AND CONDITION OF THE EXISTING INFRASTRUCTURE PRIOR TO THE START AND PRIOR TO ORDERING PRE-CAST STRUCTURES.
2. THE CONTRACTOR SHALL MAINTAIN THE FUNCTIONALITY OF THE EXISTING STORMWATER SYSTEMS THROUGHOUT CONSTRUCTION WITHOUT IMPEADING EXISTING DRAINAGE THROUGHOUT CONSTRUCTION.
3. THE CONTRACTOR WILL BE RESPONSIBLE FOR MAINTENANCE OF THE STORM DRAIN SYSTEM WITHIN THE PROJECT LIMITS DURING THE CONSTRUCTION PERIOD. THE STORM DRAIN SYSTEM SHALL BE KEPT FREE FROM SEDIMENTAION AND DEBRIS. THE CONTRACTOR SHALL INSPECT THE STORM DRAIN SYSTEM AT A MINIMUM OF ONCE PER MONTH.
4. THE CONTRACTOR SHALL CLEAN AND INSPECT ALL EXISTING STORM PIPES FROM OUTSIDE THE ROW TO BE CONNECTED INTO THE PROPOSED SYSTEM FOR A MIN. OF 20' UPSTREAM OF THE PROPOSED CONNECTION POINT. THE CONTRACTOR SHALL CLEAN AND INSPECT ALL EXISTING STORM PIPES WITHIN PUBLIC RIGHT-OF-WAYS UP TO THE NEXT EXISTING STORM STRUCTURE. THIS IS INCIDENTAL TO THE COST OF CONSTRUCTION.
5. PRIOR TO FINAL ACCEPTANCE OF THE PROJECT, THE CONTRACTOR SHALL CLEAN AND INSPECT EXISTING STORM PIPES DOWNSTREAM OF THE PROPOSED CONNECTION. THE EXISTING PIPES SHALL BE CLEAN AND FREE OF SEDIMENT AND DEBRIS DOWNSTREAM OF THE PROPOSED CONNECTION POINTS.
6. ALL RCP STORM PIPES WITH MORE THAN 2' OF COVER SHALL BE CLASS III, STORM PIPES WITH LESS THAN 2' OF COVER SHALL BE CLASS V.
7. CONTRACTOR SHALL ADHERE TO THE EXISTING STORM WATER PERMIT IN PLACE FOR THIS FACILITY.
8. SHOULD EXISTING CONDITIONS VERY FROM THOSE SHOWN ON THE PLANS, THE CONTRACTOR IS TO NOTIFY THE ENGINEER
9. POSITIVE DRAINAGE SHALL BE ESTABLISHED AWAY FROM THE PROPOSED STRUCTURE.
10. PROTECT EXISTING MONITORING WELL LOCATED WITHIN/ADJACENT TOT THE PROJECT AREA.

DEWATERING NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL DEWATERING ACTIVITIES.
2. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY AND ALL AUTHORIZATIONS OR PERMITS ASSOCIATED WITH DEWATERING ACTIVITIES INCLUDING OBTAINING ANY APPLICABLE WATER TESTING AS NEEDED.
3. CONTRACTOR SHALL PREPARE AND SUBMIT A DEWATERING PLAN SHOWING APPLICABLE BEST MANAGEMENT PRACTICES FOR REVIEW AND APPROVAL PRIOR TO ANY DEWATERING ACTIVITIES. THE PROPOSED DEWATERING PLAN SHALL ALSO INCLUDE THE PROPOSED POINT(S) OF DISCHARGE.
4. APPLICABLE SOIL EROSION AND SEDIMENTATION CONTROL (SESC) MEASURES INCLUDING, BUT NOT LIMITED TO TEMPORARY SEDIMENT TRAP(S), SETTLEMENT TANK(S), STAKED BALES, RIP RAP, SILT FENCE, FILTER BAGS, AND/OR ROCK CHECK DAMS, SHALL BE INSTALLED PRIOR TO ANY DEWATERING ACTIVITIES. THE CONTRACTOR SHALL MAINTAIN AND INSPECT DAILY.
5. THE CONTRACTOR IS RESPONSIBLE FOR STABILIZING AND MAINTAINING ALL DEWATERING EQUIPMENT AND S.E.S.C. MEASURES.

DURING DEWATERING ACTIVITIES:

1. DEWATERING DISCHARGE FLOW RATES SHALL BE RESTRICTED SO AS TO AVOID EROSION OF SOILS, EROSION CONTROL MEASURES, OR TRANSPORT OF SEDIMENT.
2. THE CONTRACTOR SHALL PERFORM DAILY INSPECTIONS OF THE DEWATERING EQUIPMENT, DISCHARGE, SEDIMENT TRAP(S), SETTLEMENT TANK(S), AND/OR POND(S) FOR SIGNS OF EROSION, SILTATION, OR OTHER DAMAGE. SHOULD ANY EROSION, SILTATION, OR OTHER DAMAGE BE OBSERVED, THE CONTRACTOR SHALL IMMEDIATELY MAKE ADJUSTMENTS TO DEWATERING ACTIVITIES AS NEEDED TO PREVENT FURTHER DAMAGE AND SHALL REPAIR ANY DAMAGE WITHIN 24 HOURS OF OBSERVATION.

DEWATERING SEQUENCE:

1. ALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO THE START OF ANY CONSTRUCTION AND/OR DEWATERING ACTIVITIES AND SHALL REMAIN IN PLACE UNTIL WORK IS COMPLETE.
2. FOLLOWING THE COMPLETION OF DEWATERING, THE CONTRACTOR SHALL REMOVE ALL WELL POINTS, PIPES, PUMPS, AND ANY ADDITIONAL DEWATERING EQUIPMENT FROM THE PROJECT SITE.
3. FOLLOWING THE REMOVAL OF DEWATERING EQUIPMENT, THE CONTRACTOR SHALL EXCAVATE ANY SEDIMENT OR MUCK ACCUMULATED WITHIN THE TEMPORARY SEDIMENT TRAP(S), SETTLEMENT TANK(S), AND/OR POND(S) AND DISPOSE OF SEDIMENT TO A QUALIFIED LAND FILL.
4. FOLLOWING REMOVAL OF SEDIMENT, THE CONTRACTOR SHALL REMOVE THE SETTLEMENT TANK(S) AND/OR FILL THE SEDIMENT TRAP(S) WITH CLEAN SANDY SOIL TO RESTORE THE NATURAL GRADE AND SOD OVER AS SOON AS PRACTIBLY POSSIBLE.

SOIL EROSION & SEDIMENTATION CONTROL NOTES:

1. ALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO THE START OF ANY CONSTRUCTION, DEMOLITION, DEWATERING, OR MOBILIZATION ACTIVITIES, MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL REMAIN IN PLACE UNTIL WORK IS COMPLETE.
2. CONTRACTOR SHALL FOLLOW BEST MANAGEMENT PRACTICES THROUGHOUT DEMOLITION AND CONSTRUCTION.
3. HAY BALES AND/OR SILT SCREENS SHALL BE INSTALLED ADJACENT TO THE WORK AREAS TO PREVENT SEDIMENT TRANSPORT PRIOR TO THE COMMENCEMENT OF WORK.
4. INLET PROTECTION SHALL BE PLACED AT ALL EXISTING AND PROPOSED INLETS IN OR ADJACENT TO THE PROJECT AREA.
5. AS SOON AS PRACTICAL, ALL DRESSED SLOPES AND DISTURBED AREAS SHALL BE SODDED OR SEEDED AND MULCHED TO PREVENT EROSION.
6. NO EXCAVATION SHALL EXTEND BELOW THE DEPTHS/ELEVATIONS SHOWN ON THE DRAWINGS OR IN THE SPECIFICATIONS WITHOUT PRIOR APPROVAL.
7. CONTRACTOR SHALL PREPARE AND SUBMIT A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) FOR REVIEW AND APPROVAL PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES AND PROVIDE APPROVED FDEP NOI TO CITY.
8. CONTRACTOR SHALL PREPARE AND SUBMIT A DISPOSAL PLAN FOR EXCAVATION MATERIAL INCLUDING THE LOCATION OF DISPOSAL SITE(S) AND DISPOSAL PLANS SHOWING APPLICABLE BEST MANAGEMENT PRACTICES FOR REVIEW AND APPROVAL PRIOR TO ANY EARTHWORK ACTIVITIES.

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BLAKE R. PETERS
LICENSE No. 64429
STATE OF FLORIDA
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REVISIONS

McKIM&CREED
378 Interstate Court
Sarasota, FL 34240
Phone: (941)379-3404, Fax: (941)379-3530
CA Lic. No. 29560
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Manatee County FLORIDA

MARS CHLORINATION SYSTEM AT THE SWWRF

GENERAL NOTES AND DRAWINGS INDEX

DATE:	MAY 2015
MCE PROJ. #	1024-0188
DRAWN	OES
DESIGNED	BRP
CHECKED	JSL
PROJ. MGR.	BRP

SCALE: HORIZONTAL: AS SHOWN; VERTICAL: AS SHOWN

G-0.2

STATUS: ISSUE FOR PERMIT

GENERAL ABBREVIATIONS

@	AT
ABW	AUTOMATIC BACKWASH
A/C	AIR CONDITIONER UNIT
AC	ACRES
AC	ASPHALTIC CONCRETE
ABD	ABANDONED
AL /ALUM	ALUMINUM
ANCH	ANCHOR
APPROX	APPROXIMATE
BLDG.	BUILDING
BM	BEAM
BOT./BOTT.	BOTTOM
(C)	CALCULATED DATA
C	CHANNEL
C.	CONDUIT
C.B.	CATCH BASIN
CCR	CERTIFIED CORNER RECORD
CHKR	CHECKERED
CIR.	CIRCLE
CLF	CHAIN LINK FENCE
℄	CENTERLINE
CMP	CORRUGATED METAL PIPE
COL.	COLUMN
CONN	CONNECTOR/CONNECTION
CONC.	CONCRETE
COR	CORNER
CPB	CONDOMINIUM PLAT BOOK
C/T	CURB TIE
CU.	COPPER
(D)	DEED DATA
D.	DEEP/DRAIN
DB	DEED BOOK
DBL.	DOUBLE
DWH.	DESIGN HIGH WATER
DISCH.	DISCHARGE
DN.	DOWN
DRWY	DRIVEWAY
E.W.	EACH WAY
EA.	EACH
ECMP	ELLIPTICAL CORRUGATED METAL PIPE
EL./ELEV.	ELEVATION
ELEC.	ELECTRICAL CONDUIT
EP	EDGE OF PAVEMENT
FRCP	ELLIPTICAL REINFORCED CONCRETE PIPE
ETC.	AND SO FORTH
EXIST	EXISTING
EXP.	EXPANSION
(F)	FIELD DATA
FCM	FOUND CONCRETE MONUMENT
FDOT	FLORIDA DEPARTMENT OF TRANSPORTATION
FF	FINISHED FLOOR
FIR	FOUND IRON ROD
FND	FOUND NAIL & DISC
FOP	FOUND OPEN PIPE
FPP	FOUND PINCHED PIPE
FRRS	FOUND RAILROAD SPIKE
F/T	FENCE TIE
FT.	FOOT
FTG.	FOOTING
FXC	FOUND X-CUT
GALV.	GALVANIZED
GDRL	GUARDRAIL
GE	GRATE ELEVATION
GEN	GENERATOR
GI	GRATED INLET
GPM	GALLONS PER MINUTE
GRTG	GRATING
G.S.	GALVANIZED STEEL
GR./GRD.	GRADE
GWP	GUY WIRE POLE
HDWALL	HEADWALL
H.R.	HANDRAIL
HWL	HIGH WATER LEVEL
IE	INVERT ELEVATION
IN.	INCH
INV.	INVERT
IP	IRON PIPE
IR	IRON ROD
J.B.	JUNCTION BOX
JT.	JOINT
(L)	LEGAL DESCRIPTION DATA
LB	LICENSED BUSINESS
LG.	LONG
LN.	LANE
LP	LIGHT POLE
LS	LICENSED SURVEYOR
MAR.	MASONRY
MARS	MANATEE AGRICUTUAL REUSE SYSTEM
MAX.	MAXIMUM
MCC	MOTOR CONTROL CENTER
MCMRS	MANATEE COUNTY MASTER REUSE SYSTEM
MES	MITERED END SECTION
MG	MILLION GALLONS
MGD	MILLION GALLONS PER DAY
MHW	MEAN HIGH WATER
MON	MONUMENT
NaOCL	SODIUM HYPOCHLORITE
NG	NATURAL GROUND
N.T.S.	NOT TO SCALE
NO.	NUMBER
NP	NORMAL POOL
ø	DIAMETER/PHASE
O/A	OVERALL
OPNG.	OPENING
OR	OFFICIAL RECORDS BOOK
(P)	PLAT BOOK
PCCP	PRE-STRESSED CONCRETE PIPE
PG	PAGE
PLCS.	PLACES
PLS	PROFESSIONAL LAND SURVEYOR
POB	POINT OF BEGINNING
POC	POINT OF COMMENCEMENT
POT	POTABLE
PP	POWER POLE
PRM	PERMANENT REFERENCE MONUMENT
PROP.	PROPOSED
PSM	PROFESSIONAL SURVEYOR & MAPPER
P/T	PAVEMENT TIE
P.V	PLUG VALVE
PVMT	PAVEMENT
R	RADIUS/RISER/RELAY
RCP	REINFORCED CONCRETE PIPE
REF.	REFERENCED
REINF.	REINFORCED/REINFORCING
REQ'D	REQUIRED
RESTR.	RESTRAINED
RLS	REGISTERED LAND SURVEYOR
R/W R/W	RIGHT-OF-WAY
SAN.	SANITARY
SEC.	SECTION
SGL.	SINGLE
SHW	SEASONAL HIGH WATER
SIR	SET IRON ROD ½" LB 6113
SND	SET NAIL & DISC LB 6113
SPRK	SPRINKLER
SQ.	SQUARE
SN.	SIGN
SR	STATE ROAD
SSMH	SANITARY SEWER MANHOLE
S/T	SIDEWALK TIE
STL.	STEEL
STY.	STORY
S/W,SWK	SIDEWALK
SYM.	SYMBOL
TBM	TEMPORARY BENCH MARK
TOB	TOP OF BANK
T.&B.	TOP & BOTTOM
TEL.	TELEPHONE
TEMP.	TEMPORARY
THK	THICK
TOS	TOE OF SLOPE
TYP.	TYPICAL
UG	UNDERGROUND GAS
UP	UTILITY POLE
UT	UNDERGROUND TELEPHONE
VCP	VITRIFIED CLAY PIPE
VERT.	VERTICAL
W	WIDE FLANGE/WIDE/WATER
W/	WITH
WF	WOOD FENCE
W/L	WATER LINE
W.L.	WATER LEVEL
W/M	WATER MAIN
W.M.	WATER METER
W.P.	WEATHER PROOF
W.S.	WALL SLEEVE/WATER STOP/WATER SERVICE
W/T	WALL TIE
WTR	WATER

FLOW ABBREVIATIONS

AL	ALUM SOLUTION
AB	AERATION BASIN
AD	AEROBIC DIGESTER
AK	ANOXIC BASIN
BA	BLOWER AIR
BP	BYPASS
BW	BACKWASH
CA	COMPRESSED AIR
CCC	CHLORINE CONTACT CHAMBER
CCE	CHLORINATED EFFLUENT
CF	CLOTH FILTER
CLE	CLARIFIER EFFLUENT
CLG	CHLORINE GAS
CLS/CL2S	CHLORINE SOLUTION
D/DR	DRAIN
DAF	DISSOLVED AIR FLOTATION
DS	DEWATERED SLUDGE
EFF	EFFLUENT
EXP	EXPANSION
FBW	FILTER BACKWASH
FC	FINAL CLARIFIER
FE	FILTER EFFLUENT
FLE	FILTERED LAKE EFFLUENT
FLW	FLOCCULATED WATER
FM	FLOW METER
FW	FILTERED WATER
GBT	GRAVITY BELT THICKENER
GR	GRIT
HDW	HEADWORKS
INF	INFLUENT
IR	INTERNAL RECYCLE
HSBFP	HIGH SOLIDS BELT FILTER PRESS
ML	MIXED LIQUOR
OF	OVERFLOW
P	POLYMER
PD	PLANT DRAIN
PDFM	PLANT DRAIN FORCE MAIN
PS	PUMP STATION
PW	POTABLE WATER
RAS	RETURNED ACTIVATED SLUDGE
RCW	RECLAIMED WATER
REJ	REJECT
RML	RECIRCULATED MIXED LIQUOR
RW	REUSE WATER
SAM	SAMPLE
SB	SPLITTER BOX
SC	SCUM
SDR	STORMWATER DRAINAGE
SL	SAMPLE LINE
SS	SANITARY SEWER
TC	THICKENED SLUDGE
WAS	WASTE ACTIVATED SLUDGE
WBW	WASTE BACKWASH WATER
WW	WASTEWATER

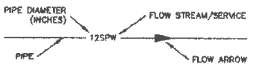
PIPING ABBREVIATIONS

ARV	AIR RELEASE VALVE
ABD	ABANDONED
BFV	BUTTERFLY VALVE
BPSV	BACK PRESSURE SUSTAINING VALVE
BV	BALL VALVE
CB	CATCH BASIN
CO	CLEANOUT
CORP	CORPORATION
CV	CHECK VALVE
DI	DUCTILE IRON
DIA	DIAMETER
D.I.P.	DUCTILE IRON PIPE
ELEC	ELECTRICAL
EXIST.	EXISTING
FHA	FIRE HYDRANT ASSEMBLY
FL	FLANGED
GS	GALVANIZED STEEL
GV	GATE VALVE
HB	HOSE BIBB
HDPE	HIGH DENSITY POLYETHYLENE
MH	MANHOLE
MJ	MECHANICAL JOINT
PE	PLAIN END
PS	PUMP STATION
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
RED.	REDUCER
SCH	SCHEDULE
DR	DIAMETER RATIO
SS	STAINLESS STEEL
TBR	TO BE REMOVED
UE	UNDERGROUND ELECTRIC
VERT.	VERTICAL
WM	WATER METER

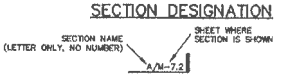
LEGEND

EXISTING		PROPOSED
	PIPE 12" OR LARGER (ABOVE GROUND)	
	PIPE 12" OR LARGER (UNDERGROUND)	
	PIPE SMALLER THAN 12" (ABOVE GROUND)	
	PIPE SMALLER THAN 12" (UNDERGROUND)	
	GATE VALVE	
	BUTTERFLY VALVE	
	BALL VALVE	
	PLUG VALVE	
	REDUCER	
	MANHOLE	M.H.
	CATCH BASIN	C.B.
	TOP OR TOE OF BANK	
	PIPING, STRUCTURES OR EQUIPMENT TO BE REMOVED	
	CONTOURS	26
	CHAIN LINK FENCE	
	SILT FENCE	

PIPE IDENTIFICATION



SECTION DESIGNATION



BLAKE R. PETERS
LICENSE
No. 64429
STATE OF FLORIDA
PROFESSIONAL ENGINEER

REVISIONS			
NO.	DESCRIPTION	DATE	APP'D

McKIM&CREED
378 Interstate Court
Sarasota, FL 34240
Phone: (941)378-3404, Fax: (941)379-3530
CA Lic. No. 27588
www.mckimcreed.com

Manatee County FLORIDA

MARS CHLORINATION SYSTEM AT THE SWWRF

LEGENDS AND ABBREVIATIONS

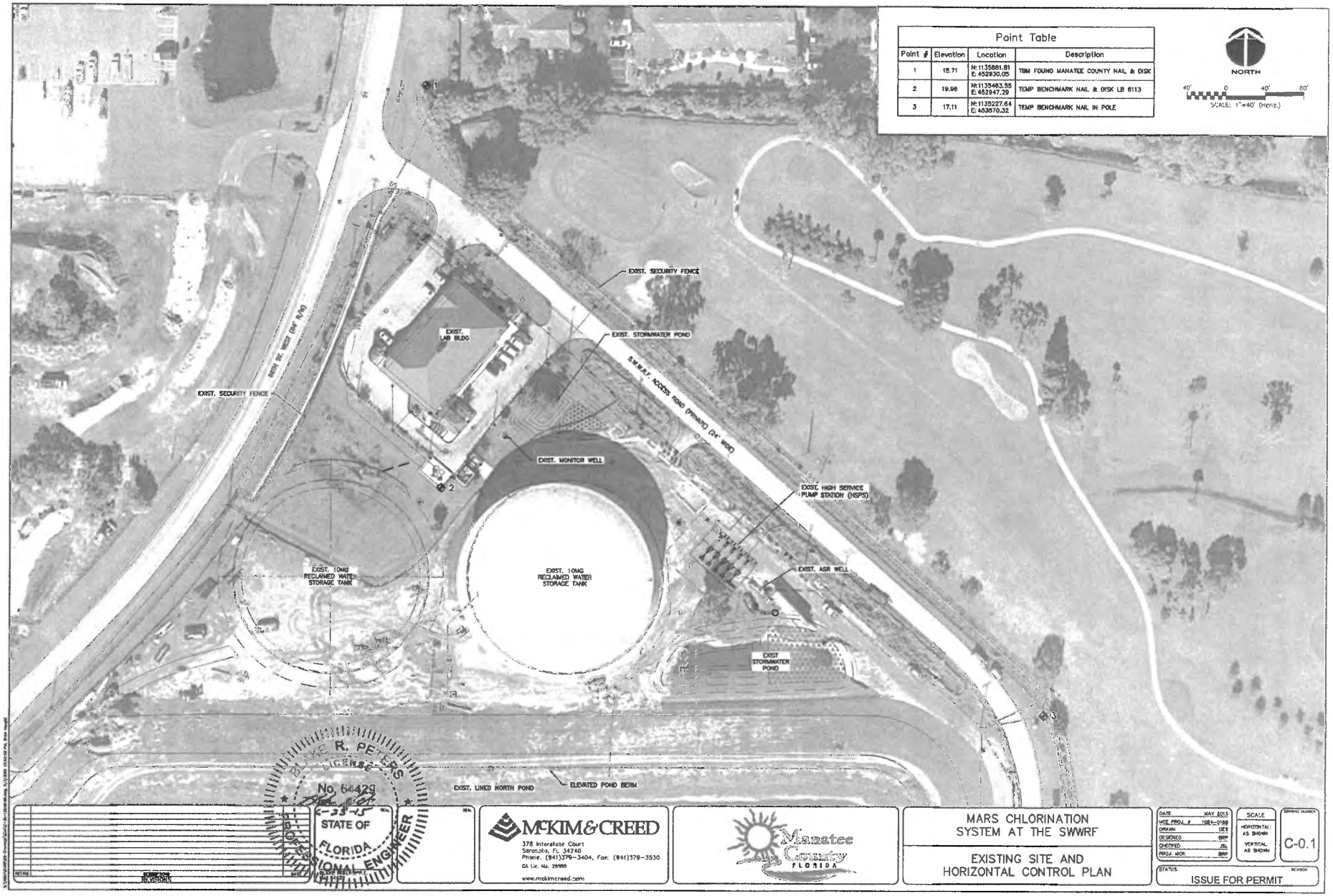
DATE	MAY 2013
MCK PROJ. #	1024-0188
DRAWN	DKR
DESIGNED	BRP
CHECKED	JRL
PROJ. MGR.	BRP

SCALE: HORIZONTAL: AS SHOWN; VERTICAL: AS SHOWN

DRAWING NUMBER: G-0.3

STATUS: ISSUE FOR PERMIT

REVISION



Point Table			
Point #	Elevation	Location	Description
1	18.71	N: 1135881.81 E: 452930.05	TBM FOUND MANATEE COUNTY NAIL & DISK
2	19.98	N: 1135483.83 E: 452947.29	TEMP BENCHMARK NAIL & DISK LB 6113
3	17.11	N: 1135227.64 E: 453570.32	TEMP BENCHMARK NAIL IN POLE

BLAKE R. PETERS
LICENSE
No. 64429
STATE OF FLORIDA
PROFESSIONAL ENGINEER
5-33-15

McKIM&CREED
378 Interstate Court
Sarasota, FL 34240
Phone: (941)379-3404, Fax: (941)379-3330
CA Lic. No. 29986
www.mckimcreed.com

Manatee County FLORIDA

MARS CHLORINATION SYSTEM AT THE SWWRF

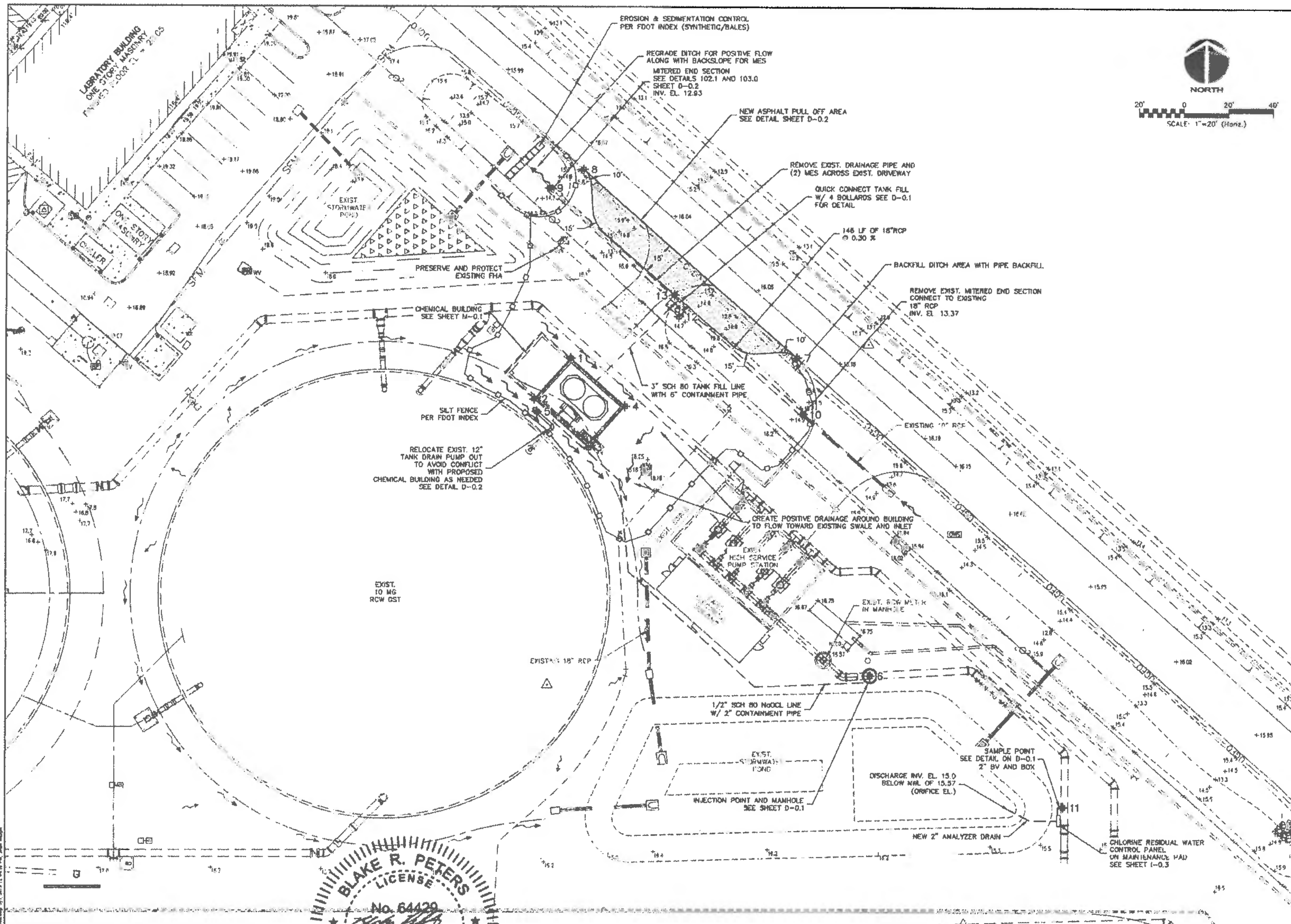
EXISTING SITE AND HORIZONTAL CONTROL PLAN

DATE: MAY 2015
MCE PROJ. #: 1581-0199
DRAWN: CES
DESIGNED: BRP
CHECKED: JSL
PROJ. MGR.: BRP

SCALE: HORIZONTAL: AS SHOWN; VERTICAL: AS SHOWN

DRAWING NUMBER: C-0.1

STATUS: ISSUE FOR PERMIT



SITE LOCATION TABLE

POINT #	LOCTAION	DESCRIPTION
1	N:1135477.39 E:453158.85	CHLORINATION BUILDING CORNER
2	N:1135458.97 E:453142.24	CHLORINATION BUILDING CORNER
3	N:1135437.24 E:453166.84	CHLORINATION BUILDING CORNER
4	N:1135455.66 E:453183.05	CHLORINATION BUILDING CORNER
5	N:1135453.28 E:453143.42	12" QUICK CONNECT
6	N:1135334.65 E:453293.03	INJECTION MANHOLE
7	N:1135477.75 E:453259.84	PULL OFF AREA
8	N:1135562.58 E:453184.14	PULL OFF AREA
9	N:1135554.21 E:453148.80	MITERED END SECTION
10	N:1135452.25 E:453262.30	CONNECT TO EXIST. 18" RCP
11	N:1135276.40 E:453379.80	SAMPLE POINT
12	N:1135496.49 E:453206.96	TANK FILL CORNER
13	N:1135506.28 E:453204.92	TANK FILL CORNER

REVISIONS

BLAKE R. PETERS LICENSE No. 64429 STATE OF FLORIDA PROFESSIONAL ENGINEER

McKIM&CREED
378 Interstate Court
Sarasota, FL 34240
Phone: (941)379-3404, Fax: (941)379-3530
CA Lic. No. 29586
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Manatee County FLORIDA

MARS CHLORINATION SYSTEM AT THE SWWRF

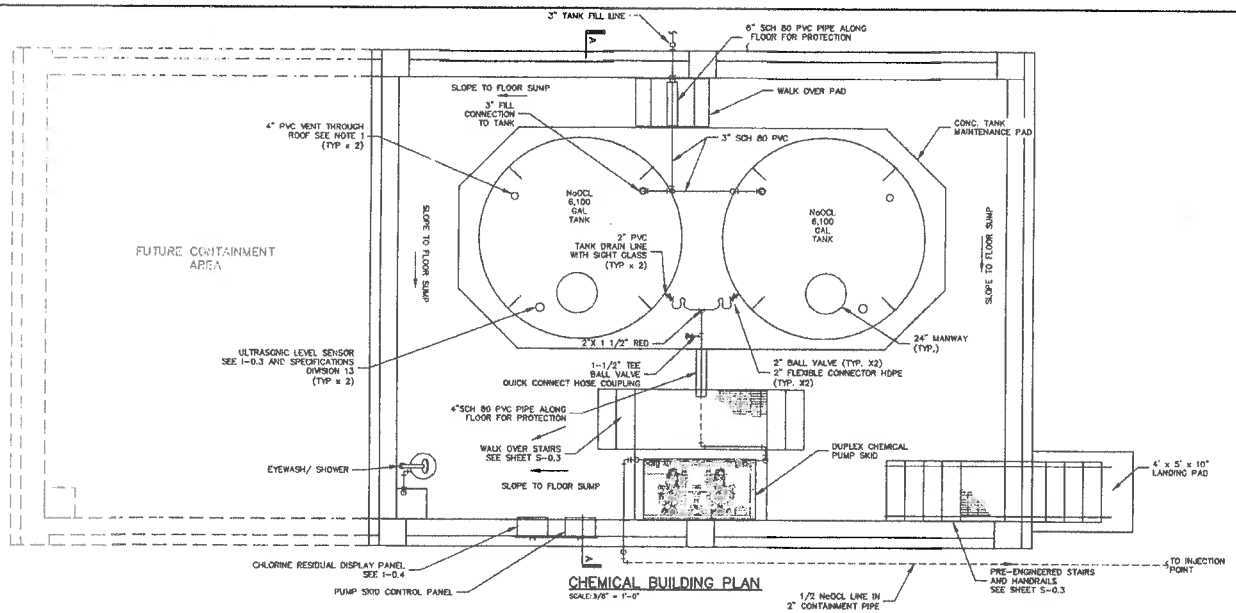
PROPOSED SITE PLAN

DATE:	MAY 2015
MCE PROJ. #	1024-0168
DRAWN	DES
DESIGNED	BRP
CHECKED	JSL
PROJ. MGR	BRP

SCALE
HORIZONTAL: AS SHOWN
VERTICAL: AS SHOWN

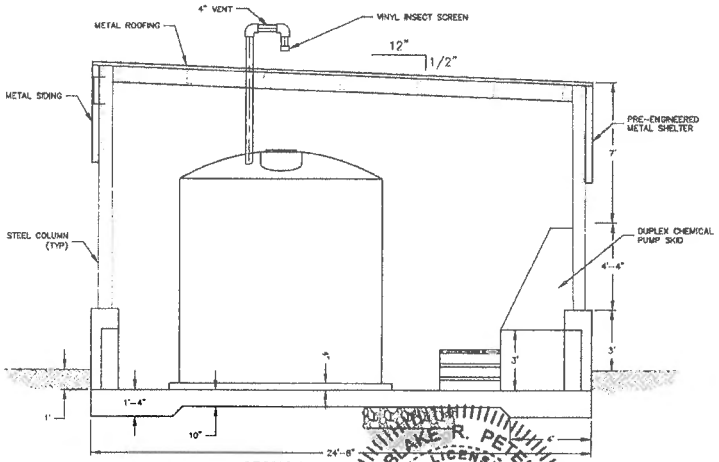
DRAWING NUMBER C-0.2

STATUS: ISSUE FOR PERMIT



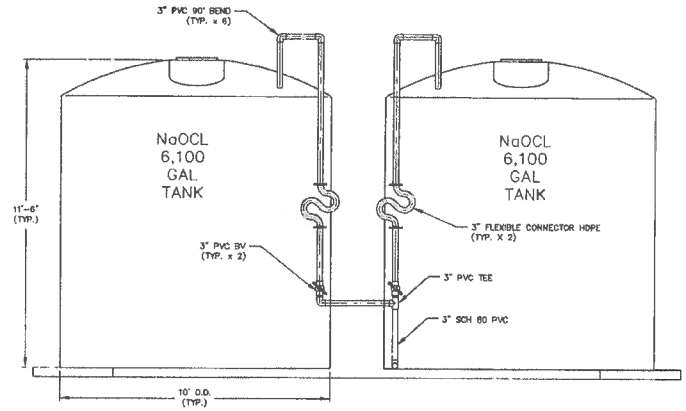
CHEMICAL BUILDING PLAN

SCALE: 3/8" = 1'-0"



SECTION A

SCALE: 3/8" = 1'-0"



CHEMICAL TANK PIPING

SCALE: 1/2" = 1'-0"

NOTES:

1. A 4" DIAMETER PVC VENT SHALL BE PROVIDED ON EACH CHEMICAL STORAGE TANK. IT SHALL BE VENTED THROUGH THE ROOF AND SHALL BE EQUIPPED WITH A VINYL INSECT SCREEN AND A GOOSENECK DISCHARGE.
2. ALL FITTINGS SHALL BE PVC.
3. SOCKET WELDING SHALL BE USED FOR CONNECTIONS. THREADED CONNECTION SHALL BE AVOIDED.
4. ALL GASKETS SHALL BE VITON.
5. ALL VALVES SHALL BE TRUE UNION TYPE.
6. FILL LINES SHALL BE 3" DIAMETER AND SHALL TERMINATE AT TOP OF STORAGE TANK.
7. PIPING SHOWN IS SCHEMATIC ONLY AND MAY NOT SHOW ALL REQUIRED VALVES, FITTINS, ETC
8. ALL PIPE SUPPORTS SHALL BE FRP UNI-STRUT WITH PVC CLICKS ON MINIMUM OF 48" CENTERS.

BLAKE R. PETERS LICENSE No. 64429 STATE OF FLORIDA PROFESSIONAL ENGINEER

6-22-15

REVISIONS

McKIM&CREED
378 Interstate Court
Sarasota, FL 34240
Phone: (941)378-3404, Fax (941)378-3530
CA Lic. No. 29388
www.mckimcreed.com

Manatee County FLORIDA

MARS CHLORINATION SYSTEM AT THE SWWRF

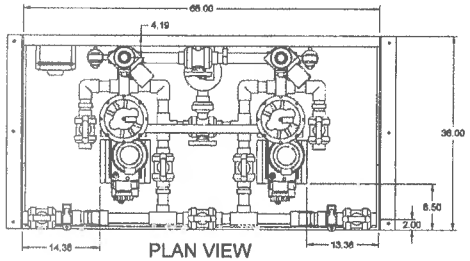
CHEMICAL BUILDING MECHANCAL PLAN

DATE	MAY 2015
M°E PROJ. #	1024-0160
DRAWN	CES
DESIGNED	BRP
CHECKED	JW
PROJ. MGR.	BRP

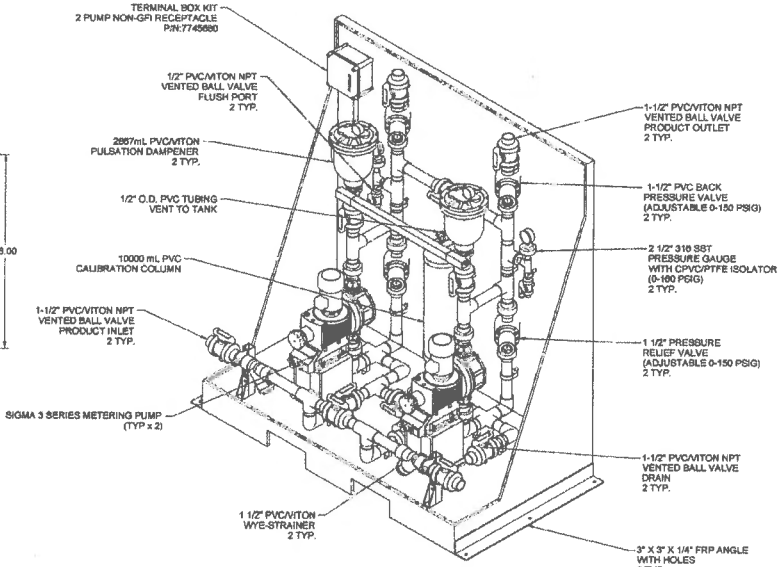
SCALE: HORIZONTAL: AS SHOWN VERTICAL: AS SHOWN

DRAWING NUMBER: M-0.1

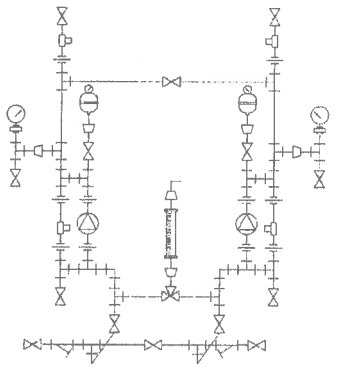
STATUS: ISSUE FOR PERMIT



PLAN VIEW



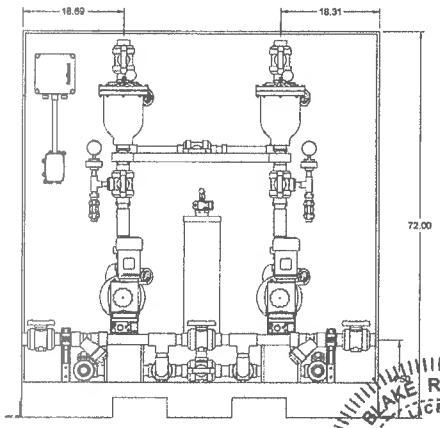
ISOMETRIC VIEW



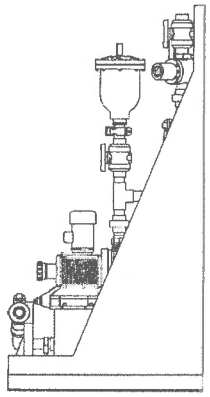
PIPING SCHEMATIC

NOTES:

1. ALL PIPING AND FITTINGS SHALL BE 1-1/2" SCH. 80 PVC SOCKET WELD WITH EPDM SEALS UNLESS OTHERWISE REQUIRED BY COMPONENTS.
2. ALL DIMENSIONS ARE IN INCHES AND ARE SHOWN FOR REFERENCE ONLY.



FRONT VIEW



SIDE VIEW

BLAKE R. PETERS
LICENSE
No. 64429
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

REVISIONS

McKIM&CREED
378 Interstate Court
Sarasota, FL 34240
Phone: (941)378-3404, Fax: (941)379-3530
CA Lic. No. 29986
www.mckimcreed.com

Manatee County FLORIDA

MARS CHLORINATION SYSTEM AT THE SWWRF

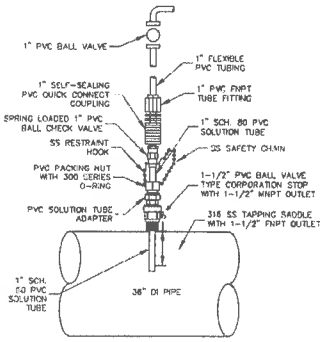
CHEMCIAL FEED PUMP DETAILS

DATE: MAY 2015
MCE PROJ. # 1924-2.00
DRAWN: CFS
DESIGNED: BRP
CHECKED: JSL
PROJ. MGR.: BRP

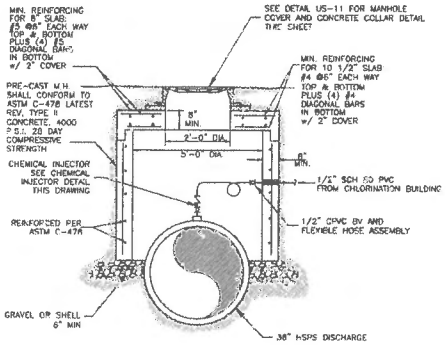
SCALE: HORIZONTAL: AS SHOWN VERTICAL: AS SHOWN

DRAWING NUMBER: M-0.2

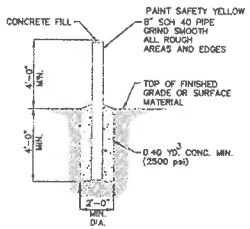
STATUS: ISSUE FOR PERMIT



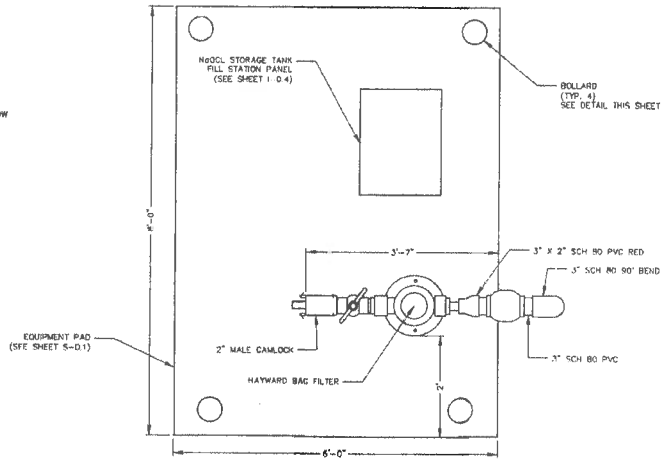
SODIUM HYPOCHLORITE INJECTOR DETAIL
NOT TO SCALE



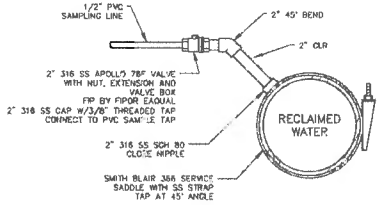
CHEMICAL INJECTION VAULT DETAIL
NOT TO SCALE



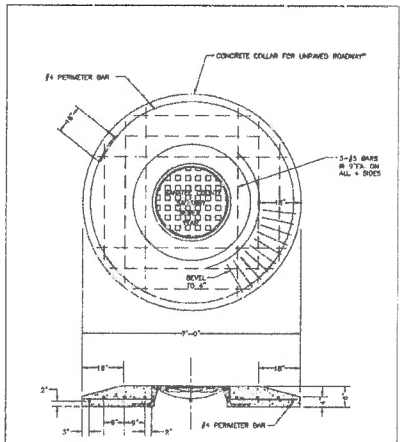
BOLLARD DETAIL
NOT TO SCALE



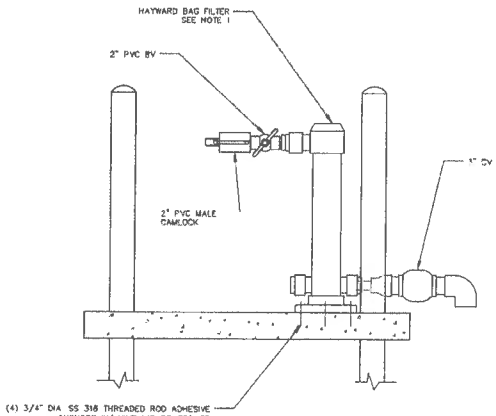
PLAN



SAMPLE TAP DETAIL
NOT TO SCALE



MANATEE COUNTY PUBLIC WORKS DEPARTMENT	MANHOLE COVER & CONCRETE COLLAR FOR UNPAVED ROADWAYS	US-11
APPROVED BY: [illegible] DATE: JAN 2011		PAGE 191



NOTE:
1. INSTALL HAYWARD FLT SERIES SIMPLEX BAG FILTER PVC, DOUBLE LENGTH, FLANGED CONNECTIONS, FPM SEALS AND 1 MICRON POLYPROPYLENE BAG FILTER, OR EQUAL.

SECTION

FILL STATION DETAIL
NOT TO SCALE

BLAKE R. PETERS — LICENSE No. 64429 — STATE OF FLORIDA — PROFESSIONAL ENGINEER
6-23-15

REVISIONS			
NO.	DESCRIPTION	DATE	BY

McKIM&CREED
375 Interstate Court
Sarasota, FL 34240
Phone: (941)379-3404, Fax: (941)379-3530
CA Lic. No. 29588
www.mckimcreed.com

Manatee County FLORIDA

MARS CHLORINATION SYSTEM AT THE SWWRF

DETAILS

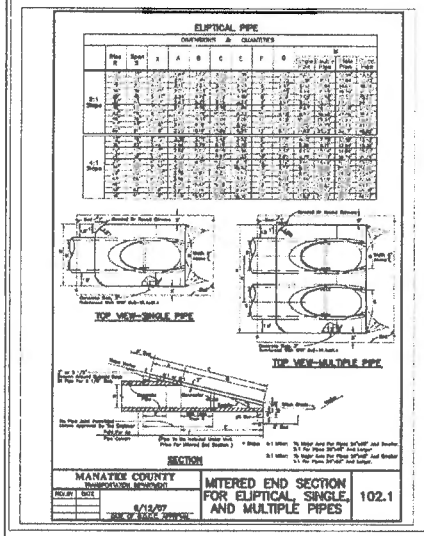
DATE:	MAY 2015
M.C. PROJ. #	1024-0188
DRAWN	CES
DESIGNED	BRP
CHECKED	JSL
PROJ. MGR.	BRP

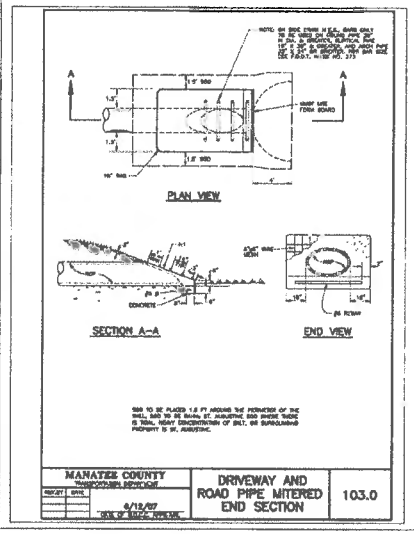
SCALE: HORIZONTAL: AS SHOWN; VERTICAL: AS SHOWN

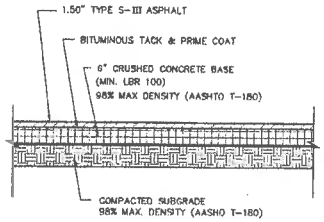
DRAWING NUMBER: D-0.1

STATUS: ISSUE FOR PERMIT

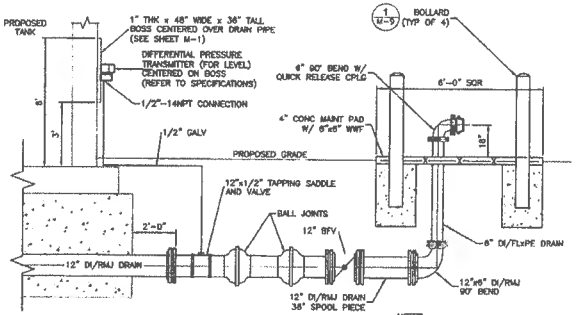
REVISION







ASPHALT DETAIL
NOT TO SCALE



TANK DRAIN PUMP-OUT/
DIFFERENTIAL PRESSURE TRANSMITTER
NOT TO SCALE

BLAKE R. PETERS
LICENSE
No. 64429
6-27-13
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

REVISIONS

McKIM&CREED
378 Interstate Court
Sarasota, FL 34240
Phone: (941)378-3404, Fax: (941)378-3530
CA Lic. no. 29566
www.mckimcreed.com

Manatee County FLORIDA

MARS CHLORINATION SYSTEM AT THE SWWRF

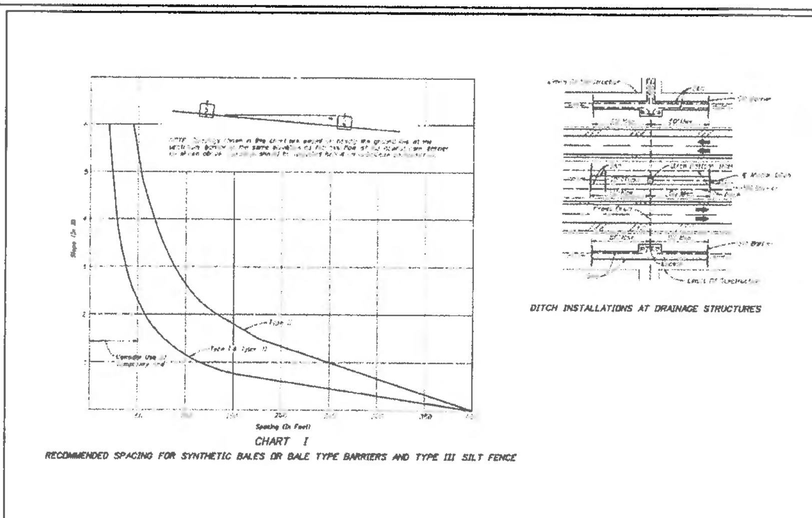
DETAILS

DATE: MAY 2013
MCE PROJ. # 1024-0189
DRAWN: GES
DES. CHKD: BRP
FINCHKD: JSL
PROJ. MGR: BRP

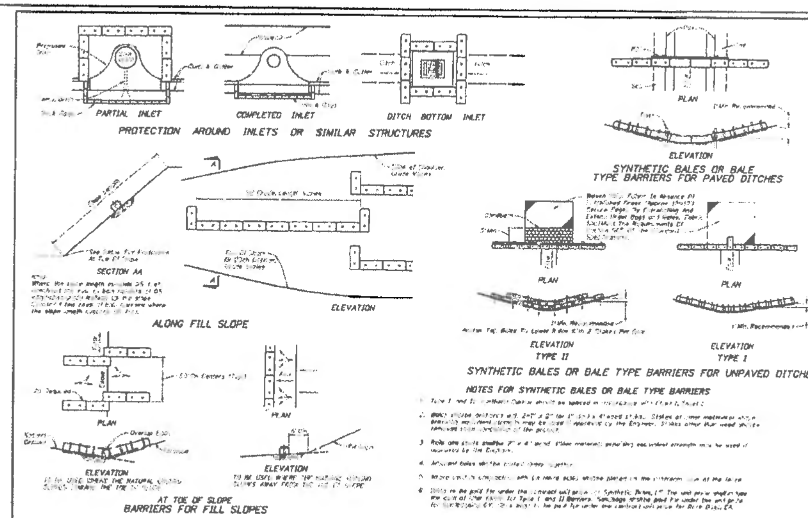
SCALE: HOR. (CENTAL): AS SHOWN
VERTICAL: AS SHOWN

D-0.2

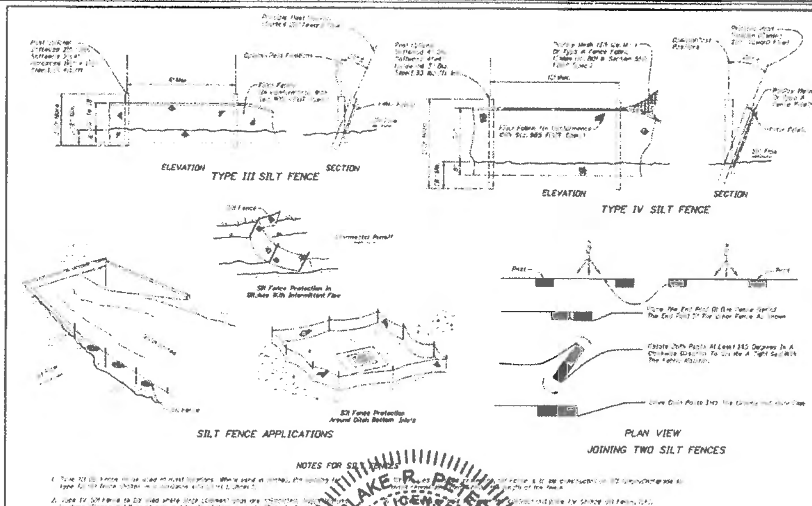
STATUS: ISSUE FOR PERMIT



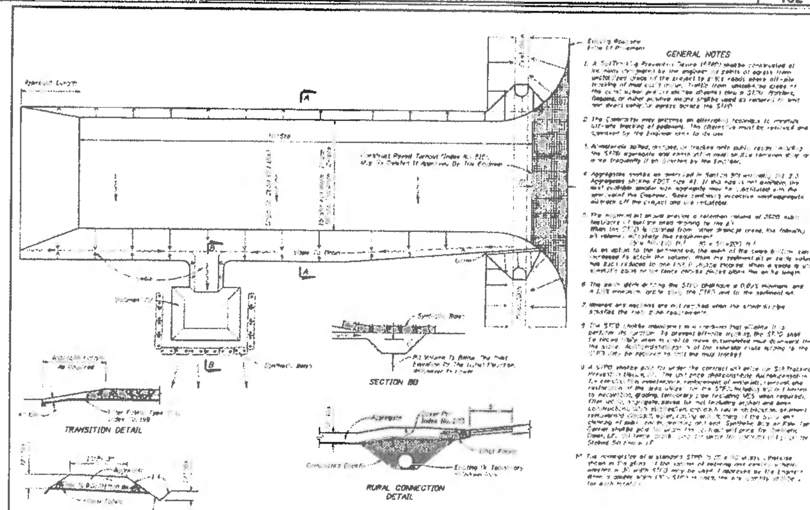
2010 FDOT Design Standards
TEMPORARY EROSION AND SEDIMENT CONTROL
07/01/07 1 of 3
102



2010 FDOT Design Standards
TEMPORARY EROSION AND SEDIMENT CONTROL
07/01/08 2 of 3
102



2010 FDOT Design Standards
TEMPORARY EROSION AND SEDIMENT CONTROL
07/01/08 3 of 3
102



2010 FDOT Design Standards
SOIL TRACKING PREVENTION DEVICE
TYPE A
07/01/07 1 of 1
106

BLAKE R. PETERS
LICENSE
No.
6-23-15
STATE OF FLORIDA
PROFESSIONAL ENGINEER

REVISIONS

McKIM&CREED
378 Interstate Court
Sarasota, FL 34240
Phone: (941)379-3404, Fax: (941)379-3530
CA Lic. No. 29586
www.mckimcreed.com

Manatee County FLORIDA

MARS CHLORINATION SYSTEM AT THE SWWRF

EROSION CONTROL DETAILS

DATE:	MAY 2015
MCE PROJ. #	1024-0166
DRAWN	GES
DESIGNED	BRP
CHECKED	JBL
PROJ. MGR.	BRP

SCALE
HORIZONTAL: AS SHOWN
VERTICAL: AS SHOWN

D-0.3

STATUS
ISSUE FOR PERMIT

CONSTRUCTION COMMENCEMENT NOTICE

Instructions: In accordance with Chapter 62-330.350(1)(d), F.A.C., complete and submit this form at least 48 hours prior to commencement of activity authorized by permit.

Permit No. _____ Application No. _____

Project Name _____ Phase _____

Construction of the system authorized by the above referenced Environmental Resource Permit and Application, is expected to commence on _____ , 20 _____ and will have an estimated completion date of _____ , 20 _____

PLEASE NOTE: If the actual construction commencement date is not known within 30 days of issuance of the permit, District staff should be so notified in writing. As soon as a construction commencement date is known, the permittee shall submit a completed construction commencement notice form.

Permittee's or Authorized Agent's Signature _____ Company _____

Print Name _____ Title _____ Date _____

E-mail _____ Phone Number _____

Reset Form Save & Print

REQUEST FOR TRANSFER OF ENVIRONMENTAL RESOURCE PERMIT TO THE PERPETUAL OPERATION ENTITY

Instructions: Complete this form to transfer to the permit to the operation and maintenance entity. This form can be completed concurrently with, or within 30 days of approval of the As-Built Certification and Request for Conversion to Operation Phase (Form 62-330.310(1)). Please include all documentation required under Section 12.2.1(b) of Applicant's Handbook Volume 1. (see checklist below). **Failure to submit the appropriate final documents will result in the permittee remaining liable for operation and maintenance of the permitted activities.**

Permit No.:	Application No(s).
Project Name:	Phase (if applicable):

A. REQUEST TO TRANSFER: The permittee requests that the permit be transferred to the legal entity responsible for operation and maintenance (O&M).

By: _____ _____
Signature of Permittee | Name and Title

_____ _____
Company | Company Address

_____ _____
Phone | City, State, Zip

B. AGREEMENT FOR SYSTEM OPERATION AND MAINTENANCE RESPONSIBILITY: The below-named legal entity agrees to operate and maintain the works or activities in compliance with all permit conditions and provisions of Chapter 62-330, Florida Administrative Code (F.A.C.) and Applicant's Handbook Volumes I and II in perpetuity. Authorization for any proposed modification to the permitted activities shall be applied for and obtained prior to conducting such modification.

By: _____ _____
Signature of Representative of O&M Entity | Name of Entity for O&M

_____ _____
Name and Title | Address

_____ _____
Email Address | City, State, Zip

_____ _____
Phone | Date

Enclosed are the following documents, as applicable:

- ☐ Copy of recorded transfer of title to the operating entity for the common areas on which the stormwater management system is located (unless dedicated by plat)
- ☐ Copy of all recorded plats
- ☐ Copy of recorded declaration of covenants and restrictions, amendments, and associated exhibits
- ☐ Copy of filed articles of incorporation and documentary evidence of active corporate status with the Department of State, Division of Corporations (for corporations)
- ☐ A completed, signed, and notarized affidavit attesting that the operating entity meets the requirements of Section 12.3 of Environmental Resource Permit Applicant's Handbook Volume I.(Note- this is optional, but aids in processing of this request)

CONSTRUCTION AGREEMENT

for

STIPULATED SUM

between

MANATEE COUNTY (AS OWNER)

and

_____ (AS CONTRACTOR)

CONSTRUCTION AGREEMENT FOR
STIPULATED SUM
MARS Chlorination System at the Southwest Water Reclamation Facility (SWWRF)
5101 65th Street West, Bradenton, FL

THIS AGREEMENT ("Agreement") is made and entered into by and between Manatee County, a political subdivision of the State of Florida, referred to herein as "Owner", and the firm of _____, incorporated in the State of _____ and registered and licensed to do business in the State of Florida (license #_____), referred to herein as "Contractor."

WHEREAS, the Owner intends to construct [**MARS Chlorination System at the Southwest Water Reclamation Facility (SWWRF)**], the aforementioned improvements being hereinafter referred to and defined as the "Project"; and

WHEREAS, in response to Owner's Invitation for Bid No. **15-2606-OV** (the "IFB"), Contractor has submitted its Bid (the "Contractor's Bid") to provide the aforementioned construction services.

NOW THEREFORE, the Owner and the Contractor, in consideration of the mutual covenants hereinafter set forth, the sufficiency of which is hereby acknowledged, agree as follows:

1. Contract Documents. The Contract Documents consist of this Agreement and attached Exhibits, the attached General Conditions of the Construction Agreement, Supplementary Conditions (if any), Special Conditions (if any), Drawings (the titles of which are attached hereto as Exhibit A), Specifications (the titles of which are attached hereto as Exhibit B), Addenda issued prior to execution of this Agreement, the Invitation for Bid (including any Instructions to Bidders, Scope of Work, Bid Summary, Supplements, and Technical Specifications), any interpretations issued pursuant to the Invitation for Bid, the Contractor's Bid, permits, notice of intent to award, Notice to Proceed, purchase order(s), any other documents listed in this Agreement, and Modifications [to include written Amendment(s), Change Order(s), Work Directive Change(s) and Field Directive(s)] issued after execution of this Agreement. These form the Agreement, and are as fully a part of the Agreement as if attached or repeated herein. This Agreement represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. No other documents shall be considered Contract Documents.

2. Work. The Contractor shall fully execute the Work described in the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others.

3. Date of Commencement and Substantial Completion.

A. Date of Commencement. The date of commencement of the Work shall be the date fixed in a Notice to Proceed issued by the Owner.

B. Contract Time. The Contract Time shall be measured from the date of commencement.

C. Substantial Completion. The Contractor shall achieve Substantial Completion of the entire Work not later than ___ days from the date of commencement, or as follows:

Portion of Work	Substantial Completion Date

subject to adjustments of this Contract Time as provided in the Contract Documents.

Time is of the essence in the Contract Documents and all obligations thereunder. If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the sum of $_____ per calendar day, commencing upon the first day following expiration of the Contract Time and continuing until the actual date of Substantial Completion. Such liquidated damages are hereby agreed to be a reasonable estimate of damages the Owner will incur as a result of delayed completion of the Work. The Owner may deduct liquidated damages as described in this paragraph from any unpaid amounts then or thereafter due the Contractor under this Agreement. Any liquidated damages not so deducted from any unpaid amounts due the Contractor shall be payable to the Owner at the demand of the Owner, together with interest from the date of the demand at the maximum allowable rate.

4. Contract Sum.

A. Payment. The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be _____ Dollars and Zero Cents ($_____), subject to additions and deductions as provided in the Contract Documents.

B. Alternates. The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner. *(State the numbers or other identification of accepted alternates. If decisions on other alternates are to be made by the Owner subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)*

C. Unit Prices. Unit prices, if any, are reflected in the Contractor's Bid.

5. Payments.

A. Progress Payments.

(1) Based upon Applications for Payment submitted to the Architect/Engineer by the Contractor and Certificates for Payment issued by the Architect/Engineer, the Owner shall make progress payments on account

of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

(2) The period covered by each Application for Payment shall be one calendar month ending on the last day of the month.

(3) Payments shall be made by Owner in accordance with the requirements of Section 218.735, Florida Statutes.

(4) Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect/Engineer may require. This schedule, unless objected to by the Owner or Architect/Engineer, shall be used as a basis for reviewing the Contractor's Applications for Payment.

(5) Applications for Payment shall indicate the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

(6) Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

i. Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of ten percent (10.00%). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 3.3.B. of the General Conditions;

ii. Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), supported by paid receipts, less retainage of ten percent (10.00%);

iii. Subtract the aggregate of previous payments made by the Owner; and

iv. Subtract amounts, if any, for which the Architect/Engineer has withheld or nullified an Application for Payment, in whole or in part as provided in Section 3.3.C. of the General Conditions.

(7) The progress payment amount determined in accordance with Section 5.A(6) shall be further modified under the following circumstances:

i. Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect/Engineer shall determine for incomplete Work, retainage applicable to such work and unsettled claims.

ii. Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 3.2.B. of the General Conditions.

(8) Reduction or limitation of retainage, if any, shall be as follows:

Notwithstanding the foregoing, upon completion of at least 50% of the Work, as determined by the Architect/Engineer and Owner, the Owner shall reduce to five percent (5%) the amount of retainage withheld from each subsequent progress payment.

(9) Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

B. Final Payment. Final Payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when:

(1) The Contractor has fully performed the Work except for the Contractor's responsibility to correct Work as provided in Section 2.4.C. of the General Conditions, and to satisfy other requirements, if any, which extend beyond final payment; and

(2) A final Application for Payment has been approved by the Architect/Engineer.

6. Termination or Suspension.

A. Termination. The Agreement may be terminated by the Owner or the Contractor as provided in Article XIV of the General Conditions.

B. Suspension by Owner. The Work may be suspended by the Owner as provided in Article XIV of the General Conditions.

7. Other Provisions.

A. Substantial Completion Defined. Substantial Completion shall be defined as provided in Article I of the General Conditions. In the event a temporary certificate of occupancy or completion is issued establishing Substantial Completion, the Contractor shall diligently pursue the issuance of a permanent certificate of occupancy or completion.

B. Project Meetings. There shall be a project meeting, at the jobsite or other location acceptable to the parties, on a regularly scheduled basis. The meeting will be attended by a representative of the Contractor, Architect/Engineer and Owner. These representatives shall be authorized to make decisions that are not otherwise contrary to the requirements of this Agreement.

C. Weather. Any rainfall, temperatures below 32 degrees Fahrenheit or winds greater than 25 m.p.h. which actually prevents Work on a given day, shall be considered lost time and an additional day added to the Contract Time, provided no work could be done on site, and provided written notice has been submitted to the Owner by the Contractor documenting same.

D. Shop Drawings; Critical Submittals. In consideration of the impact of timely review of submittals and shop drawings on the overall progress of the Work, it is hereby agreed that the Owner shall cause his agents and design professionals to accomplish the review of any particular "critical" submittals and/or shop drawings and return same to the Contractor within fourteen (14) days.

E. Applications for Payment. Applications for Payment shall be submitted once monthly at regular intervals and shall include detailed documentation of all costs incurred.

F. Punch List. Within 30 days after obtainment of Substantial Completion, the Owner shall generate a "punch list" of all work items requiring remedial attention by the Contractor. Within 5 days thereafter the Architect/Engineer shall assign a fair value to the punch list items, which sum shall be deducted from the next scheduled progress payment to the Contractor. Upon satisfactory completion of the punch list items, as certified by the Architect/Engineer, the previously deducted sum shall be paid to the Contractor.

G. Closeout documentation. Within 30 days after obtainment of Substantial Completion and before final payment, Contractor shall gather and deliver to Owner all warranty documentation, all manufacturer's product and warranty literature, all manuals (including parts and technical manuals), all schematics and handbooks, and all as-built drawings.

H. Governing Provisions; Conflicts. In the event of a conflict between this Agreement and the Specifications or as between the General Conditions and the Specifications, the Specifications shall govern.

I. E-Verify. The Contractor's employment of unauthorized aliens is a violation of Section 274(e) of the Federal Immigration and Employment Act. The Contractor shall utilize the U.S. Department of Homeland Security E-Verify system to verify the employment eligibility of all new employees hired during the term of this Agreement, and shall require the same verification procedure of all Subcontractors.

8. Insurance and Bonding. If and to the extent required by the Invitation for Bid documents, the Contractor shall furnish insurance coverage for (but not necessarily limited to) workers' compensation, commercial general liability, auto liability, excess liability, and builder's risk. The Contractor shall furnish to the Owner all appropriate policies and Certificate(s) of Insurance. The Contractor shall also post a Payment and Performance Bond for the Contract Sum, within ten (__) days following notification of intent to award, and otherwise in accordance with the Invitation for Bid documents.

9. Independent Contractor. The Contractor acknowledges that it is functioning as an independent contractor in performing under the terms of this Agreement, and it is not acting as an employee of the Owner.

10. Entire Agreement. This Agreement (inclusive of the Contract Documents incorporated herein by reference) represents the full agreement of the parties.

11. Amendments; Waivers; Assignment.

A. Amendments. This Agreement may be amended only pursuant to an instrument in writing that has been jointly executed by authorized representatives of the parties hereto.

B. Waivers. Neither this Agreement nor any portion of it may be modified or waived orally. However, each party (through its governing body or properly authorized officer) shall have the right, but not the obligation, to waive, on a case-by-case basis, any right or condition herein reserved or intended for the benefit or protection of such party without being deemed or considered to have waived such right or condition for any other case, situation, or circumstance and without being deemed or considered to have waived any other right or condition. No such waiver shall be effective unless made in writing with an express and specific statement of the intent of such governing body or officer to provide such waiver.

C. Assignment. The rights and obligations of either party to this Agreement may be assigned to a third party only pursuant to a written amendment hereto.

12. Validity. Each of the Owner and Contractor represents and warrants to the other its respective authority to enter into this Agreement.

13. Covenant To Defend. Neither the validity of this Agreement nor the validity of any portion hereof may be challenged by any party hereto, and each party hereto hereby waives any right to initiate any such challenge. Furthermore, if this Agreement or any portion hereof is challenged by a third party in any judicial, administrative, or appellate proceeding (each party hereby covenanting with the other party not to initiate, encourage, foster, promote, cooperate with, or acquiesce to such challenge), the parties hereto collectively and individually agree, at their individual sole cost and expense, to defend in good faith its validity through a final judicial determination or other resolution, unless all parties mutually agree in writing not to defend such challenge or not to appeal any decision invalidating this Agreement or any portion thereof.

14. Disclaimer of Third-Party Beneficiaries; Successors and Assigns. This Agreement is solely for the benefit of the parties hereto, and no right, privilege, or cause of

action shall by reason hereof accrue upon, to, or for the benefit of any third party. Nothing in this Agreement is intended or shall be construed to confer upon or give any person, corporation, partnership, trust, private entity, agency, or other governmental entity any right, privilege, remedy, or claim under or by reason of this Agreement or any provisions or conditions hereof. This Agreement shall be binding upon, and its benefits and advantages shall inure to, the successors and assigns of the parties hereto.

15. Construction.

A. Headings and Captions. The headings and captions of articles, sections, and paragraphs used in this Agreement are for convenience of reference only and are not intended to define or limit their contents, nor are they to affect the construction of or be taken into consideration in interpreting this Agreement.

B. Legal References. All references to statutory sections or chapters shall be construed to include subsequent amendments to such provisions, and to refer to the successor provision of any such provision. References to "applicable law" and "general law" shall be construed to include provisions of local, state and federal law, whether established by legislative action, administrative rule or regulation, or judicial decision.

16. Severability. The provisions of this Agreement are declared by the parties hereto to be severable. In the event any term or provision of this Agreement shall be held invalid by a court of competent jurisdiction, such invalid term or provision should not affect the validity of any other term or provision hereof; and all such terms and provisions hereof shall be enforceable to the fullest extent permitted by law as if such invalid term or provision had never been part of this Agreement; provided, however, if any term or provision of this Agreement is held to be invalid due to the scope or extent thereof, then, to the extent permitted by law, such term or provision shall be automatically deemed modified in order that it may be enforced to the maximum scope and extent permitted by law.

17. Governing Law; Venue. This Agreement shall be governed by the laws of the State of Florida. Venue for any petition for writ of certiorari or other court action allowed by this Agreement shall be in the Circuit Court of the Twelfth Judicial Circuit in and for Manatee County, Florida.

18. Attorney's Fees and Costs. In any claim dispute procedure or litigation arising from this Agreement, each party hereto shall be solely responsible for paying its attorney's fees and costs.

19. Notices. All notices, comments, consents, objections, approvals, waivers, and elections under this Agreement shall be in writing and shall be given only by hand delivery for which a receipt is obtained, or certified mail, prepaid with confirmation of delivery requested, or by electronic mail with delivery confirmation. All such communications shall be addressed to the applicable addressees set forth below or as any party may otherwise designate in the manner prescribed herein.

To the Owner: Manatee County Public Works Department
Attn: Mr. Brian Bates, Project Manager
1022 26th Avenue East
Bradenton, FL 34208
Phone: 941-708-7450, Ext. 7329
Email: Brian.bates@mymanatee.org

To the Contractor:

_____
_____
_____
_____
Email: _____

Notices, comments, consents, objections, approvals, waivers, and elections shall be deemed given when received by the party for whom such communication is intended at such party's address herein specified, or such other physical address or email address as such party may have substituted by notice to the other.

20. Exhibits. Exhibits to this Agreement are as follows:

Exhibit A—Title(s) of Drawings

Exhibit B—Title(s) of Specifications

Exhibit C—Affidavit of No Conflict

Exhibit D—Certificate(s) of Insurance

Exhibit E—Payment and Performance Bond

Exhibit F—Standard Forms
1—Application for Payment
2—Certificate of Substantial Completion
3—Final Reconciliation / Warranty / Affidavit
4—Change Order
5—Public Construction Bond Form

WHEREFORE, the parties hereto have executed this Agreement as of the date last executed below.

_____
Name of Contractor

By: _____

Printed Name: _____

Title: _____

Date: _____

MANATEE COUNTY, a political subdivision of the State of Florida

By: _____

Printed Name: _____

Title: _____

Date: _____

Exhibit A
Title(s) of Drawings

MARS Chlorination at the Southwest Water Reclamation Facility (SWWRF)
Signed and Sealed by Blake Peters, P.E., McKim & Creed dated July 10, 2015
(21 pages)
(County Project No. 6082190)

Exhibit B
Title(s) of Specifications / Permits

Technical Specifications and Contract Documents
(County Project No.: 6082190)
Issued and Prepared by McKim & Creed
1365 Hamlet Avenue
Clearwater, Florida 33756
Signed and Sealed by Blake Peters, P.E., dated July 10, 2015
(452 pages)

Environmental Resource Permit, Florida Department of Environmental Protection, Permit No.:41-0297915-002,
executed by Kelley M. Boatwright, Program Administrator, Permitting and Waste Cleanup Program, Southwest District, dated and recorded on July 22, 2015 (23 pages)

Exhibit C
Affidavit of No Conflict

COUNTY OF _____,

STATE OF _____,

BEFORE ME, the undersigned authority, this day personally appeared, _____, a principal with full authority to bind _____hereinafter the "Lessee"), who being first duly sworn, deposes and says:

(a) is not currently engaged or will not become engaged in any obligations, undertakings or contracts that will require the Lessee to maintain an adversarial role against the County or that will impair or influence the advice, recommendations or quality of work provided to the County; and

(b) has provided full disclosure of all potentially conflicting contractual relationships and full disclosure of contractual relationships deemed to raise a question of conflict(s); and

(c) has provided full disclosure of prior work history and qualifications that may be deemed to raise possible question of conflict(s).

Affiant makes this affidavit for the purpose of inducing Manatee County, a political subdivision of the State of Florida, to enter into this Agreement for

_____
Signature

_____
Print Name

SUBSCRIBED to and sworn before me this _____ day of _____, 20___.

[Notary Seal]

Notary Public

My commission expires: _____ _____

_____
Notary Signature

_____
Print Name

Personally Known _____or Produced Identification_____
Type of Identification Produced _____

Exhibit D

Contractor's Certificate(s) of Insurance

Exhibit E

Contractor's Payment and Performance Bond

Exhibit F

Standard Forms

1. Application for Payment
2. Certificate of Substantial Completion
3. Final Reconciliation, Warranty Period Declaration and Contractor's Affidavit
4. Contract Change Order
5. Public Construction Bond

APPLICATION FOR PAYMENT

Request No.: ____ Project No.: _____
Purchase Order No.: _____
County Bid No.: _____
Consultant: _____

Project: _____
From: _____ To: _____

CONTRACT PAYMENT SUMMARY

Original Contract Amount:				$ -
Change Order(s):				$ -
Change order summary:				
Number	Date Approved	Additive	Deductive	
SUBTOTALS:		$ -	$ -	
Net change order subtotal (Additive less Deductive):				$ -
Current Contract Amount (CCA): (Original Amount + Change Order(s))				$ -
		Previous Status	Total WIP	
Value of the Work in Place (WIP)		$ -	$ -	
Value of Stored Materials		$ -	$ -	
Total Earned ($ and % of CCA)		$ -	$ -	
Retainage ($ and % of CCA)		$ -	$ -	
Net Earned (Total earned minus retainage)				$ -
TOTAL PREVIOUS PAYMENTS				$ -
AMOUNT DUE THIS PAYMENT (Net Earned minus Previous Payments)				$ -

CONTRACTOR'S AFFIDAVIT OF NOTICE

CERTIFICATE: The undersigned CONTRACTOR certifies that all items and amounts shown on this Application for Payment are on account of work performed, materials supplied and/or materials stored on site and paid for by Contractor in accordance with the Contract Documents with due consideration for previous Payment(s), if any, received by the Contractor from the County, and that the Amount Due this Payment shown is now due.

NOTARY:

State of Florida, County of _____

Sworn to (or affirmed) and subscribed before me this _____ day of _____ by

_____
(Name of person giving notice)

_____
(Signature of Notary Public - State of Florida)
Print, Type or Stamp Commissioned Name of Notary Public:

Personally Known ____ or Produced Identification ____
Type of Identification Produced: _____

CONTRACTOR:

_____
Name of person authorized to sign Affidavit of Notice

_____
TITLE

Contractor name, address and telephone no.:

_____
_____
_____
_____
_____

VERIFICATION, RECOMMENDATION, CONCURRENCES AND APPROVALS

	(Signatures)	(Date)
Quantities verified by:	_____	_____
Consultant/Engineer:	_____	_____
Project Manager:	_____	_____
Department Head:	_____	_____
Payment approved by the Board of County Commissioners:	_____	_____
Attested to by the Clerk of Circuit Court:	_____	_____

CERTIFICATE OF SUBSTANTIAL COMPLETION (S.C.)	CHECK ONE: Partial	Total
Project Title:	Date Submitted:	
Contractor Data: Name: Address: City/State/Zip:	Project No: S. C. Date (Proposed)	

If the "Partial" completion box above is checked, the following description applies to the work for which substantial completion is being sought. Otherwise, the work described in the Contract including approved changes, if any, is certified to be substantially complete:
(Description of the portion of work substantially completed):

(USE CONTINUATION SHEETS IF NECESSARY)

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item does not alter the Contractor's responsibility to complete all of the contract work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by the Contractor within _____ days of substantial completion. The approved substantial completion date is: _____

Contractor Signature	Date	Engineer's Approval	Date
Printed Name and Title		Printed Name and Title	

The Contractor shall be responsible for security, operation, safety, maintenance, HVAC, insurance and warranties in accordance with the Contract. The County will assume the responsibility for paying the cost of electrical power from midnight of the date of Engineer's approval as indicated above.

ATTACH THE INSPECTOR'S FINAL WALKTHROUGH LIST OF DEFICIENCIES.

CERTIFICATE OF SUBSTANTIAL COMPLETION (S.C.)	CHECK ONE: Partial	Total
Project Title:	Date Submitted:	
Contractor Data: Name: Address: City/State/Zip:	Project No: S. C. Date (Proposed)	

If the "Partial" completion box above is checked, the following description applies to the work for which substantial completion is being sought. Otherwise, the work described in the Contract including approved changes, if any, is certified to be substantially complete:
(Description of the portion of work substantially completed):

(USE CONTINUATION SHEETS IF NECESSARY)

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item does not alter the Contractor's responsibility to complete all of the contract work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by the Contractor within _____ days of substantial completion. The approved substantial completion date is: _____

Contractor Signature	Date	Engineer's Approval	Date
Printed Name and Title		Printed Name and Title	

The Contractor shall be responsible for security, operation, safety, maintenance, HVAC, insurance and warranties in accordance with the Contract. The County will assume the responsibility for paying the cost of electrical power from midnight of the date of Engineer's approval as indicated above.

ATTACH THE INSPECTOR'S FINAL WALKTHROUGH LIST OF DEFICIENCIES.

FINAL RECONCILIATION, WARRANTY PERIOD DECLARATION AND CONTRACTOR'S AFFIDAVIT

Project Title:	Date Submitted:
Contractor Data: Name: Address: City/State/Zip:	Project No: Warranty (months):

This Final Reconciliation is for the work performed for Manatee County by the above named contractor, hereinafter called CONTRACTOR, pursuant to the contract dated _____ as amended, and acts as an addendum thereto.

It is agreed that all quantities and prices in the attached Final Pay Estimate No. _____ are correct and that the amount of $ _____ including retainage is due to the CONTRACTOR, that no claims are outstanding as between the parties, and that the above stated sum represents the entirety of monies owed the CONTRACTOR.

It is further agreed that the warranty period for CONTRACTOR'S work pursuant to the Contract is from _____ to _____

As (title) _____ for CONTRACTOR, I have authority to bind said CONTRACTOR, and as such make this final reconciliation, declaration and affidavit for the purpose of inducing Manatee County to make final payment to CONTRACTOR for work done at/upon _____ under said contract:

CONTRACTOR has paid all social security and withholding taxes accrued in connection with the construction project.

CONTRACTOR has paid all workers' compensation and other insurance premiums incurred in connection with this construction project.

CONTRACTOR has paid for all required permits in connection with this construction project.

All laborers, material, men, suppliers, subcontractors and service professionals who worked for and/or supplied materials, equipment and/or services to the CONTRACTOR under this construction contract have been paid in full.

_____
(Affiant Signature)

NOTARY:
State of Florida, County of _____ , Sworn to (or affirmed) and subscribed before me this _____ day of _____ , ____, by _____ (person giving notice).

Signature of Notary Public - State of Florida: _____
Print, Type or Stamp Commissioned Name of Notary Public:

Personally Known ☐ or Produced Identification ☐
Type of Identification Produced _____

CONTRACT CHANGE ORDER

PROJECT:

Change Order No.:

Contract Amount:
(Present Value)

Project Number:

NO. OF ITEM	DESCRIPTION OF ITEM AND CHANGE	DECREASE	INCREASE
	BY EXECUTION OF THIS CHANGE ORDER THE CONTRACTOR AGREES THAT ALL CLAIMS FOR ADDITIONAL CONTRACT TIME AND FEES FOR THE ITEMS IN THIS CHANGE ORDER HAVE BEEN SATISFIED.		
		TOTAL DECREASE:	TOTAL INCREASE:

Contractor: _____

Address: _____

City / State: _____

Contractor
Signature: _____ Date _____

THE NET CHANGE OF
ADJUSTS THE CURRENT CONTRACT AMOUNT FROM
TO

RECOMMENDATION, CONCURRENCES AND APPROVALS

	SIGNATURES	DATE
Consultant / Engineer:		
Project Manager:		
Department Head:		
Approved by the Manatee County Board of County Commissioners:		
	Chairman	
Attest Clerk of the Circuit Court:		

MANATEE COUNTY GOVERNMENT
PUBLIC CONSTRUCTION BOND

Bond No. _____
(Enter bond number)

BY THIS BOND, We_____, located at _____, as
(Name of Contractor) (Address)

Principal and _____, a corporation, whose address is
(Name of Surety)

_____

are bound to Manatee County, a political subdivision of the State of Florida, herein called County, in the sum of $ _____, for payment of which we bind ourselves, our heirs, personal representatives, successors, and assigns, jointly and severally.

WHEREAS, the Contractor has entered into Contract No. 15-2606-OV with the County for the project titled MARS Chlorination System at the Southwest Water Reclamation Facility (SWWRF), Project No.: 6082190, with conditions and provisions as are further described in the aforementioned Contract, which Contract is by reference made a part hereof for the purposes of explaining this bond.

THE CONDITION OF THIS BOND is that if Principal:

1. Performs Contract No. 15-2606-OV, between Principal and County for construction of

MARS Chlorination System at the Southwest Water Reclamation Facility (SWWRF), Project No.: 6082190,
(Title of Project)

the Contract being made a part of this bond by reference, at the times and in the manner prescribed in the Contract; and

2. Promptly makes payments to all claimants, as defined in Section 255.05(1), Florida Statutes, supplying Principal with labor, materials, or supplies, used directly or indirectly by Principal in the prosecution of the Work provided for in the Contract; and

3. Pays County all losses, damages, expenses, costs, and attorney's fees, including appellate proceedings, that County sustains because of a default by Principal under the Contract; and

4. Performs the guarantee of all Work and materials furnished under the Contract for the time specified in the Contract, then this bond is void; otherwise it remains in full force.

Any action instituted by a claimant under this bond for payment must be in accordance with the notice and time limitation provisions in Section 255.05(2), Florida Statutes.

Any changes in or under the Contract documents and compliance or noncompliance with any formalities connected with the Contract or the changes does not affect Surety's obligation under this bond.

DATED ON _____.

CONTRACTOR AS PRINCIPAL	**SURETY**
_____	_____
Company Name	Company Name
_____	_____
Signature	Signature
_____	_____
Print Name & Title	Print Name & Title
(Corporate Seal)	*(Corporate Seal)*

AGENT or **BROKER**

_____

Company Name

_____

Address

_____

_____

Telephone

Licensed Florida Insurance Agent? ☐ **Yes** ☐ **No**

License #: _____

State of: _____

County of: _____

City of: _____

GENERAL CONDITIONS

of the

CONSTRUCTION AGREEMENT

TABLE OF CONTENTS FOR GENERAL CONDITIONS

GENERAL CONDITIONS
ARTICLE I
DEFINITIONS

1.1 Definitions. For purposes of the Contract Documents, the following terms shall have the following meanings.

A. Acceptance: The acceptance of the Project into the Owner's operating public infrastructure.

B. Application for Payment: The form approved and accepted by the Owner, which is to be used by Contractor in requesting progress payments or final payment and which is to include such supporting documentation as is required by the Contract Documents.

C. Architect/Engineer: McKim and Creed, Inc., a corporation, registered and licensed to do business in the State of Florida.

D. Change Order: A written order signed by the Owner, the Architect/Engineer and the Contractor authorizing a change in the Project Plans and/or Specifications and, if necessary, a corresponding adjustment in the Contract Sum and/or Contract Time, pursuant to Article V.

E. Compensable Delay: Any delay beyond the control and without the fault or negligence of the Contractor resulting from Owner-caused changes in the Work, differing site conditions, suspensions of the Work, or termination for convenience by Owner.

F. Contractor's Personnel: The Contractor's key personnel designated by Contractor.

G. Construction Services: The Construction Services to be provided by Contractor pursuant to Section 2.4, in accordance with the terms and provisions of the Contract Documents.

H. Contract Sum: The total compensation to be paid to the Contractor for Construction Services rendered pursuant to the Contract Documents, as set forth in Contractor's Bid, unless adjusted in accordance with the terms of the Contract Documents.

I. Construction Team: The working team established pursuant to Section 2.1.B.

J. Contract Time: The time period during which all Construction Services are to be completed pursuant to the Contract Documents, to be set forth in the Project Schedule.

K. Days: Calendar days except when specified differently. When time is referred to in the Contract Documents by days, it will be computed to exclude the first and

include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or legal holiday, such day will be omitted from the computation.

L. Defective: When modifying the term "Work", referring to Work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents, or that does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or that has been damaged prior to Owner's approval of final payment (unless responsibility for the protection thereof has been assumed by Owner).

M. Excusable Delay: Any delay beyond the control and without the negligence of the Contractor, the Owner, or any other contractor caused by events or circumstances such as, but not limited to, acts of God or of a public enemy, fires, floods, freight embargoes, acts of government other than Owner or epidemics. Labor disputes and above average rainfall shall give rise only to excusable delays.

N. Field Directive: A written order issued by Owner which orders minor changes in the Work not involving a change in Contract Time, to be paid from the Owner's contingency funds.

O. Final Completion Date: The date upon which the Project is fully constructed and all Work required on the Project and Project Site is fully performed as verified in writing by the Owner.

P. Float or Slack Time: The time available in the Project Schedule during which an unexpected activity can be completed without delaying substantial completion of the Work.

Q. Force Majeure: Those conditions constituting excuse from performance as described in and subject to the conditions described in Article XII.

R. Inexcusable Delay: Any delay caused by events or circumstances within the control of the Contractor, such as inadequate crewing, slow submittals, etc., which might have been avoided by the exercise of care, prudence, foresight or diligence on the part of the Contractor.

S. Non-prejudicial Delay: Any delay impacting a portion of the Work within the available total Float or Slack Time and not necessarily preventing Substantial Completion of the Work within the Contract Time.

T. Notice to Proceed: Written notice by Owner (after execution of Contract) to Contractor fixing the date on which the Contract Time will commence to run and on which Contractor shall start to perform the Work.

U. Owner: Manatee County, a political subdivision of the State of Florida.

V. Owner's Project Representative: The individual designated by Owner to perform those functions set forth in Section 7.8.

W. Payment and Performance Bond: The Payment and Performance Bond security posted pursuant to Section 2.4.Y to guarantee payment and performance by the Contractor of its obligations hereunder.

X. Permitting Authority: Any applicable governmental authority acting in its governmental and regulatory capacity which is required to issue or grant any permit, certificate, license or other approval which is required as a condition precedent to the commencement or approved of the Work, or any part thereof, including the building permit.

Y. Prejudicial Delay: Any excusable or compensable delay impacting the Work and exceeding the total float available in the Project Schedule, thus preventing completion of the Work within the Contract Time unless the Work is accelerated.

Z. Progress Report: A report to Owner that includes all information required pursuant to the Contract Documents and submitted in accordance with Section 2.4.EE, hereof.

AA. Project: The total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by Owner and by separate contractors. For the purposes of the Contract Documents, the term Project shall include all areas of proposed improvements and all areas which may reasonably be judged to have an impact on the Project.

BB. Project Costs: The costs incurred by the Contractor to plan, construct and equip the Project and included within, and paid as a component of, the Contract Sum.

CC. Project Manager: Subject to the prior written consent of Owner, the individual designated to receive notices on behalf of the Contractor, or such other individual designated by the Contractor, from time to time, pursuant to written notice in accordance with the Contract Documents.

DD. Project Plans and Specifications: The one hundred percent (100%) construction drawings and specifications prepared by the Architect/Engineer, and any changes, supplements, amendments or additions thereto approved by the Owner, which shall also include any construction drawings and final specifications required for the repair or construction of the Project, as provided herein.

EE. Project Schedule: The schedule and sequence of events for the commencement, progression and completion of the Project, developed pursuant to Section 2.3., as such schedule may be amended as provided herein.

FF. Project Site: The site depicted in the Project Plans and Specifications, inclusive of all rights of way, temporary construction easements or licensed or leased sovereign lands.

GG. Pre-operation Testing: All field inspections, installation checks, water tests, performance tests and necessary corrections required of Contractor to demonstrate that

individual components of the Work have been properly constructed and do operate in accordance with the Contract Documents for their intended purposes.

HH. Procurement Ordinance: The Manatee County Procurement Code, Chapter 2-26 of the Manatee County Code of Laws, as amended from time to time.

II. Punch List Completion Date: The date upon which all previously incomplete or unsatisfactory items, as identified by the Contractor, the Architect/Engineer and/or the Owner are completed in a competent and workmanlike manner, consistent with standards for Work of this type and with good building practices in the State of Florida.

JJ. Subcontractor: Any individual (other than a direct employee of the Contractor) or organization retained by Contractor to plan, construct or equip the Project pursuant to Article IV.

KK. Substantial Completion and Substantially Complete: The stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use; provided, however, that as a condition precedent to Substantial Completion, the Owner has received all certificates of occupancy or completion and other permits, approvals, licenses, and other documents from any governmental authority which are necessary for the beneficial occupancy of the Project.

LL. Substantial Completion Date: The date on which the Project is deemed to be Substantially Complete, as evidenced by receipt of (i) the Architect/Engineer's certificate of Substantial Completion, (ii) written Acceptance of the Project by the Owner, and (iii) approvals of any other authority as may be necessary or otherwise required.

MM. Unit Price Work: Work to be paid for on the basis of unit prices.

NN. Work: The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

OO. Work Directive Change: A written directive to Contractor, issued on or after the effective date of the Agreement pursuant to Section 5.8 and signed by Owner's Project Representative, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed or responding to emergencies.

ARTICLE II
RELATIONSHIP AND RESPONSIBILITIES

2.1 Relationship between Contractor and Owner. The Contractor accepts the relationship of trust and confidence established with Owner pursuant to the Contract Documents. The Contractor shall furnish its best skill and judgment and cooperate with Owner and Owner's Project Representative in furthering the interests of the Owner. The Contractor agrees to provide the professional services required to complete the Project consistent with the Owner's direction and the terms of the Contract Documents. All services provided hereunder by Contractor, either directly or through Subcontractors, shall be provided in accordance with sound construction practices and applicable professional construction standards.

A. Purpose. The purpose of the Contract Documents is to provide for the provision of construction services for the Project on the Project Site by the Contractor, and construction of the Project by the Contractor in accordance with the Project Plans and Specifications. The further purpose of the Contract Documents is to define and delineate the responsibilities and obligations of the parties to the Contract Documents and to express the desire of all such parties to cooperate together to accomplish the purposes and expectations of the Contract Documents.

B. Construction Team. The Contractor, Owner and Architect/Engineer shall be called the "Construction Team" and shall work together as a team commencing upon full execution of the Contract Documents through Substantial Completion. As provided in Section 2.2, the Contractor and Architect/Engineer shall work jointly through completion and shall be available thereafter should additional services be required. The Contractor shall provide leadership to the Construction Team on all matters relating to construction. The Contractor understands, acknowledges and agrees that the Architect/Engineer shall provide leadership to the Construction Team on all matters relating to design.

C. Response to Invitation for Bid. The Contractor acknowledges that the representations, statements, information and pricing contained in its Bid have been relied upon by the Owner and have resulted in the award of this Project to the Contractor.

2.2 General Contractor Responsibilities. In addition to the other responsibilities set forth herein, the Contractor shall have the following responsibilities pursuant to the Contract Documents:

A. Personnel. The Contractor represents that it has secured, or shall secure, all personnel necessary to perform the Work, none of whom shall be employees of the Owner. Primary liaison between the Contractor and the Owner shall be through the Owner's Project Representative and Contractor's Project Manager. All of the services required herein shall be performed by the Contractor or under the Contractor's supervision, and all personnel engaged in the Work shall be fully qualified and shall be authorized or permitted under law to perform such services.

B. Cooperation with Architect/Engineer. The Contractor's services shall be provided in conjunction with the services of the Architect/Engineer. In the performance of

professional services, the Contractor acknowledges that time is critical for Project delivery. The Contractor acknowledges that timely construction utilizing the services of an Architect/Engineer and a Contractor requires maximum cooperation between all parties.

C. Timely Performance. The Contractor shall perform all services as expeditiously as is consistent with professional skill and care and the orderly progress of the Work, in accordance with the Project Schedule. Verification of estimated Project Schedule goals will be made as requested by the Owner.

D. Duty to Defend Work. In the event of any dispute between the Owner and any Permitting Authority that relates to the quality, completeness or professional workmanship of the Contractor's services or Work, the Contractor shall, at its sole cost and expense, cooperate with the Owner to defend the quality and workmanship of the Contractor's services and Work.

E. Trade and Industry Terminology. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe Work, materials, or equipment, such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or laws or regulations in effect at the time of opening of Bids, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of Owner or Contractor, or any of their agents or employees from those set forth in the Contract Documents. Computed dimensions shall govern over scaled dimensions.

2.3 Project Schedule. The Contractor, within ten (10) days after being awarded the Contract, shall prepare and submit for the Owner's and Architect/Engineer's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of Work.

A. The Project Schedule shall show a breakdown of all tasks to be performed, and their relationship in achieving the completion of each phase of Work, subject to review of Owner and Architect/Engineer and approval or rejection by Owner. The Project Schedule shall show, at a minimum, the approximate dates on which each segment of the Work is expected to be started and finished, the proposed traffic flows during each month, the anticipated earnings by the Contractor for each month and the approximate number of crews and equipment to be used. The Project Schedule shall include all phases of procurement, approval of shop drawings, proposed Change Orders in progress, schedules for Change Orders, and performance

testing requirements. The Project Schedule shall include a construction commencement date and Project Substantial Completion Date, which dates shall accommodate known or reasonably anticipated geographic, atmospheric and weather conditions.

B. The Project Schedule shall serve as the framework for the subsequent development of all detailed schedules. The Project Schedule shall be used to verify Contractor performance and to allow the Owner's Project Representative to monitor the Contractor's efforts.

C. The Project Schedule may be adjusted by the Contractor pursuant to Article V. The Owner shall have the right to reschedule Work provided such rescheduling is in accord with the remainder of terms of the Contract Documents.

D. The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect/Engineer's approval. The Architect/Engineer's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect/Engineer reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

E. The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect/Engineer.

2.4 Construction Services. The Contractor shall provide the following Construction Services:

A. Construction of Project. The Contractor shall work from the receipt of a Notice to Proceed through the Substantial Completion of the Project in accordance with the terms of the Contract Documents to manage the construction of the Project. The Construction Services provided by the Contractor to construct the Project shall include without limitation (1) all services necessary and commensurate with established construction standards, and (2) all services described in the Invitation for Bid and the Bid.

B. Notice to Proceed. A Notice to Proceed may be given at any time within thirty (30) days after the effective date of the Agreement. Contractor shall start to perform the Work on the date specified in the Notice to Proceed, but no Work shall be done at the site prior to the issuance of the Notice to Proceed.

C. Quality of Work. If at any time the labor used or to be used appears to the Owner as insufficient or improper for securing the quality of Work required or the required rate of progress, the Owner may order the Contractor to increase its efficiency or to improve the character of its Work, and the Contractor shall conform to such an order. Any such order shall

not entitle Contractor to any additional compensation or any increase in Contract Time. The failure of the Owner to demand any increase of such efficiency or any improvement shall not release the Contractor from its obligation to secure the quality of Work or the rate of progress necessary to complete the Work within the limits imposed by the Contract Documents. The Owner may require the Contractor to remove such personnel as the Owner deems incompetent, careless, insubordinate or otherwise objectionable, or whose continued employment on the Project is deemed to be contrary to the Owner's interest. The Contractor shall provide good quality workmanship and shall promptly correct construction defects without additional compensation. Acceptance of the Work by the Owner shall not relieve the Contractor of the responsibility for subsequent correction of any construction defects.

D. Materials. All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by Architect/Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instruction of the applicable supplier except as otherwise provided in the Contract Documents.

E. Accountability for Work. The Contractor shall be solely accountable for its Work, including plans review and complete submittals. The Contractor shall be solely responsible for means and methods of construction.

F. Contract Sum. The Contractor shall construct the Project so that the Project can be built for a cost not to exceed the Contract Sum.

G. Governing Specifications. The Project shall be constructed in accordance with applicable Owner design standards and guidelines. In the absence of specified Owner design standards or guidelines, the Architect/Engineer shall use, and the Contractor shall comply with, the most recent version of the applicable FDOT or AASHTO design standards. In general, the Project shall be constructed by the Contractor in accordance with applicable industry standards. The Contractor shall be responsible for utilizing and maintaining current knowledge of any laws, ordinances, codes, rules, regulations, standards, guidelines, special conditions, specifications or other mandates relevant to the Project or the services to be performed.

H. Adherence to Project Schedule. The development and equipping of the Project shall be undertaken and completed in accordance with the Project Schedule, and within the Contract Time described therein.

I. Superintendent. The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project Site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

(1) The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect/Engineer the name and qualifications of the proposed superintendent. The Architect/Engineer may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect/Engineer has reasonable objection to the proposed superintendent or (2) that the Architect/Engineer requires additional time to review.

Failure of the Architect/Engineer to reply within 14 days shall constitute notice of no reasonable objection.

(2) The Contractor shall not employ a proposed superintendent to whom the Owner or Architect/Engineer has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not be unreasonably withheld or delayed.

J. Work Hours. Contractor shall provide competent, suitable qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the Work or property at the site or adjacent thereto and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours, and Contractor shall not permit overtime work or the performance of Work on a Saturday, Sunday or legal holiday without Owner's written consent given after prior notice to Architect/Engineer (at least seventy-two (72) hours in advance).

K. Overtime-Related Costs. Contractor shall pay for all additional Architect/Engineering charges, inspection costs and Owner staff time for any overtime work which may be authorized. Such additional charges shall be a subsidiary obligation of Contractor and no extra payment shall be made by Owner on account of such overtime work. At Owner's option, such overtime costs may be deducted from Contractor's monthly payment request or Contractor's retainage prior to release of final payment.

L. Insurance, Overhead and Utilities. Unless otherwise specified, Contractor shall furnish and assume full responsibility for all bonds, insurance, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

M. Cleanliness. The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project Site. Contractor shall restore to original conditions all property not designated for alteration by the Contract Documents If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from Contractor.

N. Loading. Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

O. Safety and Protection. Contractor shall comply with the Florida Department of Commerce Safety Regulations and any local safety regulations. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in

connection with the Work. Contractor shall take all necessary precautions for the safety of and shall provide the necessary protection to prevent damage, injury or loss to:

(1) All employees on the Work and other persons and organizations who may be affected thereby;

(2) All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Project Site; and

(3) Other property at the Project Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities not designated for removal, relocation or replacement in the course of construction.

Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss, and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall provide and maintain all passageways, guard fences, lights and other facilities for the protection required by public authority or local conditions. Contractor shall provide reasonable maintenance of traffic for the public and preservation of the Owner's business, taking into full consideration all local conditions. Contractor's duties and responsibilities for safety and protection with regard to the Work shall continue until such time as all the Work is completed.

P. Emergencies. In emergencies affecting the safety or protection of persons or the Work or property at the Project Site or adjacent thereto, Contractor, without special instruction or authorization from Architect/Engineer or Owner, shall act to prevent threatened damage, injury or loss. Contractor shall give Owner prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If Owner determines that a change in the Project is required because of the action taken in response to an emergency, a Work Directive Change or Change Order will be issued to document the consequences of the changes or variation.

Q. Substitutes. For substitutes not included with the Bid, but submitted after the effective date of the Contract Documents, Contractor shall make written application to Architect/Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will also contain an itemized estimate of all costs and delays or schedule impacts that will result directly or indirectly from review, acceptance and provisions of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by the Architect/Engineer in evaluating the proposed substitute. Architect/Engineer may require Contractor to furnish at Contractor's expense, additional data about the proposed substitute. In rendering a decision, Owner, Architect/Engineer and Contractor shall have access to any available Float Time in the Project Schedule. In the event that substitute materials or equipment not included as part of the Bid, but proposed after the effective date of the Contract Documents, are accepted and are less costly than the originally specified materials or equipment, then the net difference in cost shall be credited to the Owner and an appropriate Change Order executed to adjust the Contract Sum.

(1) If a specific means, method, technique, sequence of procedure of construction is indicated in or required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to Architect/Engineer if Contractor submits sufficient information to allow Architect/Engineer to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents.

(2) Architect/Engineer will be allowed a reasonable time within which to evaluate each proposed substitute. Architect/Engineer will be the sole judge of acceptability and no substitute will be ordered, installed or utilized without Architect/Engineer's prior written acceptance which will be evidenced by either a Change Order or an approved shop drawing. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

(3) Contractor shall reimburse Owner for the charges of Architect/Engineer and Architect/Engineer's Consultants for evaluating each proposed substitute submitted after the effective date of the Contract Documents and all costs resulting from any delays in the Work while the substitute was undergoing review.

R. Surveys and Stakes. The Contractor shall furnish, free of charge, all labor, stakes, surveys, batter boards for structures, grade lines and other materials and supplies and shall set construction stakes and batter boards for establishing lines, position of structures, slopes and other controlling points necessary for the proper prosecution of the Work. Where rights-of-way, easements, property lines or any other conditions which make the lay-out of the Project or parts of the Project critical are involved, the Contractor shall employ a competent surveyor who is registered in the State of Florida for lay-out and staking. These stakes and marks shall constitute the field control by and in accord with which the Contractor shall govern and execute the Work. The Contractor shall be held responsible for the preservation of all stakes and marks and if for any reason any of the stakes or marks or batter boards become destroyed or disturbed, they shall be immediately and accurately replaced by the Contractor.

S. Suitability of Project Site. The Contractor has, by careful examination, satisfied itself as to the nature and location of the Work and all other matters which can in any way affect the Work, including, but not limited to details pertaining to borings, as shown on the drawings. Such boring information is not guaranteed to be more than a general indication of the materials likely to be found adjacent to holes bored at the Project Site, approximately at the locations indicated. The Contractor has examined boring data, where available, made its own interpretation of the subsurface conditions and other preliminary data, and has based its Bid on its own opinion of the conditions likely to be encountered. Except as specifically provided in Sections 2.4.U., 5.4 and 5.5, no extra compensation or extension of time will be considered for any Project Site conditions that existed at the time of bidding. No verbal agreement or conversation with any officer, agent or employee of the Owner, before or after the execution of the Agreement, shall affect or modify any of the terms or obligations herein contained.

T. Project Specification Errors. If the Contractor, in the course of the Work, finds that the drawings, specifications or other Contract Documents cannot be followed, the Contractor shall immediately inform the Owner in writing, and the Owner shall promptly check the accuracy of the information. Any Work done after such discovery, until any necessary changes are authorized, will be done at the Contractor's sole risk of non-payment and delay.

U. Remediation of Contamination: Owner and Contractor recognize that remediation of subsurface conditions may be necessary due to potential hazardous materials contamination. Because the presence or extent of any contamination is not known, Contractor shall include no cost in the Contract Sum, and no time in the Project Schedule, for cost or delays that might result from any necessary remediation. The Project Schedule will provide a period of time between demolition activities and the start of the next activity to commence any remediation if needed. Contractor shall use all reasonable efforts in scheduling the Project to minimize the likelihood that remediation delays construction. Any hazardous materials remediation Work which Contractor agrees to perform shall be done pursuant to a Change Order or amendment consistent with the following:

(1) The dates of Substantial Completion shall be equitably adjusted based on delays, if any, incurred in connection with remediation efforts.

(2) Contractor, and any Subcontractors which have mobilized on the Project Site, shall be paid for demonstrated costs of overhead operations at the Project Site during any period of delay in excess of seven (7) days, except to the extent that Work proceeds concurrently with remediation. The categories of costs to be reimbursed are limited to those reasonably incurred at the jobsite during the delay period (such as trailers or offices, telephones, faxes, and the like); equipment dedicated to the Project and located at the Project Site; salaries and associated costs of personnel dedicated to the Project to the extent that they do not perform Work on other projects; and other jobsite costs that are reasonable and which are incurred during the delay period. Subcontractors and suppliers which have not mobilized are limited to the costs set forth in Section 2.4.U(3).

(3) Contractor and any Subcontractor or supplier on the Project who is eligible for compensation shall be paid any demonstrated costs of escalation in materials or labor, and reasonable costs of off-site storage of materials identified to the Project, arising as a result of any delay in excess of seven (7) days. Such Contractor, Subcontractors and suppliers are obligated to take all reasonable steps to mitigate escalation costs, such as through early purchase of materials.

(4) Contractor, for itself and all Subcontractors and suppliers on the Project, hereby agrees that the extension of time for delays under Section 2.4.U(1), and payment of the costs identified in Sections 2.4.U(2) and/or Section 2.4.U(3), are the sole remedies for costs and delays described in this Section, and waives all claims and demands for extended home office overhead (including, but not limited to, "Eichleay" claims), lost profit or lost opportunities, and any special, indirect, or consequential damages

arising as a result of delays described in this Section. The Contract Sum shall be adjusted to reflect payment of allowable costs.

(5) If any delay described in this section causes the time or cost for the Project to exceed the Contract Time or the Contact Sum, then the Owner may terminate the Agreement pursuant to Section 14.2.

(6) Contractor and any Subcontractor or supplier seeking additional costs under this Section 2.4.U. shall promptly submit estimates or any costs as requested by Owner, and detailed back-up for all costs when payment is sought or whenever reasonably requested by Owner. All costs are auditable, at Owner's discretion. Bid, estimate and pricing information reasonably related to any request for additional compensation will be provided promptly upon request.

(7) Contractor shall include provisions in its subcontracts and purchase orders consistent with this Section.

V. Interfacing.

(1) The Contractor shall take such measures as are necessary to ensure proper construction and delivery of the Project, including but not limited to providing that all procurement of long-lead items, the separate construction Subcontractors, and the general conditions items are performed without duplication or overlap to maintain completion of all Work on schedule. Particular attention shall be given to provide that each bid package clearly identifies the Work included in that particular separate subcontract, it's scheduling for start and completion, and its relationship to other separate contractors.

(2) Without assuming any design responsibilities of the Architect/Engineer, the Contractor shall include in the Progress Reports required under this Section 2.4 comments on overlap with any other separate subcontracts, omissions, lack of correlation between drawings, and any other deficiencies noted, in order that the Architect/Engineer may arrange for necessary corrections.

W. Job Site Facilities. The Contractor shall arrange for all job site facilities required and necessary to enable the Contractor and Architect/Engineer to perform their respective duties and to accommodate any representatives of the Owner which the Owner may choose to have present on the job.

X. Weather Protection. The Contractor shall provide temporary enclosures of building areas in order to assure orderly progress of the Work during periods when extreme weather conditions are likely to be experienced. The Contractor shall also be responsible for providing weather protection for Work in progress and for materials stored on the Project Site. A contingency plan shall be prepared upon request of the Owner for weather conditions that may affect the construction.

Y. Payment and Performance Bond. Prior to the construction commencement date, the Contractor shall obtain, for the benefit of and directed to the Owner, a Payment and Performance Bond satisfying the requirements of Section 255.05, Florida Statutes, covering the faithful performance by the Contractor of its obligations under the Contract Documents, including but not limited to the construction of the Project on the Project Site and the payment of all obligations arising thereunder, including all payments to Subcontractors, laborers, and materialmen. The surety selected by the Contractor to provide the Payment and Performance Bond shall be approved by the Owner prior to the issuance of such Bond, which approval shall not be unreasonably withheld or delayed provided that the surety is rated A or better by Best's Key Guide, latest edition.

Z. Construction Phase; Building Permit; Code Inspections. Unless otherwise provided, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work.

(1) Building Permit. The Owner and Architect/Engineer shall provide such information to any Permitting Authority as is necessary to obtain approval from the Permitting Authority to commence construction prior to beginning construction. The Contractor shall pull any required building permit, and shall be responsible for delivering and posting the building permit at the Project Site prior to the commencement of construction. The cost of the building permit is included in the Contract Sum. The Owner and Architect/Engineer shall fully cooperate with the Contractor when and where necessary.

(2) Code Inspections. The Project requires detailed code compliance inspection during construction in disciplines determined by any Permitting Authority. These disciplines normally include, but are not necessarily limited to, structural, mechanical, electrical, plumbing general building and fire. The Contractor shall notify the appropriate inspector(s) and the Architect/Engineer, no less than 24 hours in advance, when the Work is ready for inspection and before the Work is covered up. All inspections shall be made for conformance with the applicable ordinances and building codes. Costs for all re-inspections of Work found defective and subsequently repaired shall not be included as Project Costs and shall be borne by the Contractor or as provided in the contract between Contractor and Subcontractor.

(3) Contractor's Personnel. The Contractor shall maintain sufficient off-site support staff and competent full-time staff at the Project Site authorized to act on behalf of the Contractor to coordinate, inspect, and provide general direction of the Work and progress of the Subcontractors. At all times during the performance of the Work, the Owner shall have the right to demand replacement of Contractor Personnel to whom the Owner has reasonable objection, without liability to the Contractor.

(4) Lines of Authority. To provide general direction of the Work, the Contractor shall establish and maintain lines of authority for its personnel and shall provide this information to the Owner and all other affected parties, such as the code inspectors of any Permitting Authority, the Subcontractors, and the Architect/Engineer. The Owner and Architect/Engineer may attend meetings between the Contractor and his Subcontractors; however, such attendance is optional and shall not diminish either the authority or responsibility of the Contractor to administer the subcontracts.

AA. Quality Control. The Contractor shall develop and maintain a program, acceptable to the Owner and Architect/Engineer, to assure quality control of the construction. The Contractor shall be responsible for and supervise the Work of all Subcontractors, providing instructions to each when their Work does not conform to the requirements of the Project Plans and Specifications, and the Contractor shall continue to coordinate the Work of each Subcontractor to ensure that corrections are made in a timely manner so as to not affect the efficient progress of the Work. Should a disagreement occur between the Contractor and the Architect/Engineer over the acceptability of the Work, the Owner, at its sole discretion and in addition to any other remedies provided herein, shall have the right to determine the acceptability, provided that such determination is consistent with standards for construction projects of this type and generally accepted industry standards for workmanship in the State of Florida.

BB. Management of Subcontractors. All Subcontractors shall be compensated in accordance with Article IV. The Contractor shall solely control the Subcontractors. The Contractor shall negotiate all Change Orders and Field Orders with all affected Subcontractors and shall review the costs and advise the Owner and Architect/Engineer of their validity and reasonableness, acting in the Owner's best interest. When there is an imminent threat to health and safety, and Owner's Project Representative concurrence is impractical, the Contractor shall act immediately to remove the threats to health and safety and shall subsequently fully inform Owner of all such action taken. The Contractor shall also carefully review all shop drawings and then forward the same to the Architect/Engineer for review and actions. The Architect/Engineer will transmit them back to the Contractor, who will then issue the shop drawings to the affected Subcontractor for fabrication or revision. The Contractor shall maintain a suspense control system to promote expeditious handling. The Contractor shall request the Architect/Engineer to make interpretations of the drawings or specifications requested of him by the Subcontractors and shall maintain a business system to promote timely response. The Contractor shall inform the Architect/Engineer which shop drawings or requests for clarification have the greatest urgency, so as to enable the Architect/Engineer to prioritize requests coming from the Contractor. The Contractor shall advise the Owner and Architect/Engineer when timely response is not occurring on any of the above.

CC. Job Requirements.

(1) The Contractor shall provide each of the following as a part of its services hereunder:

(a) Maintain a log of daily activities, including manpower records, equipment on site, weather, delays, major decisions, etc;

(b) Maintain a roster of companies on the Project with names and telephone numbers of key personnel;

(c) Establish and enforce job rules governing parking, clean-up, use of facilities, and worker discipline;

(d) Provide labor relations management and equal opportunity employment for a harmonious, productive Project;

(e) Provide and administer a safety program for the Project and monitor for subcontractor compliance without relieving them of responsibilities to perform Work in accordance with best acceptable practice;

(f) Provide a quality control program as provided under Section 2.4.C above;

(g) Provide miscellaneous office supplies that support the construction efforts which are consumed by its own forces;

(h) Provide for travel to and from its home office to the Project Site and to those other places within Manatee County as required by the Project;

(i) Verify that tests, equipment, and system start-ups and operating and maintenance instructions are conducted as required and in the presence of the required personnel and provide adequate records of same to the Architect/Engineer;

(j) Maintain at the job site orderly files for correspondence, reports of job conferences, shop drawings and sample submissions, reproductions of original Contract Documents including all addenda, change orders, field orders, additional drawings issued subsequent to the execution of the Agreement, Owner/Architect/Engineer's clarifications and interpretations of the Contract Documents, progress reports, as-built drawings, and other project related documents;

(k) Keep a diary or log book, recording hours on the job site, weather conditions, data relative to questions of extras or deductions; list of visiting officials and representatives or manufacturers, fabricators, suppliers and distributors; daily activities, decisions, observations in general and specific observations in more detail as in the case of observing test procedures, and provide copies of same to Owner/Architect/Engineer;

(l) Record names, addresses and telephone numbers of all Contractors, Subcontractors and major suppliers of materials and equipment;

(m) Furnish Owner/Architect/Engineer periodic reports, as required, of progress of the Work and Contractor's compliance with the approved progress schedule and schedule of shop drawing submissions;

(n) Consult with Owner/Architect/Engineer in advance of scheduling major tests, inspections or start of important phases of the Work;

(o) Verify, during the course of the Work, that certificates, maintenance and operations manuals and other data required to be assembled and furnished are applicable to the items actually installed, and deliver same to Owner/Architect/Engineer for review prior to final Acceptance of the Work; and

(p) Cooperate with Owner in the administration of grants.

(2) The Contractor shall provide personnel and equipment, or shall arrange for separate Subcontractors to provide each of the following as a Project Cost:

(a) Services of independent testing laboratories, and provide the necessary testing of materials to ensure conformance to contract requirements; and

(b) Printing and distribution of all required bidding documents and shop drawings, including the sets required by Permitting Authority inspectors.

DD. As-Built Drawings. The Contractor shall continuously review as-built drawings and mark up progress prints to provide as much accuracy as possible. Prior to, and as a requirement for authorizing final payment to the Contractor due hereunder, the Contractor shall provide to the Owner an original set of marked-up, as-built Project Plans and Specifications and an electronic format of those records showing the location and dimensions of the Project as constructed, which documents shall be certified as being correct by the Contractor and the Architect/Engineer. Final as-built drawings shall be signed and sealed by a registered Florida surveyor.

EE. Progress Reports. The Contractor shall forward to the Owner, as soon as practicable after the first day of each month, a summary report of the progress of the various parts of the Work under the Contract, in fabrication and in the field, stating the existing status, estimated time of completion and cause of delay, if any. Together with the summary report, the Contractor shall submit any necessary revisions to the original schedule for the Owner's review and approval. In addition, more detailed schedules may be required by the Owner for daily traffic control.

FF. Contractor's Warranty. The Contractor warrants to the Owner and Architect/Engineer that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements will be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect/Engineer, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

(1) Contractor shall use its best efforts and due diligence to ensure that during the warranty period, those entities or individuals who have provided direct warranties to the Owner as required by the Contract Documents perform all required warranty Work in a timely manner and at the sole cost and expense of such warranty providers. Any such cost or expense not paid by the warranty providers shall be paid by the Contractor, to include any costs and attorney's fees incurred in warranty-related litigation between Contractor and any Subcontractors.

(2) The Contractor shall secure guarantees and warranties of Subcontractors, equipment suppliers and materialmen, and assemble and deliver same to the Owner in a manner that will facilitate their maximum enforcement and assure their meaningful implementation. The Contractor shall collect and deliver to the Owner any specific written guaranties or warranties given by others as required by subcontracts.

(3) At the Owner's request, the Contractor shall conduct, jointly with the Owner and the Architect/Engineer, no more than two (2) warranty inspections within three (3) years after the Substantial Completion Date.

GG. Apprentices. If Contractor employs apprentices, their performance of Work shall be governed by and comply with the provisions of Chapter 446, Florida Statutes.

HH. Schedule of Values. Unit prices shall be established for this Contract by the submission of a schedule of values within ten (10) days of receipt of the Notice to Proceed. The schedule shall include quantities and prices of items equaling the Contract Sum and will subdivide the Work into components in sufficient detail to serve as the basis for progress payments during construction. Such prices shall include an appropriate amount of

overhead and profit applicable to each item of Work. Upon request of the County, the Contractor shall support the values with data which will substantiate their correctness.

II. Other Contracts. The Owner reserves the right to let other Contracts in connection with this Work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and execution of their Work, and promptly connect and coordinate the Work with theirs.

ARTICLE III
COMPENSATION

3.1 Compensation. The Contract Sum constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at Contractor's expense without change in the Contract Sum.

A. Adjustments. The Contract Sum may only be changed by Change Order or by a written amendment. Any claim for an increase or decrease in the Contract Sum shall be based on written notice delivered by the party making the claim to the other party. Notice of the amount of the claim with supporting data shall be delivered within fifteen (15) days from the beginning of such occurrence and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect and consequential) to which the claimant is entitled as a result of the occurrence of said event. Failure to deliver a claim within the requisite 15–day period shall constitute a waiver of the right to pursue said claim.

B. Valuation. The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Sum shall be determined in one of the following ways (at Owner's discretion):

(1) In the case of Unit Price Work, in accordance with Section 3.1.C, below; or

(2) By mutual acceptance of lump sum; or

(3) On the basis of the cost of the Work, plus a negotiated Contractor's fee for overhead and profit. Contractor shall submit an itemized cost breakdown together with supporting data.

C. Unit Price Work. The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment pursuant to a requested Change Order under the following conditions:

(1) If the total cost of a particular item of Unit Price Work amounts to 5% or more of the Contract Sum and the variation in the quantity of the particular item of Unit Price Work performed by Contractor differs by more than 15% from the estimated quantity of such item indicated in the Agreement; and

(2) If there is no corresponding adjustment with respect to any other item of Work; and

(3) If Contractor believes that it has incurred additional expense as a result thereof; or

(4) If Owner believes that the quantity variation entitles it to an adjustment in the unit price; or

(5) If the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

3.2 Schedule of Compensation. All payments for services and material under the Contract Documents shall be made in accordance with the following provisions.

A. Periodic Payments for Services. The Contractor shall be entitled to receive payment for Construction Services rendered pursuant to Section 2.4 in periodic payments which shall reflect a fair apportionment of cost and schedule of values of services furnished prior to payment, subject to the provisions of this Section.

B. Payment for Materials and Equipment. In addition to the periodic payments authorized hereunder, payments may be made for material and equipment not incorporated in the Work but delivered and suitably stored at the Project Site, or another location, subject to prior approval and acceptance by the Owner on each occasion.

C. Credit toward Contract Sum. All payments for Construction Services made hereunder shall be credited toward the payment of the Contract Sum as Contractor's sole compensation for the construction of the Project.

3.3 Invoice and Payment. All payments for services and materials under the Contract Documents shall be invoiced and paid in accordance with the following provisions.

A. Invoices. The Contractor shall submit to the Owner periodic invoices for payment, in a form acceptable to the Owner, which shall include a sworn statement certifying that, to the best of the Contractor's knowledge, information and belief, the construction has progressed to the point indicated, the quality and the Work covered by the invoice is in accord with the Project Plans and Specifications, and the Contractor is entitled to payment in the amount requested, along with the cost reports required pursuant to Article II, showing in detail all monies paid out, Project Costs accumulated, or Project Cost incurred during the previous period. This data shall be attached to the invoice.

B. Additional Information; Processing of Invoices. Should an invoiced amount appear to exceed the Work effort believed to be completed, the Owner may, prior to processing of the invoice for payment, require the Contractor to submit satisfactory evidence to support the invoice. All progress reports and invoices shall be delivered to the attention of the Owner's Project Representative. Invoices not properly prepared (mathematical errors, billing not reflecting actual Work done, no signature, etc.) shall be returned to the Contractor for correction.

C. Architect/Engineer's Approval. Payment for Work completed shall be subject to the Architect/Engineer approving the payment requested by the Contractor and certifying the amount thereof that has been properly incurred and is then due and payable to the Contractor, and identifying with specificity any amount that has not been properly incurred and that should not be paid. .

D. Warrants of Contractor with Respect to Payments. The Contractor warrants that (1) upon payment of any retainage, materials and equipment covered by a partial payment request will pass to Owner either by incorporation in construction or upon receipt of payment by the Contractor, whichever occurs first; (2) Work, materials and equipment covered by previous partial payment requests shall be free and clear of liens, claims, security interests, or encumbrances, hereinafter referred to as "liens"; and (3) no Work, materials or equipment covered by a partial payment request which has been acquired by the Contractor or any other person performing Work at the Project Site, or furnishing materials or equipment for the Project, shall be subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or any other person.

E. All Compensation Included. Contractor's compensation includes full payment for services set forth in the Contract Documents, including but not limited to overhead, profit, salaries or other compensation of Contractor's officers, partners and/or employees, general operating expenses incurred by Contractor and relating to this Project, including the cost of management, supervision and data processing staff, job office equipment and supplies, and other similar items.

ARTICLE IV
SUBCONTRACTORS

4.1 Subcontracts. At the Owner's request, the Contractor shall provide Owner's Project Representative with copies of all proposed and final subcontracts, including the general and supplementary conditions thereof.

A. Subcontracts Generally. All subcontracts shall: (1) require each Subcontractor to be bound to Contractor to the same extent Contractor is bound to Owner by the terms of the Contract Documents, as those terms may apply to the portion of the Work to be performed by the Subcontractor, (2) provide for the assignment of the subcontracts from Contractor to Owner at the election of Owner, upon termination of Contractor, (3) provide that Owner will be an additional indemnified party of the subcontract, (4) provide that Owner will be an additional insured on all insurance policies required to be provided by the Subcontractor, except workers' compensation, (5) assign all warranties directly to Owner, and (6) identify Owner as an intended third-party beneficiary of the subcontract.

(1) A Subcontractor is a person or entity who has a direct contract with Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

(2) A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

B. No Damages for Delay. Except when otherwise expressly agreed to by Owner in writing, all subcontracts shall provide:

> "LIMITATION OF REMEDIES – NO DAMAGES FOR DELAY. The Subcontractor's exclusive remedy for delays in the performance of the contract caused by events beyond its control, including delays claimed to be caused by the Owner or Architect/Engineer or attributable to the Owner or Architect/Engineer and including claims based on breach of contract or negligence, shall be an extension of its contract time and shall in no way involve any monetary claim."

Each subcontract shall require that any claims by the Subcontractor for delay must be submitted to the Contractor within the time and in the manner in which the Contractor must submit such claims to the Owner, and that failure to comply with the conditions for giving notice and submitting claims shall result in the waiver of such claims.

C. Subcontractual Relations. The Contractor shall require each Subcontractor to assume all the obligations and responsibilities which the Contractor owes the Owner pursuant to the Contract Documents, by the parties to the extent of the Work to be performed by the Subcontractor. Said obligations shall be made in writing and shall preserve and protect the rights of the Owner and Architect/Engineer, with respect to the Work to be performed by the Subcontractor, so that the subcontracting thereof will not prejudice such rights. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with its sub-subcontractor.

D. Insurance; Acts and Omissions. Insurance requirements for Subcontractors shall be no more stringent than those requirements imposed on the Contractor by the Owner. The Contractor shall be responsible to the Owner for the acts and omissions of its employees, agents, Subcontractors, their agents and employees, and all other persons performing any of the Work or supplying materials under a contract to the Contractor.

4.2 Relationship and Responsibilities. Except as specifically set forth herein with respect to direct materials acquisitions by Owner, nothing contained in the Contract Documents or in any Contract Document does or shall create any contractual relation between the Owner or Architect/Engineer and any Subcontractor. Specifically, the Contractor is not acting as an agent of the Owner with respect to any Subcontractor. The utilization of any Subcontractor shall not relieve Contractor from any liability or responsibility to Owner, or obligate Owner to the payment of any compensation to the Subcontractor or additional compensation to the Contractor.

4.3 Payments to Subcontractors; Monthly Statements. The Contractor shall be responsible for paying all Subcontractors from the payments made by the Owner to Contractor pursuant to Article III, subject to the following provisions:

A. Payment. The Contractor shall, no later than ten (10) days after receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's Work, pay to each Subcontractor the amount to which the Subcontractor is entitled in accordance with the terms of the Contractor's contract with such Subcontractor. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to sub-Subcontractors in a similar manner. After receipt of payment from Owner, if the need should arise to withhold payments to Subcontractors for any reason, as solely determined by Contractor, the Contractor shall promptly restore such monies to the Owner, adjusting subsequent pay requests and Project bookkeeping as required.

B. Final Payment of Subcontractors. The final payment of retainage to Subcontractors shall not be made until the Project has been inspected by the Architect/Engineer or other person designated by the Owner for that purpose, and until both the Architect/Engineer and the Contractor have issued a written certificate that the Project has been constructed in accordance with the Project Plans and Specifications and approved Change Orders. Before issuance of final payment to any Subcontractor without any retainage, the Subcontractor shall submit satisfactory evidence that all payrolls, material bills, and other indebtedness connected with the Project have been paid or otherwise satisfied, warranty information is complete, as-built markups have been submitted, and instruction for the Owner's operating and maintenance personnel is complete. Final payment may be made to certain select Subcontractors whose Work is satisfactorily completed prior to the completion of the Project, but only upon approval of the Owner's Project Representative.

4.4 Responsibility for Subcontractors. As provided in Section 2.4.BB, Contractor shall be fully responsible to Owner for all acts and omissions of the Subcontractors, suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect Contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions.

4.5 Contingent Assignment of Subcontracts. Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that:

(1) assignment is effective only after termination of the Contract by the Owner for cause pursuant to Article XIV and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

(2) assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Agreement.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract. Upon such assignment, if the Work has been suspended for more than thirty (30) days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension. Upon such assignment to the Owner, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner

shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE V
CHANGES IN WORK

5.1 General. Changes in the Work may be accomplished after execution of the Agreement, and without invalidating the Agreement, by Change Order, Work Directive Change or order for a minor change in the Work, subject to the limitations stated in this Article V and elsewhere in the Contract Documents. A Change Order shall be based upon agreement among the Owner, Contractor and Architect/Engineer; a Work Directive Change requires agreement by the Owner and Architect/Engineer and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect/Engineer alone. Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Work Directive Change or order for a minor change in the Work.

5.2 Minor Changes in the Work. The Owner or Architect/Engineer shall have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such change will be effected by written order signed by the Architect/Engineer and shall be binding on the Owner and Contractor. The Contractor shall abide by and perform such minor changes. Such changes shall be effected by a Field Directive or a Work Directive Change. Documentation of changes shall be determined by the Construction Team, and displayed monthly in the Progress Reports. Because such changes shall not affect the Contract Sum to be paid to the Contractor, they shall not require a Change Order pursuant to Section 5.6.

5.3 Emergencies. In any emergency affecting the safety of persons or property, the Contractor shall act at its discretion to prevent threatened damage, injury, or loss. Any increase in the Contract Sum or extension of time claimed by the Contractor on account of emergency Work shall be determined as provided in Section 5.6. However, whenever practicable, the Contractor shall obtain verbal concurrence of the Owner's Project Representative and Architect/Engineer where the act will or may affect the Contract Sum or Contract Time.

5.4 Concealed Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect/Engineer before conditions are disturbed and in no event later than ten (10) days after first observance of the conditions. The Architect/Engineer will promptly investigate such conditions and, if the Architect/Engineer determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect/Engineer determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect/Engineer

shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect/Engineer's determination or recommendation, that party may proceed as provided in Article VIII.

5.5 Hazardous Materials. In the event the Contractor encounters on the Project Site material reasonably believed to be hazardous, petroleum or petroleum related products, or other hazardous or toxic substances, except as provided in Section 2.4.U, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and the Architect/Engineer in writing. The Work in the affected area shall not thereafter be resumed except by written amendment, if in fact the material or substance has not been rendered harmless. The Work in the affected area shall be resumed when the Project Site has been rendered harmless, in accordance with the final determination by the Architect/Engineer or other appropriate professional employed by Owner. The Contractor shall not be required to perform without its consent any Work relating to hazardous materials, petroleum or petroleum related products, or other hazardous or toxic substances. In the event the Contractor encounters on the Project Site materials believed in good faith to be hazardous or contaminated material, and the presence of such hazardous or contaminated material was not known and planned for at the time the Contractor submitted its Bid, and it is necessary for the Contractor to stop Work in the area affected and delays Work for more than a seven (7) day period, adjustments to the Contract Sum and/or Contract Time shall be made in accordance with this Article V.

5.6 Change Orders; Adjustments to Contract Sum.

A. Change Orders Generally. The increase or decrease in the Contract Sum resulting from a change authorized pursuant to the Contract Documents shall be determined:

(1) By mutual acceptance of a lump sum amount properly itemized and supported by sufficient substantiating data, to permit evaluation by the Architect/Engineer and Owner; or

(2) By unit prices stated in the Agreement or subsequently agreed upon; or

(3) By any other method mutually agreeable to Owner and Contractor.

If Owner and Contractor are unable to agree upon increases or decreases in the Contract Sum and the Architect/Engineer certifies that the work needs to be commenced prior to any such agreement, the Contractor, provided it receives a written Change Order signed by or on behalf of the Owner, shall promptly proceed with the Work involved. The cost of such Work shall then be determined on the basis of the reasonable expenditures of those performing the Work attributed to the change. However, in the event a Change Order is issued under these conditions, the Owner, through the Architect/Engineer, will establish an estimated cost of the Work and the Contractor shall not perform any Work whose cost exceeds that estimated without prior written approval by the Owner. In such case, the Contractor shall keep and present in such form as the Owner may prescribe an itemized accounting, together with appropriate supporting data of the increase in overall costs of the Project. The amount of any decrease in the Contract Sum to be allowed by the Contractor to the Owner for any deletion or change which results in a net decrease in costs will be the amount of the actual net decrease.