

June 30, 2014
BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY, FLORIDA

ADDENDUM NO. 1
IFB NO. Y14-748
ORANGE COUNTY EASTERN WATER RECLAMATION FACILITY
PHASE V AND CENTRIFUGE DEWATERING IMPROVEMENTS

BID OPENING: July 31, 2014 at 2:00 PM

This addendum is hereby incorporated into the bid documents of the project referenced above. The following items are clarifications, corrections, additions, deletions and/or revisions to and shall take precedence over the original documents. Additions are indicated by underlining, deletions are indicated by ~~strikethrough~~.

The bid opening date remains July 31, 2014 at 2:00 PM.

A. FRONT END DOCUMENT CHANGES

1.Part D-BID FORM page D-4 is changed as follows:

1. Work shall start at the project site within fourteen (14) days of the effective date of the Notice to Proceed.
2. Package A Phase V Improvement will be substantially complete within 1020 consecutive calendar days from date of Official Notice to Proceed.
3. Package A Phase V Improvement will achieve final completion within 1080 consecutive calendar days from date of Official Notice to Proceed.
4. Package B Centrifuge Dewatering will be substantially complete within 480 consecutive calendar days from date of Official Notice to Proceed.
5. Package B Centrifuge Dewatering will achieve final complete within 540 consecutive calendar days from date of Official Notice to Proceed.
6. Package C Wetlands Outfall Stage Recorder will be substantially completion within 120 consecutive calendar days from date of Official Notice to Proceed.
7. Package C Wetlands Outfall Stage Recorder will achieve final completion within 150 consecutive calendar days from date of Official Notice to Proceed
8. Should the Successful Bidder fail to complete work as specified, the liquidated damage clause will apply (Part E, Contract).

2. PART E, page E-4 CONSTRUCTION CONTRACT is changed as follows:

VI

TIME OF COMMENCEMENT AND FINAL COMPLETION:

- a. Work to commence within fourteen (14) days of Official Notice to Proceed date and shall be completed, unless amended by written Change Order or Amendment executed by both parties to this Contract.
- b. **Package A Phase V Improvement will be substantially complete within 1020 consecutive calendar days from date of Official Notice to Proceed.**
- c. **Package A Phase V Improvement will achieve final completion within 1080 consecutive calendar days from date of Official Notice to Proceed.**
- d. **Package B Centrifuge Dewatering will be substantially complete within 480 consecutive calendar days from date of Official Notice to Proceed.**
- e. **Package B Centrifuge Dewatering will achieve final completion within 540 consecutive calendar days from date of Official Notice to Proceed.**
- f. Package C Wetlands Outfall Stage Recorder will be substantially completion within 120 consecutive calendar days from date of Official Notice to Proceed.
- g. **Package C Wetlands Outfall Stage Recorder will achieve final completion within 150 consecutive calendar days from date of Official Notice to Proceed**

B. SPECIFICATIONS

1. Replace Bid Package A, Section 01025, Measurement and Payment with the attached Section 01025 (**Attachment**). Reference Additional Information, Item 1 for the inclusion of additional Work to the scope of the Phase V Improvements, Bid Package C, EWRF Wetlands Outfall Stage Recorder Improvements. This inclusion of this work is described in Section 01025, Part D.1.a. (23) (**Attachment**). The bid for this Work is to be included within Bid Item 1.0 Bid Package A (Phase V Improvements).

C. DRAWINGS

Bid Package A – Phase V Improvements are modified as follows.

No.	Sheet No.	Sheet Title	Comments
22	C-110	Demolition Plan	Reference Drawing Note 1
25	C-113	Demolition Plan	Reference Drawing Note 1
36	C-124	Yard Piping Plan	Reference Drawing Note 1
47	C-135	Paving Grading And Drainage Plan	Reference Drawing Note 1
53	C-141	South Ribs - Plan 1	Reference Drawing Note 3
54	C-142	South Ribs - Plan 2	Reference Drawing Note 3
55	C-143	Sewer And Storm Piping & Manhole Data Tables	Reference Drawing Note 1
107	S-360-103	Filter Splitter Box T-Structure Plan	Reference Drawing Note 1
153	S-506	Stair Key Plan	Reference Drawing Note 1
155	S-508	Stair Details II of IV	Reference Drawing Note 1
No.	Sheet No.	Sheet Title	Comments
158	S-511	Slab Schedule I of II	Reference Drawing Note 1
159	S-512	Slab Schedule II of II	Reference Drawing Note 1
164	D-220-101	Ph I-II Basin 1 & 2 Aeration Demolition Plan	Reference Drawing Note 2
165	D-220-102	Ph I-II Basin 3 & 4 Aeration Demolition Plan	Reference Drawing Note 2
167	D-220-104	Ph I-II Basin 1 & 2 Aeration Improvement Plan	Reference Drawing Note 2
168	D-220-105	Ph I-II Basin 3 & 4 Aeration Improvement Plan	Reference Drawing Note 2
219	D-360-101	Filter Splitter Box Modifications Demolition Plan	Reference Drawing Note 1
220	D-360-102	Filter Splitter Box Modifications Improvement Plan	Reference Drawing Note 1
224	D-360-304	Filter Splitter Box Modifications Improvement Section	Reference Drawing Note 1
234	D-470-101	Phase IV Disk Filter Demolition Plan	Reference Drawing Note 1
235	D-470-102	Phase IV Disk Filter Improvement Plan	Reference Drawing Note 1
280	D-580-100	Chlorine Contact Tank Overall Plan	Reference Drawing Note 1
281	D-580-101	Chlorine Contact Tank Plan	Reference Drawing Note 1
282	D-580-102	Chlorine Contact Tank Plan	Reference Drawing Note 1
284	D-580-302	Chlorine Contact Tank Section	Reference Drawing Note 1
367	E-360-101	Filter Splitter Box Electrical Demolition Plan	Reference Drawing Note 1
368	E-360-102	Filter Splitter Box Electrical Modification Plan	Reference Drawing Note 1

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375	E-470-101	Phase IV Disk Filter Electrical Plans	Reference Drawing Note 1
429	E-628	Mcc-17 Single Line Power Diagram	Reference Drawing Note 1
439	E-706	Mcc-15, Mcc-16, Mcc-17, Mcc-18 Front Elevation	Reference Drawing Note 1
477	I-113	Process Flow Diagram Filter Splitter Box	Reference Drawing Note 1
508	I-470-301	P&ID Temporary Disk Filter	Reference Drawing Note 1

Drawing Notes:

1. Elimination of the relocation of the existing Process 470 Aqua-Aerobics Disk Filter from the Contract, reference Additional Information, Item No. 2.
2. Reference Bidder Questions, Item Nos. 6 and 7.
3. Reference Additional Information, Item No. 3.

D. BIDDER QUESTIONS

1. **Are weld-on collars for ductile iron pipe acceptable in addition to shrink-fit collars/grooves per Specification Section 15062 Part 2.B?**

Yes. The following will be added to Bid Packages A and B, Specification Section 15062, Wall Pipes, Seep Rings, and Penetrations, Part 2.B.2.d for cast-iron or ductile-iron wall pipes and sleeves:

d. Pipe or sleeve with 360 degree fillet welds on both sides of the collar.

2. **Referencing Bid Package A Drawing G-004, Bid Package B Drawing G-003 and Specification Section 09900, is Tnemec N140-1211 primer acceptable for submerged ductile iron pipe?**

Coating System No. 1 for ductile iron piping shall be coated in accordance with Bid Packages A and B, Specification Section 09900, Painting and Coating Part 2.B.1.

3. **Clarify the method of restraint between Specification Section 02223, 15240 and the Thrust Restraint length tables in the Civil Detail Drawings (Bid Package A and B Detail 4/C-502)**

Reference Bid Package A, Drawing G-004 and Bid Package B, Drawings G-002 & G-003. Flow Stream Identification Note 7 states "All piping Joints are to be mechanically restrained", reference Section 15240, Part 2.L.3 "All buried joints shall be restrained". General Note 16 states "All existing piping requiring a new connection shall be restrained per Detail 4/C-502", the thrust restraint length tables.

4. **Will additional manufacturers or suppliers be considered prior to submittal of bid for this project?**

Reference IFB No. Y14-748-PH, Invitation for Bids for Orange County Eastern Water Reclamation Facility Phase V and Centrifuge Dewatering Improvements, Part C, Instructions to Bidders, Paragraph 7- Substitute Material and Equipment regarding the policy of Orange County regarding the submittal of "or equal" substitutions. "Or Equal" substitutions will not be considered during advertisement. Bids are to be based upon the named manufacturers listed in the specifications. "Or Equal" and Value Engineering alternatives may be submitted following Notice of Award.

5. **For Bid Package A sanitary running traps (standard plumber P-trap) are shown installed on DIP drain lines. Bid Package B shows the same type traps are shown as four (4) - 90 degree D.I. bends with short spools between the 90's using mechanical restraints. Clarify which detail should be used on this project.**

Standard plumber P-traps are acceptable for P-traps in both Bid Packages.

6. **Bid Package A, Drawings D-220-101, D-220-102 and D-220-104 - where does the 1½" WM connect on the eastern side of the aeration basins?**

*The 1½" RW (incorrectly labeled as 1½" WM) shown on Bid Package A drawings referenced above is existing. The RW connects to the existing 4 RW shown on drawing C-119. Reference the revised Drawings with revised the line weight of the 1½" RW to show it screened (existing) as well as the corrected labeling. In sections where it will be demolished for the new walkways, a new Hose Bib and Rack Detail are installed at the termination of the demolished sections per Detail 5/D-504. To highlight those sections to be demolished, the sections of the existing piping to be demolished are shown slightly darker than those sections that are to remain. Reference the revised Drawings (**Attachment**).*

7. **Bid Package A, Drawing D-200-104 and typical of other drawings, what does the symbol represent on the end of the 1½" WM?**

*It is a hose bib and hose rack. Existing hose bibs and racks are differentiated from new hose bibs and racks by line weight, screened or dark. Reference the additional annotation added to the revised Drawings (**Attachment**).*

8. **Bid Package A | Sheet D-360-102 | Process 360 | The 16” & 18” SE-1 show its flow leaving the building, but the remainder of the pipe is not shown Sheet C-124 (Yard Piping). Additionally, Sheet D-470-102 & D-580-101 | Process 470 | The 18” SE-1 is flowing west from the east side of Process 580 to the Disk Filter, Process 470. The yard piping plan, Sheet C-124, does not show where this pipe connects and starts its flow process. Please verify where these lines continue and connect.**

The piping in question is used to transfer flow from the new Filter Splitter Box (Process 360) to the existing Disk Filter (Process 470). It is shown in greater detail in the Process 580 Drawings. Reference Additional Information, Item 2, below where the relocation of the existing Process 470 Aqua-Aerobics Disk Filter and this piping is eliminated from the Contract.

9. **Reference Specification Section 15100 Part 2.P. 3 for Butterfly Valves – Henry Pratt is a named manufacturer in the Orange County Utilities Standards and Construction Specification Manual (current edition 2011), Appendix D, but are not named in the above referenced specification. Since Henry Pratt butterfly valves conform to the project Specification we request that they be listed as an approved manufacturer for this project.**

Henry Pratt butterfly valves are added as acceptable products for the following valve type:

Type 200--Flanged, Rubber-Seated Butterfly Valves 4 Through 72 Inches, Class 150B:

In addition, Type 205 – Flanged, Rubber Seated, Rubber-Lined, Butterfly Valves 4 Inches and Larger, Class 150B has been added to Section 15100, Manual, Check, and Process Valves, Part 2.P.3:

Type 205–Flanged, Rubber Seated, Rubber-Lined, Butterfly Valves 4 Inches and Larger, Class 150B:

Butterfly valves shall be short body, flanged type for exposed valves and valves in vaults or structures, and either flanged or mechanical joint for buried valves. Valve shall conform to AWWA C504, Class 150B. Minimum working differential pressure across the valve disc shall be 150 psi. Flanged ends shall be Class 125, ASME B16.1. Valve shafts shall be stub shaft or one-

piece units extending completely through the valve disc. Materials of construction shall be as follows:

<u>Component</u>	<u>Material</u>	<u>Specification</u>
<u>Body</u>	<u>Cast iron or ductile iron</u>	<u>AWWA C504</u>
<u>Exposed body cap screws and bolts and nuts</u>	<u>Stainless steel</u>	<u>ASTM A276, Type 304 or 316</u>
<u>Discs</u>	<u>Cast iron, ductile iron, or Ni-Resist</u>	<u>AWWA C504</u>
<u>Shafts, disc fasteners, seat retention segments, and seat fastening devices</u>	<u>Stainless steel</u>	<u>ASTM A276, Type 304 or 316</u>
<u>Seat material</u>	<u>Buna-N</u>	<u>--</u>

Where the rubber seat is applied to the disc, it shall be bonded to a stainless steel seat retaining ring which is clamped to the disc by Type 304 or 316 stainless steel screw fasteners or secured to a stainless steel seat by a combination of cap screws, a serrated disc retaining ring, and molded shoulders in the seat mating with machined registers in the disc. The rubber valve seat shall be secured to or retained in the valve body. Valves shall be Pratt, DeZurik Series BAW, M&H, Val-Matic, or equal.

10. Are there any “Domestic” requirements on material for this project or can import material be used?

No, the FDEP State Revolving Fund (SRF) Loan Application was approved prior to domestic materials requirement being required.

11. Bid Package B | Sheet D-630-104 | Process 630 | Please verify the size and material type of the pipe flowing from the Polymer Injection Pumps to the 2” PS-1. I have been unsuccessful in finding this information.

Reference Bid Package B, Drawing G-003, Flow Stream Identification Table, the 2 PS-1 is CPVC.

12. **Bid Package A | Drawing C-508: The section view of the RIB overflow structure states “Bollard, typ. 8 plcs” however the plan view directly above it on the same sheet only shows (4) four. How many bollards are desired at each RIB overflow structure?**

The planview illustration is accurate. There should be four (4) bollards provided for each overflow structure. .

E. ADDITIONAL INFORMATION:

1. Orange County Utilities will include additional Work to the Contract as Bid Package C, EWRF Wetlands Outfall Stage Recorder Improvements (**Attachment**). The Work shall be substantially complete within one hundred twenty (120) days from the Notice to Proceed. The bid for this Work is to be included within Bid Item 1.0 Bid Package A (Phase V Improvements).
2. The Work for the relocation of the existing Process 470 Aqua-Aerobics Disk Filter is eliminated from the Bid Package A contract. The existing filter will remain in service. The Contractor will be responsible to temporarily relocate the existing pumps in order to construct the New Filter Splitter Box (Process 360) and maintain service to Proc 470. There are two (2) phases of construction for Proc 360; the South Part B and North Part D. Reference Section 01040, Part D.1.i (3) regarding the sequence of construction for Process 360. The Contractor will be required to temporarily relocate the existing pumps in kind in order to maintain two (2) pumps in service to Proc 470 during the sequence of the Work. Reference the attached Drawings illustrating the elimination of this Work from the Contract. (**Attachment**).
3. A clarification on Bid Package A Drawings C-141 and C-142, the following notes and respective call-outs are deleted on both drawings. (**Attachment**):
 - ~~2. Contractor Responsible to grade, excavate, and dispose of excess fill in order to re-grade reject storage pond to elevations noted herein.~~
 - ~~4. PVC geomembrane anchoring detail per 12/C-505.~~
 - ~~5. PVC geomembrane pipe puncture seal detail per 3/C-510.~~

- F. The Bidder shall acknowledge receipt of this addendum by completing the applicable section in the solicitation or by completion of the acknowledgement information on the addendum. Either form of acknowledgement must be completed and returned not later than the date and time for receipt of the bid.**
- G. All other terms and conditions remain the same.**

Receipt acknowledged by:

Authorized Signature

Date Signed

Title

Name of Firm

**BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY, FLORIDA**

ADDENDUM NO. 1

IFB NO. Y14-748

**ORANGE COUNTY EASTERN WATER RECLAMATION FACILITY
PHASE V AND CENTRIFUGE DEWATERING IMPROVEMENTS**

SPECIFICATIONS

SECTION 01025 MEASUREMENT AND PAYMENT

A. Payment

1. Work under this contract will be paid for on both a unit priced and lump sum basis as described on the Bid Schedule. The amount of payment will be as defined in the Construction Contract.
2. The quotations for the work are intended to establish a total price cost for completing the work in its entirety.
3. Additions, deletions, modifications or changes to the work as defined by this contract will be performed by change order according to the General Conditions.

B. General

1. All work under this contract shall be included in the lump sum amount listed on the Bid Schedule.
2. Any items not shown or omitted that are required for a complete installation shall be furnished and installed by the Contractor at no additional cost to the County.
3. The prices shall include all labor, materials, tools, and equipment required to complete the work.
4. Payment for repair and replacement of existing utilities will be included in the lump sum bid amount for the new construction.
5. Payment for lump sum items shall be on a percentage of completion of the particular item basis.

C. Partial Pay Request

1. The installation of pipe and fittings includes backfilling, compacting, hydrostatic testing, fine grading, property restoration, clean up, and placing the facilities in operation. When measurements of the amount of work constructed each month are made, for the purpose of partial payment, the following will be considered:
 - a. In addition to the retainage as set out in the Construction Contract, 10% of the amount of footage of pipe shall be withheld if the trench has not been backfilled, compacted, and tested.
 - b. In addition to the above, 10% of the amount of footage of pipe shall be withheld if the area has

not been fine graded, properly restored to its previous condition, cleaned up, sodded, pressure tested, and ready to be placed in operation.

2. No less than 2% of the contract price shall be retained until the record drawings, specifications, addenda, modifications, and shop drawings are delivered and reviewed by the County.
3. The Contractor will provide the following with each Partial Pay Request:
 - a. Current record drawings for the County's review.
 - b. Partial release of liens from all Vendors and Subcontractors.
 - c. Photos of work completed.
 - d. Consent of Surety Company for Partial Payment.

D. Description of Lump Sum Pay Items - Bid Package A

Described below is a brief summary of the work to be accomplished for the amount in the Bid Schedule. The amount will include shop drawings, sample submittals, record drawing submittals, O&M manual submittals, clean-up, start-up, testing, and placing in operation. The summary is not intended to describe all items in detail, but to clarify the items on which the price is to be based. The summary does not relieve the Contractor of his responsibility to supply all items complete.

1. Description of Base Bid Pay Items - Bid Package A:

- a. Bid Package A - Base Bid Item No. 1A (The Phase V Improvements) - This lump sum bid item is for the following elements as generally defined within the Contract Documents;
 - (1) New Preliminary Treatment Structure, Process 500. This includes all labor, materials, supplies and equipment for constructing the new preliminary treatment structure including but not limited to hydraulically cleaned band screens with sluice, screw presses, odor control facilities, flow meters, piping, weirs, slide gates, valves, reinforcement, concrete, grating, coating, pipe supports, testing, electrical & control improvements, and any other elements associated with this process. It shall also include all labor, materials, supplies and services in order to

install the Grit Removal System that is identified in Base Bid Item No. 2A (Hydro-International Inc. Grit Removal System)

- (2) Aeration improvements to Phase I/II, III, and IV Biological Nutrient Removal trains, including but not limited to the following processes; Process 210-230, 310-330, 420 and 520. This includes all labor, materials, supplies and equipment for the addition of supplemental aeration consisting of new blowers, fine bubble membrane disk diffusers, new air piping, reaeration channel modification, for the Phase I/II train, replacement of existing blowers, reaeration channel modifications, for the Phase III train, adding blower, for the Phase IV train, weirs, slide gates, valves, reinforcement, concrete, grating, coating, pipe supports, testing, electrical & control improvements, and any other elements associated with this process.

- (3) Clarifiers 1 to 4 Rehabilitation including WAS/RAS/SCUM pumping improvements and improvements to provide waste sludge pumping for Clarifiers 7 to 9, including but not limited to the following processes; Process 251-253 and 352. This includes all labor, materials, supplies and equipment for the Clarifiers 1 to 4 Rehabilitation including WAS/RAS/SCUM pumping improvements and improvements to provide waste sludge pumping for Clarifiers 7 to 9 including but not limited to RAS pumps, WAS pumps, VFDs, valves, piping, slabs, above grade RAS & WAS flow meters, replacement of Clarifier 9 flow meters, WAS, & RAS pumps, exterior concrete scum wet wells with a dedicated scum pump at each clarifier, sludge blanket level indicator, scum spray system, lighting along the mechanism walkway, and electrical and control components and any other elements of this process.

The improvements to Clarifiers 1 through 4 are planned to be constructed under two separate contracts. The County will contract separately for the "internal" clarifier improvements, including mechanism/drives, walkway, weirs, baffles, launder covers and scum beach.

Coordination will be required to integrate these improvements with the overall Phase V clarifier, RAS, WAS and scum pumping systems improvements.

- (4) New Clarifier 11 and improvements to the Clarifier 10 and 11 RAS/WAS/SCUM pumping station, Process 450 and 540. This includes all labor, materials, supplies and equipment for the secondary clarifier (Clarifier 11) including but not limited to energy dissipating inlet, spiral blade scraper, sludge blanket indicator, density current baffles, FRP launder covers, RAS pump on VFD, exterior concrete scum wet wells with a submersible scum pump, valves, piping, coating, testing, concrete, electrical & control components, and any other elements associated with this process.
- (5) Conversion of the Existing Phase III Effluent Flocculation Basin into a New Filter Splitter Box - Process 360. This includes all labor, materials, supplies and equipment for Conversion of the Existing Phase III Effluent Flocculation Basin into a New Filter Splitter Box including but not limited to weir gates, concrete, slide gates, motorized actuators, piping/concrete demolition & cleanup, modification to existing disk filter piping, electrical and control components and any other elements of this process.
- (6) Chlorine Contact Tank, Process 580. This includes all labor, materials, supplies and equipment for the chlorine contact tank including but not limited to valves, piping, concrete structures, grating, chemical mixer, weirs, electrical and control components and any other elements of this process.
- (7) Relocate Existing Disk Filter, Process 470. This includes all labor, materials, supplies and equipment for demolition and relocation of the existing disk filter including but not limited to valves, piping, electrical and controls, concrete slab, staircases and any other elements of this process.
- (8) Improvements to Existing Phase III Effluent and In-Plant Reuse Pump Stations - Processes 390 and 395. This includes all labor,

materials, supplies and equipment for the improvements to the existing EPS including but not limited to demolition of pumps, piping, canopy, and pump pedestals and construction of new pumps, valves, piping, fittings, air release valves, pipe supports, electrical and control components and any other elements of this process.

- (9) New Secondary Effluent Reject Pump Station and Reject Diversion Boxes, Process 560 - 565. This includes all labor, materials, supplies and equipment for the new secondary effluent reject pump station including but not limited to submersible pumps with guide rails, valves, reject pond outfall/intake structures, piping, slabs, wet well, flow meters, motor operated valves, electrical and control components and any other elements of this process.
- (10) Improvements to the Reject Storage Pond and Rapid Infiltration Basins (RIBs). This includes all labor, materials, supplies and equipment to the existing reject storage pond and Rapid Infiltration Basins including but not limited to the following; demolition, excavation, grading, liner and overflow installation.
- (11) Improvements to the Phase IV In-Plant Lift Station, Process 495. This includes all labor, materials, supplies and equipment for the improvements to the existing in-plant lift station including but not limited to a new submersible pumps with guide rails, limit switch on existing check valves, electrical and control components and any other elements of this process.
- (12) New Supplemental Carbon Feed and Storage System, Process 520. This includes all labor, materials, supplies and equipment for the new supplemental carbon source feed and storage system including but not limited to prefabricated metal building, concrete slab, chemical feed skids with pumps, storage tanks, piping, fittings, valves, miscellaneous appurtenances, electrical and control components and any other elements of this process.

- (13) New West Electrical Building, Process 575. This includes all labor, materials, supplies and equipment for the new main electrical building including but not limited to masonry block with foam insulation, hollow core plank membrane roof with sloped insulation, concrete, structural members, motor control centers, electrical switchgears, PLCs, fire alarm system tied to SCADA, civil, architectural, structural, electrical, instrumentation components, and any other elements associated with this building.
- (14) Improvements to the Existing Main Electrical/Blower Building and the North Control Building, Processes 185 and 155 respectively. This includes all labor, materials, supplies and equipment for the existing main electrical/blower building including but not limited to salvage of existing 150 Hp blowers supplying process air to Phase III BNR, install larger blowers in the existing main electrical/blower room. This includes all labor, materials, supplies and equipment for the existing north control building including but not limited to demolition and architectural, structural, electrical and HVAC improvements.
- (15) Improvements to the Existing SCADA Control Room - This includes all labor, materials, supplies and equipment for the existing SCADA control room but not limited to PC services, PC workstations, electrical improvements, integrate existing/proposed projects (Biosolids Handling System Modifications, Wetland Outfall Stage Recorder, Phase IV-C, and proposed Centrifuge Dewatering) into Phase V new open-architecture using Siemens S7 series PLCs, include automatic report generation, and any other elements associated with this building.
- (16) Miscellaneous Hydraulic Capacity Improvements - This includes all labor, materials, supplies and equipment for the miscellaneous hydraulic capacity improvements but not limited to construction of secondary effluent reject diversion boxes and any other elements associated with this building.

- (17) Miscellaneous site improvements and yard piping - This includes all labor, materials, supplies and equipment for the miscellaneous site improvements including grading modifications, concrete slabs, drainage ditches, sidewalks, process yard piping (raw sewage, MLSS, WAS, RAS, SCUM, secondary effluent, reject, drainage, potable water, reuse, NPW etc.) manholes, stormwater conveyance & treatment, existing roadway & storm drain repairs, cleanouts, valve boxes, valves, concrete, reinforcement, excavation, sheeting/shoring, dewatering, backfilling, restoration, testing, and other items shown on the drawings or specified herein, or as necessary to provide a complete operating system.
- (18) HVAC and Plumbing Improvements - This includes all labor, materials, supplies and equipment for construction of the HVAC and plumbing components associated with the Preliminary Treatment Structure, West Electrical Building, and Existing North Control Building including but not limited to piping, ducts, fittings, valves, air compressors and air handling units, fans, pumps, meters, concrete pads, supports, condensers and other respective appurtenances.
- (19) Electrical Site Improvements - This includes all labor, materials, supplies and equipment for the various external electrical improvements associated with the Phase V expansion including but not limited to ductbanks, wiring, substations, transformers, pull boxes, vaults, pedestals, reinforcement, concrete pads, and other elements associated with the electrical system.
- (20) Grading, Landscaping and Miscellaneous Site Improvements - This includes all labor, materials, supplies and equipment for the various site improvements associated with the Phase V expansion, including but not limited to hauling, mass grading, masonry block walls, relocation of equipment storage (crushed stone and geogrid fabric) open are south of Basin 7, bollards, watering, excavation, storm water best management practices, compaction, fine grading and landscaping.

- (21) General Requirements/
Mobilization/Demobilization - This includes all costs associated with mobilization, temporary control facilities, utilities, permits and demobilization as specified herein.
 - (22) Bonds/Permits/Indemnification - This includes all costs associated with bonds and permits as specified herein. The item shall include an amount for indemnifications specified in the Contract Documents and any addenda and modifications made thereto.
 - (23) Bid Package C: EWRW Wetlands Outfall Stage Recorder Improvements - This includes all costs associated with all labor, materials, equipment, and incidentals required to design, fabricate, deliver to project site, construct and start-up the wetland outfall stage recorder as shown on the Bid Package C Drawings and Specifications.
2. Bid Package A - Base Bid Item No. 2A (Hydro-International Grit Removal System)
- a. The Bid Item shall include the equipment cost of the Grit Removal System and manufacturer's services as provided by Hydro-International Inc. The Grit Removal System is described within Specification Sections 11314 and 11320 and illustrated within the Drawings, including but not limited to the Headcell®, Grit Pumps, SlurryCup™, Grit Snail® and associated auxiliary materials and equipment. The Bid Item shall include all manufacturer's services, including the 3-year warranty, as specified under Sections 11320 and 11314. The manufacturer's additive 2-year warranty shall be included within the Additive Bid Item No.1A (Additive Equipment Warranty). The cost for the labor, materials, supplies and all services to install and test the Grit Removal System shall be included in Base Bid Item No. 1A, including but not limited to the electrical, mechanical, structural and instrumentation disciplines. Reference Attachment C for the manufacturer's proposal regarding the Grit Removal System.
3. Bid Package A - Base Bid Item No. 3A (Material and Debris Removal from Existing Structures):

- a. Material Removal and Disposal from Existing Structures - This unit cost pay item includes all labor, materials, supplies, equipment, fuel, and disposal fees for all material and debris and material removal from existing tanks and structures encountered during execution of the Work. Note that the quantity of **1,000 tons** is only to obtain a unit cost for the items and may vary significantly from what is identified herein. The quantity noted is based upon the weight of material as it is weighed when it is disposed of at an authorized jurisdictional disposal location. No adjustments in the unit costs will be made to reflect changes in the quantities. Actual quantities for billing purposes shall be documented by the submittal of load tickets from the authorized jurisdictional disposal location.
4. Bid Package A - Base Bid Item No. 4A (Unforeseen Leakage Repair to Existing Structures)
 - a. This unit cost pay item includes all labor, materials, supplies, equipment for the repair of leaking cracks discovered in existing structures encountered during execution of the Work. The unit cost pay item is to encompass those unforeseen leaking cracks discovered after the structure is taken out of service to execute the Work. This unit cost pay item shall include, but not be limited to, the following; cracks, seeps, and areas of leakage. The repair procedure shall be performed as specified within the Contract Documents. Note that the quantity of **200 lineal feet** of cracked structure is only to obtain a unit cost for the items and may vary significantly from what is identified herein. Note that the quantity shown is only to obtain a unit cost for the items and may vary significantly from what is identified herein. No adjustments in the unit costs will be made to reflect changes in the quantities.
5. Bid Package A - Base Bid Item No. 5A (Unforeseen Concrete Repair to Existing Structures)
 - a. This unit cost pay item includes all labor, materials, supplies, equipment for the repair of structural deficiencies discovered in existing structures encountered during execution of the Work. The unit cost pay item is to encompass those unforeseen structural deficiencies discovered after the structure is taken out of service to execute the Work. This unit cost pay item shall include, but not

be limited to, the following; spauled concrete, deteriorated concrete, chipped concrete, reinforcement deterioration, etc... The repair procedure shall be performed as specified within the Contract Documents. Note that the quantity of **1,000 square feet** of damaged concrete is only to obtain a unit cost for the items and may vary significantly from what is identified herein. Note that the quantity shown is only to obtain a unit cost for the items and may vary significantly from what is identified herein. No adjustments in the unit costs will be made to reflect changes in the quantities.

E. Bid Package A - Additive Bid Items

1. Bid Package A - Additive Bid Item No.1A (2 Year Additive Equipment Warranty increasing the Base Bid 3 Year Equipment Warranty up to 5 Years):
 - a. Additive Equipment Warranty - This lump sum alternative bid item shall be for a two (2) year extension of the equipment warranty supplied on the project. For the equipment identified within the Contract Documents for a warranty duration of three (3) years from the date of substantial completion of the respective process from which the equipment is installed, the alternative bid item shall encompass an additional two (2) years for extension of the warranty and preventative maintenance service duration, providing total of five (5) years from the date of substantial completion of the respective process from which the equipment is installed within.

END OF SECTION

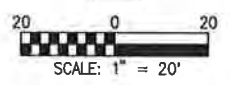
**BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY, FLORIDA**

**ADDENDUM NO. 1
IFB NO. Y14-748
ORANGE COUNTY EASTERN WATER RECLAMATION FACILITY
PHASE V AND CENTRIFUGE DEWATERING IMPROVEMENTS**

DRAWINGS
(NOTE DRAWINGS ENCLOSED ARE 11"X17" - 1/2 SCALE)

PATH/FILENAME: \\ORANGE\COUNTY\UTILITY\DESIGN\000_CAD\PROJECTS\C-106.DWG
 LAST UPDATE: Tuesday, October 08, 2013 9:26:07 AM
 PLOTTED: robertsonq
 ANS: D - 8-Oct-13

- NOTES:**
1. REFERENCE SHEET C-005 FOR LEGEND ILLUSTRATING DEMOLITION & ABANDONMENT.
 2. ALL EXISTING PIPE TO BE ABANDONED TO BE GROUT FILLED.
 3. REFERENCE SPECIFICATIONS AND UTILITY NOTES ON C-143 FOR SEQUENCE OF CONSTRUCTION.



PHASE III STORMWATER POND

SEE SHEET C-107

CHLORINE CONTACT TANKS
PROCESS 280

PH III ABW FILTERS
PROCESS 270

CLARIFIER NO. 4
PROCESS 244

SEE PROCESS DRAWING
D-252-101

CONTRACTOR TO PROVIDE TEMPORARY
DRAINAGE/STORM WATER CONVEYANCE
FACILITIES PRIOR TO DEMOLITION OF STORM
DRAIN, REF G-004, GENERAL NOTES, TYP.

DEMOLITION/SALVAGE
BY OTHERS

36 FE €
12 SE TO
REMAIN

RELOCATE EXISTING
DISK FILTER
REF D-470-101
TO
REMAIN

CHLORINE CONTACT TANKS
PROCESS 380

SEE SHEET C-113

CLARIFIER NO. 5
PROCESS 345

CLARIFIER NO. 6
PROCESS 340

MARK	DATE	MADE BY	CHECKED	DESCRIPTION

AECOM
 15 NORTH GAVAN AVENUE, SUITE 200
 ORANGE, FL 32837
 PHONE: (407) 243-2422

CERTIFICATE OF AUTHORIZATION NO. CH-1113

WILLIAM E. MARSHALL, P.E.
 FLORIDA PROFESSIONAL LICENSE NO. 66382

SEE SHEET C-111

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
 DEMOLITION PLAN

CIVIL

PROJECT NO:	60222491
CAD DWG FILE:	C-106
DESIGNED BY:	WDM
DRAWN BY:	QRR/DLP
DEPT CHECK:	CFE
PROJ CHECK:	MDC
DATE:	OCTOBER 2013
SCALE:	AS NOTED

C-110
22 OF 527

PATH/FILENAME: X:\ORANGE COUNTY\ESTERN WRF\60222491_FINAL-DESIGN\000_CAD\SHEETS\C-C-139.DWG
 LAST UPDATE: Wednesday, June 25, 2014 2:29:11 PM
 PLOTTED: Marsh@iwd
 ANSI D - 25-Jun-14

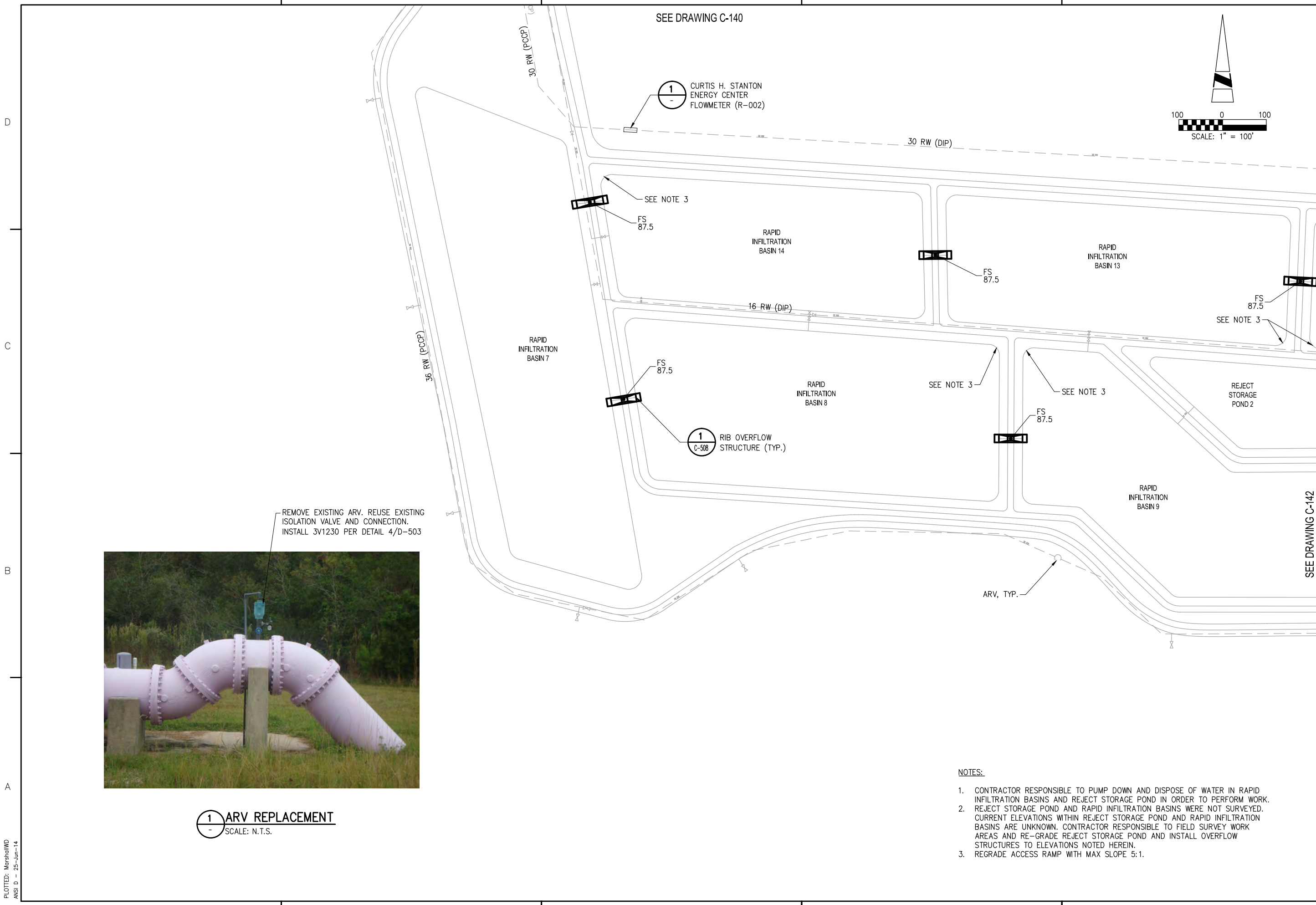
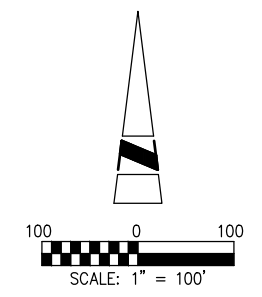


REMOVE EXISTING ARV. REUSE EXISTING ISOLATION VALVE AND CONNECTION. INSTALL 3V1230 PER DETAIL 4/D-503

1 ARV REPLACEMENT
 SCALE: N.T.S.

SEE DRAWING C-140

1 CURTIS H. STANTON ENERGY CENTER FLOWMETER (R-002)

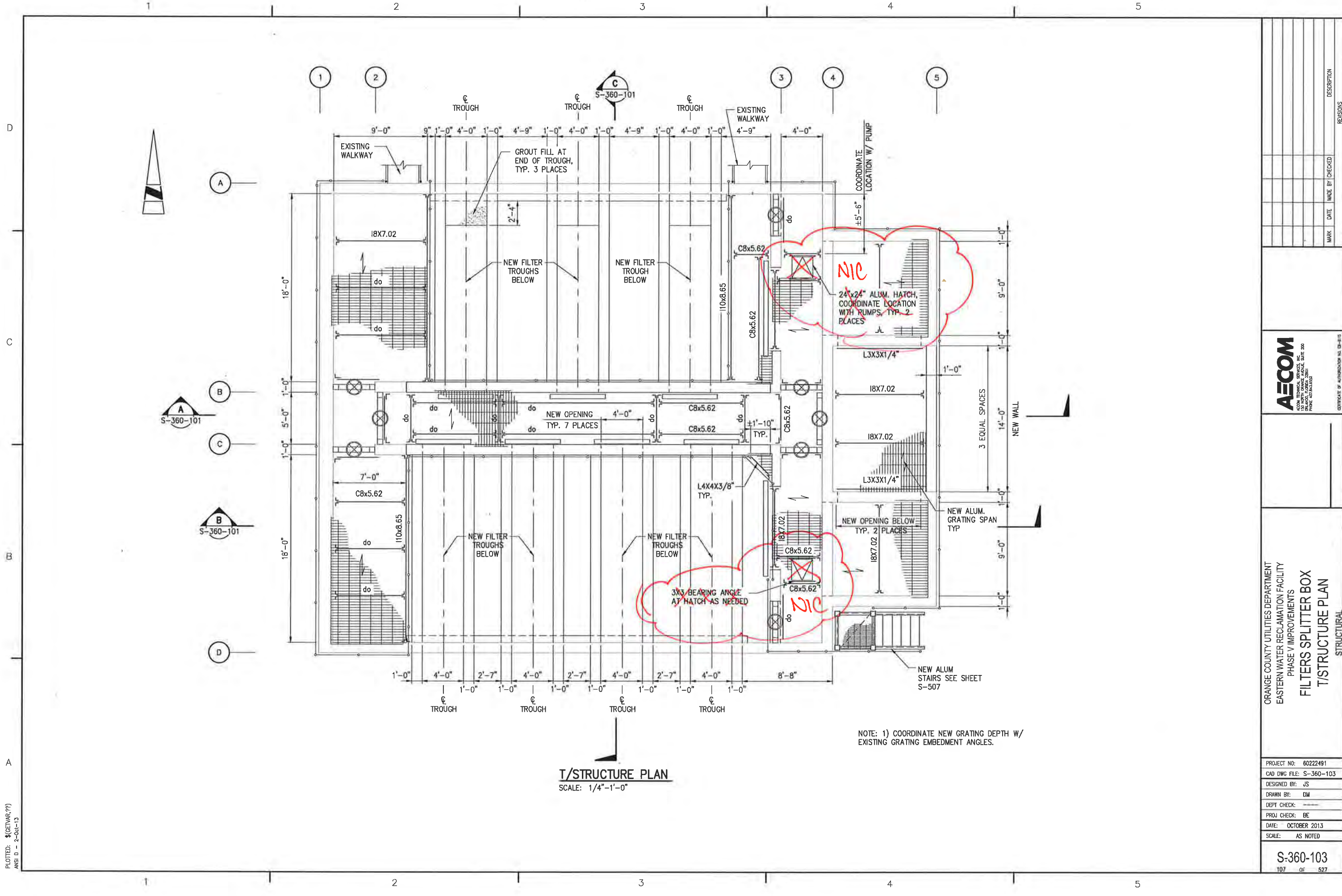


NOTES:

1. CONTRACTOR RESPONSIBLE TO PUMP DOWN AND DISPOSE OF WATER IN RAPID INFILTRATION BASINS AND REJECT STORAGE POND IN ORDER TO PERFORM WORK.
2. REJECT STORAGE POND AND RAPID INFILTRATION BASINS WERE NOT SURVEYED. CURRENT ELEVATIONS WITHIN REJECT STORAGE POND AND RAPID INFILTRATION BASINS ARE UNKNOWN. CONTRACTOR RESPONSIBLE TO FIELD SURVEY WORK AREAS AND RE-GRADE REJECT STORAGE POND AND INSTALL OVERFLOW STRUCTURES TO ELEVATIONS NOTED HEREIN.
3. REGRADE ACCESS RAMP WITH MAX SLOPE 5:1.

AECOM <small>AECOM TECHNICAL SERVICES, INC. 1000 CENTRAL EXPRESSWAY, SUITE 200 ORLANDO, FLORIDA 32801 PHONE: 407.633.6522</small>		<small>CERTIFICATE OF AUTHORIZATION NO. EB-815</small>
<small>WILLIAM D. MARSHALL, PE FLORIDA PROFESSIONAL LICENSE NO. 86252</small>		<small>REVISIONS</small>
ORANGE COUNTY UTILITIES DEPARTMENT EASTERN WATER RECLAMATION FACILITY PHASE V IMPROVEMENTS SOUTH RIBS - PLAN 1 CIVIL		
PROJECT NO: 60222491 CAD DWG FILE: C-139 DESIGNED BY: WDM DRAWN BY: QRR/DLLP DEPT CHECK: CFE PROJ CHECK: MDC DATE: OCTOBER 2013 SCALE: AS NOTED	MADE BY (CHECKED) DATE MARK	DESCRIPTION
C-141 53 OF 527		

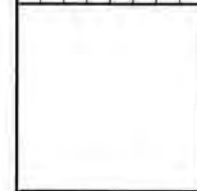
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 PLOTTED: 4/24/2013 4:14:27 PM
 ANS I D - 2-061-13



T/STRUCTURE PLAN
SCALE: 1/4"=1'-0"

NOTE: 1) COORDINATE NEW GRATING DEPTH W/
EXISTING GRATING EMBEDMENT ANGLES.

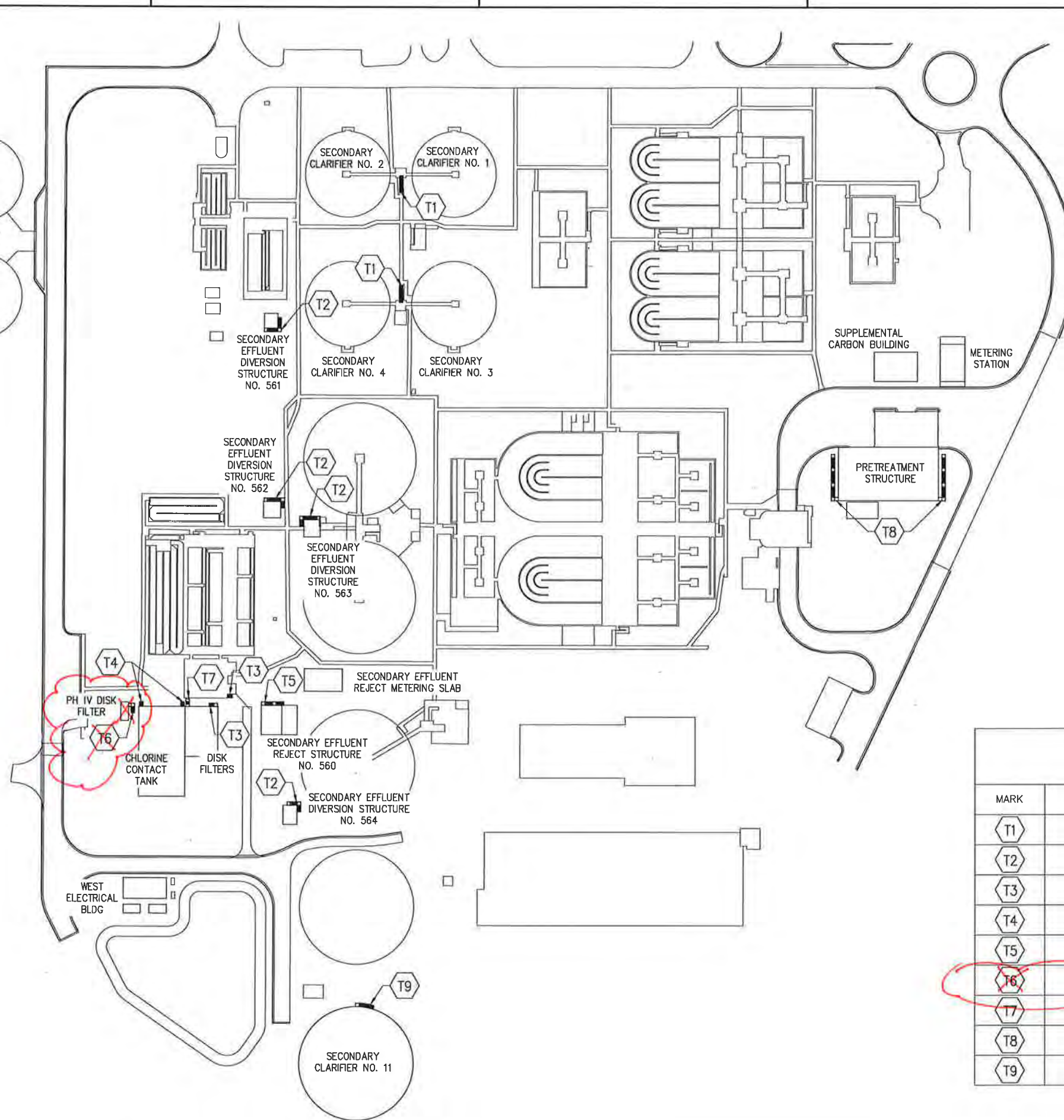
MARK	DATE	MADE BY	CHECKED	REVISIONS



ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
FILTER SPLITTER BOX
 T/STRUCTURE PLAN
 STRUCTURAL

PROJECT NO:	60222491
CAD DWG FILE:	S-360-103
DESIGNED BY:	JS
DRAWN BY:	DM
DEPT CHECK:	---
PROJ CHECK:	BE
DATE:	OCTOBER 2013
SCALE:	AS NOTED

PART/FILENAME: F:\NCDMA\10-176 ENRF PHASE V\1000\STRUC\S-506.DWG
 LAST UPDATE: Wednesday, September 25, 2013 04:43:48 AM
 PLOTTED: \\GETVAP\??
 ANSI D - 25-SEP-13



STAIR LEGEND		
MARK	STAIR LOCATION	SHEET NO.
T1	SECONDARY CLARIFIERS 1-4	S-507
T2	EFFLUENT DIVERSION STRUCTURES	S-507
T3	FILTERS SPLITTER BOX & DISK FILTERS	S-507
T4	CHLORINE CONTACT TANK	S-507
T5	SECONDARY EFFLUENT REJECT PS	S-508
T6	PH IV DISK FILTER	S-508 A-NIC
T7	FILTERS BRIDGE	S-508
T8	PRETREATMENT STRUCTURE	S-509
T9	SECONDARY CLARIFIER NO. 11	S-510

MARK	DATE	MADE BY	CHECKED	DESCRIPTION



ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS

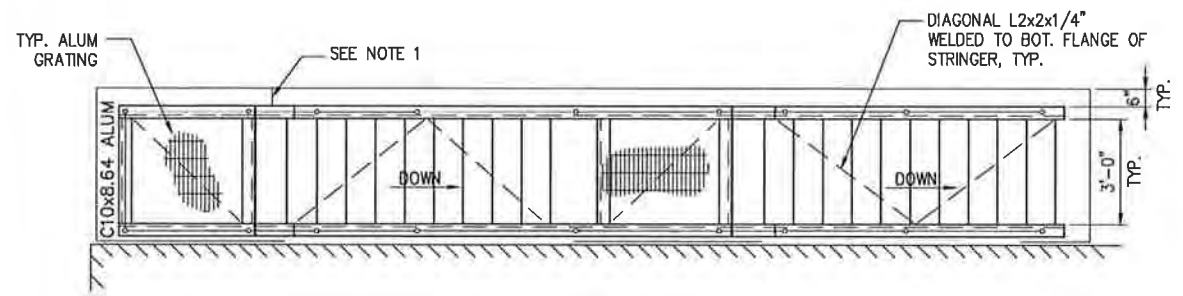
STAIR KEY PLAN

STRUCTURAL

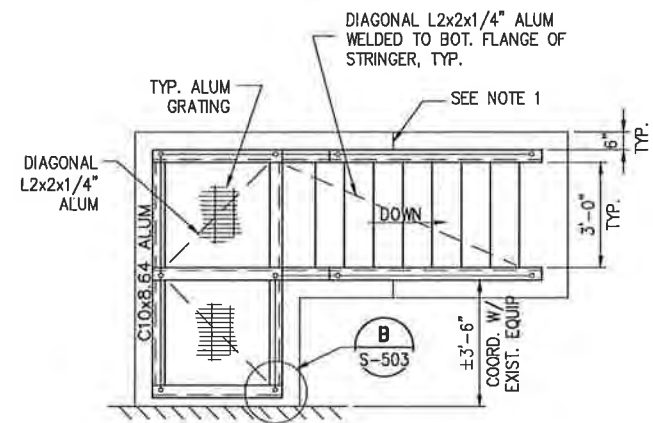
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 DRAWN BY: DM
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 PROJ CHECK: BE
 DATE: OCTOBER 2013
 SCALE: AS NOTED

S-506

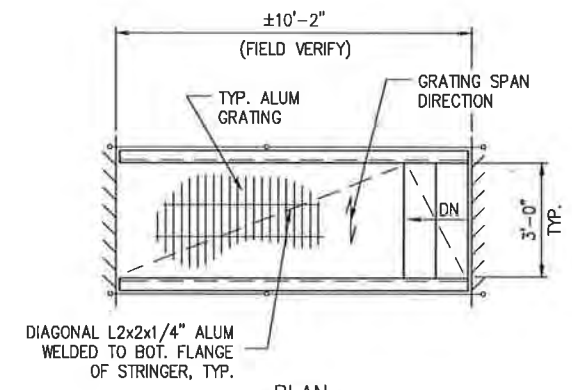
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 ANSI D - 25-Sep-13



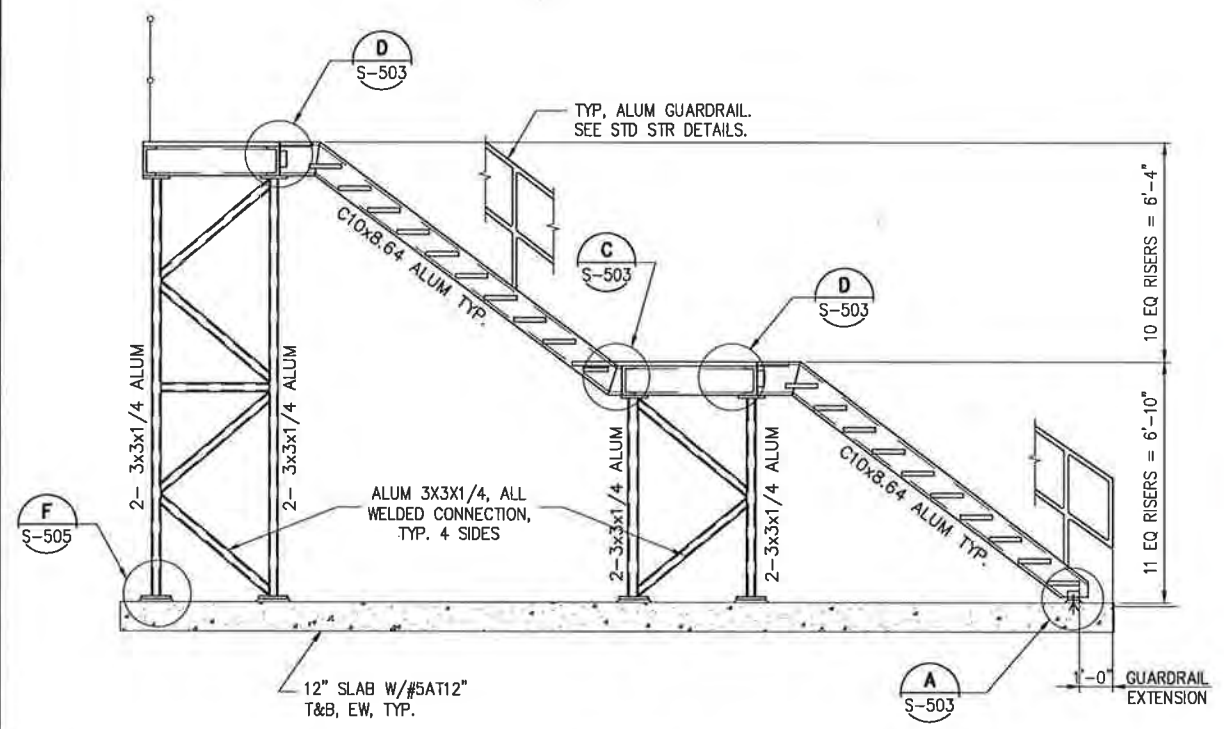
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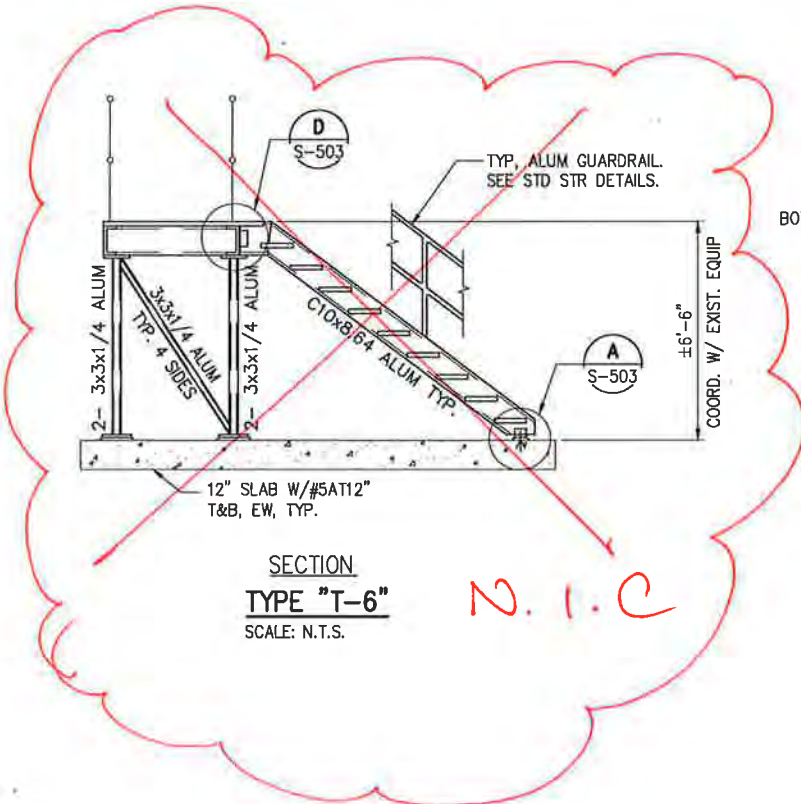
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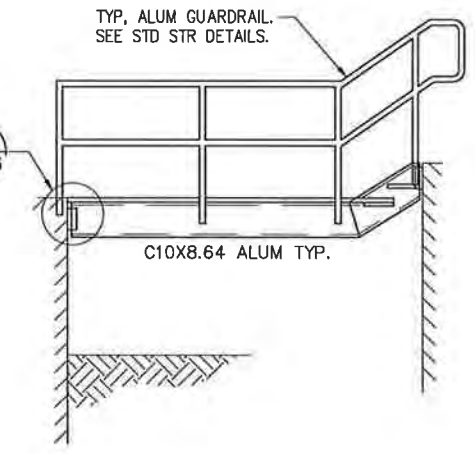
PLAN



SECTION
 TYPE "T-5"
 N.T.S. SCALE: 3/4"=1'-0"



SECTION
 TYPE "T-6"
 N.T.S. SCALE: N.T.S.



SECTION
 TYPE "T-7"
 N.T.S. SCALE: N.T.S.

NOTES:
 1. PROVIDE SAWCUT OR TOOLED JOINTS AT 5' O.C.

REVISIONS	DESCRIPTION	MARK	DATE	MADE BY	CHECKED

AECOM
 AECOM TECHNICAL SERVICES, INC.
 10000 BOULEVARD OF THE ARTS, SUITE 200
 ORLANDO, FLORIDA 32837
 PHONE 407.641.1552
 APPROVED BY AUTHORIZATION NO. 04-00143

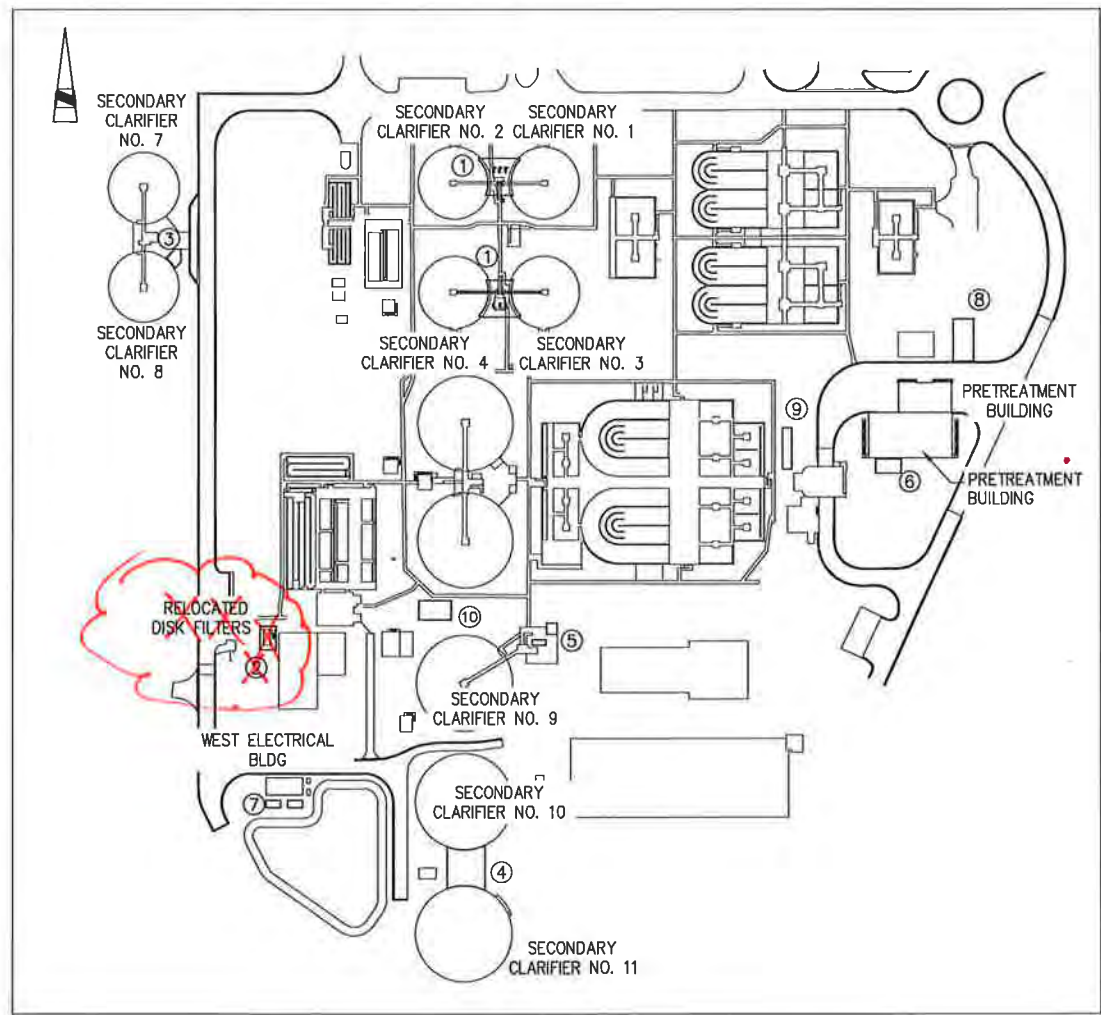
ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS

STAIR DETAILS
 II OF IV
 STRUCTURAL

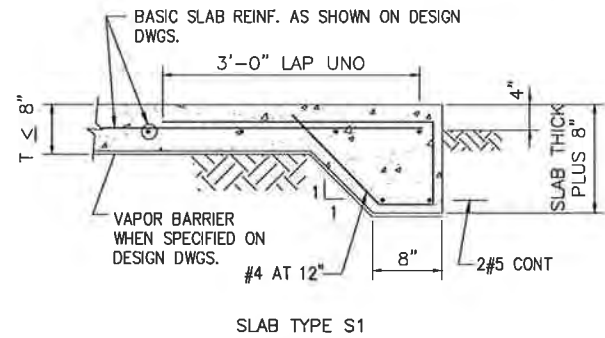
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DESIGNED BY:	JS
DRAWN BY:	DM
DEPT CHECK:	----
PROJ CHECK:	BE
DATE:	OCTOBER 2013
SCALE:	AS NOTED

S-508
 155 OF 527

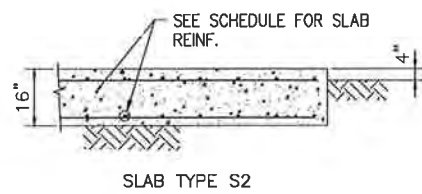
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 ANS D - 25-Sep-13



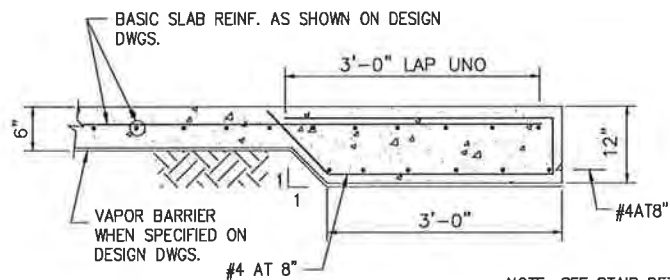
KEYPLAN
SCALE: N.T.S.



SLAB TYPE S1



SLAB TYPE S2



SLAB TYPE S3

NOTE: SEE STAIR DETAILS FOR SLAB TYPE S3

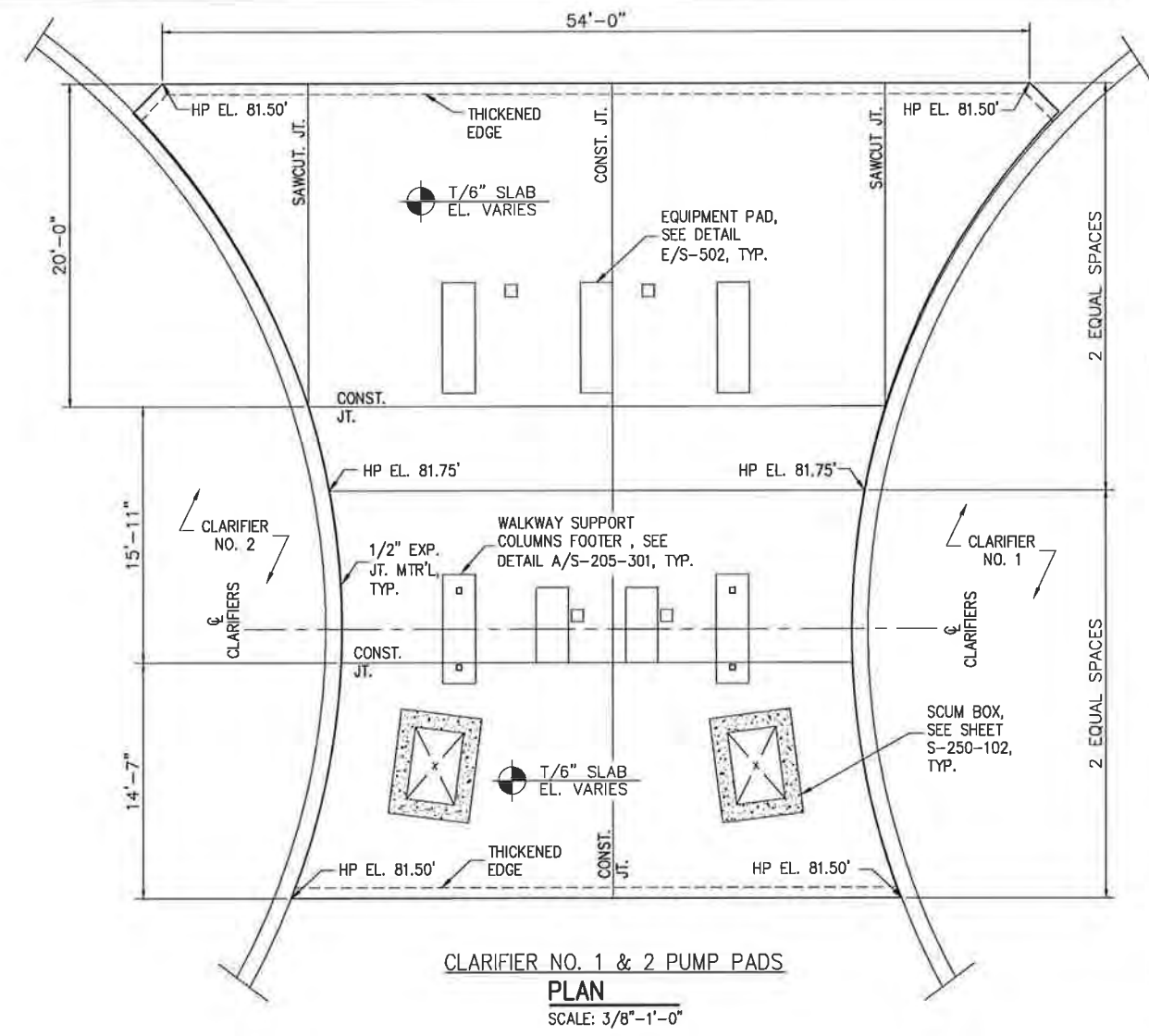
SLAB SCHEDULE

MARK	SLAB LOCATION	SLAB TYPE	SLAB THICKNESS	SIZE	REINFORCEMENT	REMARKS
1	SECONDARY CLARIFIERS 1-4 PUMP PADS	S1	6"	SEE PLAN	#4AT8" CTR EW	PUMP PADS FOR CLARIFIER NO. 1 & 2 SHOWN, PADS FOR CLARIFIER NO. 3 & 4 SIMILAR, SEE KEY PLAN
2	PH IV DISK FILTER SLAB	S2	12"	22FT X 32FT	#5AT12" T&B, EW	N.I.C.
3	SECONDARY CLARIFIER 7 & 8 WAS PS PAD	S1	8"	SEE PLAN	#4AT8" CTR, EW	
4	SECONDARY CLARIFIER 10 & 11 RAS/SCUM PS PAD	S1	6"	SEE PLAN	#4AT8" CTR, EW	
5	SECONDARY CLARIFIER NO. 9 RAS/WAS PS SLABS	S1	8"	SEE PLAN	#4AT8" CTR, EW	
6	ODOR CONTROL PAD	S2	16"	19FT X 36FT	#6AT12" T&B, EW	
7	OUTDOOR SUBSTATION 9 & 10 PADS	S1	8"	10FT X 20FT	#5AT12" CTR, EW	
8	PRETREATMENT FLOW METER STATION PAD	S1	8"	29FT X 49.5FT	#5AT12" CTR, EW	
9	PHASE III INFLUENT FLOW METER STATION PAD	S1	8"	13FT X 56FT	#5AT12" CTR, EW	
10	SE EFF REJECT METER STATION PAD	S1	8"	26FT X 44FT	#5AT12" CTR, EW	

S1= SLAB W/ THICKENED EDGE (CENTER REINF.)
 S2= DOUBLE MAT SLAB (TOP & BOTTOM REINF.)

NOTES

1-FOR CONCRETE AND METAL PIPE SUPPORTS OVER CONCRETE PADS AND PIPE PENETRATION LOCATIONS SEE "M" DWGS. 2- VERIFY ALL SLAB ELEVATIONS WITH "M" AND "C" DWGS.



CLARIFIER NO. 1 & 2 PUMP PADS
PLAN
SCALE: 3/8"=1'-0"

MARK	DATE	MADE BY	CHECKED	DESCRIPTION

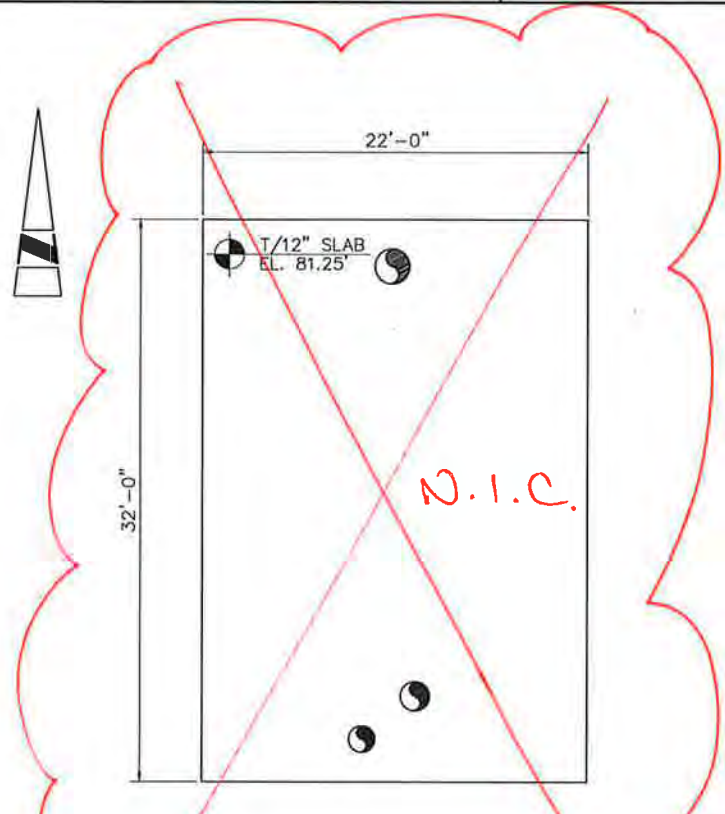
AECOM
 AECOM TECHNICAL SERVICES, INC.
 2000 N. CENTRAL EXPRESSWAY, SUITE 200
 ORLANDO, FLORIDA 32810
 PHONE: 407.328.1234
 FACSIMILE: 407.328.1235
 WWW.AECOM.COM

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
SLAB SCHEDULE
 STRUCTURAL

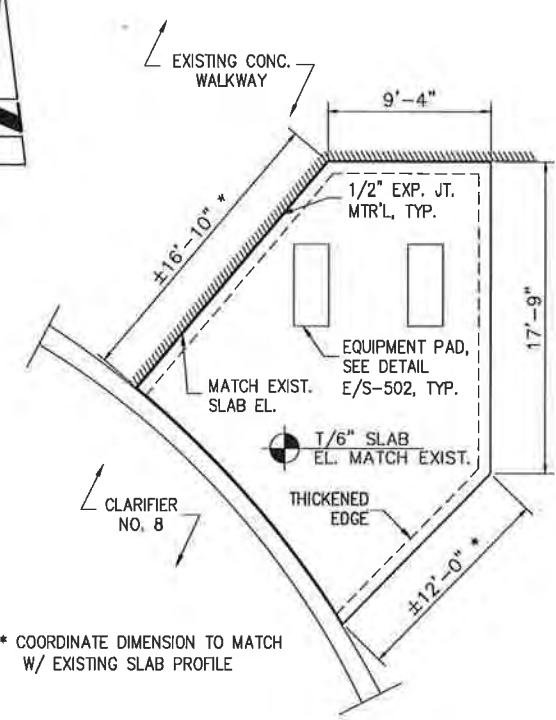
PROJECT NO: 60222491
 CAD DWG FILE: S-511
 DESIGNED BY: JS
 DRAWN BY: DM
 DEPT CHECK: ---
 PROJ CHECK: BE
 DATE: OCTOBER 2013
 SCALE: AS NOTED

S-511
 158 OF 527

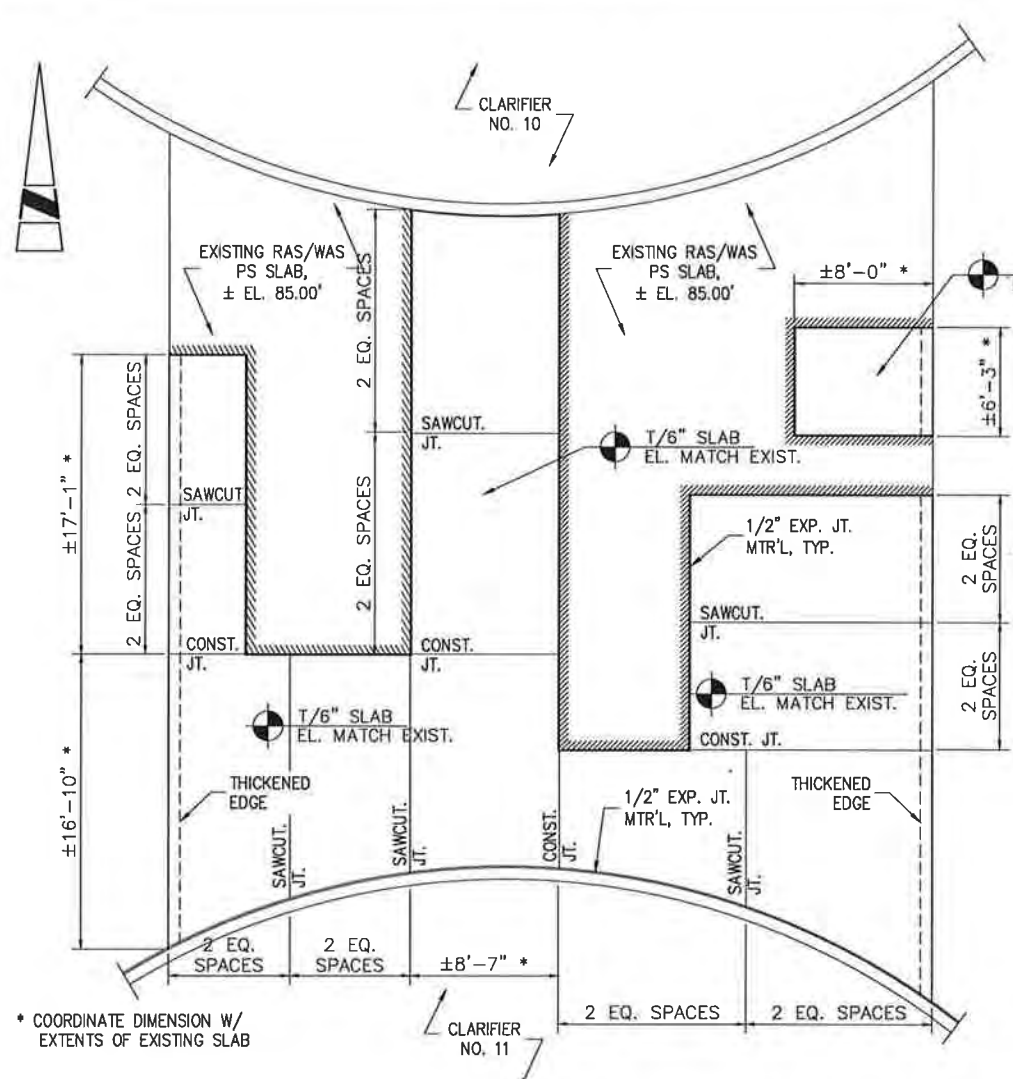
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 ANSI D - 25-Sep-13



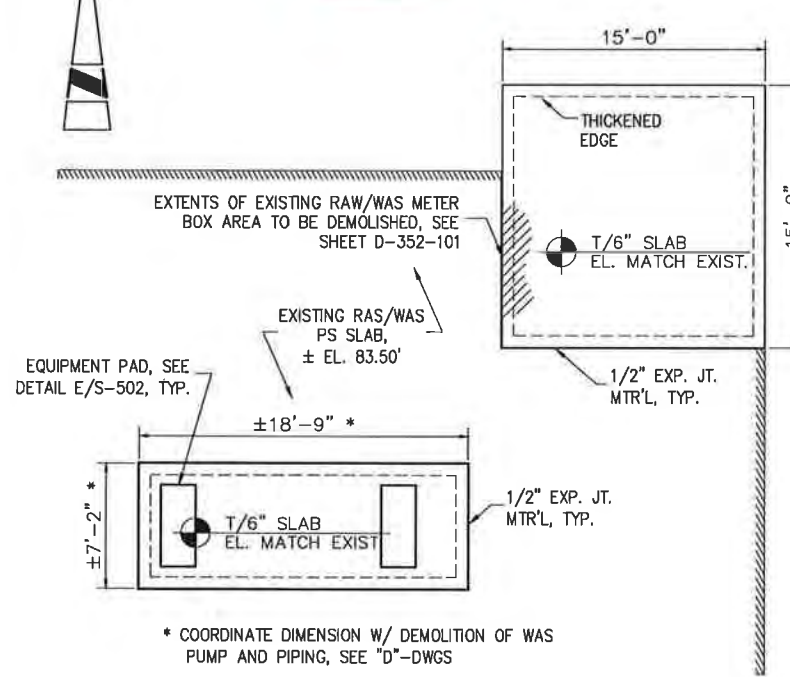
PH IV DISK FILTER SLAB
PLAN
 SCALE: 3/8"-1'-0"



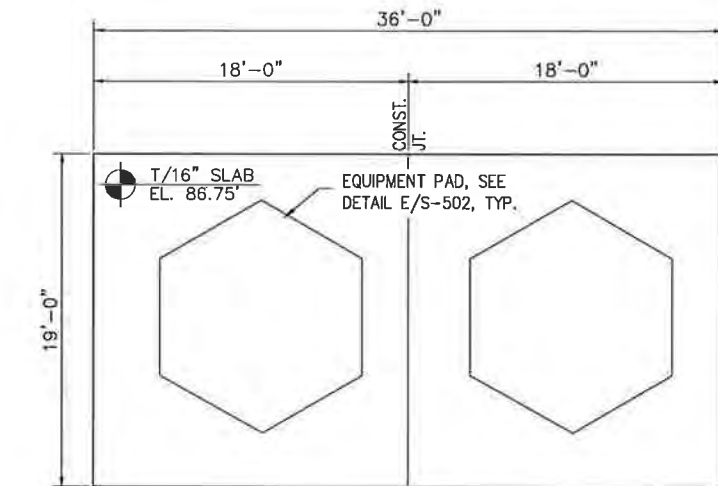
SECONDARY CLARIFIER 7 & 8 WAS PS PAD
PLAN
 SCALE: 3/8"-1'-0"



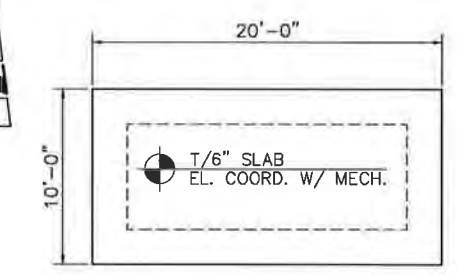
SECONDARY CLARIFIER 10 & 11 RAS/SCUM PS PAD
PLAN
 SCALE: 1/4"-1'-0"



SECONDARY CLARIFIER NO. 9 RAS/WAS PS SLAB
PLAN
 SCALE: 3/8"-1'-0"



ODOR CONTROL PAD
PLAN
 SCALE: 3/8"-1'-0"



OUTDOOR SUBSTATION PADS
PLAN
 SCALE: 3/8"-1'-0"

* COORDINATE DIMENSION TO MATCH W/ EXISTING SLAB PROFILE

* COORDINATE DIMENSION W/ EXTENTS OF EXISTING SLAB

REVISIONS	DESCRIPTION	DATE	MADE BY	CHECKED

AECOM	
AECOM TECHNICAL SERVICES, INC. 10000 W. BOULEVARD, SUITE 200 DUBLIN, CALIFORNIA 94568 PHONE: 415.891.2000	
CONTRACT NO. OF AUTHORIZATION NO. 09-4115	

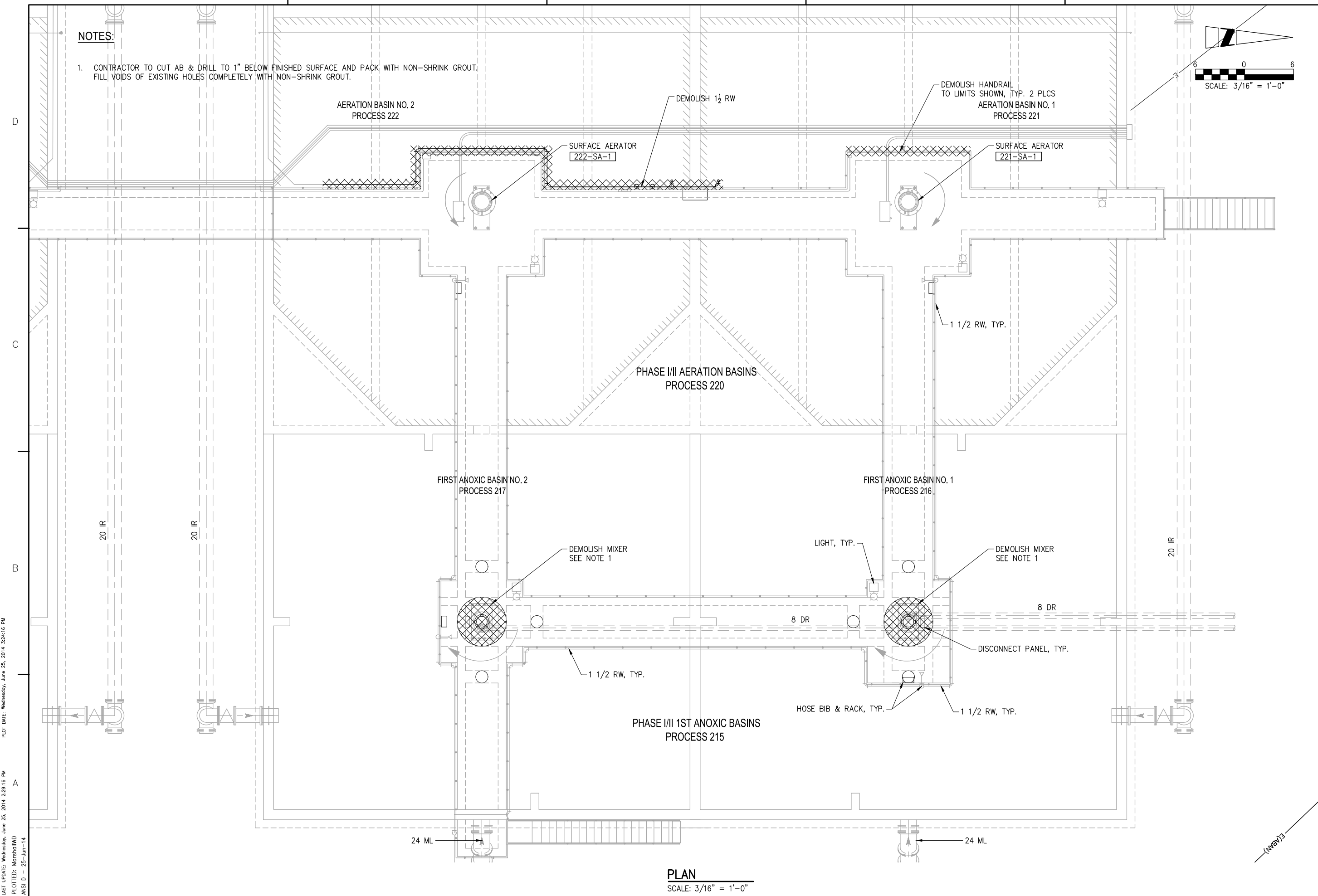
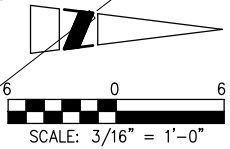
ORANGE COUNTY UTILITIES DEPARTMENT EASTERN WATER RECLAMATION FACILITY PHASE V IMPROVEMENTS SLAB SCHEDULE II OF II STRUCTURAL	
PROJECT NO:	60222491
CAD DWG FILE:	S-512
DESIGNED BY:	JS
DRAWN BY:	DM
DEPT CHECK:	---
PROJ CHECK:	BE
DATE:	OCTOBER 2013
SCALE:	AS NOTED

S-512
159 OF 527

PATH/FILENAME: X:\ORANGE COUNTY\UTILITY\EASTERN WRF\60222491_L\DWG_5-FINAL-DESIGN\000_CAD\SHEETS\VD-220-101.DWG
 LAST UPDATE: Wednesday, June 25, 2014 2:29:16 PM
 PLOTTED: Marshall\WD
 ANSI D - 25-Jun-14

NOTES:

1. CONTRACTOR TO CUT AB & DRILL TO 1" BELOW FINISHED SURFACE AND PACK WITH NON-SHRINK GROUT. FILL VOIDS OF EXISTING HOLES COMPLETELY WITH NON-SHRINK GROUT.



PLAN
 SCALE: 3/16" = 1'-0"

REVISIONS		DESCRIPTION
MARK	DATE	MADE BY (CHECKED)

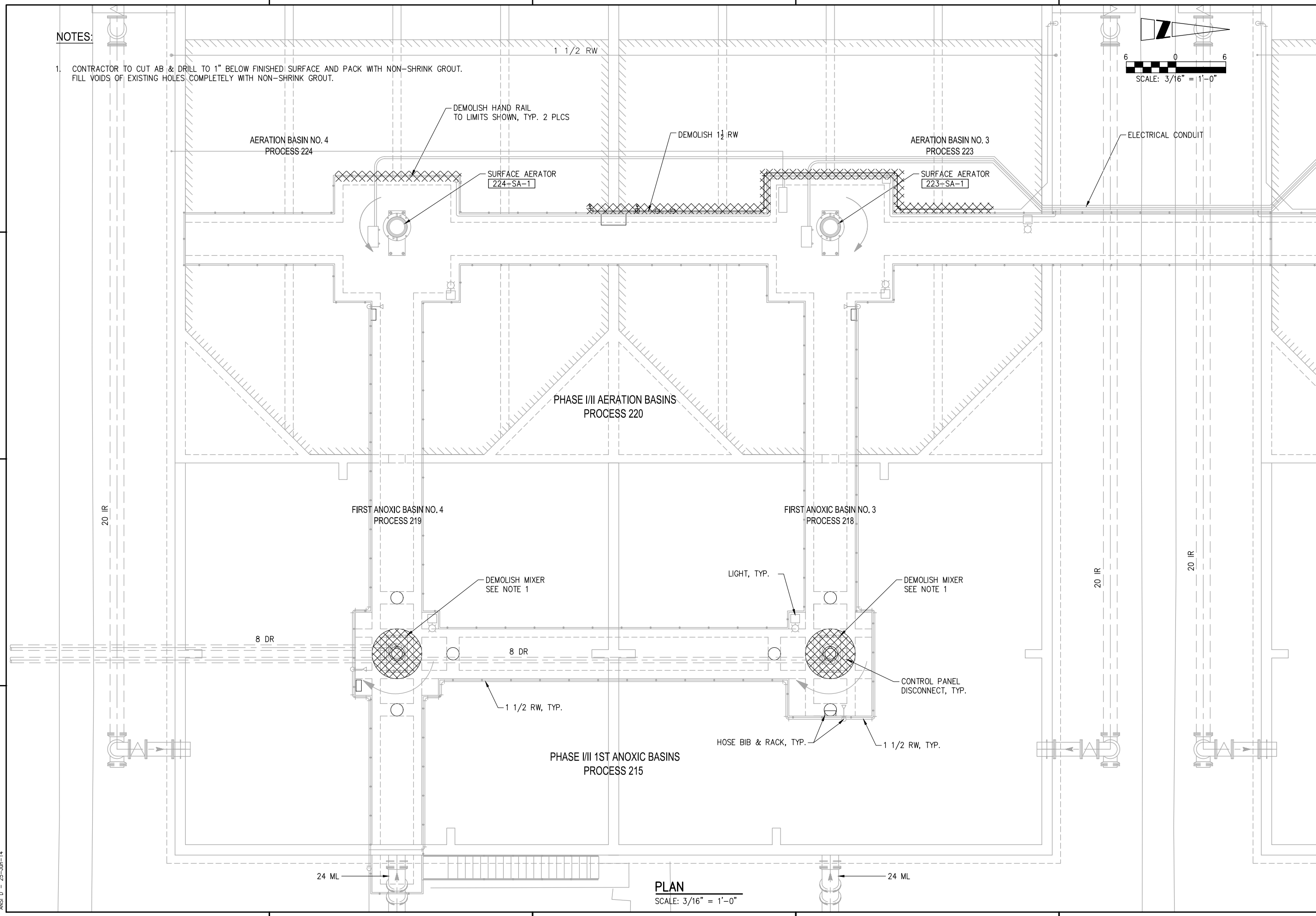
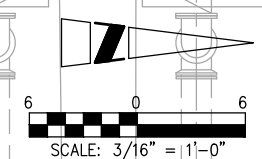
AECOM	
AECOM TECHNICAL SERVICES, INC. ONE WATSON DRIVE, SUITE 200 ORLANDO, FLORIDA 32801 PHONE: 407.643.6522	
WILLIAM D. MARSHALL, PE	CERTIFICATE OF AUTHORIZATION NO. EB-8115
ORANGE COUNTY UTILITIES DEPARTMENT EASTERN WATER RECLAMATION FACILITY PHASE V IMPROVEMENTS PH I-II BASIN 1 & 2 AERATION DEMOLITION PLAN MECHANICAL PROCESS	
PROJECT NO:	60222491
CAD DWG FILE:	D-220-101
DESIGNED BY:	WDM
DRAWN BY:	QRR
DEPT CHECK:	CFE
PROJ CHECK:	MDC
DATE:	OCTOBER 2013
SCALE:	AS NOTED
D-220-101	
164 OF 527	

(WEP)13

PATH/FILENAME: X:\ORANGE COUNTY\ESTERN WRF\60222491_LWF_5-FINAL-DESIGN\000_CAD\SHEETS\A-D-220-102.DWG
 LAST UPDATE: Wednesday, June 25, 2014 2:29:18 PM
 PLOTTED: Marsh@IWD
 ANSI D - 25-Jun-14

NOTES:

- CONTRACTOR TO CUT AB & DRILL TO 1" BELOW FINISHED SURFACE AND PACK WITH NON-SHRINK GROUT. FILL VOIDS OF EXISTING HOLES COMPLETELY WITH NON-SHRINK GROUT.



PLAN
SCALE: 3/16" = 1'-0"

MARK	DATE	MADE BY	CHECKED	DESCRIPTION

AECOM
AECOM TECHNICAL SERVICES, INC.
 200 S.W. 10TH AVENUE, SUITE 200
 ORLANDO, FLORIDA 32801
 PHONE: 407.633.6222

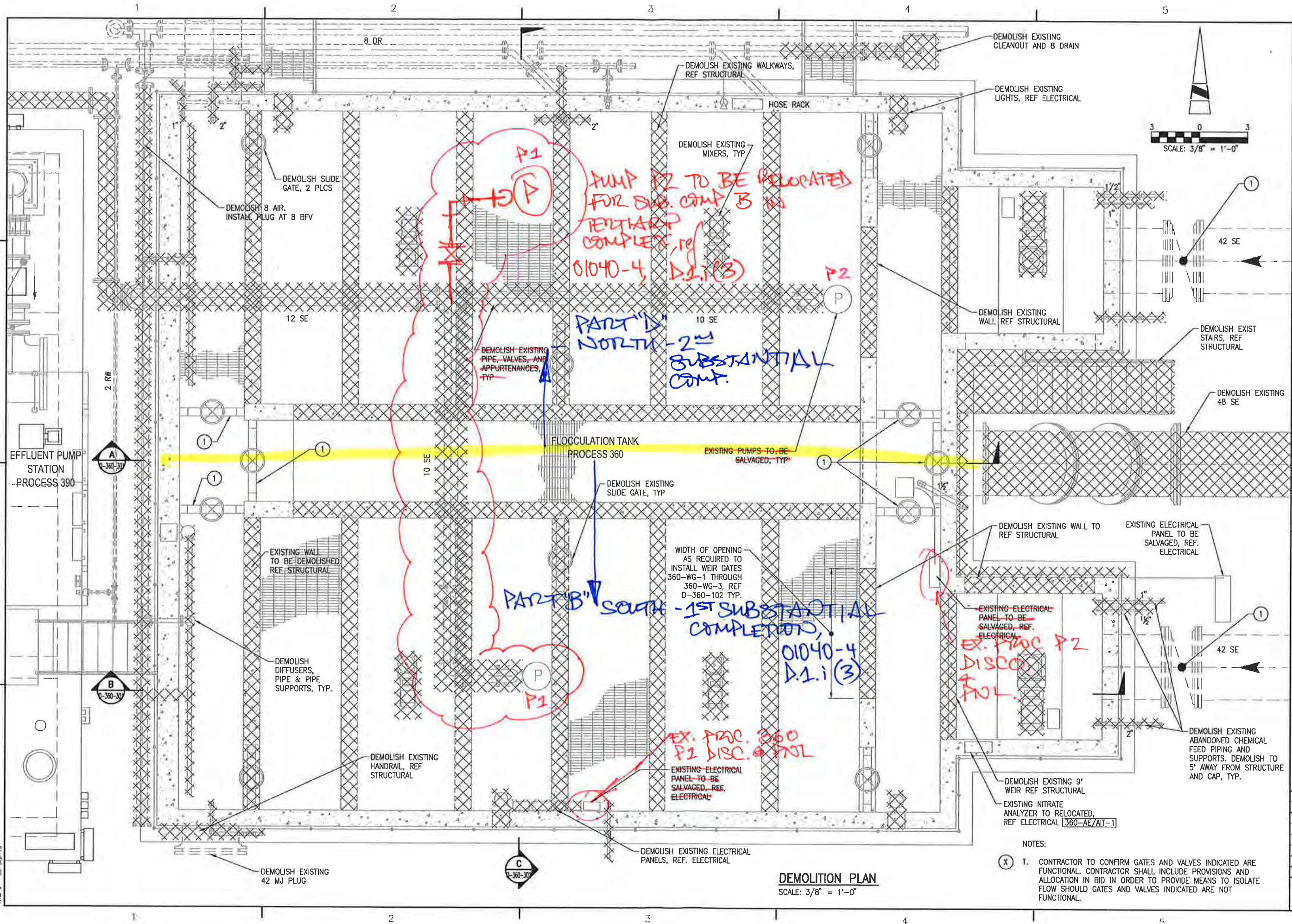
WILLIAM D. MARSHALL, PE
 FLORIDA PROFESSIONAL LICENSE NO. 86522
 CERTIFICATE OF AUTHORIZATION NO. EB-815

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
**PH I-II BASIN 3 & 4 AERATION
 DEMOLITION PLAN**
 MECHANICAL PROCESS

PROJECT NO:	60222491
CAD DWG FILE:	D-220-102
DESIGNED BY:	WDM
DRAWN BY:	QRR
DEPT CHECK:	CFE
PROJ CHECK:	MDC
DATE:	OCTOBER 2013
SCALE:	AS NOTED

D-220-102
165 OF 527

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 ANSI D - 30-50-13

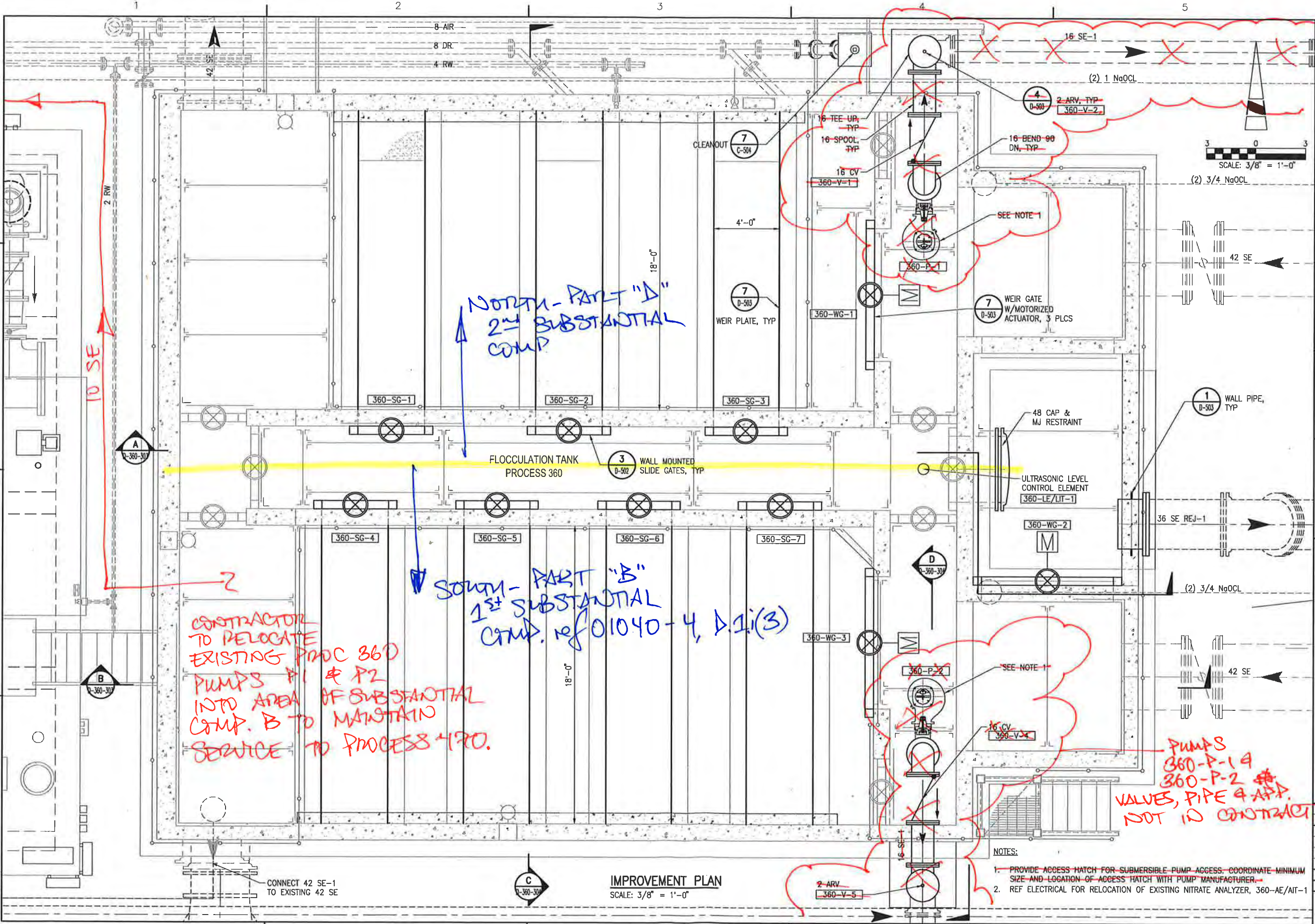


DEMOLITION PLAN
 SCALE: 3/8" = 1'-0"

- NOTES:
- (X) 1. CONTRACTOR TO CONFIRM GATES AND VALVES INDICATED ARE FUNCTIONAL. CONTRACTOR SHALL INCLUDE PROVISIONS AND ALLOCATION IN BID IN ORDER TO PROVIDE MEANS TO ISOLATE FLOW SHOULD GATES AND VALVES INDICATED ARE NOT FUNCTIONAL.

	REVISIONS
	DESCRIPTION
	DATE
	MADE BY
	CHECKED
ORANGE COUNTY UTILITIES DEPARTMENT EASTERN WATER RECLAMATION FACILITY PHASE V IMPROVEMENTS FILTER SPLITTER BOX MODIFICATIONS DEMOLITION PLAN MECHANICAL PROCESS	
PROJECT NO: 6022491 CAD DWG FILE: D-360-101 DESIGNED BY: WDM DRAWN BY: QRR/DLP DEPT CHECK: CFE PROJ CHECK: MDC DATE: OCTOBER 2013 SCALE: AS NOTED	
D-360-101 219 OF 527	

PART/FILENAME: X:\ORANGE COUNTY\EASTERN WRF\60222491_EWRF_5-FINAL-DESIGN\DCG CAD\SHEETS\D-360-102.DWG
 LAST UPDATE: Monday, September 30, 2013 10:53:15 AM
 PLOT DATE: Tuesday, October 08, 2013 3:18:06 PM
 PLOTTED: robertsonq
 ANS: D = 30-Sep-13



10 SE

CONTRACTOR TO RELOCATE EXISTING PROC 360 PUMPS P1 & P2 INTO AREA OF SUBSTANTIAL COMP. B TO MAINTAIN SERVICE TO PROCESS 470.

NORTH - PART "D"
2nd SUBSTANTIAL COMP.

SOUTH - PART "B"
1st SUBSTANTIAL COMP. REF 01040-4, D1(3)

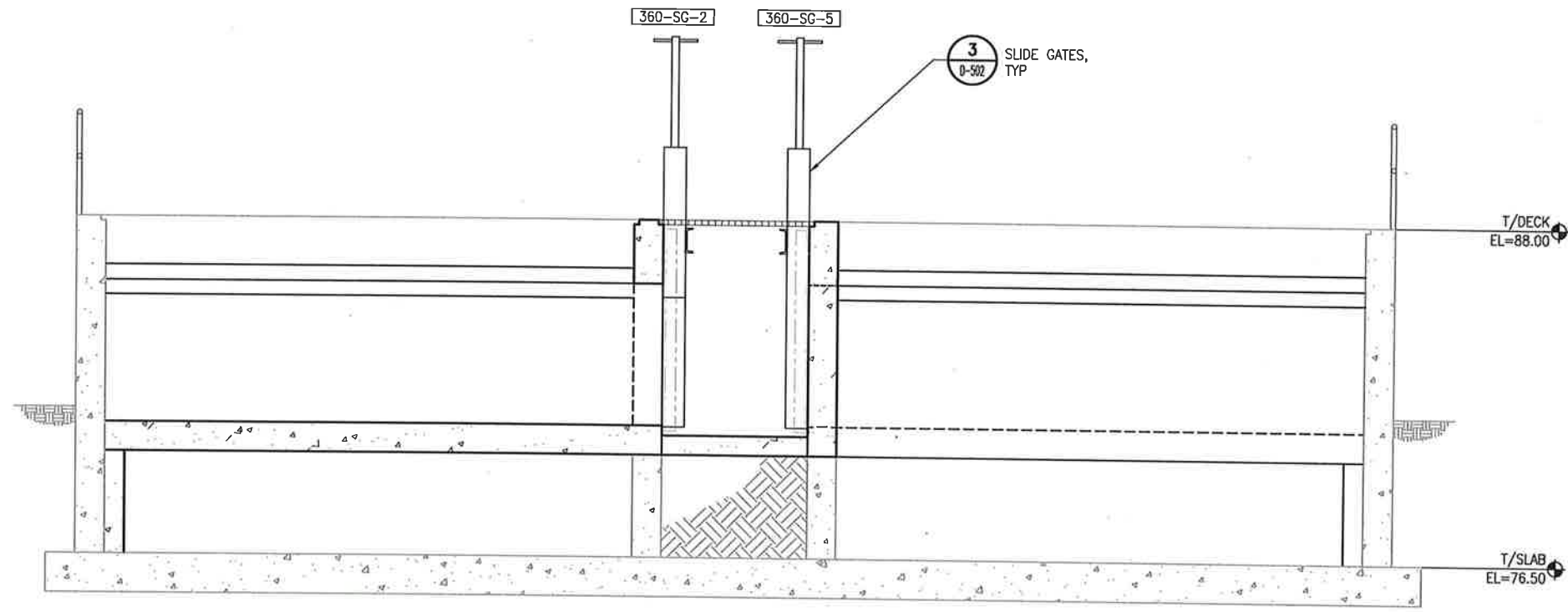
PUMPS 360-P-1 & 360-P-2 VALVES, PIPE & APP. NOT IN CONTRACT

IMPROVEMENT PLAN
SCALE: 3/8" = 1'-0"

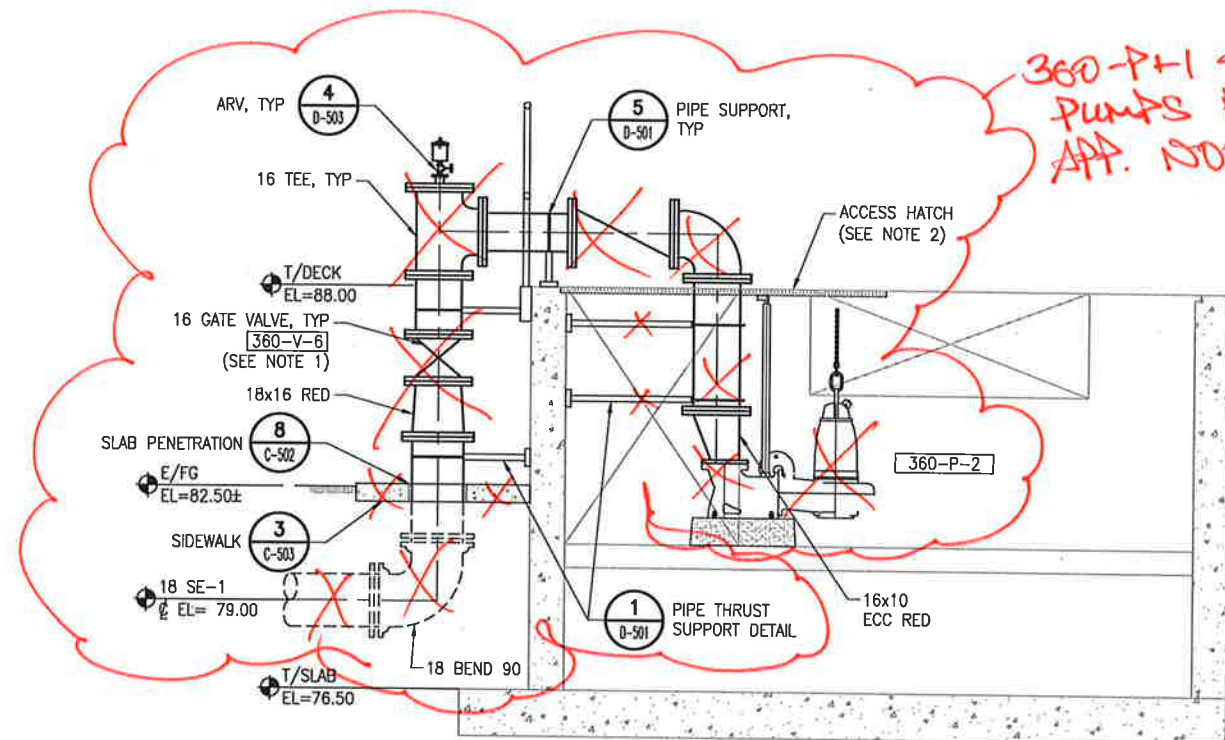
- NOTES:
1. PROVIDE ACCESS HATCH FOR SUBMERSIBLE PUMP ACCESS. COORDINATE MINIMUM SIZE AND LOCATION OF ACCESS HATCH WITH PUMP MANUFACTURER.
 2. REF ELECTRICAL FOR RELOCATION OF EXISTING NITRATE ANALYZER, 360-AE/AIT-1

		PROJECT NO: 60222491 CAD DWG FILE: D-360-102 DESIGNED BY: WDM DRAWN BY: QRR/DLP DEPT CHECK: CFE PROJ CHECK: MDC DATE: OCTOBER 2013 SCALE: AS NOTED
		ORANGE COUNTY UTILITIES DEPARTMENT EASTERN WATER RECLAMATION FACILITY PHASE V IMPROVEMENTS FILTER SPLITTER BOX MODIFICATIONS IMPROVEMENT PLAN MECHANICAL PROCESS
REVISIONS MARK DATE MADE BY CHECKED		D-360-102 220 OF 527

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 PLOT DATE: Tuesday, October 08, 2013 3:18:23 PM
 PLOTTED: robertsonq
 ANSI D - 17-Sep-13



C SECTION
 SCALE: 3/8" = 1'-0"
 SCALE: 3/8" = 1'-0"



D SECTION
 SCALE: 3/8" = 1'-0"
 SCALE: 3/8" = 1'-0"

- NOTES:**
- GATE VALVE TAG NO. FOR 360-P-1 (NOT SHOWN) IS 360-V-3.
 - PROVIDE ACCESS HATCH FOR SUBMERSIBLE PUMP ACCESS. COORDINATE MINIMUM SIZE AND LOCATION OF ACCESS HATCH WITH PUMP MANUFACTURER.

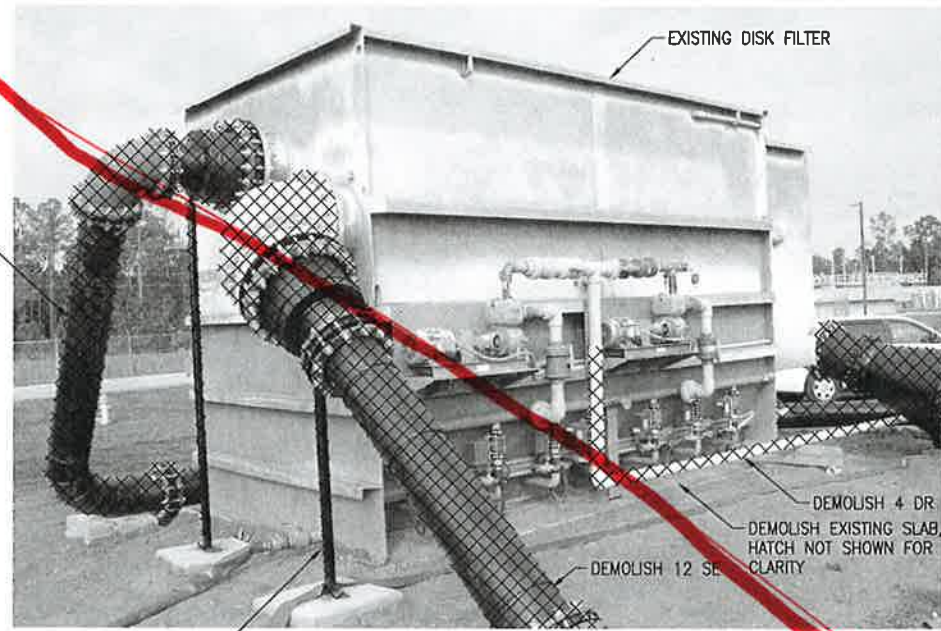
MARK	DATE	MADE BY	CHECKED	DESCRIPTION

AECOM
AECOM TECHNICAL SERVICES, INC.
 1000 ALA BAY BLVD, SUITE 200
 ORLANDO, FLORIDA 32837
 PHONE: 407.343.3333

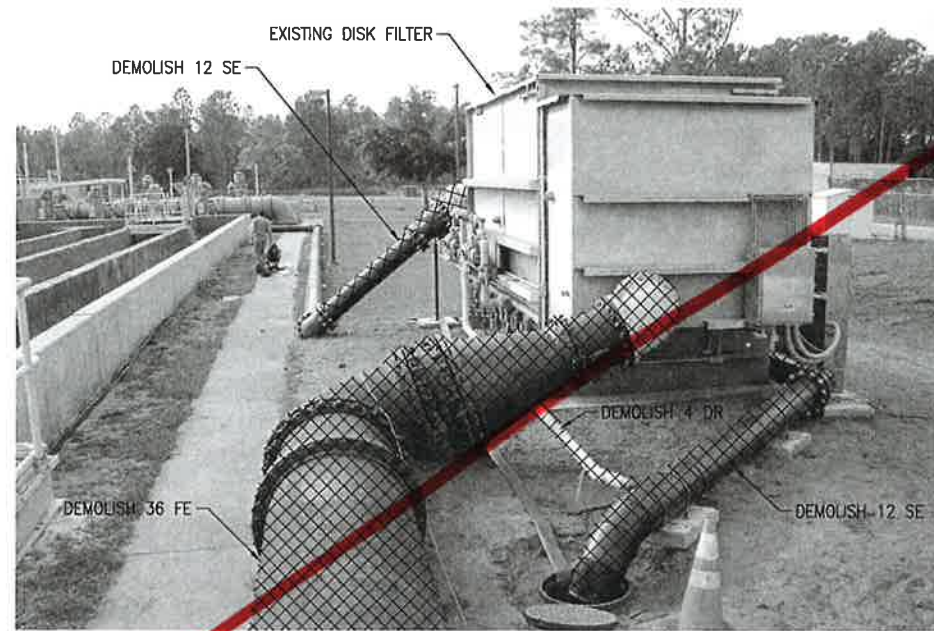
WILLIAM D. MARSHALL, PE
 FLORIDA PROFESSIONAL LICENSE NO. 82682

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
FILTER SPLITTER BOX MODIFICATIONS
IMPROVEMENT SECTION
 MECHANICAL PROCESS

PROJECT NO:	6022491
CAD DWG FILE:	D-360-304
DESIGNED BY:	WDM
DRAWN BY:	QRR/DLP
DEPT CHECK:	CFE
PROJ CHECK:	MDC
DATE:	OCTOBER 2013
SCALE:	AS NOTED

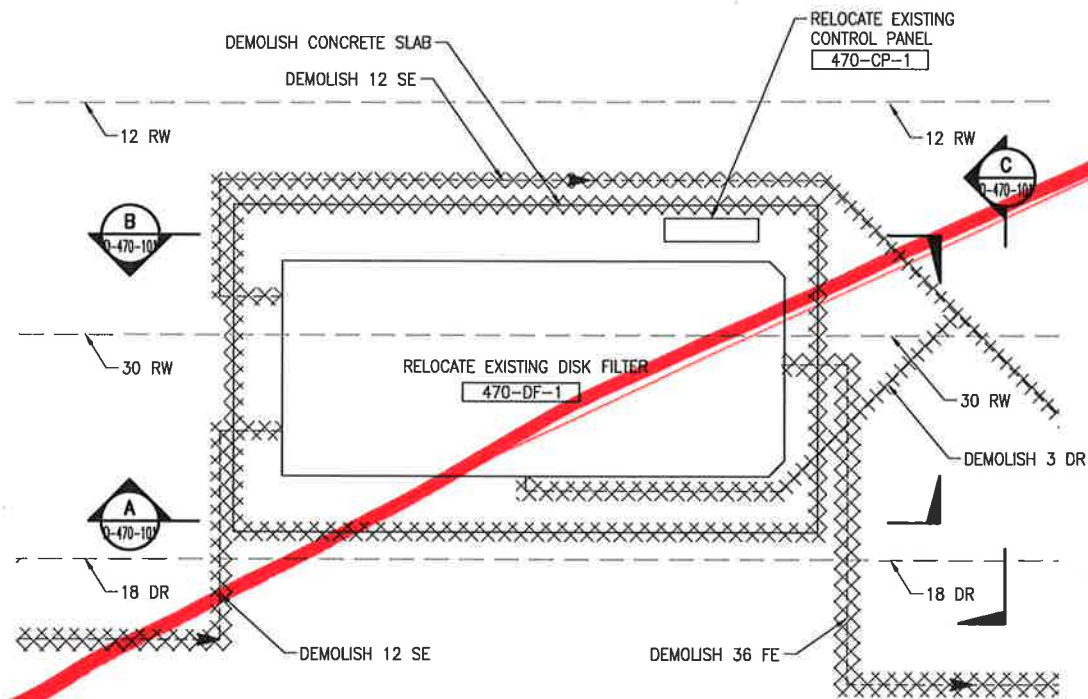


A SECTION
SCALE: NONE

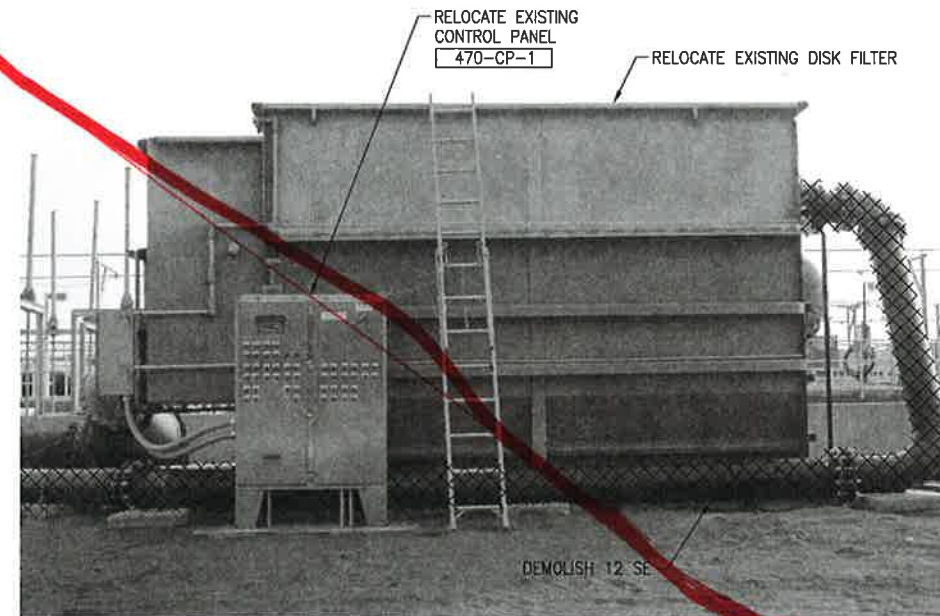


B SECTION
SCALE: NONE

*EXIST. PROCESS 470
DISK FILTER TO
REMAIN. WORK
ELIMINATED FROM
CONTRACT.*



PLAN
SCALE: 1" = 4'



C SECTION
SCALE: NONE

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 PLOT DATE: Tuesday, October 08, 2013 3:15:25 AM
 PLOTTED: robertsonq
 ANSI D - 8-Oct-13

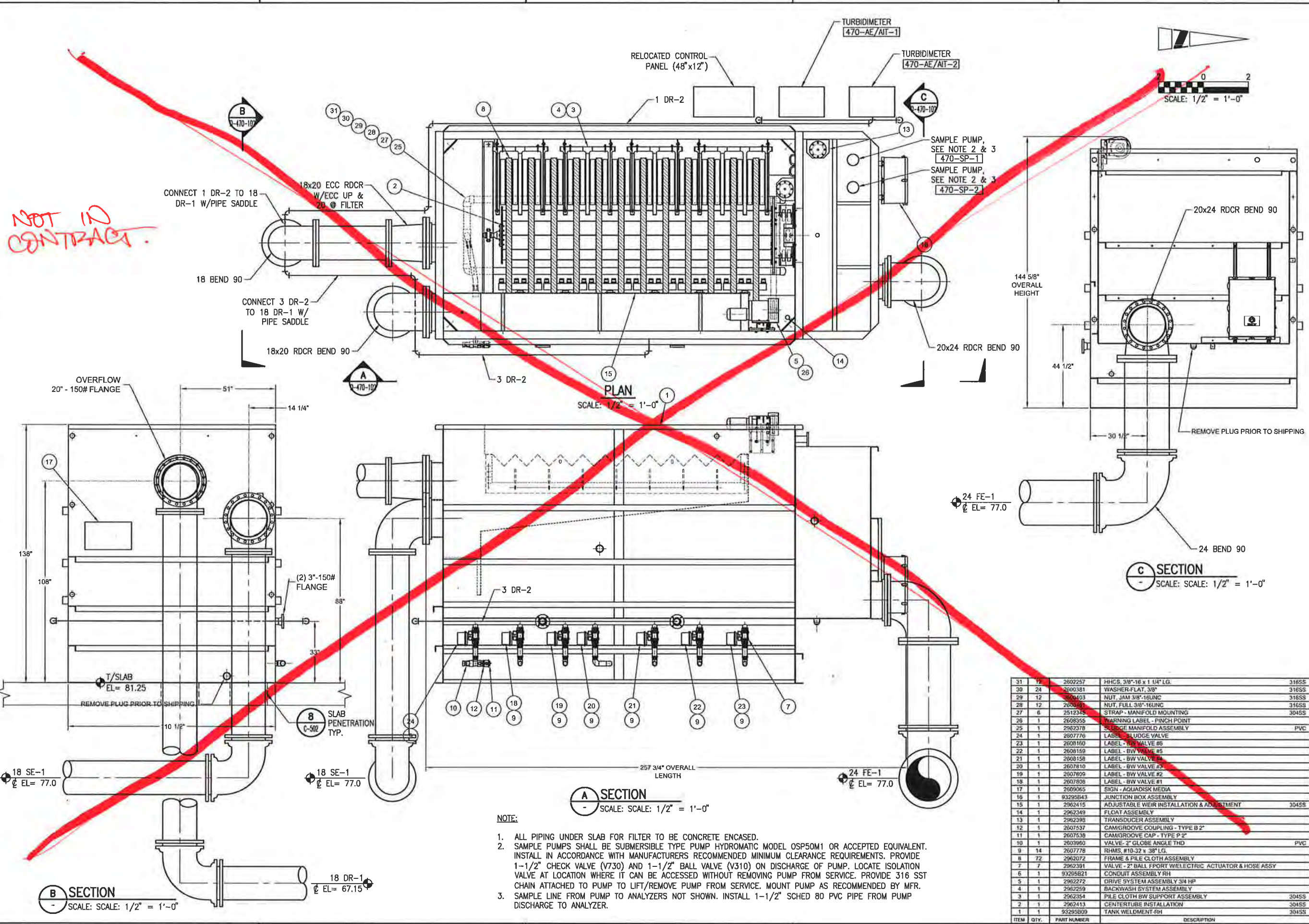
MARK	DATE	MADE BY	CHECKED	DESCRIPTION

AECOM
 155 NORTH CHANCE AVENUE, SUITE 200
 ORLANDO, FLORIDA 32801
 PHONE: 407.241.4600
 LICENSE NO. 62938
 WILLIAM D. WERSHALL, P.E.
 FLORIDA PROFESSIONAL ENGINEER LICENSE NO. 62938

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
PHASE IV DISK FILTER DEMOLITION PLAN
 MECHANICAL PROCESS

PROJECT NO:	6022491
CAD DWG FILE:	D-470-101
DESIGNED BY:	WDM
DRAWN BY:	QRR/DLP
DEPT CHECK:	CFE
PROJ CHECK:	MDC
DATE:	OCTOBER 2013
SCALE:	AS NOTED

NOT IN CONTRACT.



ITEM	QTY.	PART NUMBER	DESCRIPTION	QTY.	UNIT
31	12	2602257	HHCS, 3/8" x 1 1/4" LG.	316SS	-
30	24	2600381	WASHER-FLAT, 3/8"	316SS	-
29	12	2600403	NUT, JAM 3/8" x 16UNC	316SS	-
28	12	2600401	NUT, FULL 3/8" x 16UNC	316SS	-
27	6	2512345	STRAP - MANIFOLD MOUNTING	3045S	B
26	1	2608355	WARNING LABEL - PINCH POINT		
25	1	2962378	SLUDGE MANIFOLD ASSEMBLY	PVC	C
24	1	2607776	LABEL - SLUDGE VALVE	B	B
23	1	2608160	LABEL - BW VALVE #5	B	B
22	1	2608159	LABEL - BW VALVE #5	B	B
21	1	2608158	LABEL - BW VALVE #4	B	B
20	1	2607810	LABEL - BW VALVE #3	B	B
19	1	2607809	LABEL - BW VALVE #2	B	B
18	1	2607808	LABEL - BW VALVE #1	B	B
17	1	2609965	SIGN - AQUADISK MEDIA	B	B
16	1	93295843	JUNCTION BOX ASSEMBLY		
15	1	2963415	ADJUSTABLE WEIR INSTALLATION & ADJUSTMENT	3045S	D
14	1	2962349	FLOAT ASSEMBLY		
13	1	2962398	TRANSDUCER ASSEMBLY		
12	1	2607537	CAM/GROOVE COUPLING - TYPE B 2"		
11	1	2607536	CAM/GROOVE CAP - TYPE P 2"		
10	1	2603960	VALVE - 2" GLOBE ANGLE THD	PVC	-
9	14	2607778	RHMS, #10-32 x 3/8" LG.		
8	72	2962072	FRAME & PILE CLOTH ASSEMBLY		
7	7	2962391	VALVE - 2" BALL FPORT W/ELECTRIC ACTUATOR & HOSE ASSY		
6	1	93295821	CONDUIT ASSEMBLY RH	D	D
5	1	2962272	DRIVE SYSTEM ASSEMBLY 3/4 HP		
4	1	2962269	BACKWASH SYSTEM ASSEMBLY		
3	1	2962354	PILE CLOTH BW SUPPORT ASSEMBLY	3045S	D
2	1	2962413	CENTERTUBE INSTALLATION	3045S	D
1	1	93295809	TANK WELDMENT-RH	3045S	D

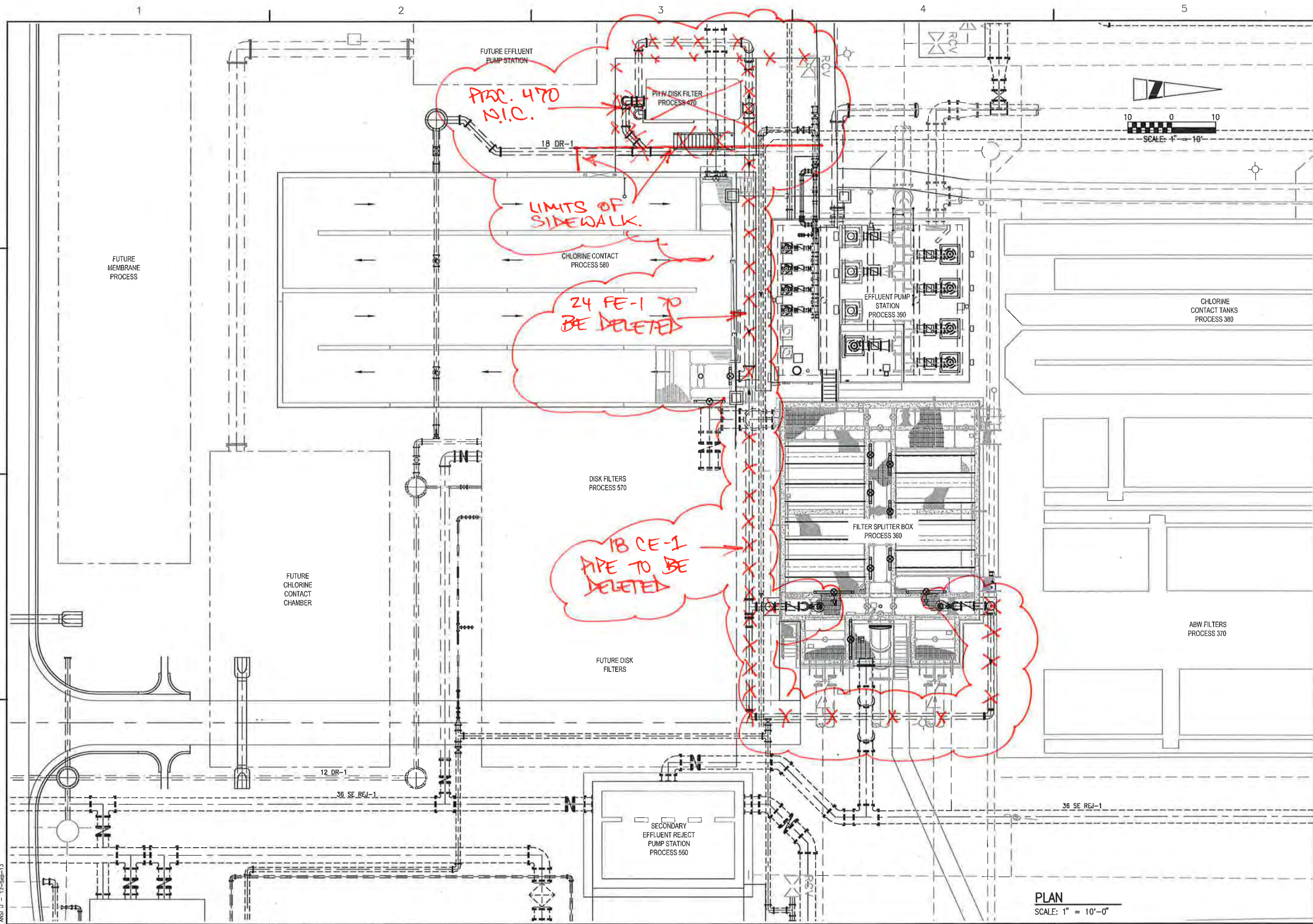
NOTE:

- ALL PIPING UNDER SLAB FOR FILTER TO BE CONCRETE ENCASED.
- SAMPLE PUMPS SHALL BE SUBMERSIBLE TYPE PUMP HYDROMATIC MODEL OSP50M1 OR ACCEPTED EQUIVALENT. INSTALL IN ACCORDANCE WITH MANUFACTURERS RECOMMENDED MINIMUM CLEARANCE REQUIREMENTS. PROVIDE 1-1/2" CHECK VALVE (V730) AND 1-1/2" BALL VALVE (V310) ON DISCHARGE OF PUMP. LOCATE ISOLATION VALVE AT LOCATION WHERE IT CAN BE ACCESSED WITHOUT REMOVING PUMP FROM SERVICE. PROVIDE 316 SST CHAIN ATTACHED TO PUMP TO LIFT/REMOVE PUMP FROM SERVICE. MOUNT PUMP AS RECOMMENDED BY MFR.
- SAMPLE LINE FROM PUMP TO ANALYZERS NOT SHOWN. INSTALL 1-1/2" SCHED 80 PVC PIPE FROM PUMP DISCHARGE TO ANALYZER.

REVISIONS	MARK	DATE	MADE BY	CHECKED	DESCRIPTION
ORANGE COUNTY UTILITIES DEPARTMENT EASTERN WATER RECLAMATION FACILITY PHASE V IMPROVEMENTS					
PHASE IV DISK FILTER IMPROVEMENT PLAN					
MECHANICAL PROCESS					
PROJECT NO: 60222491					A
CAD DWG FILE: D-470-102					
DESIGNED BY: WDM					
DRAWN BY: QRR/DLP					
DEPT CHECK: CFE					
PROJ CHECK: MOC					
DATE: OCTOBER 2013					
SCALE: AS NOTED					
D-470-102					
235 OF 527					

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 LAST UPDATE: Tuesday, September 17, 2013 5:43:17 AM
 PLOTTED: robertsong
 ANS D - 17-Sep-13

P:\17\1\ORANGE COUNTY EASTERN WRF\6222491_CWRF_5-FINAL-DESIGN\100 CAD\SHEETS\10-D-580-100.DWG
 LAST UPDATE: Tuesday, September 17, 2013 3:25:04 PM
 PLOTTED: roberts@rcg
 ANSI D - 11-589-13



PLAN
 SCALE: 1" = 10'-0"

MARK	DATE	MADE BY	CHECKED	DESCRIPTION

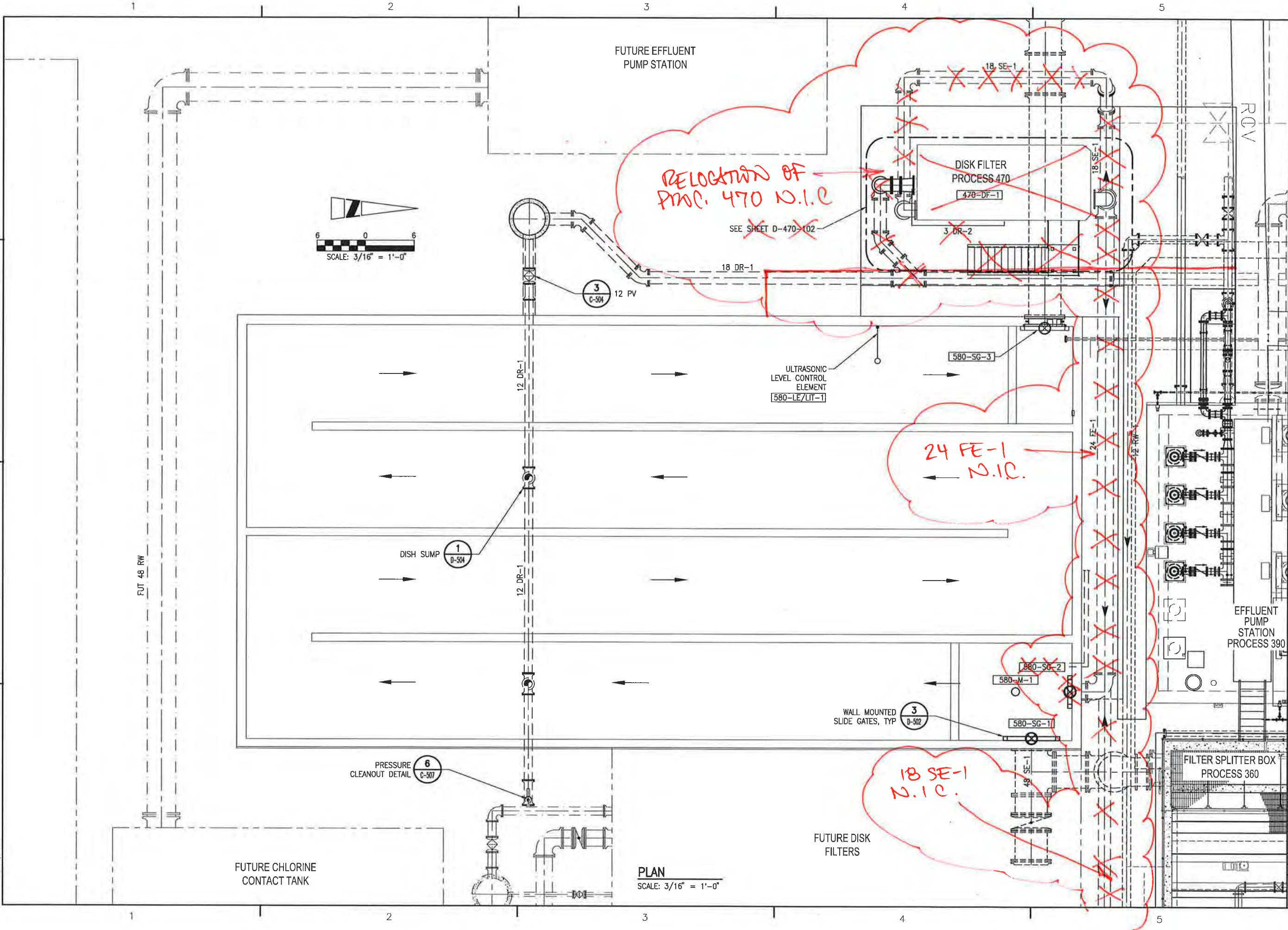
AECOM
 AECOM TECHNOLOGICAL SERVICES, INC.
 100 W. GARDNER STREET, SUITE 200
 ORLANDO, FLORIDA 32801
 PHONE: 407.833.5221

WILLIAM D. WARDHALL, P.E.
 FLORIDA PROFESSIONAL LICENSE NO. 62232

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
CHLORINE CONTACT TANK OVERALL PLAN
 MECHANICAL PROCESS

PROJECT NO:	60222491
CAD DWG FILE:	D-580-100
DESIGNED BY:	WDM
DRAWN BY:	QRR
DEPT CHECK:	CFE
PROJ CHECK:	MDC
DATE:	OCTOBER 2013
SCALE:	AS NOTED

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 LAST UPDATE: Monday, September 30, 2013 11:54:09 AM
 PLOTTED: robertsong
 ANSI D - 30-Sep-13



PLAN
 SCALE: 3/16" = 1'-0"

MARK	DATE	MADE BY	CHECKED	DESCRIPTION

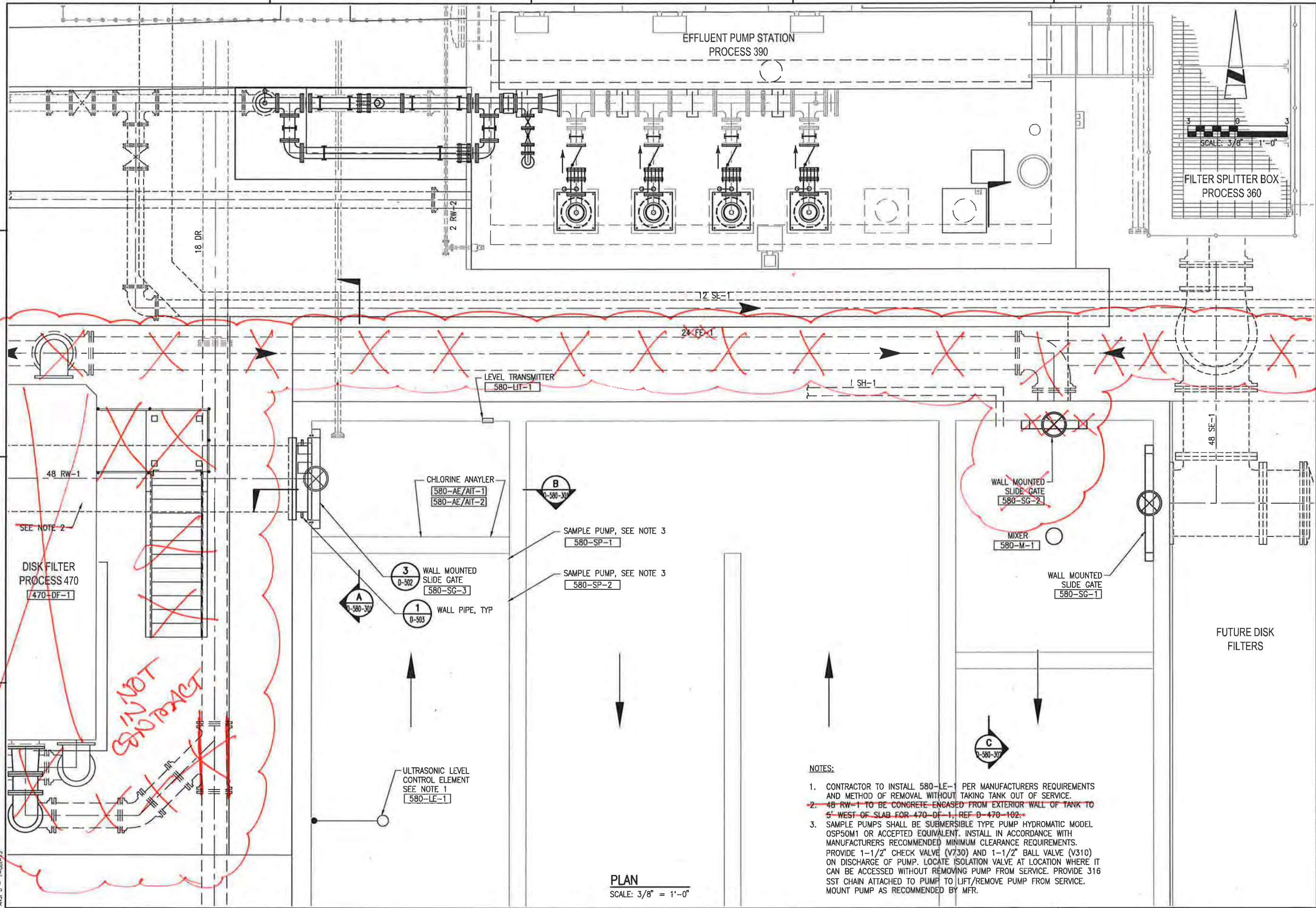
AECOM		COMPANY # ASSOCIATION No. 08-0116	
AECOM TECHNICAL SERVICES, INC. 1000 WEST GORNING ROAD, SUITE 500 ORLANDO, FLORIDA 32826 PHONE: 407-943-6222		WILLIAM D. WARDHILL, P.E. FLORIDA PROFESSIONAL LICENSE NO. 68292	

ORANGE COUNTY UTILITIES DEPARTMENT	
EASTERN WATER RECLAMATION FACILITY	
PHASE V IMPROVEMENTS	
CHLORINE CONTACT TANK	
PLAN	
MECHANICAL PROCESS	

PROJECT NO:	60222491
CAD DWG FILE:	D-580-101
DESIGNED BY:	WDM
DRAWN BY:	QRR
DEPT CHECK:	CFE
PROJ CHECK:	MDC
DATE:	OCTOBER 2013
SCALE:	AS NOTED


D-580-101
281 OF 527

PAN/FILENAME: X:\ORANGE COUNTY\EASTERN WFR\6022491_LBRV_5-FINAL-DESIGN\000 CAD\SHEETS\000-580-102.DWG
 LAST UPDATE: Tuesday, October 01, 2013 2:52:59 PM
 PLOTTED: roberta@aec.com
 ANSI D - 1-0ct-23

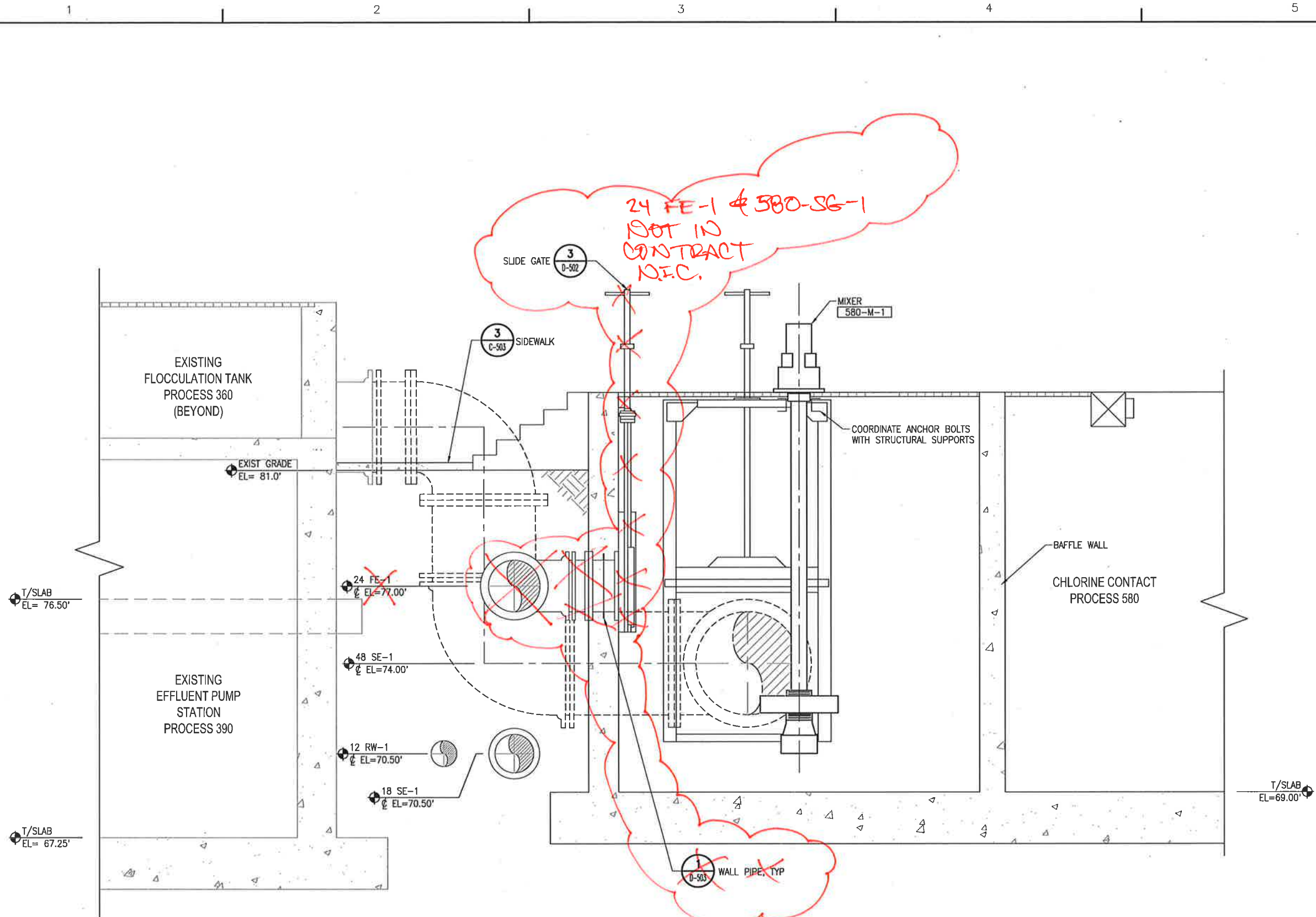


PLAN
 SCALE: 3/8" = 1'-0"

- NOTES:**
- CONTRACTOR TO INSTALL 580-LE-1 PER MANUFACTURERS REQUIREMENTS AND METHOD OF REMOVAL WITHOUT TAKING TANK OUT OF SERVICE.
 - ~~48 RW-1 TO BE CONCRETE ENCASED FROM EXTERIOR WALL OF TANK TO 5' WEST OF SLAB FOR 470-DF-1, REF D-470-102.~~
 - SAMPLE PUMPS SHALL BE SUBMERSIBLE TYPE PUMP HYDROMATIC MODEL OSP50M1 OR ACCEPTED EQUIVALENT. INSTALL IN ACCORDANCE WITH MANUFACTURERS RECOMMENDED MINIMUM CLEARANCE REQUIREMENTS. PROVIDE 1-1/2" CHECK VALVE (V730) AND 1-1/2" BALL VALVE (V310) ON DISCHARGE OF PUMP. LOCATE ISOLATION VALVE AT LOCATION WHERE IT CAN BE ACCESSED WITHOUT REMOVING PUMP FROM SERVICE. PROVIDE 316 SST CHAIN ATTACHED TO PUMP TO LIFT/REMOVE PUMP FROM SERVICE. MOUNT PUMP AS RECOMMENDED BY MFR.

 <small>AECOM TECHNICAL SERVICES, INC. 1000 COLLEEN AVENUE, SUITE 200 ORLANDO, FLORIDA 32801 PHONE: 407/945-6222</small>		<small>REVISIONS</small> <table border="1"> <tr> <th>MARK</th> <th>DATE</th> <th>MADE BY</th> <th>CHECKED</th> <th>DESCRIPTION</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	MARK	DATE	MADE BY	CHECKED	DESCRIPTION					
MARK	DATE	MADE BY	CHECKED	DESCRIPTION								
<small>WILLIAM D. MARSHALL, P.E. FLORIDA PROFESSIONAL LICENSE NO. 68282</small>		<small>CONTRACT NO. A6022491-01-01-11</small>										
ORANGE COUNTY UTILITIES DEPARTMENT EASTERN WATER RECLAMATION FACILITY PHASE V IMPROVEMENTS CHLORINE CONTACT TANK PLAN <small>MECHANICAL PROCESS</small>												
<small>PROJECT NO: 6022491 CAD DWG FILE: D-580-102</small>		<small>DESIGNED BY: WDM DRAWN BY: QRR DEPT CHECK: CFE PROJ CHECK: MDC DATE: OCTOBER 2013 SCALE: AS NOTED</small>										
D-580-102 <small>282 OF 527</small>		<small>A</small>										

PAT/FILENAME: X:\ORANGE COUNTY\EASTERN WRF\60222491_LWF_5-FINAL-DESIGN\00 CAD\SHEETS\00-D-580-302.DWG
 LAST UPDATE: Tuesday, October 01, 2013 2:24:38 PM
 PLOT DATE: Tuesday, October 08, 2013 3:25:25 PM
 PLOTTED: robertsonq
 ANSI D - 1-0ct-13



C SECTION
 SCALE: 1/2" = 1'-0"

NO.	DATE	MADE BY	CHECKED	DESCRIPTION

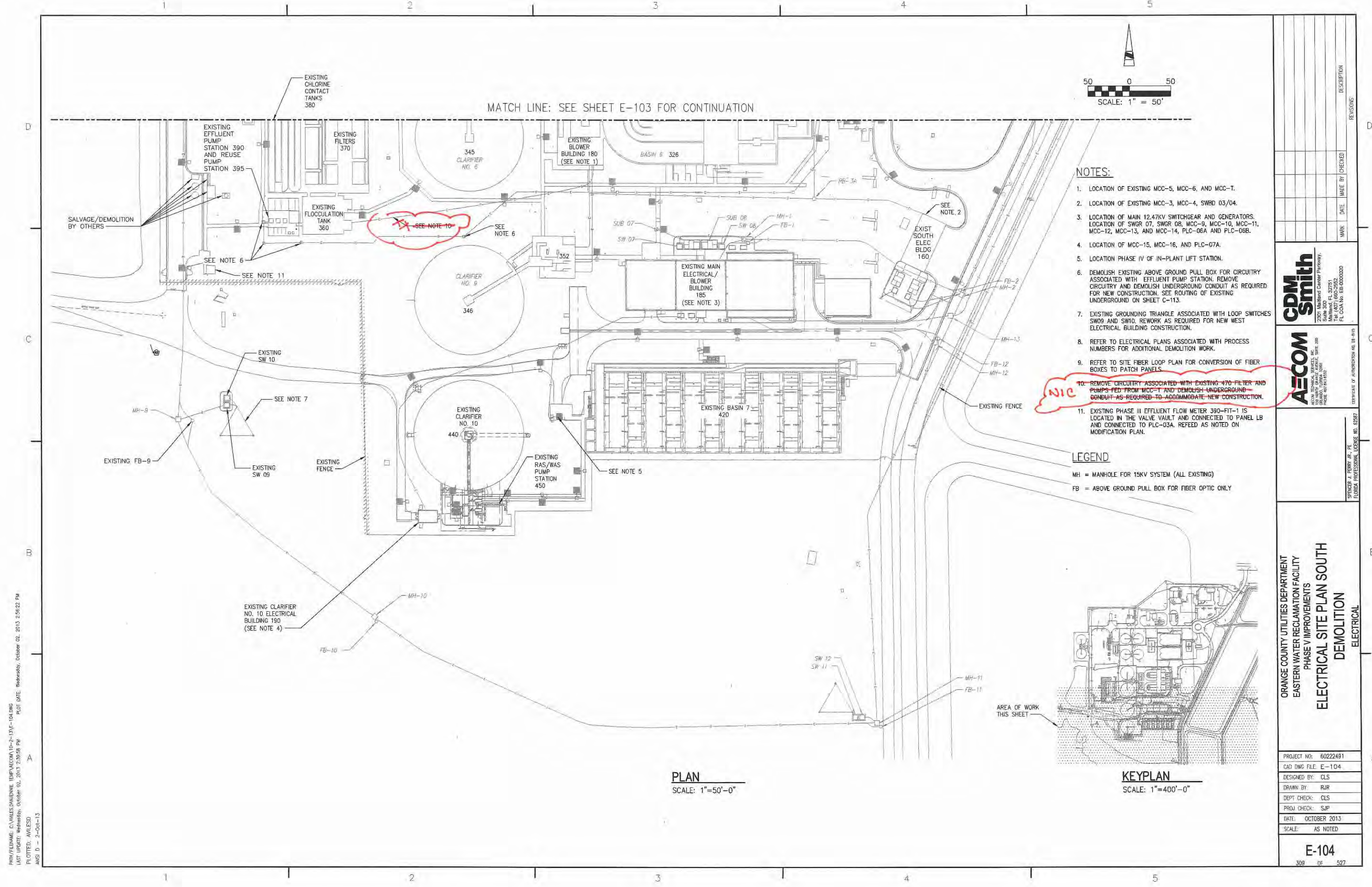
AECOM
 AECOM TECHNICAL SERVICES, INC.
 100 NORTH GORHAM AVENUE, SUITE 200
 PALM BEACH, FLORIDA 33480
 PHONE: 561.832.3222

WILLIAM D. MARSHALL, P.E.
 FLORIDA PROFESSIONAL LICENSE NO. 66282

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
CHLORINE CONTACT TANK SECTION
 MECHANICAL PROCESS

PROJECT NO:	60222491
CAD DWG FILE:	D-580-302
DESIGNED BY:	WDM
DRAWN BY:	QRR
DEPT CHECK:	CFE
PROJ CHECK:	MDC
DATE:	OCTOBER 2013
SCALE:	AS NOTED

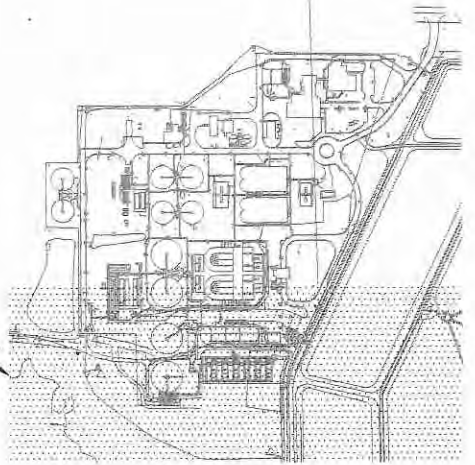
D-580-302
 284 OF 527



- NOTES:**
1. LOCATION OF EXISTING MCC-5, MCC-6, AND MCC-T.
 2. LOCATION OF EXISTING MCC-3, MCC-4, SWBD 03/04.
 3. LOCATION OF MAIN 12.47KV SWITCHGEAR AND GENERATORS. LOCATION OF SWGR 07, SWGR 08, MCC-9, MCC-10, MCC-11, MCC-12, MCC-13, AND MCC-14, PLC-06A AND PLC-06B.
 4. LOCATION OF MCC-15, MCC-16, AND PLC-07A.
 5. LOCATION PHASE IV OF IN-PLANT LIFT STATION.
 6. DEMOLISH EXISTING ABOVE GROUND PULL BOX FOR CIRCUITRY ASSOCIATED WITH EFFLUENT PUMP STATION. REMOVE CIRCUITRY AND DEMOLISH UNDERGROUND CONDUIT AS REQUIRED FOR NEW CONSTRUCTION. SEE ROUTING OF EXISTING UNDERGROUND ON SHEET C-113.
 7. EXISTING GROUNDING TRIANGLE ASSOCIATED WITH LOOP SWITCHES SW09 AND SW10. REWORK AS REQUIRED FOR NEW WEST ELECTRICAL BUILDING CONSTRUCTION.
 8. REFER TO ELECTRICAL PLANS ASSOCIATED WITH PROCESS NUMBERS FOR ADDITIONAL DEMOLITION WORK.
 9. REFER TO SITE FIBER LOOP PLAN FOR CONVERSION OF FIBER BOXES TO PATCH PANELS.
 10. REMOVE CIRCUITRY ASSOCIATED WITH EXISTING 470-FILTER AND PUMPS FED FROM MCC-T AND DEMOLISH UNDERGROUND CONDUIT AS REQUIRED TO ACCOMMODATE NEW CONSTRUCTION.
 11. EXISTING PHASE III EFFLUENT FLOW METER 390-FIT-1 IS LOCATED IN THE VALVE VAULT AND CONNECTED TO PANEL LB AND CONNECTED TO PLC-03A. REFEED AS NOTED ON MODIFICATION PLAN.

NIC

- LEGEND**
- MH = MANHOLE FOR 15KV SYSTEM (ALL EXISTING)
 - FB = ABOVE GROUND PULL BOX FOR FIBER OPTIC ONLY



PLAN
SCALE: 1"=50'-0"

KEYPLAN
SCALE: 1"=400'-0"

NO.	DATE	MADE BY	CHECKED	DESCRIPTION

CDM Smith
2700 Macdonald Center Parkway,
Suite 300
Maitland, FL 32751
Tel: (407) 660-9552
FL CCA No. EE-000020

AECOM
100 NORTH BRADLEY AVENUE, SUITE 200
ORLANDO, FLORIDA 32801
PHONE: (407) 344-6100

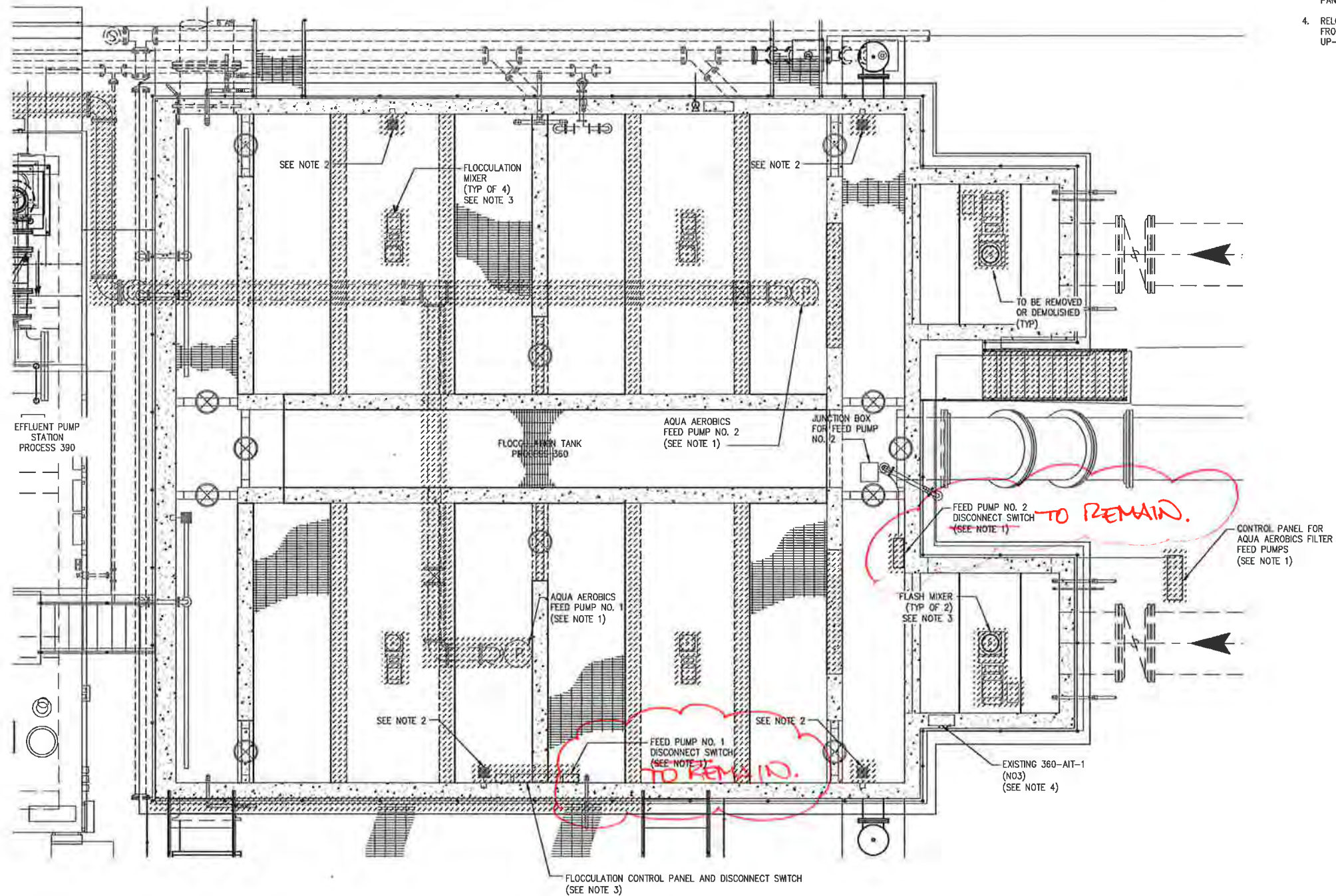
SPENCER J. FERRY, JR., P.E.
FLORIDA PROFESSIONAL LICENSE NO. 85827

ORANGE COUNTY UTILITIES DEPARTMENT
EASTERN WATER RECLAMATION FACILITY
PHASE V IMPROVEMENTS
ELECTRICAL SITE PLAN SOUTH
DEMOLITION
ELECTRICAL

PROJECT NO:	60222491
CAD DWG FILE:	E-104
DESIGNED BY:	CLS
DRAWN BY:	RJR
DEPT CHECK:	CLS
PROJ CHECK:	SJP
DATE:	OCTOBER 2013
SCALE:	AS NOTED

PW/FLD/AME C:\VILES\DWG\EME\PROJECTS\10-2-13\10-104.DWG
LAST UPDATE: Wednesday, October 02, 2013 2:56:22 PM
PLOT DATE: Wednesday, October 02, 2013 2:59:58 PM
PLOTTED: AVLESD
ANSI D - 3-Oct-13

PATH/FILENAME: C:\ORANGE\CARTERRA\07052491\E-360-101.DWG
 LAST UPDATE: Thursday, April 03, 2014 5:43:19 AM
 PLOTTED: corferrh
 ANSI D - 11-2014



PLAN
 SCALE: 1/4" = 1'-0"

NOTES:

1. REMOVE CONTROL PANEL AND ASSOCIATED FEED PUMPS AND LOCAL DISCONNECT SWITCHES. RETURN EQUIPMENT TO COUNTY. CONTROL PANEL IS FED FROM MCC-7.
2. RELOCATE FOUR EXISTING LIGHTS (WITH LOCAL RECEPTACLES MOUNTED IN POLE) TO COORDINATE WITH NEW CONSTRUCTION. LIGHTS ARE ASSUMED TO BE FED FROM PC/TC-3 LOCATED IN BUILDING 180. EXTEND/REPLACE CIRCUITRY AS NECESSARY.
3. DEMOLISH FLASH MIXERS AND FLOCCULATION MIXERS, INCLUDING LOCAL DISCONNECT SWITCHES AND CONTROL PANELS. MIXERS ARE FED FROM MCC-5 AND MCC-6. FLOCCULATION CONTROL PANEL 120V IS FED FROM PANEL LB. CUT OFF AND CAP CONDUITS IN SLAB.
4. RELOCATE EXISTING 360-AIT-1 SCADA CONNECTION FROM PLC-03A TO PLC-08A AND REFEED 120V TO UP-575.

MARK	DATE	MADE BY	CHECKED	REVISIONS

CDM Smith
 2301 Maitland Center Parkway
 Suite 300 FL 32751
 Tel: (407) 650-2552
 FL COA No. EB-00000220

AECOM
 AECOM TECHNICAL SERVICES, INC. SITE 200
 1000 N. GULF BLVD., SUITE 200
 ORLANDO, FLORIDA 32801
 PHONE 407.415.6500

SPENCER J. PERRY, JR., P.E.
 FLORIDA PROFESSIONAL LICENSE NO. 62587

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
FILTER SPLITTER BOX
ELECTRICAL DEMOLITION PLAN

PROJECT NO:	60222491
CAD DWG FILE:	E-360-101
DESIGNED BY:	CLS
DRAWN BY:	RHC
DEPT CHECK:	CLS
PROJ CHECK:	SJP
DATE:	OCTOBER 2013
SCALE:	AS NOTED

E-360-101
 367 OF 527

PART/FOLDER: C:\WORKS\DWG\ENR\TEMP\ACOM\10-2-2-13\E-470-101.DWG
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 ANSI D - 2-06-13

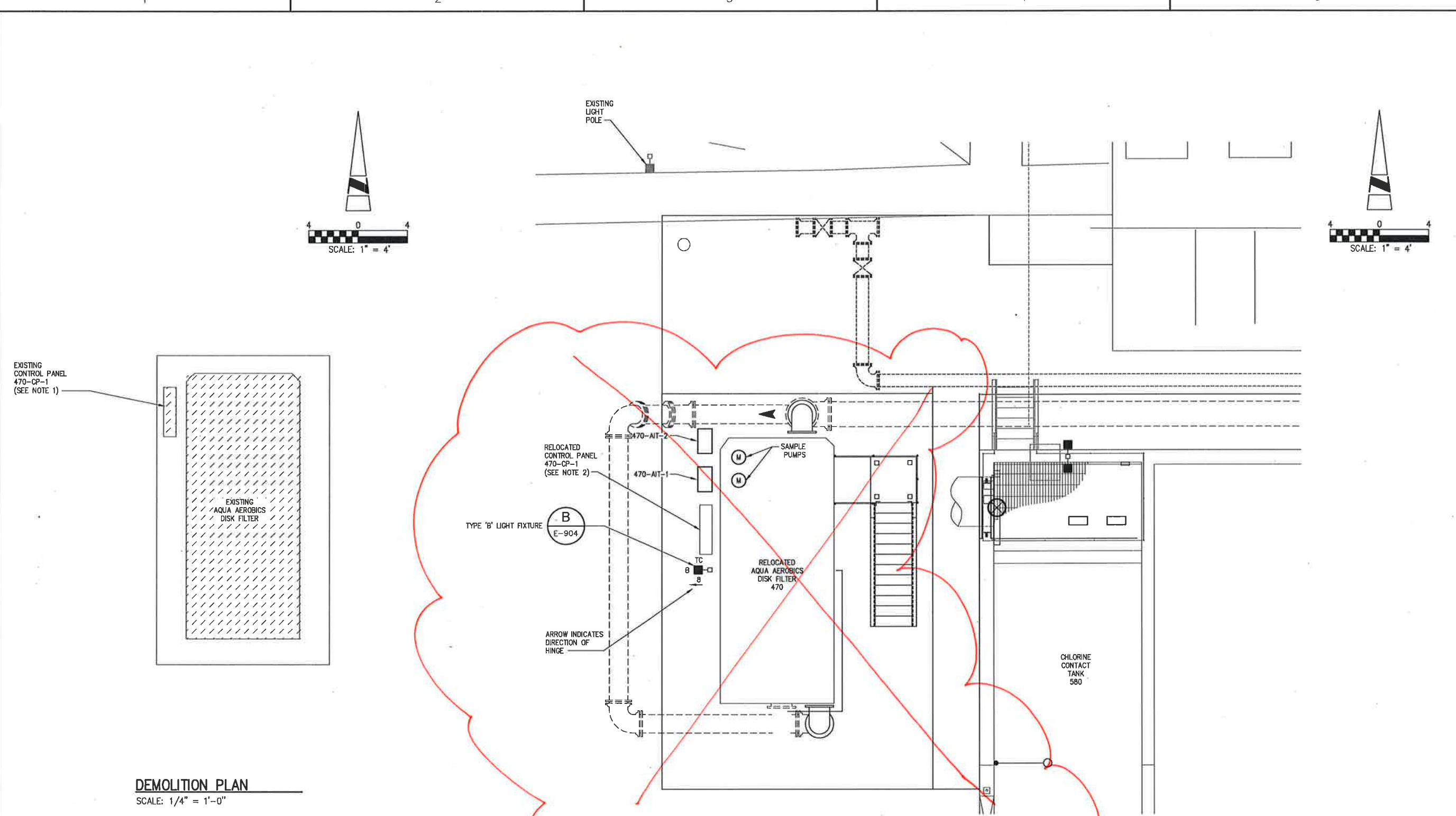
DEMOLITION PLAN
 SCALE: 1/4" = 1'-0"

NOTES:

1. DEMOLISH EXISTING SERVICES AND RELOCATE EXISTING FILTER AND ASSOCIATED ACCESSORIES. POWER IS CURRENTLY FED FROM FEED PUMP CONTROL PANEL LOCATED ON SHEET E-360-101. REFER TO SINGLE LINE POWER DIAGRAM FOR MCC-1.
2. REFEED RELOCATED CONTROL PANEL FROM MCC-17. PROVIDE NEW SCADA SYSTEM WIRING TO PLC-08A. REFER TO PROCESS MECHANICAL DRAWINGS FOR LOCATION OF MOTORS AND OTHER EQUIPMENT AT FILTER.
3. NEW LIGHT TO BE FED FROM PANEL PC/TC-575 LOCATED IN BUILDING 575.
4. NEW INSTRUMENTS TO BE FED FROM PANEL UP-575 LOCATED IN BUILDING 575.
5. NEW SAMPLE PUMPS TO BE FED FROM PANEL LP-575 LOCATED IN BUILDING 575.

MODIFICATION PLAN
 SCALE: 1/4" = 1'-0"

RELOCATION OF DISK FILTER NOT IN CONTRACT NTC



MARK	DATE	MADE BY	CHECKED	DESCRIPTION

CDM Smith
 2301 Mallard Center Parkway
 Maitland, FL 32751
 Tel: (407) 866-2552
 FL COA No. EB-0000020

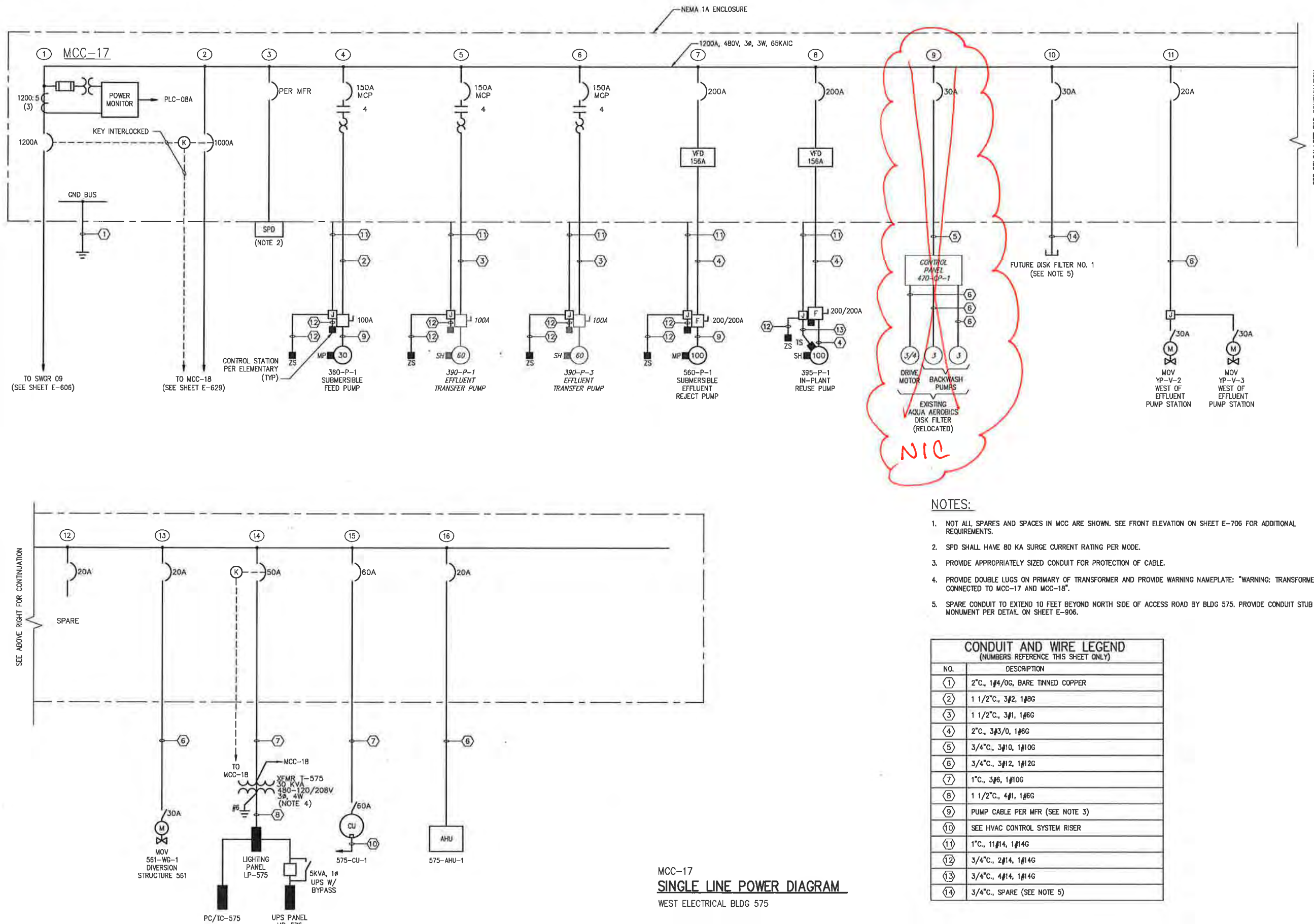
AECOM
 AECOM TECHNICAL SERVICES, INC.
 1001 W. BRADLEY BLVD., SUITE 200
 ORLANDO, FL 32837
 PHONE 407.241.2222
 LICENSE OF AUTHORIZATION NO. CE-1113

SPENCER J. PERRY, JR., PE
 LICENSE PROFESSIONAL ENGINEER NO. 50567

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
 PHASE IV DISK FILTER
 ELECTRICAL PLANS
 ELECTRICAL

PROJECT NO:	60222491
CAD DWG FILE:	E-470-101
DESIGNED BY:	CLS
DRAWN BY:	NNK
DEPT CHECK:	CLS
PROJ CHECK:	SJP
DATE:	OCTOBER 2013
SCALE:	AS NOTED

P:\PROJECTS\ORANGE COUNTY UTILITIES DEPARTMENT\EASTERN WATER RECLAMATION FACILITY PHASE V IMPROVEMENTS\DWG\E-628.DWG
 LAST UPDATE: Wednesday, October 02, 2013 11:08:32 AM PLOT DATE: Wednesday, October 02, 2013 3:07:47 PM
 PLOTTED: AVILESD
 ANSI D - 2-04-13



NOTES:

1. NOT ALL SPARES AND SPACES IN MCC ARE SHOWN. SEE FRONT ELEVATION ON SHEET E-706 FOR ADDITIONAL REQUIREMENTS.
2. SPD SHALL HAVE 80 KA SURGE CURRENT RATING PER MODE.
3. PROVIDE APPROPRIATELY SIZED CONDUIT FOR PROTECTION OF CABLE.
4. PROVIDE DOUBLE LUGS ON PRIMARY OF TRANSFORMER AND PROVIDE WARNING NAMEPLATE: "WARNING: TRANSFORMER IS CONNECTED TO MCC-17 AND MCC-18".
5. SPARE CONDUIT TO EXTEND 10 FEET BEYOND NORTH SIDE OF ACCESS ROAD BY BLDG 575. PROVIDE CONDUIT STUB MONUMENT PER DETAIL ON SHEET E-906.

CONDUIT AND WIRE LEGEND (NUMBERS REFERENCE THIS SHEET ONLY)	
NO.	DESCRIPTION
①	2" C., 1#4/0G, BARE TINNED COPPER
②	1 1/2" C., 3#2, 1#6G
③	1 1/2" C., 3#1, 1#6G
④	2" C., 3#3/0, 1#6G
⑤	3/4" C., 3#10, 1#10G
⑥	3/4" C., 3#12, 1#12G
⑦	1" C., 3#6, 1#10G
⑧	1 1/2" C., 4#1, 1#6G
⑨	PUMP CABLE PER MFR (SEE NOTE 3)
⑩	SEE HVAC CONTROL SYSTEM RISER
⑪	1" C., 11#14, 1#14G
⑫	3/4" C., 2#14, 1#14G
⑬	3/4" C., 4#14, 1#14G
⑭	3/4" C., SPARE (SEE NOTE 5)

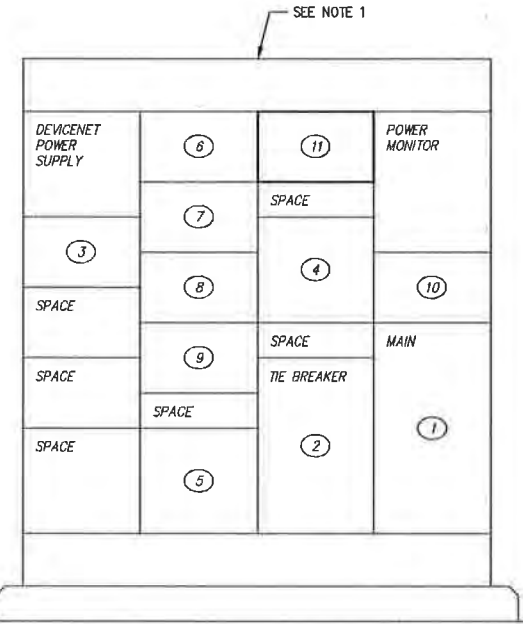
**MCC-17
 SINGLE LINE POWER DIAGRAM**
 WEST ELECTRICAL BLDG 575

SEE BELOW LEFT FOR CONTINUATION

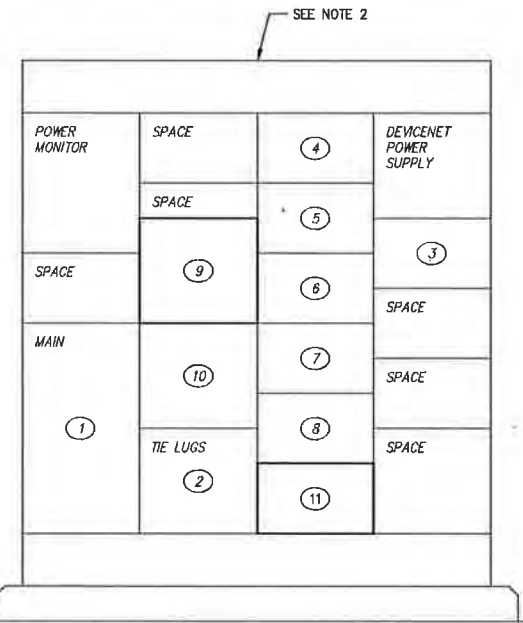
SEE ABOVE RIGHT FOR CONTINUATION

ORANGE COUNTY UTILITIES DEPARTMENT EASTERN WATER RECLAMATION FACILITY PHASE V IMPROVEMENTS MCC-17 ELECTRICAL											
PROJECT NO: 60222491 CAD DWG FILE: E-628 DESIGNED BY: CLS DRAWN BY: NNK DEPT CHECK: CLS PROJ CHECK: SJP DATE: OCTOBER 2013 SCALE: AS NOTED	REVISIONS <table border="1"> <tr> <th>MARK</th> <th>DATE</th> <th>MADE BY</th> <th>CHECKED</th> <th>DESCRIPTION</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	MARK	DATE	MADE BY	CHECKED	DESCRIPTION					
MARK	DATE	MADE BY	CHECKED	DESCRIPTION							
E-628 429 OF 527											

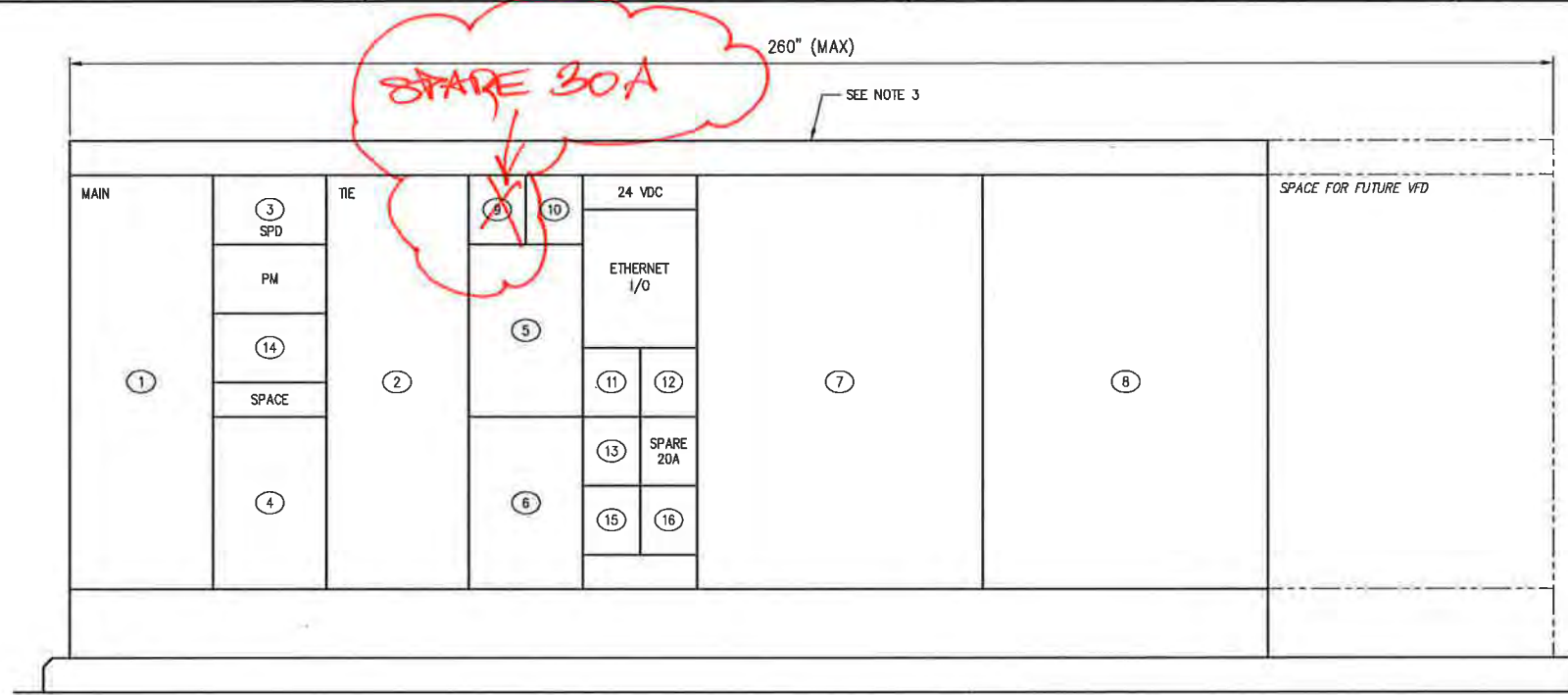
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 USER: AMLES
 PLOTTED: AMLES
 ANSI D - 2-10-13



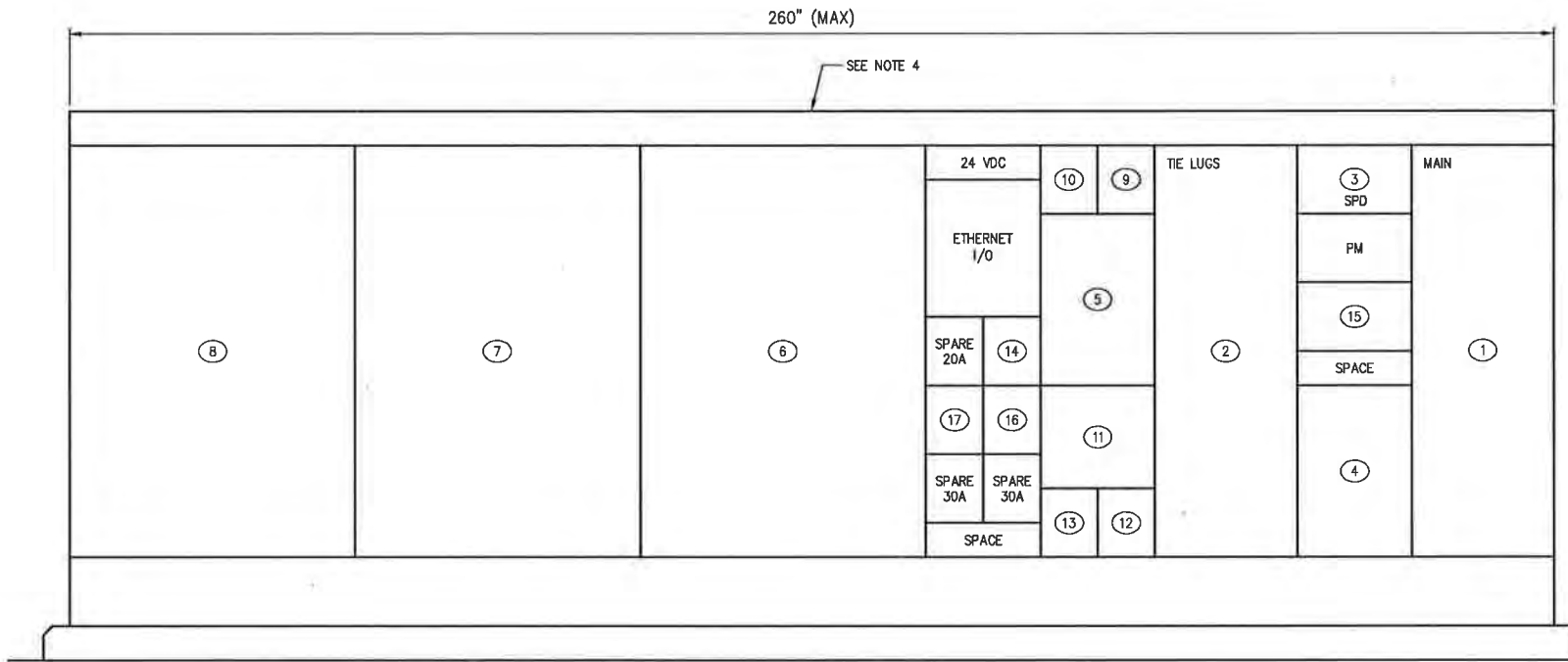
EXISTING MCC-15 FRONT ELEVATION
 SCALE: NTS
 EATON/CUTLER-HAMMER FREEDOM 2100 MOTOR CONTROL CENTER
 600A, 3-PHASE, 3-WIRE, 65KAIC RATING, (2009)
 NEMA 12/NEMA 1 GASKETED
 GO # MOR03322



EXISTING MCC-16 FRONT ELEVATION
 SCALE: NTS
 EATON/CUTLER-HAMMER FREEDOM 2100 MOTOR CONTROL CENTER
 600A, 3-PHASE, 3-WIRE, 65KAIC RATING, (2009)
 NEMA 12/NEMA 1 GASKETED
 GO # MOR03322



MCC-17 FRONT ELEVATION
 SCALE: NTS



MCC-18 FRONT ELEVATION
 SCALE: NTS

- NOTES:**
1. MODIFY MCC-15 AS SHOWN ON SINGLE LINE POWER DIAGRAM ON SHEET E-626. PROVIDE UPDATED NAMEPLATES.
 2. MODIFY MCC-16 AS SHOWN ON SINGLE LINE POWER DIAGRAM ON SHEET E-627. PROVIDE UPDATED NAMEPLATES.
 3. REFER TO SHEET E-628 FOR MCC-17 SINGLE LINE POWER DIAGRAM. PROVIDE NUMBER AND TYPE OF SPARES SHOWN.
 4. REFER TO SHEET E-629 FOR MCC-18 SINGLE LINE POWER DIAGRAM. PROVIDE NUMBER AND TYPE OF SPARES SHOWN.

4" CONCRETE HOUSEKEEPING PAD (TYP)
 FINISHED FLOOR (TYP)

MARK	DATE	MADE BY	CHECKED	REVISIONS	DESCRIPTION

CDM Smith
 2201 The Sabre Center Parkway,
 Suite 200
 Maitland, FL 32751
 Tel: (407) 660-2552
 FL COA No. EB-0000020

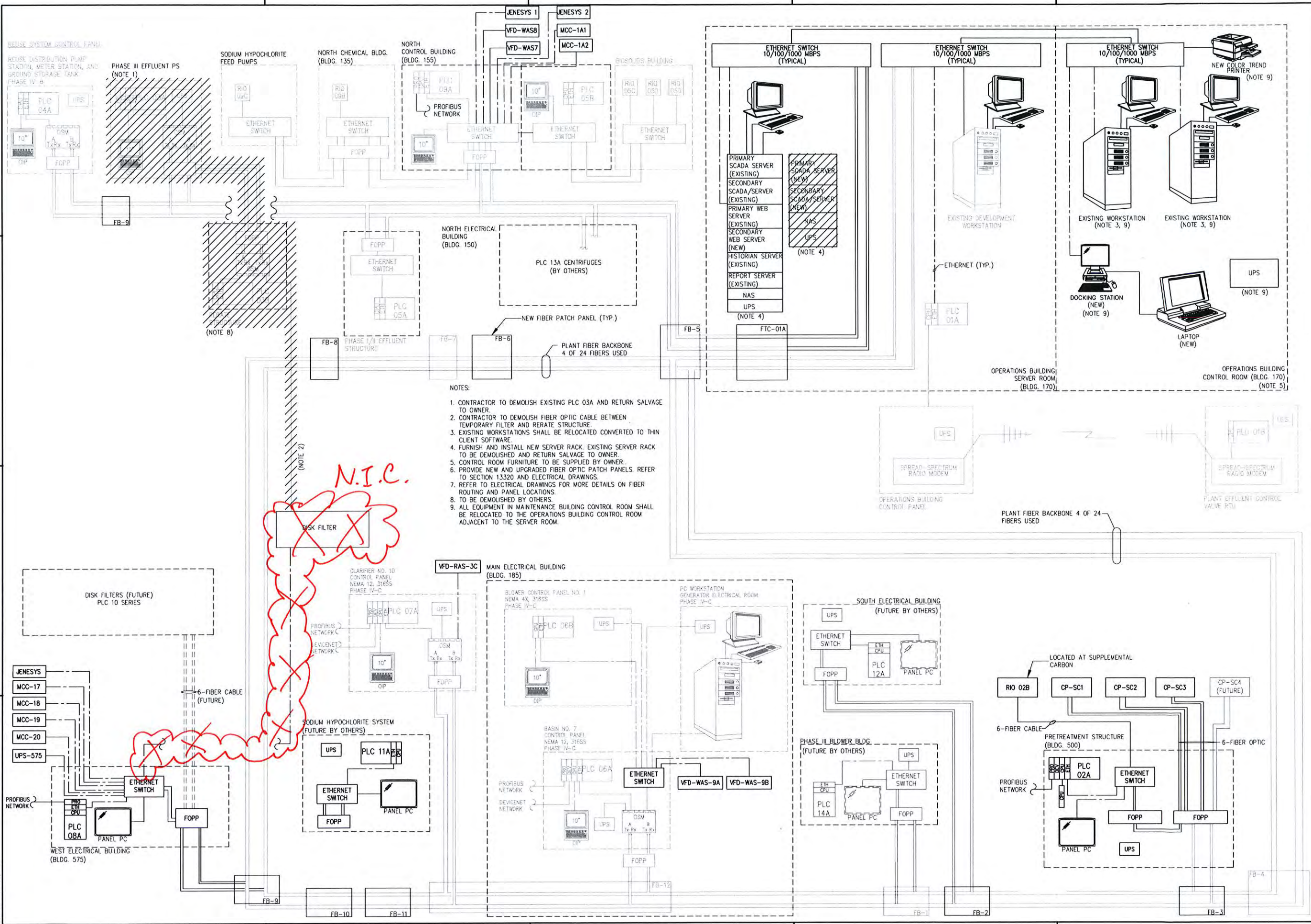
AECOM
 150 NORTH GUNNWAY AVENUE, SUITE 200
 ORLANDO, FLORIDA 32801
 PHONE: 407.241.4600

REGISTERED PROFESSIONAL ENGINEER
 LICENSE NO. 6287

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
MCC-15, MCC-16, MCC-17, MCC-18
FRONT ELEVATION
 ELECTRICAL

PROJECT NO:	60222491
CAD DWG FILE:	E-706
DESIGNED BY:	CLS
DRAWN BY:	RJR
DEPT CHECK:	CLS
PROJ CHECK:	SJP
DATE:	OCTOBER 2013
SCALE:	AS NOTED

PATH/FILENAME, C:\DOCUMENTS AND SETTINGS\DAVST\TEMP 2\1-003.DWG
 LAST UPDATE: Tuesday, September 24, 2013 9:52:12 AM
 PLOT DATE: Wednesday, October 02, 2013 3:19:46 PM
 PLOTTED: DAVST
 ANS 0 - 24-Sep-13



- NOTES:
1. CONTRACTOR TO DEMOLISH EXISTING PLC 03A AND RETURN SALVAGE TO OWNER.
 2. CONTRACTOR TO DEMOLISH FIBER OPTIC CABLE BETWEEN TEMPORARY FILTER AND RERATE STRUCTURE.
 3. EXISTING WORKSTATIONS SHALL BE RELOCATED CONVERTED TO THIN CLIENT SOFTWARE.
 4. FURNISH AND INSTALL NEW SERVER RACK. EXISTING SERVER RACK TO BE DEMOLISHED AND RETURN SALVAGE TO OWNER.
 5. CONTROL ROOM FURNITURE TO BE SUPPLIED BY OWNER.
 6. PROVIDE NEW AND UPGRADED FIBER OPTIC PATCH PANELS. REFER TO SECTION 13320 AND ELECTRICAL DRAWINGS.
 7. REFER TO ELECTRICAL DRAWINGS FOR MORE DETAILS ON FIBER ROUTING AND PANEL LOCATIONS.
 8. TO BE DEMOLISHED BY OTHERS.
 9. ALL EQUIPMENT IN MAINTENANCE BUILDING CONTROL ROOM SHALL BE RELOCATED TO THE OPERATIONS BUILDING CONTROL ROOM ADJACENT TO THE SERVER ROOM.

N.I.C.

MARK	DATE	MADE BY	CHECKED	DESCRIPTION

AECOM
 150 SOUTH BRADY AVENUE, SUITE 200
 ANAHEIM, CALIFORNIA 92801
 PHONE: 714.952.2000
 FAX: 714.952.2001

WILLIAM E. WATKINS, P.E.
 FLORIDA PROFESSIONAL LICENSE NO. 5815

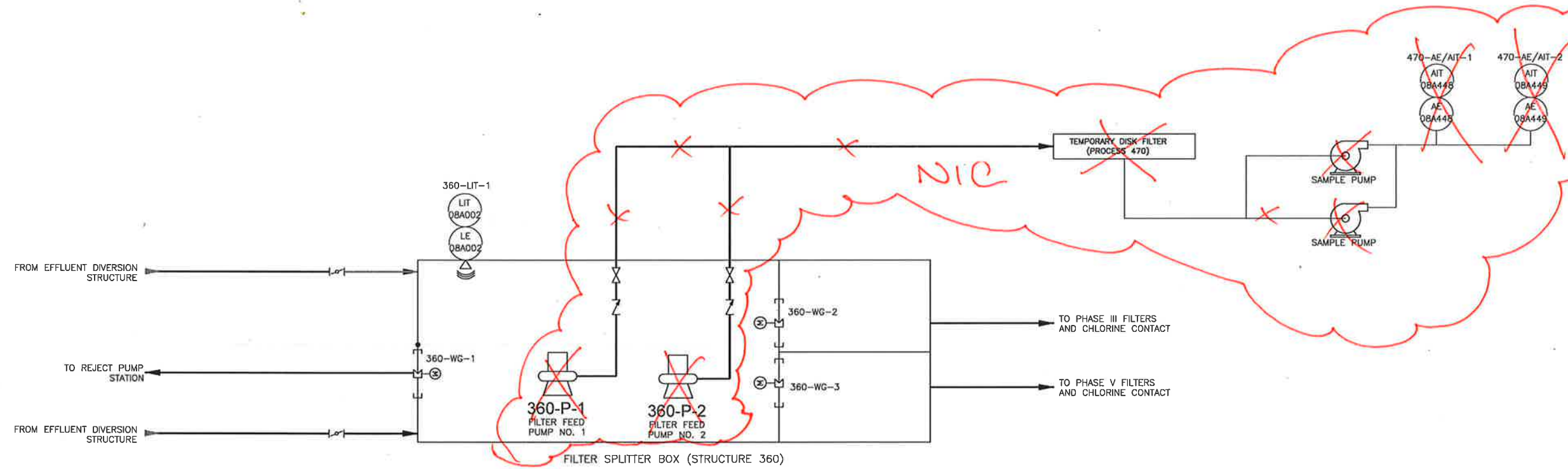
CERTIFICATE OF AUTHORIZATION NO. EB-8115

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
 SYSTEM ARCHITECTURE

PROJECT NO:	60222491
CAD DWG FILE:	I-003
DESIGNED BY:	WSW
DRAWN BY:	SD
DEPT CHECK:	DLU
PROJ CHECK:	WSW
DATE:	OCTOBER 2013
SCALE:	AS NOTED

I-003
 462 OF 527

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 LAST UPDATE: Tuesday, September 24, 2013 10:09:23 AM
 PLOTTED: DAYST
 ANSI 0 - 24-Sep-13



MARK	DATE	MADE BY	CHECKED	REVISIONS

AECOM
 AECOM TECHNICAL SERVICES, INC.
 2000 N. WINDY HILL ROAD, SUITE 200
 ORLANDO, FLORIDA 32801
 PHONE 407.353.6222

WILLIAM S. WINTHROP, P.E.
 FLORIDA PROFESSIONAL LICENSE NO. 38215

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
**PROCESS FLOW DIAGRAM
 FILTER SPLITTER BOX**

PROJECT NO:	60222491
CAD DWG FILE:	I-113
DESIGNED BY:	WSW
DRAWN BY:	SD
DEPT CHECK:	DLU
PROJ CHECK:	WSW
DATE:	OCTOBER 2013
SCALE:	AS NOTED

ANSI D - 23-Jan-13

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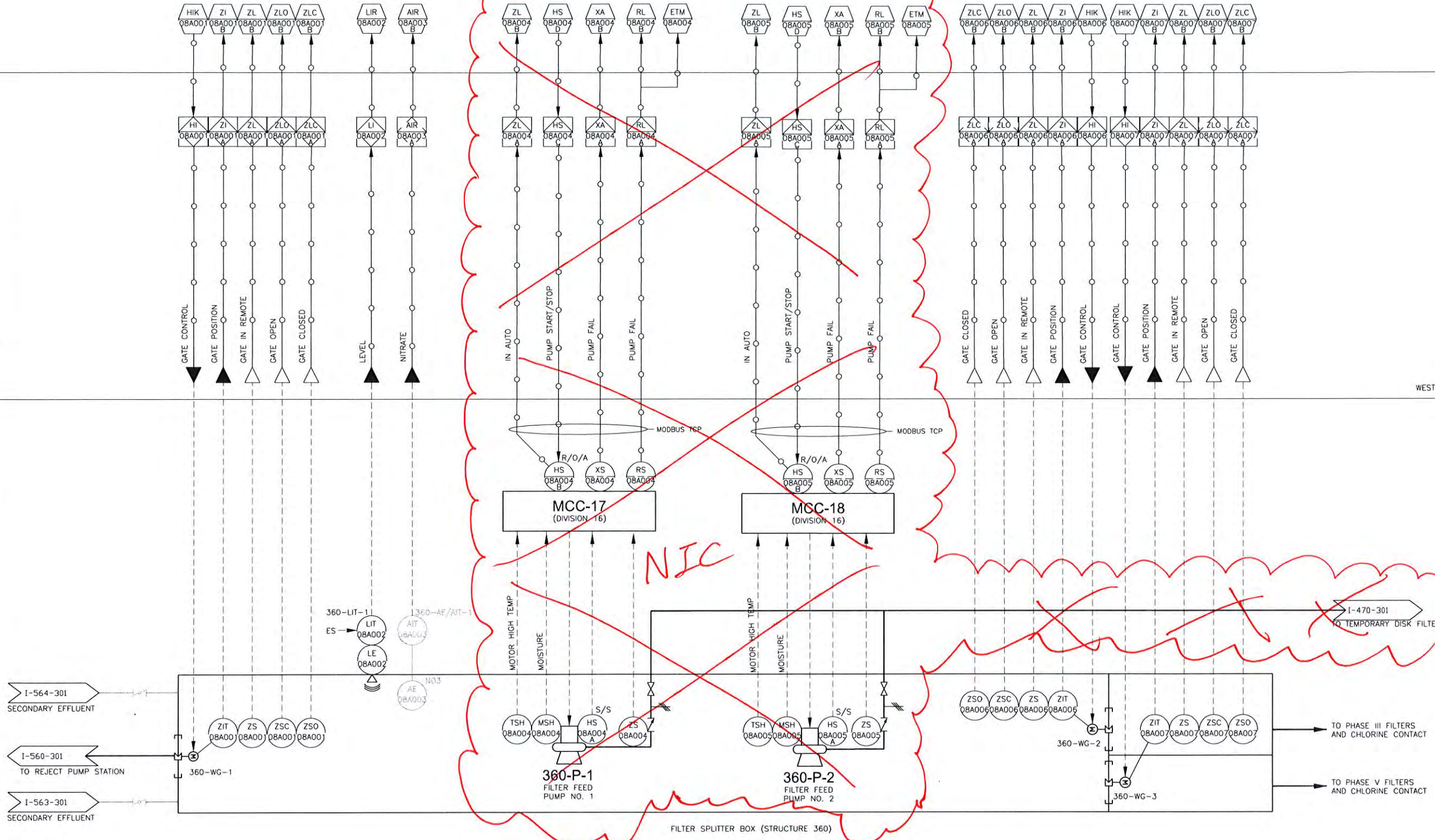
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PLC OBA
WEST ELECTRIC BLDG

HMI

MARK	DATE	MADE BY	CHECKED	DESCRIPTION

CDM Smith
 2301 Fairlane Center Parkway
 Suite 300
 Maitland, FL 32751
 Tel: (407) 962-2552
 FL CCA No. EC0000020

AECOM
 100 NORTH WINDY HAVEN, SUITE 200
 BOCA RATON, FL 33433
 PHONE: 561.443.5272

WILLIAM S. WEINBERG, P.E.
 FLORIDA PROFESSIONAL LICENSE NO. 58015

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
P&ID
FILTER SPLITTER BOX

PROJECT NO:	60222491
CAD DWG FILE:	I-470-301
DESIGNED BY:	WSW
DRAWN BY:	SD
DEPT CHECK:	DLU
PROJ CHECK:	WSW
DATE:	JAN 2013
SCALE:	AS NOTED

I-360-301
SHEET

A

B

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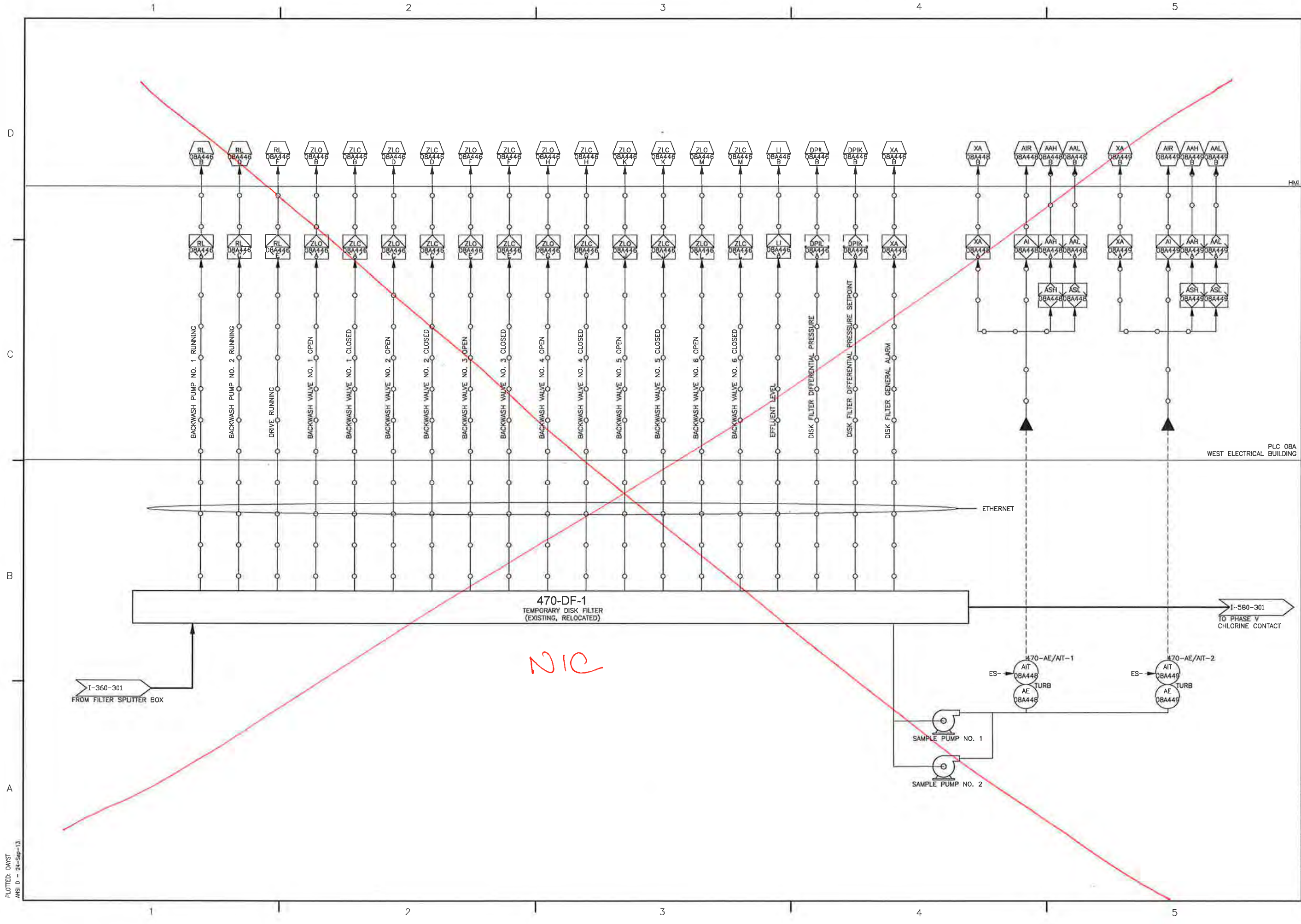
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PLOTTED: DAYST
ANSI D - 24-Sub-13

MARK	DATE	MADE BY	CHECKED	REVISIONS	DESCRIPTION

AECOM
AECOM TECHNICAL SERVICES, INC.
 1000 N. WINDYBROOK DRIVE, SUITE 200
 ORLANDO, FLORIDA 32801
 PHONE 407.241.2522

CONTRACT NO. 04-18-015

PLC OBA
WEST ELECTRICAL BUILDING

WILLIAM S. WATSON, P.E.
FLORIDA PROFESSIONAL ENGINEER NO. 58215

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN WATER RECLAMATION FACILITY
 PHASE V IMPROVEMENTS
 P&ID
TEMPORARY DISK FILTER

PROJECT NO:	60222491
CAD DWG FILE:	I-470-301
DESIGNED BY:	WSW
DRAWN BY:	SD
DEPT CHECK:	DLU
PROJ CHECK:	WSW
DATE:	OCTOBER 2013
SCALE:	AS NOTED

**BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY, FLORIDA**

**ADDENDUM NO. 1
IFB NO. Y14-748**

**ORANGE COUNTY EASTERN WATER RECLAMATION FACILITY
PHASE V AND CENTRIFUGE DEWATERING IMPROVEMENTS**

**BID PACKAGE C:
EWRF WETLANDS OUTFALL STAGE
RECORDER IMPROVEMENTS**

EASTERN WATER RECLAMATION FACILITY WETLAND OUTFALL STAGE RECORDER

FOR
ORANGE COUNTY UTILITIES DEPARTMENT

BOARD OF COUNTY COMMISSIONERS

S. SCOTT BOYD
DISTRICT 1

FREDERICK C. BRUMMER
DISTRICT 2

PETE CLARKE
DISTRICT 3

JENNIFER THOMPSON
DISTRICT 4

TED B. EDWARDS
DISTRICT 5

TIFFANY MOORE RUSSELL
DISTRICT 6

TERESA JACOBS
COUNTY MAYOR



DECEMBER 2013

**CDM
Smith**

2301 MAITLAND CENTER PARKWAY, SUITE 300
MAITLAND, FLORIDA 32751
Tel: 407-680-2552
FL COA No. EB-0000020

PROJECT NUMBER: 79378-74112

PREPARED FOR:

AECOM AECOM TECHNICAL SERVICES, INC.
150 NORTH ORANGE AVE., SUITE 200
ORLANDO, FLORIDA 32801
PHONE (407) 843-6552

CERTIFICATE OF AUTHORIZATION NO. EB-8115

ISSUED FOR BID

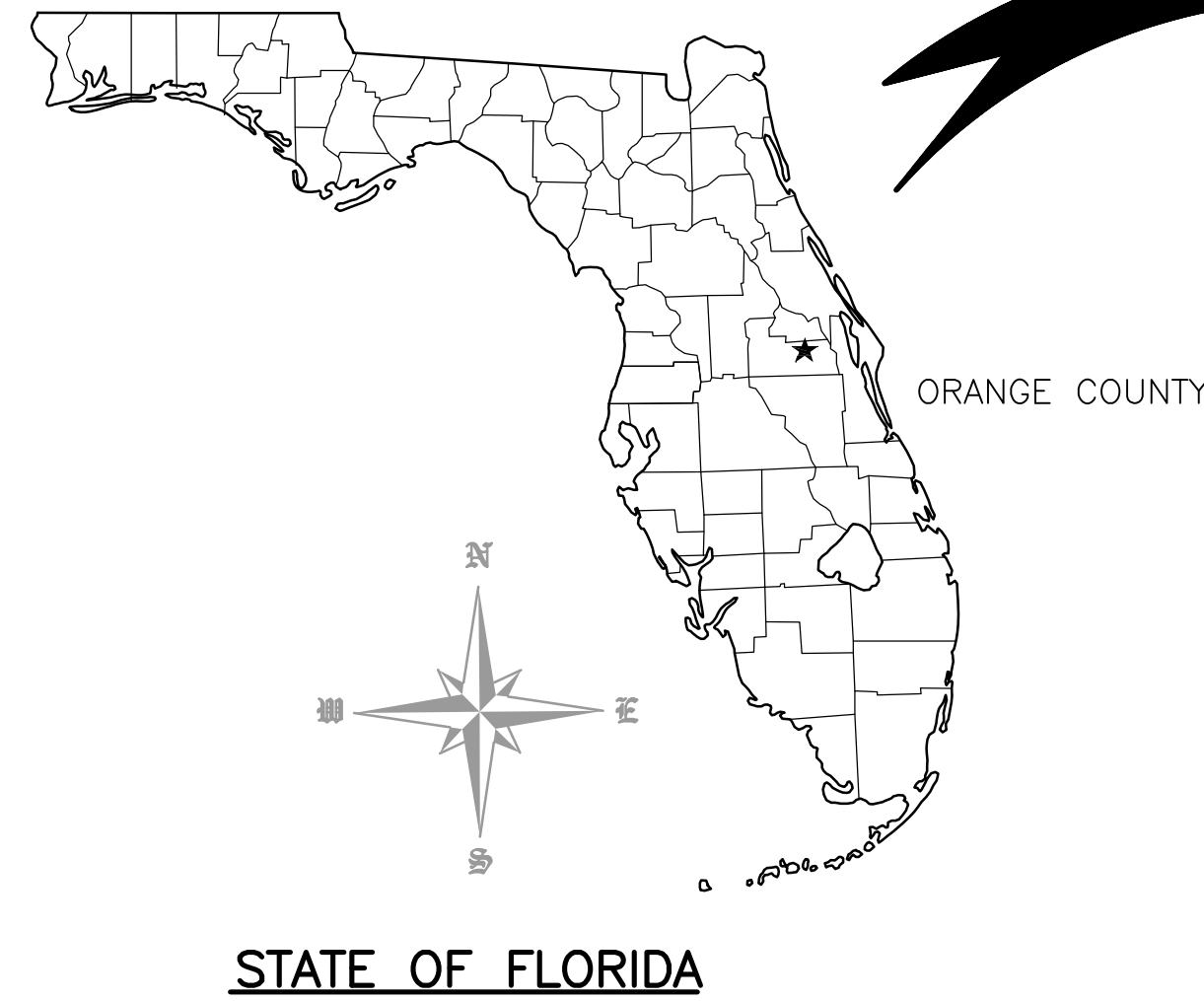
WATER
ENVIRONMENT
TRANSPORTATION
ENERGY
FACILITIES
**CDM
Smith**

LOCATION MAP

INDEX OF DRAWINGS	
SHT NO	SHEET TITLE
General	
G-001	COVER SHEET
G-002	INDEX OF DRAWINGS AND LOCATION MAP
G-003	GENERAL NOTES ABBREVIATIONS LEGEND AND SYMBOLS
Civil	
C-001	PROPOSED MONITORING WELL MWB SITE PLAN AND DETAILS
Structural	
S-001	PLANS, SECTIONS, AND DETAILS
Electrical	
E-001	PROPOSED MONITORING WELL MWB SITE PLAN, SYMBOLS AND ABBREVIATIONS
Instrumentation	
I-001	INSTRUMENTATION DETAILS



VICINITY MAP



MARK	DATE	MADE BY	CHECKED	DESCRIPTION

AECOM
CERTIFICATE OF AUTHORIZATION NO. EB-8115

CDM Smith
Camp Dresser & McKee Inc.
 2301 Mallard Center Parkway,
 Suite 300 Orlando, FL 32817
 Mailroom, Fax 407-245-5252
 FL CCA No. EB-0000020
 consulting • engineering •
 construction • operations

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN REGIONAL WATER RECLAMATION FACILITY WETLAND
 OUTFALL STAGE RECORDER AND WELL MWB-3 RELOCATION
INDEX OF DRAWINGS AND LOCATION MAP

GENERAL

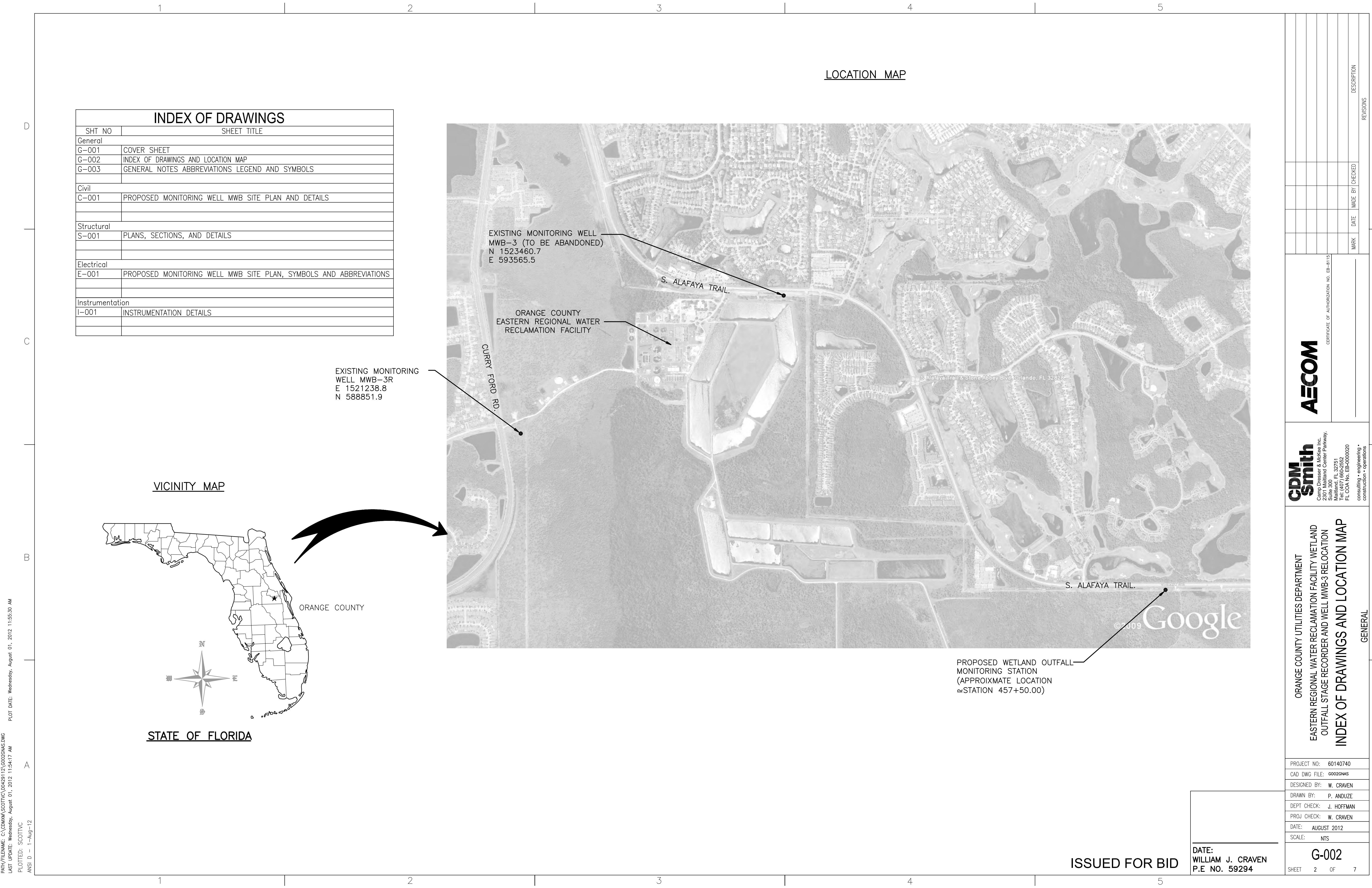
PROJECT NO:	60140740
CAD DWG FILE:	0002GNAS
DESIGNED BY:	W. CRAVEN
DRAWN BY:	P. ANDUZE
DEPT CHECK:	J. HOFFMAN
PROJ CHECK:	W. CRAVEN
DATE:	AUGUST 2012
SCALE:	NTS

DATE:
 WILLIAM J. CRAVEN
 P.E. NO. 59294

ISSUED FOR BID

G-002
 SHEET 2 OF 7

PATH: \\FILENAME: C:\CDMA\SCOTT\00429112\0002GNAS.DWG
 LAST UPDATE: Wednesday, August 01, 2012 11:54:17 AM
 PLOTTED: SCOTT\VC
 ANSI D - 1-Aug-12



GENERAL NOTES

- LOCATIONS, ELEVATIONS, AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THESE PLANS, BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL VERIFY AND AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES AFFECTING HIS WORK.
- THE CONTRACTOR SHALL CONTACT THE ENGINEER'S OFFICE IMMEDIATELY UPON FINDING ANY CONFLICTS DURING CONSTRUCTION ON ANY IMPROVEMENTS SHOWN ON THE DRAWINGS.
- EROSION CONTROL AND SEDIMENTATION CONTROL DEVICES SHALL BE IN PLACE PRIOR TO BEGINNING ANY DEMOLITION OR CONSTRUCTION. THEY SHALL BE INSTALLED TO AS REQUIRED IN THE SPECIFICATIONS AND IN ACCORDANCE WITH ALL REGULATORY AGENCY REQUIREMENTS (SEE EROSION CONTROL NOTES).
- THE CONTRACTOR SHALL, BY REPAIR OR REPLACEMENT, RETURN TO EQUAL OR BETTER CONDITION ALL PAVEMENT, SIDEWALK, UTILITIES AND OTHER ITEMS DAMAGED BY THIS CONSTRUCTION ACTIVITY.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL UTILITIES THAT MAY EXIST, ABOVE OR BELOW GROUND.
- ALL PRIVATE PROPERTY AFFECTED BY THIS WORK SHALL BE RESTORED TO A CONDITION EQUAL TO OR BETTER THAN THE CONDITION EXISTING PRIOR TO COMMENCING CONSTRUCTION UNLESS SPECIFICALLY EXEMPTED BY THE PLANS. COSTS TO BE INCIDENTAL TO OTHER CONSTRUCTION AND NO EXTRA COMPENSATION TO BE ALLOWED.
- THE LIMITS OF CONSTRUCTION IS THE PROPERTY BOUNDARIES AND EASEMENTS, AND R-O-W SHOWN ON THE PLANS AND SHALL BE STRICTLY OBSERVED BY THE CONTRACTOR. NO WORK SHALL BE PERFORMED OUTSIDE THESE LIMITS.
- ABSOLUTELY NO WORK SHALL BE ALLOW WITHIN ANY CONSERVATION AREA, BUFFER AREA, MITIGATION AREA, OR DESIGNATED WETLAND AREA UNLESS SO SPECIFICALLY DESCRIBED BY THE PLANS AND GRANTED BY REASON OF PERMIT FROM THE GOVERNMENTAL ENTITY HAVING JURISDICTION OVER SAID AREA.
- ALL DISTURBED AREAS SHALL BE SODDED (SEE SPECIFICATION 02999)
- IT WILL BE THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT ALL PERMITS ARE OBTAINED PRIOR TO COMMENCING OF WORK.
- ALL EQUIPMENT SHALL BE HANDLED, STORED, INSTALLED, TESTED, AND OPERATED IN STRICT ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
- PRECONSTRUCTION VIDEO REQUIRED.
- SITE MEETING WITH COUNTY REPRESENTATIVES REQUIRED PRIOR TO CONSTRUCTION START. ATTENDEES TO INCLUDE O.C. UTILITIES & O.C. PUBLIC WORKS.

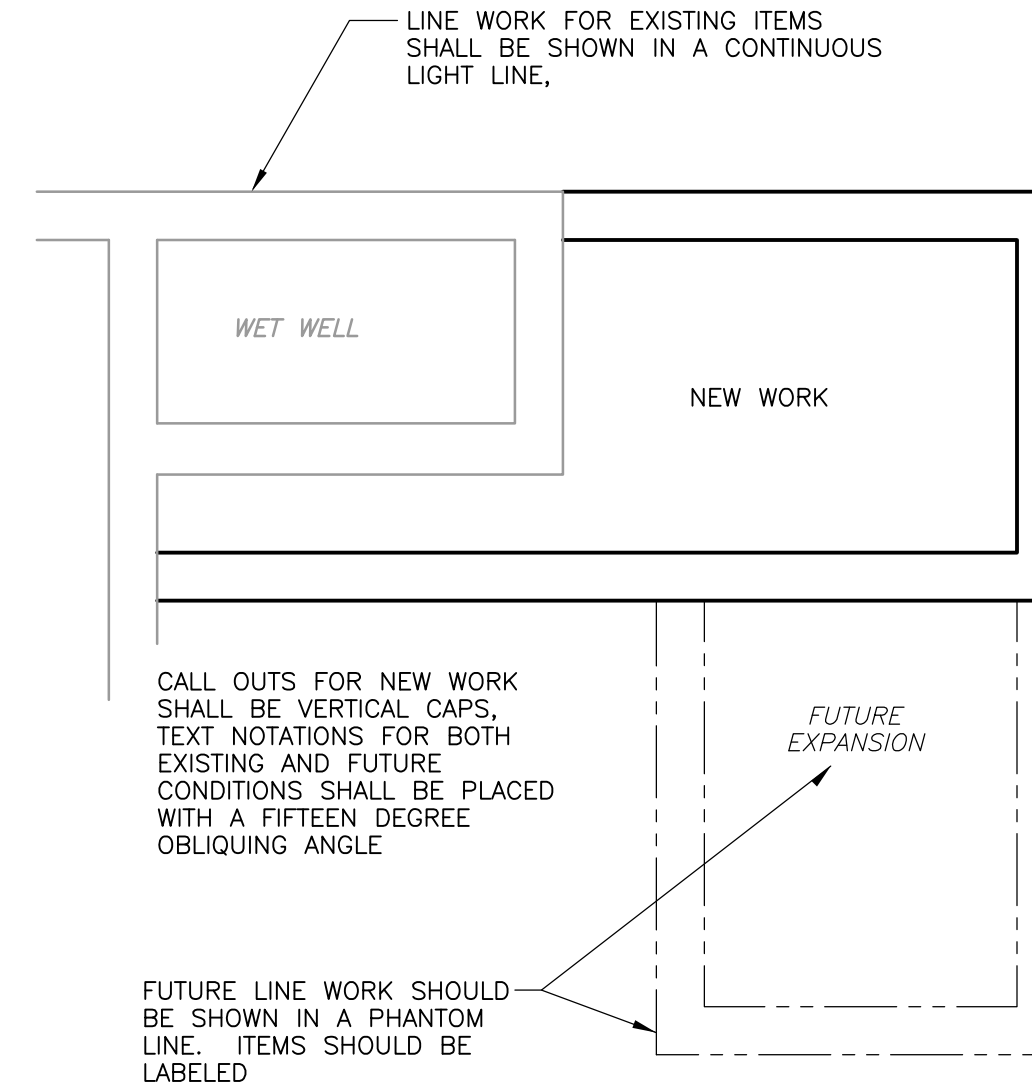
EROSION CONTROL

- IT IS THE CONTRACTORS RESPONSIBILITY TO IMPLEMENT THE EROSION AND TURBIDITY CONTROLS AS REQUIRED. IT IS ALSO THE CONTRACTORS RESPONSIBILITY TO ENSURE THESE CONTROLS ARE PROPERLY INSTALLED, MAINTAINED AND FUNCTIONING PROPERLY TO PREVENT TURBID OR POLLUTED WATER FROM LEAVING THE PROJECT SITE. THE CONTRACTOR WILL ADJUST THE EROSION AND TURBIDITY AS REQUIRED TO ENSURE THE SITE MEETS ALL FEDERAL, STATE AND LOCAL EROSION AND TURBIDITY CONTROL REQUIREMENTS. THE FOLLOWING BEST MANAGEMENT PRACTICES WILL BE IMPLEMENTED BY THE CONTRACTOR; SILT FENCE AND TURBIDITY BARRIER.

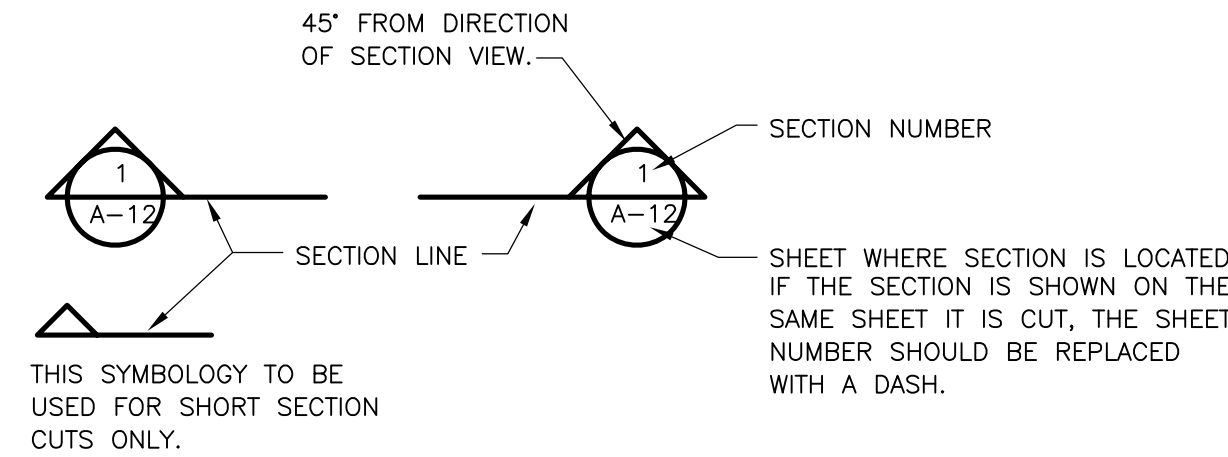
MAINTENANCE OF TRAFFIC

- THE CONTRACTOR SHALL FINISH, ERECT AND MAINTAIN ALL NECESSARY TRAFFIC CONTROL AND SAFETY DEVICES IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICE AND FLORIDA DEPARTMENT OF TRANSPORTATION.

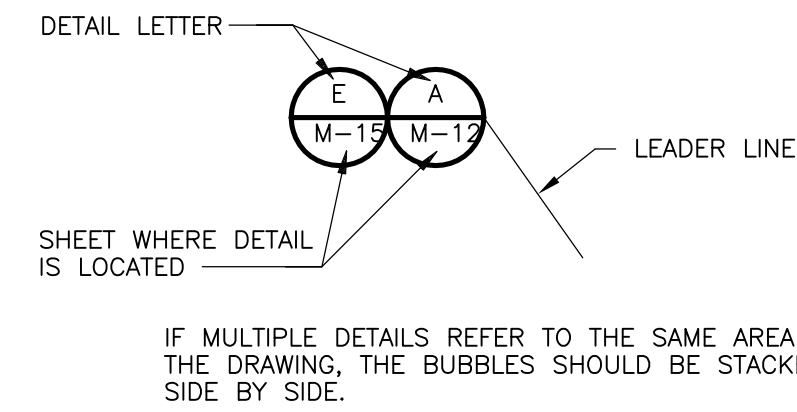
EXISTING OR FUTURE CONDITION DESIGNATION



SECTION CUT SYMBOLS



DETAIL CALL OUT SYMBOLS

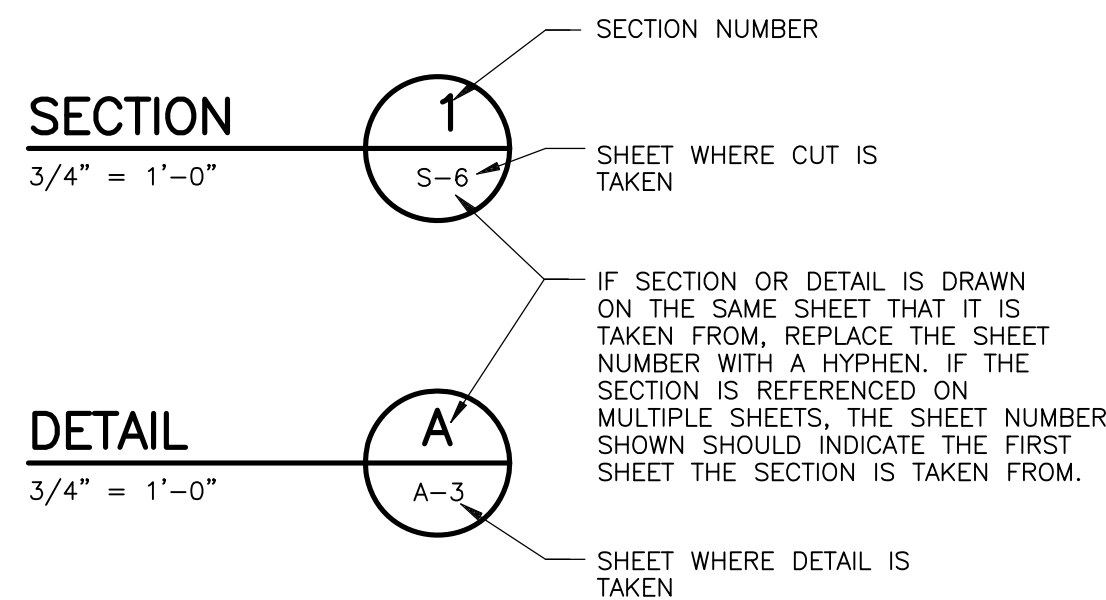


DRAWING, SECTION AND DETAIL TITLES

SUBTITLE OR DESCRIPTION (AS REQ'D)

PLAN

1/4" = 1'-0"



GENERAL

20" WM	EXISTING WATER MAIN
16" RW	EXISTING RAW WATER MAIN
MH SAN S	EXISTING SANITARY SEWER W/ MANHOLE
10" FM	EXISTING FORCE MAIN
T	EXISTING BURIED TELEPHONE
P	EXISTING POWER DUCTS OR CABLES
OHP	OVERHEAD POWER
CATV	EXISTING CABLE TELEVISION
CB 15" SS	EXISTING STORM SEWER W/CATCH BASIN
FH	FIRE HYDRANT
---	R/W - RIGHT OF WAY
℞	PROPERTY LINE
□ or ○ PP	EXISTING POWER POLE
□ or ○ LP	EXISTING LIGHT POLE
BM 1	BENCH MARK
X-X	EXISTING CHAIN LINK FENCE
12.00	EXISTING CONTOUR
12.00	NEW CONTOUR
12.00 +	EXISTING SPOT ELEVATION
12.00	NEW SPOT ELEVATION
[Solid Box]	NEW STRUCTURES OR STRUCTURAL COMPONENTS OR EQUIPMENT
[Hatched Box]	EXISTING STRUCTURES (TO REMAIN)
[Diagonal Hatched Box]	EXISTING STRUCTURES (TO BE MODIFIED)
[Cross-hatched Box]	EXISTING STRUCTURES (TO BE REMOVED)
[Dashed Box]	FUTURE STRUCTURES
[Stippled Box]	NEW CONCRETE SLAB OR SIDEWALKS
EXISTING	SLANTED TEXT
NEW	VERTICAL TEXT

AECOM

CDM Smith
Camp Dresser & McKee Inc.
2301 Mallard Center Parkway
Suite 300
Maitland, FL 32751
FL COA No. EB-0000020
consulting • engineering • construction • operations

ORANGE COUNTY UTILITIES DEPARTMENT
EASTERN REGIONAL WATER RECLAMATION FACILITY WETLAND
OUTFALL STAGE RECORDER AND WELL MWB-3 RELOCATION
**GENERAL NOTES ABBREVIATIONS
LEGEND AND SYMBOLS**

PROJECT NO:	60140740
CAD DWG FILE:	000209AS
DESIGNED BY:	W. CRAVEN
DRAWN BY:	P. ANDUZE
DEPT CHECK:	J. HOFFMAN
PROJ CHECK:	W. CRAVEN
DATE:	AUGUST 2012
SCALE:	AS NOTED

DATE:
WILLIAM J. CRAVEN
P.E. NO. 59294

ISSUED FOR BID

G-003
SHEET 3 OF 7

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 PLOTTED: SCOTT\VC
 ANSI D - 1-Aug-12

PATH: \\F:\ENR\CA\CDMA\SCOTT\00429\20\001\FID\FID.DWG
 LAST UPDATE: Wednesday, August 01, 2012 1:53:58 PM
 PLOTTED: SCOTT\VC
 ANSI D - 1-Aug-12

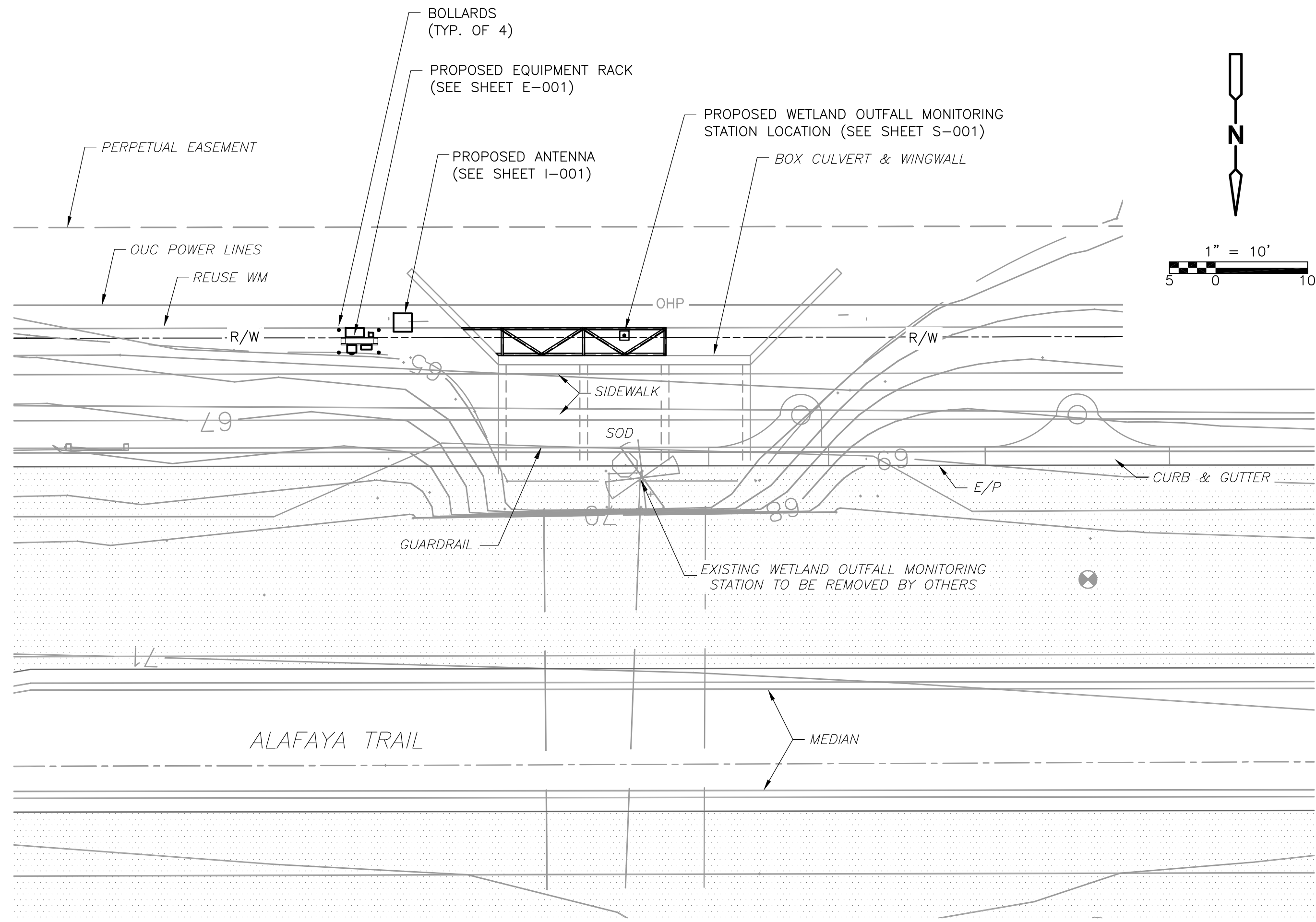
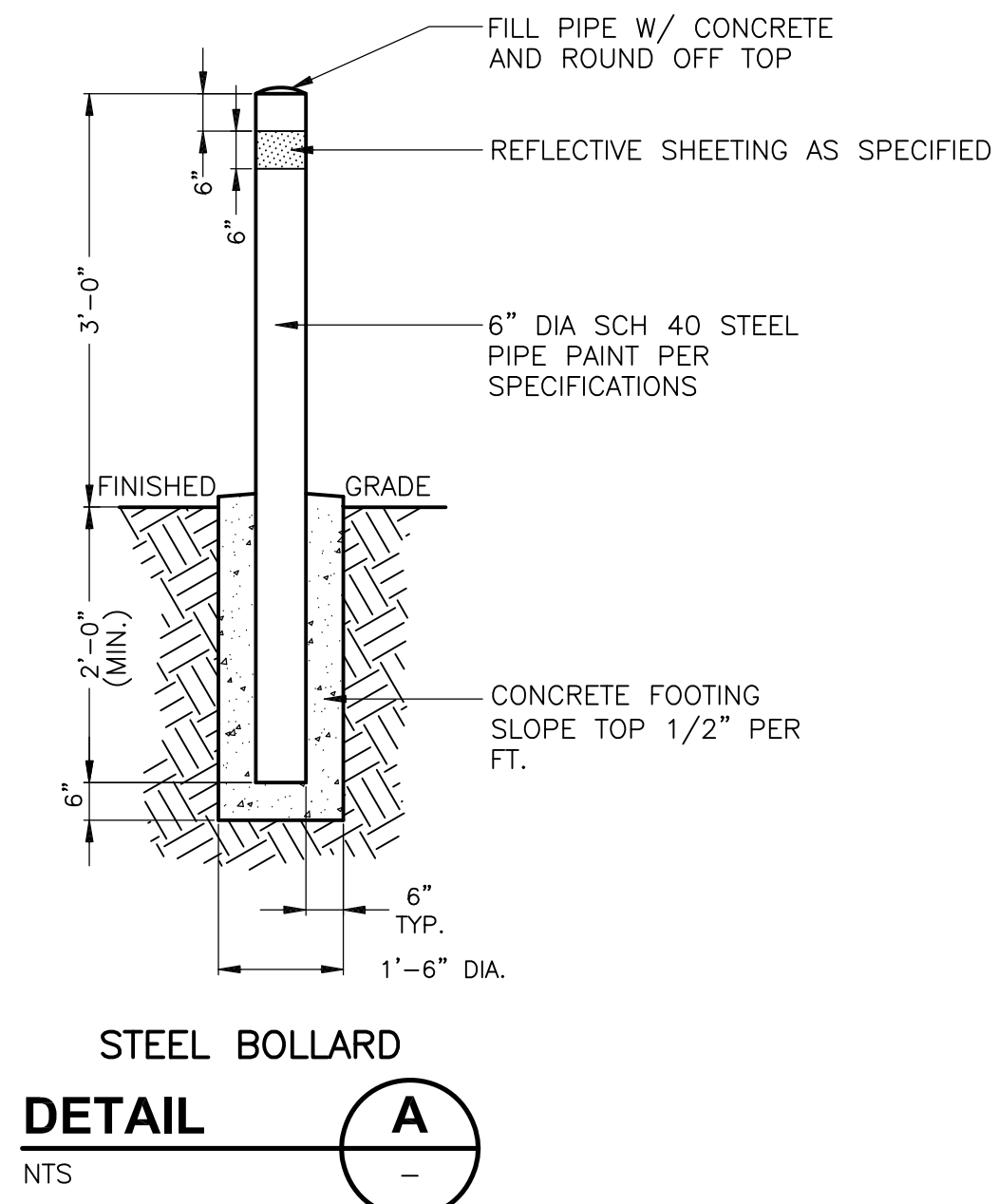
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**WETLAND OUTFALL MONITORING STATION
 PLAN**

NOTES:

- CONTRACTOR SHALL FURNISH AND INSTALL MONITORING STATION PLATFORM IN ACCORDANCE WITH SHEET S-001 AND SPECIFICATION 05500.
- CONTRACTOR SHALL PROVIDE LABOR, MATERIAL, EQUIPMENT, AND INCIDENTALS REQUIRED TO INSTALL FULLY FUNCTIONAL MONITORING STATION IN ACCORDANCE WITH SPECIFICATIONS 13325, 13300, AND 13335.
- CONTRACTOR SHALL FURNISH AND INSTALL STYLE C STAFF GAGE (EL 64 TO EL 70) BY RICKLY HYDROLOGICAL COMPANY (PART NO. SP-100-0520), OR APPROVED EQUAL. STAFF GAGE SHALL BE INSTALLED WITHIN THE CHANNEL PER MANUFACTURER RECOMMENDATIONS. ELEVATIONS FOR STAFF GAGE SHALL BE VERIFIED BY A REGISTERED LAND SURVEYOR.
- BOLLARDS TO BE LOCATED BY COUNTY'S REPRESENTATIVE.
- EQUIPMENT RACK LOCATION TO BE DETERMINED BY O.C. UTILITIES/PUBLIC WORKS REPRESENTATIVES.
- LOCATION OF CULVERT IS APPROXIMATELY LOCATED AT STATION 457+50.00 ON THE ALAFAYA TRAIL ROAD CONSTRUCTION PLANS.

		CERTIFICATE OF AUTHORIZATION NO. EB-8115
		Camp Dresser & McKee Inc. 2301 Mallard Center Parkway Suite 300 Tallahassee, FL 32310 Phone: 904-242-6552 Fax: 904-242-6552 FL CCA No. EB-0000020 consulting • engineering • construction • operations
ORANGE COUNTY UTILITIES DEPARTMENT EASTERN REGIONAL WATER RECLAMATION FACILITY WETLAND OUTFALL STAGE RECORDER AND WELL MMB-3 RELOCATION PROPOSED MONITORING WELL MMB SITE PLAN AND DETAILS CIVIL		
PROJECT NO:	60140740	A
CAD DWG FILE:	0001PLDT	
DESIGNED BY:	W. CRAVEN	
DRAWN BY:	P. ANDUZE	
DEPT CHECK:	J. MILLS	
PROJ CHECK:	W. CRAVEN	
DATE:	AUGUST 2012	
SCALE:	AS NOTED	
DATE: WILLIAM J. CRAVEN P.E. NO. 59294		C-001 SHEET 4 OF 7

ISSUED FOR BID

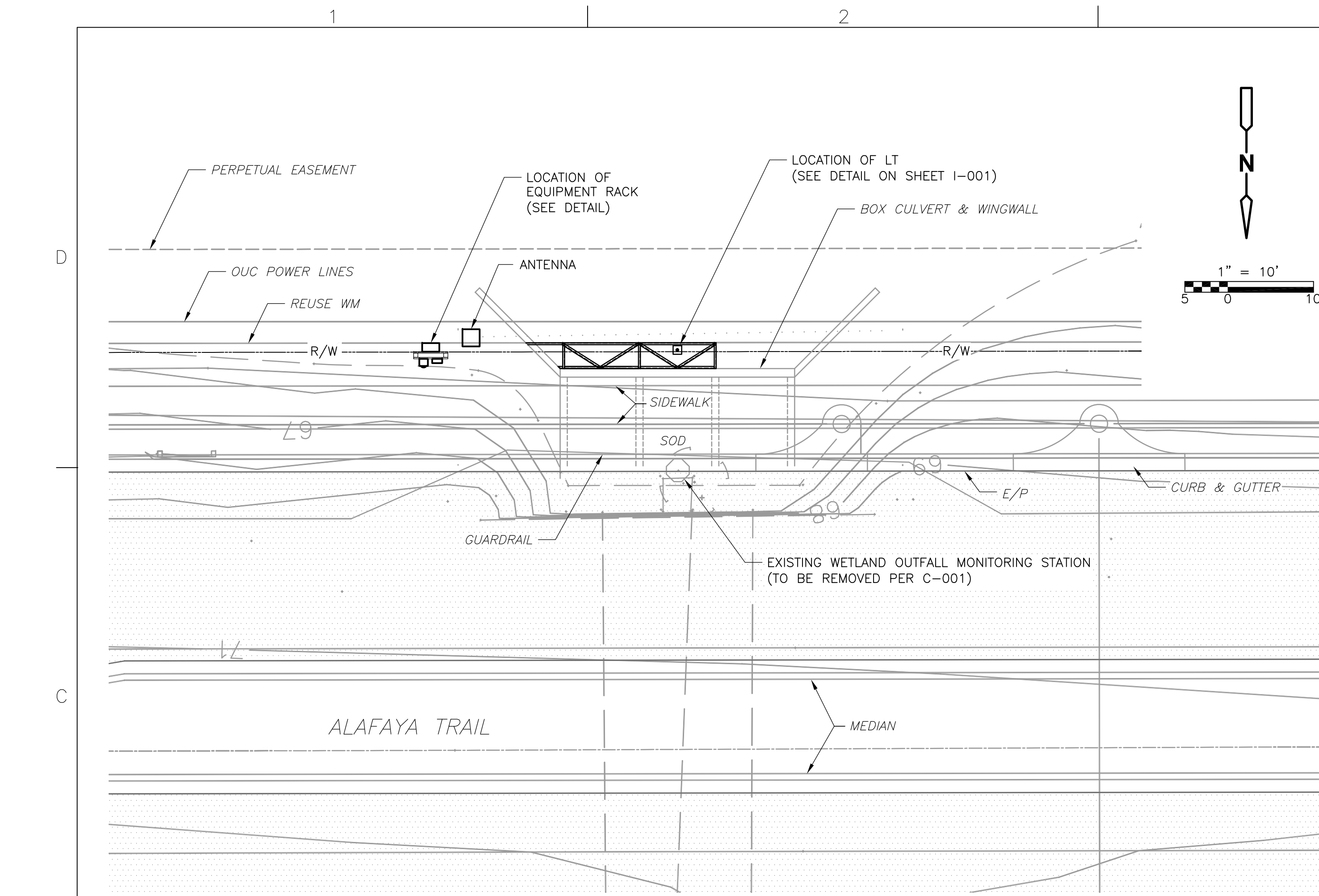
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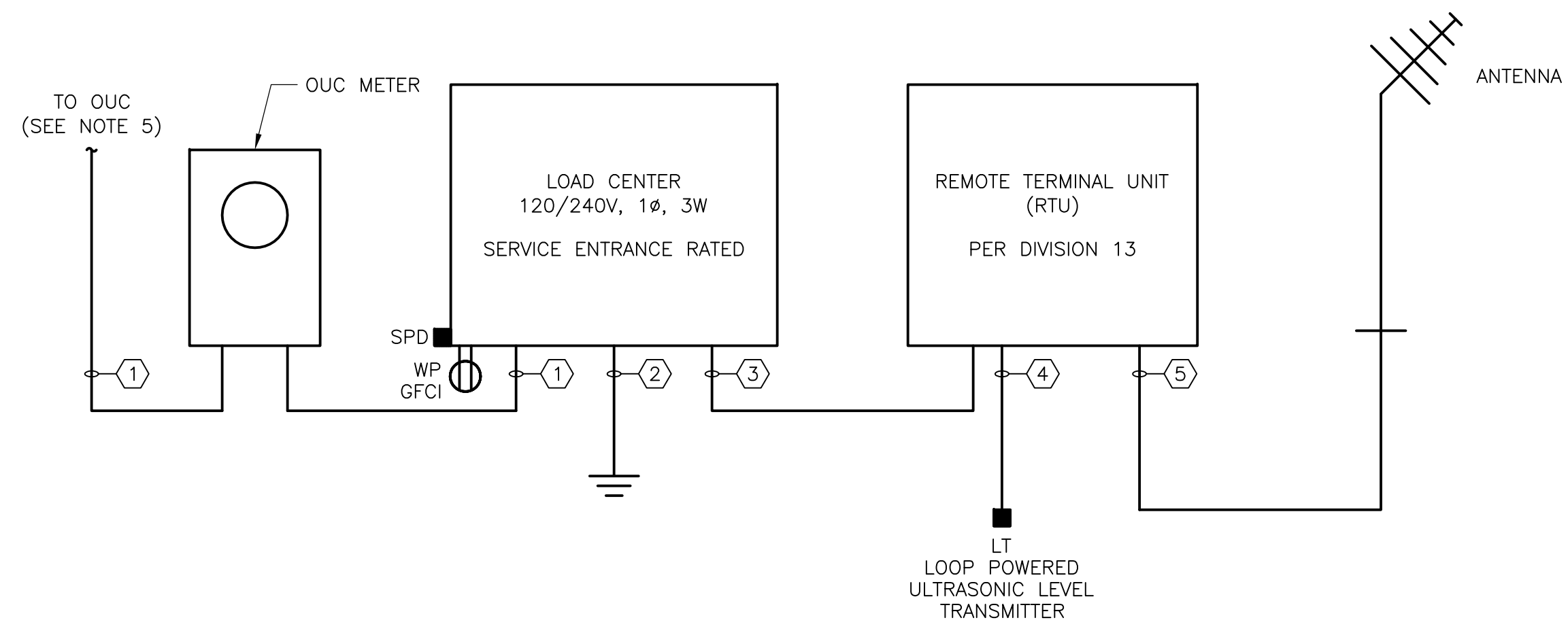
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4

5

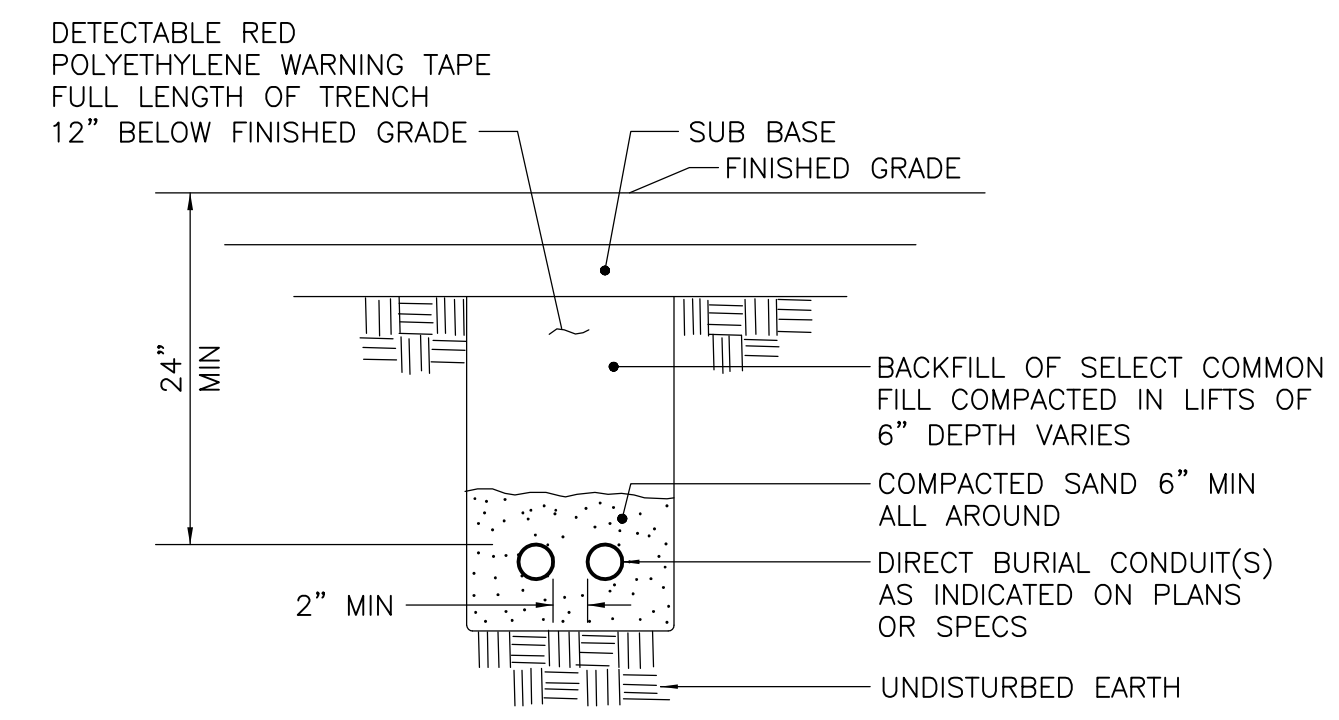


**WETLAND OUTFALL MONITORING STATION
PLAN**

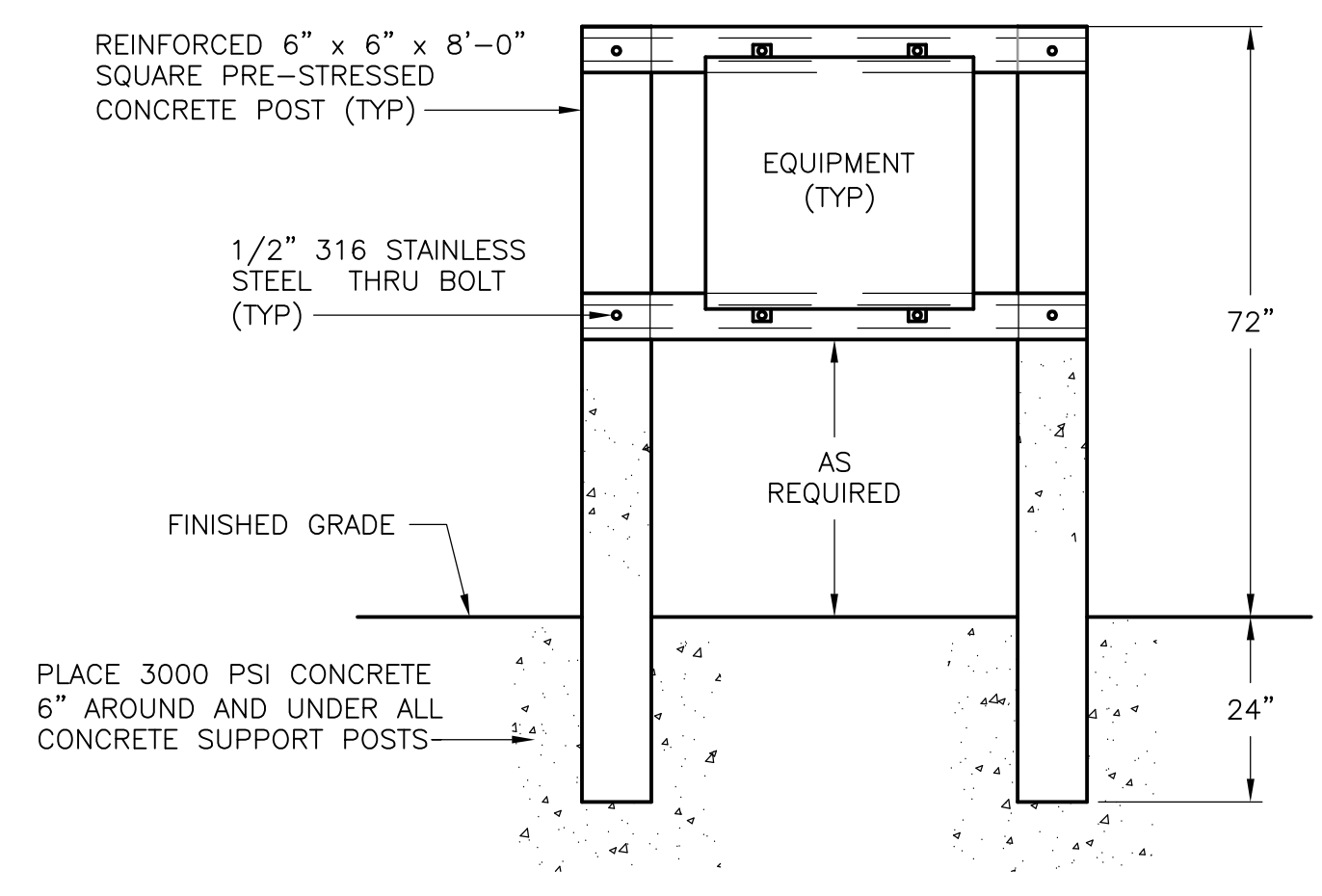


**MONITORING STATION
RISER DIAGRAM**
NTS

CONDUIT AND WIRE LEGEND (NUMBERS REFERENCE THIS SHEET ONLY)	
NO.	DESCRIPTION
①	3/4"C., 2#8, 1#8G
②	3/4"C., 1#8G
③	3/4"C., 2#12, 1#12G
④	1"C., 1-2/C #16TS
⑤	1 1/2"C., W/ COAX PER DIVISION 13



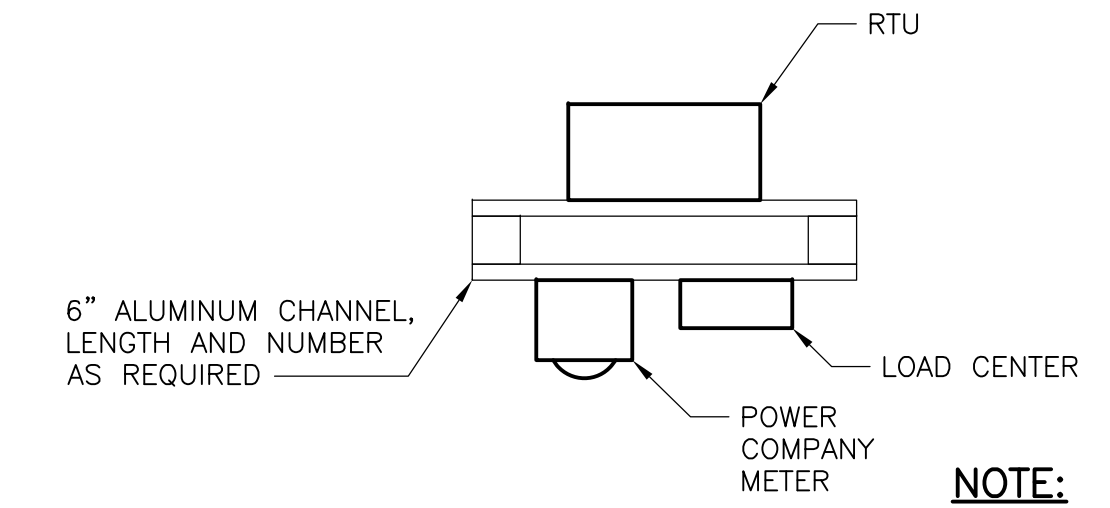
**DIRECT BURIAL CONDUIT
DETAIL**
NTS



**EQUIPMENT MOUNTING
DETAIL**
NTS

NOTES:

- DO NOT SCALE THE ELECTRICAL DRAWINGS. REFER TO THE CIVIL, MECHANICAL, STRUCTURAL DRAWINGS, AND APPROVED MANUFACTURER'S SHOP DRAWINGS FOR THE EXACT LOCATION OF ALL EQUIPMENT.
- ALL WORK SHALL COMPLY WITH NEC AND LOCAL CODES.
- CONDUCTORS SHALL NOT BE SPLICED EXCEPT AS NOTED IN SPECS.
- ALL CONDUITS SHALL HAVE A BOND WIRE SIZED PER TABLE 250.122 OF THE NEC (UON).
- COORDINATE WITH ORLANDO UTILITIES COMMISSION (OUC) FOR ALL REQUIREMENTS FOR INSTALLATION ASSOCIATED WITH NEW SERVICE. ASSUME UTILITY POWER POLE MAY BE UP TO 200 FEET AWAY FROM NEW SERVICE LOCATION. PROVIDE ALL HARDWARE, CT'S, METER CAN, TRENCHING, CONDUIT ETC. AS REQUIRED BY POWER COMPANY. SEE SPECIFICATION 16020 FOR ADDITIONAL INFORMATION.
- LOCATION OF EQUIPMENT RACK AND ANTENNA IS APPROXIMATE AS COORDINATION WITH EXISTING OVERHEAD LINES AND OTHER FIELD CONDITIONS IS REQUIRED.



**EQUIPMENT RACK
PLAN**
1/2" = 1'-0"

LOAD CENTER SCHEDULE				MONITORING STATION EQUIPMENT RACK		
100 AMP BUS RATING	40 AMP MAIN C/B	10 KA SHORT CIRCUIT RATING	6 POLES			
120/240 VOLTS	1 PH.	3 WIRE	60 HZ.	NEMA 3R ENCLOSURE	SURFACE MOUNTED	
DESCRIPTION	LOAD VA	C/B AMP POLES		C/B AMP POLES	LOAD VA	DESCRIPTION
SPARE	-	20 / 1		20 / 1	180	GFCI RECEPTACLE BELOW PANEL
RTU	500	20 / 1		20 / 2	-	LOAD CENTER SPD
SPARE	-	20 / 1		- / -	-	-
TOTAL CONNECTED VOLT-AMPS:				180	φA 500	φB
TOTAL CONNECTED AMPS:				2	φA 4	φB

WIRING TO RECEPTACLE - 3/4"C., 2#12, 1#12G

ABBREVIATIONS

- A AMPERES
- AFG ABOVE FINISHED GRADE
- AWG AMERICAN WIRE GAUGE
- BKR BREAKER
- C CONDUIT
- CB CIRCUIT BREAKER
- ELEC ELECTRICAL
- GFCI GROUND FAULT CIRCUIT INTERRUPTER
- G, GND GROUND
- HH HANDHOLE
- LT LEVEL TRANSMITTER
- MIN MINIMUM
- MTD MOUNTED
- NEC NATIONAL ELECTRICAL CODE
- NTS NOT TO SCALE
- P POLE
- PB PULLBOX
- PH PHASE
- RTU REMOTE TERMINAL UNIT
- SPD SURGE PROTECTIVE DEVICE
- SS STAINLESS STEEL
- TS TWISTED SHIELDED
- TYP TYPICAL
- WP WEATHERPROOF
- UON UNLESS OTHERWISE NOTED
- V VOLTS
- W WIRE

SYMBOLS

- CONDUIT CONCEALED IN WALL, IN SLAB ABOVE, OR ABOVE CEILING
- CONDUIT CONCEALED IN OR BELOW FLOOR OR UNDERGROUND.
- CONDUIT RUN EXPOSED. RUN PARALLEL OR PERPENDICULAR TO STRUCTURE OR WALL.
- OR GROUND AND/OR GROUND ROD
- INSTRUMENT
- ELECTRICAL ENCLOSURE AS NOTED
- DUPLEX RECEPTACLE, NEMA 5-20R

ORANGE COUNTY UTILITIES DEPARTMENT
 EASTERN REGIONAL WATER RECLAMATION FACILITY WETLAND OUTFALL STAGE RECORDER WELL AND MWB-3 RELOCATION PROPOSED MONITORING WELL MWB SITE PLAN, SYMBOLS AND ABBREVIATIONS ELECTRICAL

REVISIONS	DESCRIPTION	DATE	MADE BY	CHECKED

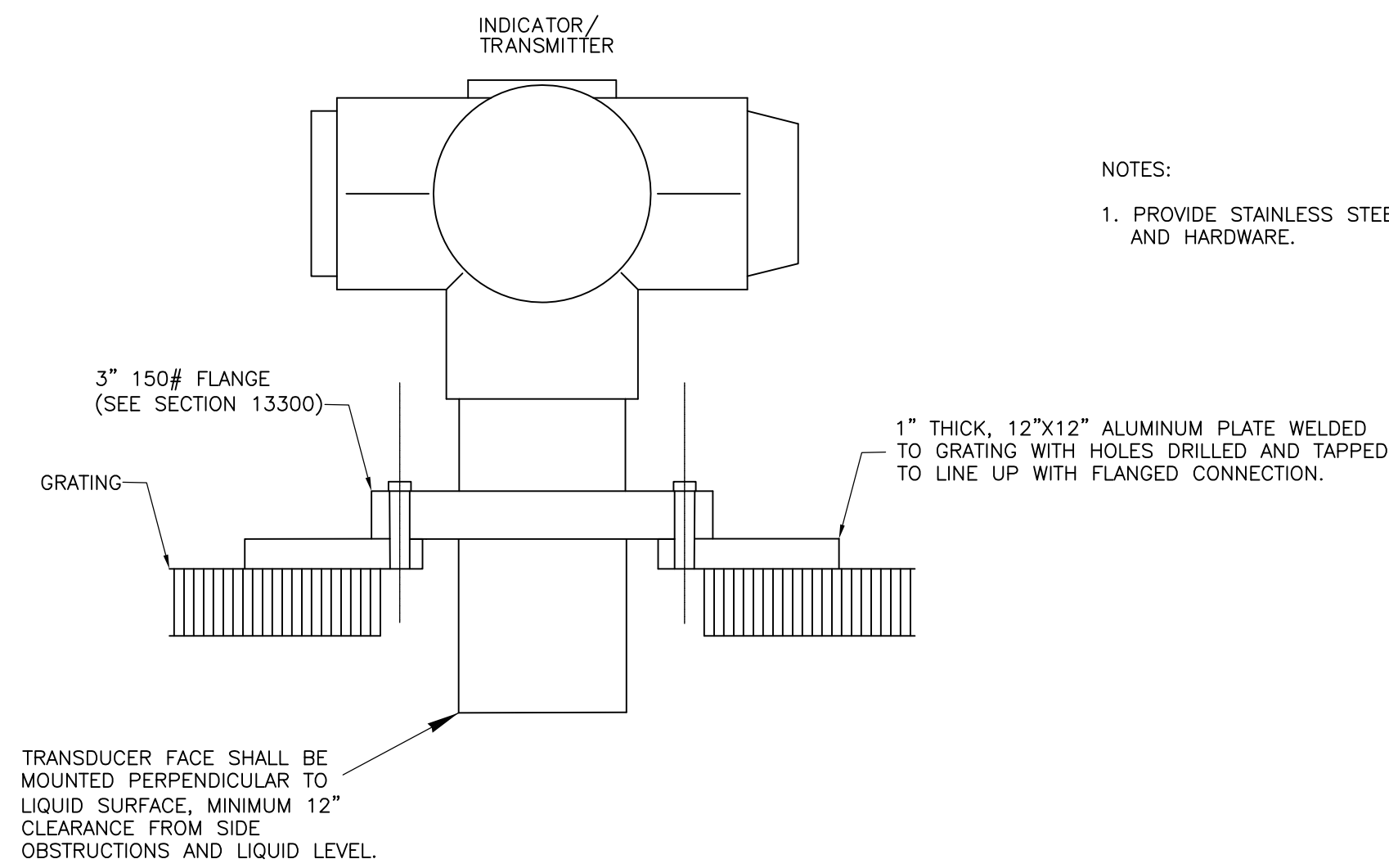
AECOM
 CERTIFICATE OF AUTHORIZATION NO. EB-8115
CDM Smith
 Camp Dresser & McKee Inc.
 2301 Mallard Center Parkway
 Suite 300
 Tallahassee, FL 32310
 P: 904.432.2652
 F: 904.432.2652
 FL COA No. EB-0000020
 consulting • engineering • construction • operations

PROJECT NO: 60140740
 CAD DWG FILE: E001STPL
 DESIGNED BY: C. STELLMACK
 DRAWN BY: R. CARTER
 DEPT CHECK: J. SANCHEZ
 PROJ CHECK: W. CRAVEN
 DATE: JULY 2012
 SCALE: AS NOTED

DATE:
SPENCER J. PERRY
P.E. NO. 62587

E-001
 SHEET 6 OF 7

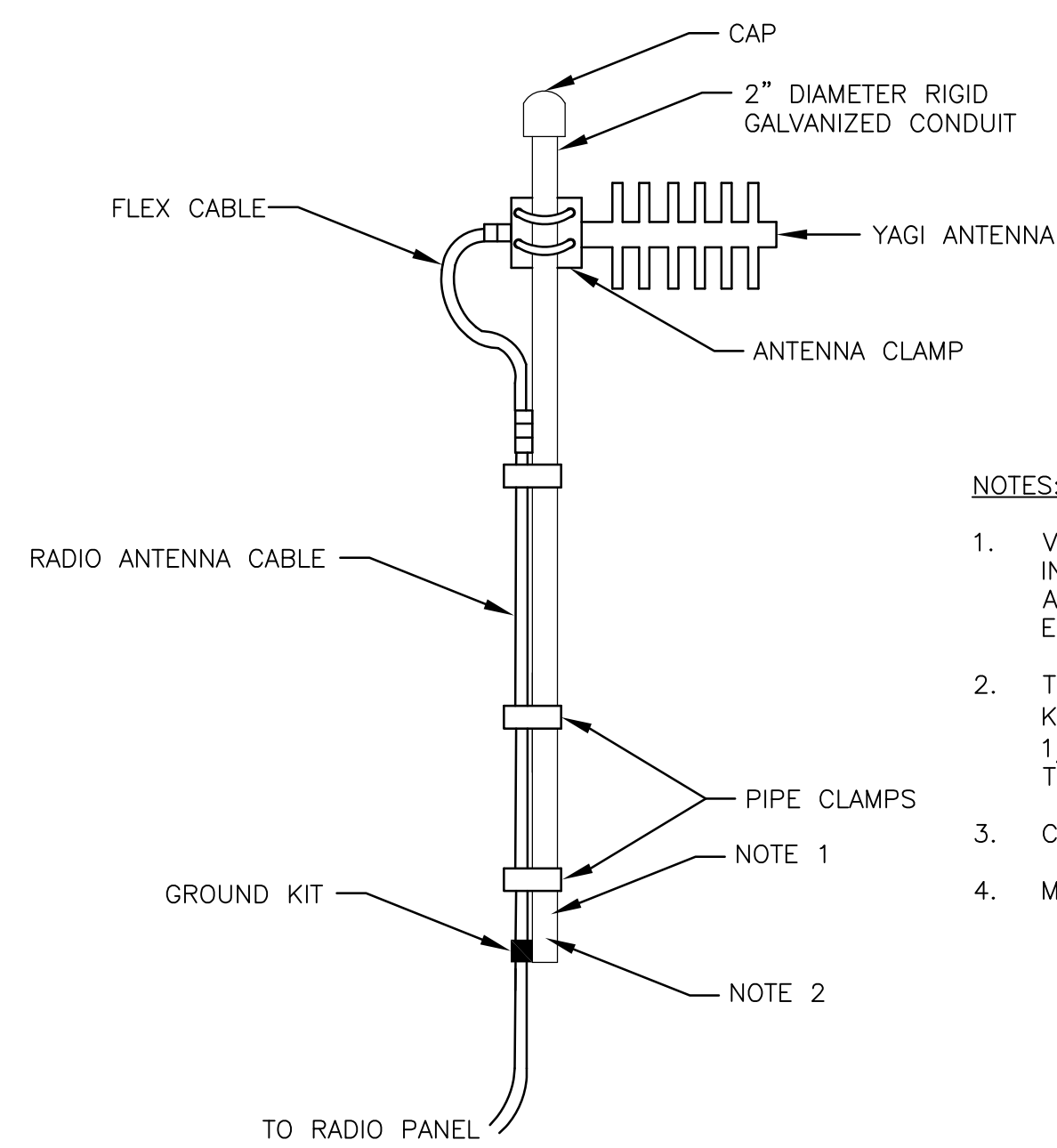
PATH: \\C:\COMMA\CARTER\042916A\1001STPL.DWG
 LAST UPDATE: Monday, August 06, 2012 3:02:40 PM
 PLOTTED: carterrh
 ANSI D - 6-Aug-12



**ULTRASONIC LEVEL
INSTALLATION IN GRATING**

N.T.S.

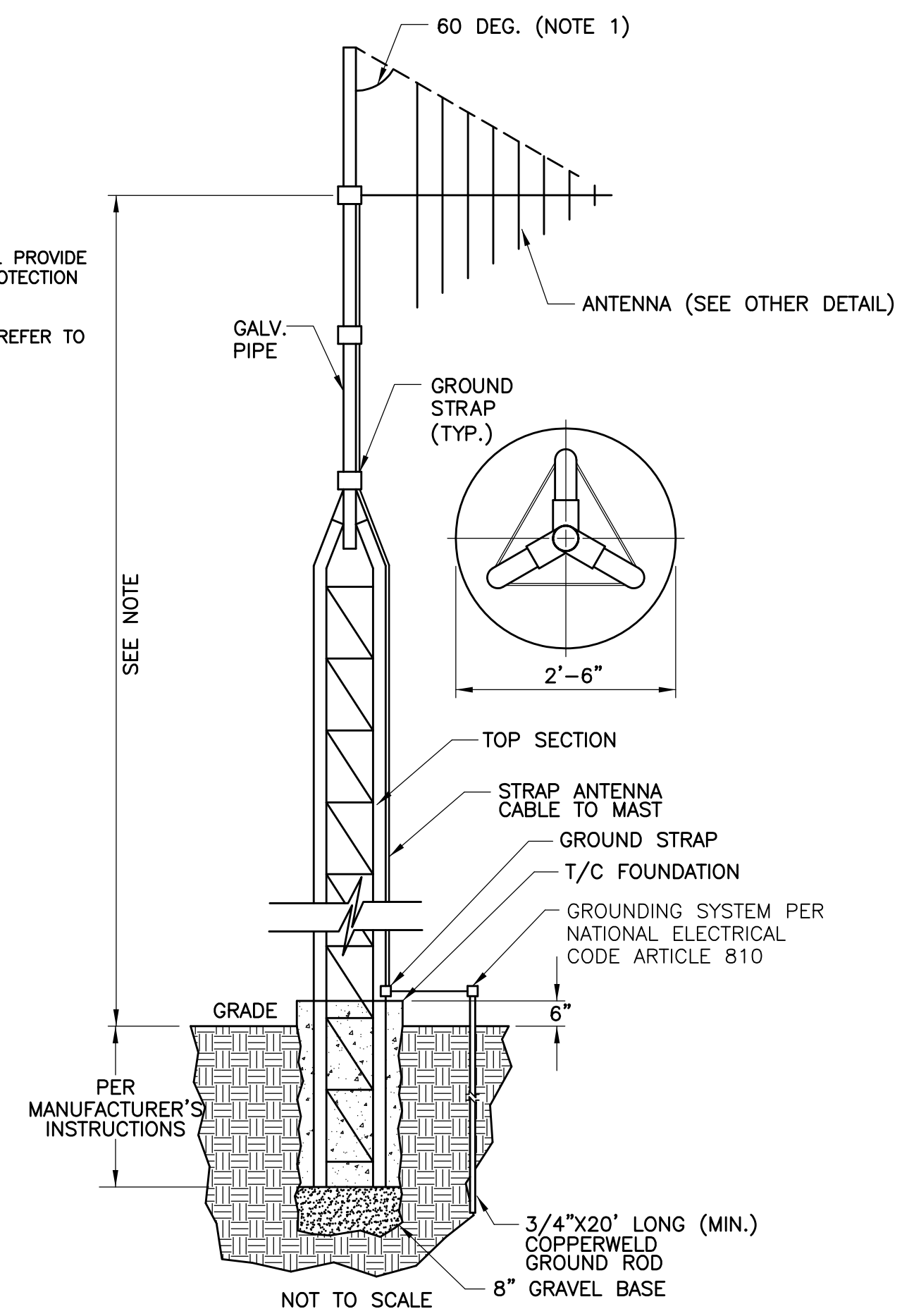
- NOTES:
1. PROVIDE STAINLESS STEEL BOLTS AND HARDWARE.



ANTENNA MOUNTING (TYPICAL)

N.T.S.

- NOTES:
1. VAPOR WRAP ALL RF CONNECTORS. THIS INCLUDES THE CONNECTION AT THE ANTENNA AND ANY OTHER CONNECTION EXPOSED TO THE ELEMENTS.
 2. TIE WRAP ABOVE AND BELOW GROUNDING KITS AND EVERY TWO AND ONE HALF (2 1/2) FEET OF HELIAX. BE CAREFUL NOT TO CRUSH OR MISTAPE THE CABLE.
 3. CLAMP GROUND WIRE AT BASE OF POLE.
 4. MAST HEIGHT: REFER TO SECTION 13300.



ANTENNA DETAIL

NTS

- NOTES:
1. THE ANTENNA MAST SHALL PROVIDE 60 DEGREE LIGHTNING PROTECTION CONE.
 2. ANTENNA TOWER HEIGHT: REFER TO SECTION 13300.

PLOTTED: DAYST
ANSI D - 7-Oct-11

DATE:
WILLIAM S. WHITMORE
P.E. NO. 58215

I-001
SHEET 7 OF 7

		CERTIFICATE OF AUTHORIZATION NO. EE-8115
		Camp Dresser & McKee Inc. 2301 Mallard Center Parkway, Suite 300, 33751 Maitland, FL 32751 FL CCA No. EE-0000020 consulting • engineering • construction • operations
ORANGE COUNTY UTILITIES DEPARTMENT EASTERN REGIONAL WATER RECLAMATION FACILITY WETLAND OUTFALL STAGE RECORDER WELL AND MMB-3 RELOCATION		
INSTRUMENTATION DETAILS INSTRUMENTATION		
PROJECT NO:	74112	
CAD DWG FILE:	10010TL	
DESIGNED BY:	WSW	
DRAWN BY:	STD	
DEPT CHECK:	CWW	
PROJ CHECK:	WJC	
DATE:	9/2011	
SCALE:	NTS	
REVISIONS		
MARK	DATE	MADE BY
CHECKED		
DESCRIPTION		



Orange County, Florida

PROJECT MANUAL

**EASTERN WATER RECLAMATION FACILITY
WETLAND OUTFALL STAGE RECORDER**

IFB No. Y14-XXX XX

ISSUED FOR BID

DECEMBER 2013

Prepared For

AECOM

150 North Orange Ave.

Suite 200

Orlando, Florida 32801

Prepared By

**CDM
Smith**

2301 Maitland Center Parkway

Suite 300

Maitland, Florida 32751

CDM Project No. 79378-74112

ORANGE COUNTY UTILITIES ENGINEERING DIVISION

EASTERN WATER RECLAMATION FACILITY WETLAND OUTFALL STAGE RECORDER

PROJECT MANUAL
DECEMBER 2013

ISSUED FOR BID

CDM Smith Project No. 79378-74112

GENERAL/CIVIL

_____ Date

William J. Craven, P.E.
Florida Registered Professional Engineer
No. 59294
DIVISIONS 1 AND 2

STRUCTURAL

_____ Date

Timothy A. Verwey, P.E.
Florida Registered Professional Engineer
No. 50947
DIVISIONS 3 AND 5

ELECTRICAL

_____ Date

Spencer J. Perry, P.E.
Florida Registered Professional Engineer
No. 62587
DIVISION 16

INSTRUMENTATION & CONTROLS

_____ Date

William S. Whitmore, P.E.
Florida Registered Professional Engineer
No. 58215
DIVISION 13

TABLE OF CONTENTS

VOLUME 1

DIVISION 0 BIDDING AND CONTRACT REQUIREMENTS

Part A	Invitation for Bids
Part B	Notice
Part C	Instructions to Bidder
Part D	Bid Form
Part E	Construction Contract
Part F	General Conditions
Part G	Supplemental Conditions / Special Provisions
Part H	Technical Provisions (Specifications)
Part I	Licenses / Permits / Fees

DIVISION 1 GENERAL REQUIREMENTS

01010	Summary of Work
01025	Measurement and Payment
01046	Control of Work
01050	Field Engineering
01110	Environmental Protection Procedures
01300	Submittals
01310	Construction Schedule
01370	Schedule of Values
01570	Traffic Control
01600	Delivery, Storage and Handling
01630	Substitutions and Product Options
01700	Contract Closeout
01710	Cleaning
01720	Project Record Documents
01740	Warranties and Bonds

DIVISION 2 SITE WORK

02221	Trenching, Backfilling and Compaction
02999	Miscellaneous Work and Clean-up

DIVISION 3 CONCRETE

03301	Concrete and Reinforcing Steel
-------	--------------------------------

DIVISION 4 MASONRY

Not Used

DIVISION 5 METALS

05500 Miscellaneous Metal

DIVISION 6 WOOD AND PLASTICS

Not Used

DIVISION 7 THERMAL AND MOISTURE PROTECTION

Not Used

DIVISION 8 DOORS AND WINDOWS

Not Used

DIVISION 9 FINISHES

Not Used

DIVISION 10 SPECIALTIES

Not Used

DIVISION 11 EQUIPMENT

Not Used

DIVISION 12 FURNISHING

Not Used

DIVISION 13 SPECIAL CONSTRUCTION

13300 Instrumentation and Controls
13325 Control Panels and Panel Mounted Equipment
13335 Radio Telemetry Equipment

DIVISION 14 CONVEYING SYSTEM

Not Used

DIVISION 15 MECHANICAL

Not Used

DIVISION 16 ELECTRICAL

16020 Electrical

PART G
SPECIAL PROVISIONS
EASTERN WATER RECLAMATION FACILITY
WETLAND OUTFALL STAGE RECORDER

ARTICLE 1 - PREPARATION AND SUBMISSION OF BIDS

This is a Unit Price Contract, and the base bid is the sum of all pay item totals. The COUNTY reserves the right to correct errors in the pay item totals arising from incorrect extensions. See "Bid Errors", Part C, Paragraph 4.

ARTICLE 2 - CONTRACT PAYMENTS

The PROJECT MANAGER, may, at his discretion, reduce the retainage percentage withheld when the completion of the work ascertained as payable exceeds fifty percent (50%) of the total contract amount. See ARTICLE 20 – Special Project Consideration for landscape and mitigation retainage.

ARTICLE 3 - DEFINITIONS

Wherever the terms "APPROVE", "APPROVED", "APPROVAL", "ACCEPT", "ACCEPTED", "ACCEPTANCE" or other derivations of these terms are used within these specification or references therein in the context of actions to be taken by the COUNTY or its representatives with respect to submittals made by, or work performed by the CONTRACTOR, they shall mean that the COUNTY or its representative finds no exception with the submittal or the work provided/performed by the CONTRACTOR. Acceptance or approval by the COUNTY or its representative shall NOT relieve the CONTRACTOR of any responsibility for conformance to the intent of the plans and specifications, for the accuracy of dimensions and details, for conformity of dimensions and details, or for adherence to generally accepted engineering and construction practices.

ARTICLE 4 - SURVEY WORK

General: CONTRACTOR shall employ a Professional Surveyor and Mapper (PS&M), registered in the State of Florida and satisfactory to COUNTY, to lay out the work from bench marks, points and lines noted on the Contract Documents, established at the site, or supplied by COUNTY. CONTRACTOR shall provide to COUNTY at the pre-construction conference, the name of Professional Surveyor and Mapper to perform Project survey work. All work of every description shall be laid out and checked by CONTRACTOR who will be held solely responsible for its correctness.

Work may be checked by PROJECT MANAGER and, in the event of discrepancy, PROJECT MANAGER'S decision shall be final.

No special compensation will be made to CONTRACTOR to defray costs of surveys and measurements, but such costs shall be considered as having been included in the price stipulated for the several items of work to be done under this contract. Payment is included in the price for bid item number 4 "Site Elevation Survey To Verify Design Elevations" (Technical Provision No. 7). CONTRACTOR shall pay all expenses in connection with this work.

PART G
SPECIAL PROVISIONS
EASTERN WATER RECLAMATION FACILITY
WETLAND OUTFALL STAGE RECORDER

All survey work shall comply with Chapter 61G17, Florida Administrative Code (F.A.C.), regarding minimum technical standards for land surveying in the State of Florida.

Benchmarks: During construction the CONTRACTOR shall have an ORANGE COUNTY Control Point Brass Disk provided by the ORANGE COUNTY survey section set in concrete (e.g. in headwalls,) at the beginning and end of the project. The CONTRACTOR'S Professional Surveyor and Mapper (PSM) shall conduct a three wire leveling run through the benchmarks based on the Orange County Vertical Datum (or other datum as specified on the Engineering plans). The level work will be performed to Second Order, Class II standards (or better) and the maximum allowable error will be no more than 0.035 feet times the square root of "K", where "K" is the total distance in miles. The level run will be performed with a geodetic automatic level, or better whose three wires will be read to 0.001 feet. Invar rods are preferred but not required. Digital automatic levels with associated bar code rods are also acceptable. Prior to substantial completion, CONTRACTOR shall submit a copy of the field notes certified by the PS&M to the PROJECT MANAGER. Benchmark elevations shall be expressed in English units.

ARTICLE 5 - CONTRACTOR'S RESPONSIBILITIES

Safety and Protection: CONTRACTOR shall be responsible for any damage whatsoever occurring out of the boundaries of PROJECT and upon any property adjacent to PROJECT when such damage is caused in whole or in part by any act of CONTRACTOR or any employee, agent or subcontractor working under, with or in privity to CONTRACTOR. CONTRACTOR and all the aforementioned parties shall stay off private property adjacent to PROJECT unless CONTRACTOR receives from the affected property owner a written release, which specifically releases COUNTY from any liability for any damage to such property caused by any acts other than those of COUNTY. This written release must be acceptable in form to PROJECT MANAGER and delivered to and accepted by PROJECT MANAGER before CONTRACTOR makes any entry upon such private property.

Subsurface Investigation: CONTRACTOR shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the nature and location of the work, the conformation of the ground, the character and quality of the substrata, the types and quantity of materials to be encountered, the nature of the groundwater conditions and all other matters which can in any way affect the work under this contract. The prices established for the work to be done will reflect all costs pertaining to the work. Any claims for extras based on substrata or groundwater table conditions will not be allowed.

Information available to COUNTY on subsoil conditions is available to bidders as information only and solely for the convenience of bidders. COUNTY does not warrant or guarantee the accuracy or correctness of this material with respect to actual subsurface conditions. CONTRACTOR agrees that he will make no claims against COUNTY if, in carrying out the work, he finds that actual conditions encountered do not conform to those indicated.

**PART G
SPECIAL PROVISIONS
EASTERN WATER RECLAMATION FACILITY
WETLAND OUTFALL STAGE RECORDER**

Cleaning Up: All debris and waste materials shall be removed from the site to leave a clean project area, as determined by the PROJECT MANAGER, prior to final acceptance.

ARTICLE 6 - PROSECUTION OF WORK, PAYMENT AND COMPLETION

Compliance with Time Requirements: Commence work in accordance with the approved working schedule required below. Contractor shall provide sufficient equipment and labor to reach substantial completion within 120 days from issuance of Notice to Proceed. Contractor shall correct all deficiencies and complete project closeout within 180 days from issuance of Notice to Proceed.

Submission of Working Schedule: Within 14 calendar days after the Contract has been awarded, CONTRACTOR shall submit to COUNTY on an acceptable form, a working schedule for PROJECT, showing in detail the working day on which he expects to begin and complete various major items of work. PROJECT MANAGER may require revisions of working schedule for approval as a requirement for approval of partial payment.

ARTICLE 7 - LABORATORY TESTING

Cost of laboratory testing routinely performed on the job site or subsequent to samples typically retrieved from the job site, shall be borne by CONTRACTOR. Concrete mix and in-place soil compaction testing costs shall be borne by CONTRACTOR.

All testing shall be in accordance with the applicable portions of Division I, Section 6 of the STANDARD SPECIFICATIONS.

The Record Laboratory is the testing laboratory contracted by CONTRACTOR. Only results of testing by the Record Laboratory shall be considered in evaluating CONTRACTOR'S compliance with contract requirements.

CONTRACTOR may be required to reimburse the COUNTY for the cost of all failed tests, including consultant fees, when the percentage of failed tests exceeds 15% of all tests taken. At the COUNTY'S discretion these costs may be deducted from the contract amount.

ARTICLE 8 - METHOD OF MEASUREMENT

All measurements for payment shall be based on the completed work performed in strict accordance with Contract Documents. All work completed under this contract shall be measured by CONTRACTOR or his representatives in the presence of PROJECT MANAGER.

PART G
SPECIAL PROVISIONS
EASTERN WATER RECLAMATION FACILITY
WETLAND OUTFALL STAGE RECORDER

ARTICLE 9 - COOPERATION WITH OTHERS

CONTRACTOR shall cooperate with owners of any underground or overhead utilities in their removal and relocation operations, in order that these operations may progress in a reasonable manner and that service rendered by these parties will not be interrupted.

ARTICLE 10 - NOTIFICATION TO & COORDINATION WITH UTILITY COMPANIES

Excavators shall comply with Florida Statutes, Chapter 553.851, regarding notification of existing gas and oil pipeline company owners prior to excavating. **Evidence of such notice shall be furnished to PROJECT MANAGER prior to excavating.** During the period of this contract CONTRACTOR shall coordinate all utility relocations and adjustments necessary for project.

ARTICLE 11 - USE OF EXPLOSIVES

No blasting shall be done except upon approval by COUNTY and the governmental agency or political subdivision having jurisdiction. When the use of explosives is approved by COUNTY as necessary for the execution of the work, CONTRACTOR shall use the utmost care so as not to endanger life or property, and assume responsibility for any such damage resulting from his blasting operations, and whenever directed, the number and size of the charges shall be reduced.

All explosives shall be stored in a secure manner and all such storage places shall be clearly marked, "**DANGER EXPLOSIVES**" and shall be in care of competent watchmen. All permits required for the use of explosives shall be obtained by CONTRACTOR at his expense. All requirements of the governmental agency issuing permit shall be observed.

ARTICLE 12 - USE OF PUBLIC ROADS AND STREETS

Use of public streets shall be such as to provide a minimum of inconvenience to the public and to traffic. Any earth or excavated material spilled from trucks shall be removed by CONTRACTOR and streets cleaned to the satisfaction of PROJECT MANAGER. Cleaning may include street sweeping and/or washing, if so directed by PROJECT MANAGER.

CONTRACTOR shall provide vehicular access to each residence, subdivision and other public roads at all times.

ARTICLE 13 - CARE OF TREES, SHRUBS AND GRASS

CONTRACTOR shall be fully responsible for maintaining in good condition all cultivated grass plots, trees and shrubs beyond the grading limits of this Contract. After completion of the work, CONTRACTOR shall replace or restore to the original condition all destroyed or damaged

**PART G
SPECIAL PROVISIONS
EASTERN WATER RECLAMATION FACILITY
WETLAND OUTFALL STAGE RECORDER**

shrubby or grass areas. Tree limbs, which interfere with equipment operation and are approved for pruning, shall be neatly trimmed and the tree cut coated with tree paint.

ARTICLE 14 - DAMAGE TO EXISTING STRUCTURES AND UTILITIES

CONTRACTOR shall be responsible for and make good all damage resulting from his activities, both within and beyond the limits of this contract, to buildings, telephone, power or other cables, water pipes, storm sewer facilities, sanitary pipes, gas lines, traffic signalization, or other utilities or structures, which may be encountered, whether or not shown on the plans.

Information shown on the plans as to the location of existing utilities has been prepared from the most reliable data available to the Engineer. This information is not guaranteed, however, and it shall be this CONTRACTOR'S responsibility to determine the location, character and depth of any existing utilities and to assist the utility companies, by every means possible, to determine said locations. Extreme caution shall be exercised to eliminate any possibility of any damage to utilities resulting from CONTRACTOR'S activities.

ARTICLE 15 - PROJECT PROGRESS PHOTOGRAPHS

Omitted

ARTICLE 16 - MISCELLANEOUS

Whenever any provision of Contract Documents requires giving of notice, it shall be deemed to have been validly given if delivered in person to the individual, to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail (postage prepaid) to the last business address known to COUNTY.

All specifications, drawings and copies thereof furnished by COUNTY shall remain the property of the COUNTY. They shall not be used on another project and, with the exception of those sets, which have been signed in connection with execution of the Agreement, shall be returned to COUNTY upon completion of project.

Duties and obligations imposed by these General Conditions and rights and remedies available hereunder, and, in particular but without limitation, the warrants, guarantees and obligations imposed upon CONTRACTOR and the rights and remedies available to COUNTY thereunder shall be in addition to and not a limitation of any otherwise imposed or available by law, by special guarantee or other provisions of Contract Documents.

Should COUNTY or CONTRACTOR suffer injury or damage to its person or property because of any error, omission or act of the other or of any of his employees, agents or others for whose acts he is legally liable, claim should be made in writing to other party within a reasonable time of first observance of such injury or damage.

PART G
SPECIAL PROVISIONS
EASTERN WATER RECLAMATION FACILITY
WETLAND OUTFALL STAGE RECORDER

ARTICLE 17 - ORANGE COUNTY INSPECTOR'S OFFICE

Omitted

ARTICLE 18 - WORK HOURS

Project work hours shall be between 7:00 A.M. and 6:00 P.M. Monday through Friday, unless approved otherwise by PROJECT MANAGER. NO WORK is to be preformed on Saturday, Sunday, or Federal, State and County holidays unless authorized by the County's representative.

ARTICLE 19 - PRIORITY OF DOCUMENTS

The governing of the documents shall be as follows:

1. Construction Contract
2. Permits
3. Supplemental Conditions / Special Provisions
4. General Conditions
5. Specifications / Technical Provisions
6. Drawings / Plans
7. Road Design, Structures, and Traffic Operations Standards (if applicable)
8. Florida Department of Transportation Standard Specifications for Road and Bridge Construction (if applicable)
9. Bid Proposal
10. Instructions to Bidder

ARTICLE 20 – SPECIAL PROJECT CONSIDERATIONS

1. **PROJECT IMPROVEMENTS** - Contractor shall furnish all labor, materials, equipment, and incidentals required to design, fabricate, deliver to project site, and erect wetland outfall stage recorder as shown on the Drawings and as specified in the Contract Documents. The Contractor shall procure the services of a single Instrumentation System Supplier (ISS) to furnish and install all materials, equipment, labor and services, except for those services and materials specifically noted, as required to achieve a fully integrated and operational system as outlined in Divisions 13 and 16.
2. **MAINTENANCE OF TRAFFIC** - The CONTRACTOR shall submit a Maintenance Of Traffic (MOT) Plan to Orange County Traffic Engineering for review and approval if required to perform the work. Following approval, the CONTRACTOR shall furnish, erect and maintain all necessary traffic control and safety devices in accordance with the approved MOT Plan and in accordance with the manual on uniform traffic control devices and the latest Florida Department Of Transportation Roadway Design Standards or as directed by the PROJECT MANAGER.

PART G
SPECIAL PROVISIONS
EASTERN WATER RECLAMATION FACILITY
WETLAND OUTFALL STAGE RECORDER

3. **LANDSCAPE AND MITIGATION RETAINAGE-** Where replacement of landscaping is required under this contract, CONTRACTOR shall warranty all landscaping for 6 months from project completion or as noted in the Contract Documents. If replacement is required within the warranty period, CONTRACTOR shall replace at no additional cost to County.

4. **ACCESS CONSIDERATIONS** - The CONTRACTOR shall be responsible for maintenance of traffic throughout the duration of the project. Due to existing roadway usage, the staging of equipment and supplies must be limited to the project work area or at an approved alternate location. Extreme care should be taken to keep all works within the specified areas. Any incidental damage to private property shall be restored to pre-existing conditions or better at the CONTRACTOR's expense.

ARTICLE 21 – PERMITS

Contractor is responsible for obtaining all permits to complete the work.

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 LOCATION OF WORK

- A. The work of this Contract is located within Orange County at the following locations:
 - 1. The proposed wetland outfall stage recorder is located in the right-of-way for Alafaya Trail approximately two miles east of the entrance to EWRP. The locations of the existing and proposed wetland outfall stage recorders are provided on Sheet G002.

1.02 SCOPE OF WORK

- A. The Work includes, but is not necessarily limited to the following:
 - 1. Furnishing all labor, materials, equipment, and incidentals required to design, fabricate, deliver to project site, and erect wetland outfall stage recorder as shown on the Drawings and as specified in the Contract Documents. The Contractor shall procure the services of a single Instrumentation System Supplier (ISS) to furnish and install all materials, equipment, labor and services, except for those services and materials specifically noted, as required to achieve a fully integrated and operational system outlined in Divisions 13 and 16.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. Unit Price Contracts: The quantities of work to be done and materials to be furnished under a unit price contract, as given in the Bid Form, are to be considered as approximate only and are to be used solely for the comparison of Bids received and determining an initial Contract Price. The Owner/Engineer do not expressly or by implication represent that the actual quantities involved will correspond exactly herewith; nor shall the Contractor plead misunderstanding or deception because of such estimate or quantities or of the character, location or other conditions pertaining to the Work. Payment to the Contractor will be made only for the actual quantities of work performed or material furnished in accordance with the Drawings and other Contract Documents, and it is understood that the quantities may be increased or diminished as provided in the General Conditions without in any way invalidating any of the unit prices bid.
- B. Unit Price and Lump Sum Contracts:
 - 1. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quantity of materials and equipment included in work to be done under this Contract.
 - 2. All contracts shall be subject to 10% minimum retainage as defined in the General Conditions and the Agreement.

1.02 SCHEDULE OF VALUES

- A. Scope of Work
 - 1. Submit to the Engineer a Schedule of Values within twenty (20) days after the Notice to Proceed.
 - 2. A Schedule of Values shall be submitted for both lump sum and unit price contracts and the sum of the values in the schedule shall equal the Total Bid amount.
 - 3. The Schedule of Values shall establish the actual value of the component parts of the Work and, unless objected to by the Engineer, shall be used as the basis for the Contractor's Applications for Payment.
- B. Form and Content
 - 1. Type the schedule on the Engineer's 8-1/2 x 11-inch standard form. Contractor's standard forms and computer printout will be considered for approval by the Engineer upon Contractor's request.

2. The values listed shall be the installed values of the component parts of the Work, including material, labor, overhead and profit, and all other costs associated with the installed value of each item.
- C. Unit Price Contracts: For unit price contracts, the Bid Schedule shall be used as the basis for the Schedule of Values. The Contractor shall resubmit the Bid Schedule in the format described herein, and may, at his option, divide the items in the Bid Schedule into sub-items to provide a more detailed basis of payment.
- D. The Owner reserves the right to delete any item included in the Schedule of Values and decrease the Contract Price by the scheduled amount for the item deleted.

1.03 APPLICATIONS FOR PAYMENT

- A. Applications for Payment shall be submitted by the Contractor to the Owner's resident project representative (RPR) in accordance with the schedule established by the General Conditions and Agreement between the Owner and the Contractor.
- B. Format:
 1. Submit applications typed on forms provided by the Owner. The Contractor shall prepare itemized continuation sheets using the acceptable Schedule of Values and attach them to the Application. Each item shall have an assigned dollar value for the current pay period, and a cumulative value for the project to date. Change Orders executed prior to the date of submission shall be listed at the end of the continuation sheets and shall be totaled separately.
 2. The following items shall be included with each copy of the application for payment:
 - a. Progress Schedule
 - b. Stored Material Log
 - c. Partial Release of Liens (for payment for stored material)
 - d. Release of Lien (final payment)
 - e. Consent of Surety
 - f. Invoices for Stored Material
 3. The Contractor shall certify, for each current pay request, that all previous payments received from the Owner, under his Contract, have been applied by the Contractor to discharge in full all obligations of the Contractor in connection with Work covered by prior applications for payment, and all materials and equipment incorporated into the Work are free and clear of all liens, claims, security interest and encumbrances. Contractor shall attach to each application for payment like affidavits by all Subcontractors and Suppliers. Contractor shall also attach a "Consent of Surety" to each application for payment. Additionally, a "Partial Release of Lien" from each subcontractor and supplier shall be attached to each application for payment.
 4. Submit seven (7) copies of each application to the RPR. Each copy shall include original signatures. The RPR shall review the application and verify quantities of installed work and stored materials. Upon his approval, he shall submit the application to the Owner for review. When the Owner finds the application properly completed and correct, he will make payment to the Owner.

- C. Work not installed in accordance with the requirements of the Contract Documents or materials not conforming to the Contract Documents will not be approved by the RPR or the Engineer for payment.
- D. The Application for Final Payment shall be prepared in accordance with Article 1.15 of the General Requirements – Warranty and Payment.

1.04 MEASUREMENT AND PAYMENT

A. Methods of Payment

- 1. Unit Price Contracts/Items: Payment will be made for actual quantities of work properly installed as approved by the Owner/Engineer unless otherwise indicated herein.

B. Methods of Measurement

- 1. Units of measurement shall be defined in general terms as follows:
 - a. Linear Feet (LF)
 - b. Square Feet (SF)
 - c. Each (EA)
 - d. Lump Sum (LS)
- 2. Unit Price Contracts/Items:
 - a. Linear Feet (LF) shall be measured along the horizontal length of the centerline of the installed material, unless otherwise specified. Pipe shall be measured along the length of the completed pipeline, regardless of the type of joint required, without deduction for the length of valves or fittings. Pipe included within the limits of lump sum items will not be measured.
 - b. Square Feet (SF), and Each (EA) shall be measured as the amount of the unit of measure installed within the limits specified and shown in the Specifications and Drawings. Slope angles and elevations shall be measured using land-surveying equipment. Contractor shall provide supporting documentation (i.e. drawings, truck tickets, invoices, etc.) to verify actual installed quantities.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01046

CONTROL OF WORK

PART 1 GENERAL

1.01 Right-of-Way

- A. Furnish personnel and equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will ensure the completion of the work within the Contract Time. If at any time the resources provided appear to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, Engineer may order the Contractor to increase the efficiency, change the character or increase the personnel and/or equipment and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

1.02 PRIVATE LAND

- A. Do not enter or occupy private land outside of Orange County property boundaries, except by permission of the land owner.

1.03 OPEN EXCAVATIONS

- A. Adequately safeguard all open excavations by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. Provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Remove bridges provided for access during construction when no longer required. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated material in the street and requiring that the trench shall not remain open overnight.
- B. Take precautions to prevent injury to the public due to open trenches. Provide adequate light at all trenches, excavated material, equipment, or other obstacles which could be dangerous to the public at night.

1.04 TEST PITS

- A. Excavate test pits to locate underground pipelines or structures in advance of the construction. Backfill test pits immediately after their purpose has been satisfied and restore and maintain the surface in a manner satisfactory to the Engineer.

1.05 MAINTENANCE OF TRAFFIC

- A. Unless permission to close a street is received in writing from the proper authority, place all excavated material so that vehicular and pedestrian traffic may be maintained at all times. If the construction operations cause traffic hazards, repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures for safety satisfactory to the Engineer.

- B. Detours around construction will be subject to the approval of the Owner and the Engineer. Where detours are permitted, provide all necessary barricades and signs as required to divert the flow of traffic. Expedite construction operations while traffic is detoured. Periods when traffic is being detoured will be strictly controlled by the Owner.
- C. Take precautions to prevent injury to the public due to open trenches, subject to the direction of the Owner and Engineer. Night watchmen may be required where special hazards exist, or police protection provided for traffic while work is in progress. Be fully responsible for damage or injuries whether or not police protection has been provided.

1.06 CARE AND PROTECTION OF PROPERTY

- A. Be responsible for the preservation of all public and private property and use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, restore such property to a condition similar or equal to that existing before the damage was done, or make good the damage in other manner acceptable to the Engineer.

1.07 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

- A. Assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains and electric and telephone cables, whether or not they are shown on the Drawings. Carefully support and protect all such structures and utilities from injury of any kind. Immediately repair any damage resulting from the construction operations.
- B. Assistance will be given the Contractor in determining the location of existing services. The Contractor, however, shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water services, drain lines and sewers). Maintain services to buildings and pay costs or charges resulting from damage thereto.
- C. Notify all utility companies in writing at least 72 hours (excluding Saturdays, Sundays, and Legal Holidays) before excavating in any public way.

1.08 COOPERATION WITHIN THIS CONTRACT

- A. All firms or persons authorized to perform any work under this Contract shall cooperate with Contractor and Subcontractors or trades and assist in incorporating the work of other trades where necessary or required.
- B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

1.09 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

- A. During the course of the work, keep the site of operations as clean and neat as possible. Dispose of all residue resulting from the construction work and, at the conclusion of the work, remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary

structures and any other refuse remaining from the construction operations and leave the entire site of the work in a neat and orderly condition.

- B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, comply with all applicable Federal, State and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and in other related Sections.
- C. Disposal of excess excavated material in wetlands, stream corridors and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. The Contractor will be required to remove the fill and restore the area impacted at no increase in the Contract Price.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01050

FIELD ENGINEERING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide and pay for field engineering services required for project.
 - 1. Survey work required in execution of project.
 - 2. Civil, structural or other professional engineering services specified, or required to execute Contractor's construction methods.
- B. Retain the services of a registered land surveyor licensed in the State of Florida:
 - 1. Identify existing control points as required.
 - 2. Verify and record all existing structures/roadways at project locations and all proposed equipment/structure locations.
 - 3. Identify horizontal location of proposed monitor well MWB-3R (Northing and Easting coordinates) as well as vertical elevation of well riser pipe and land surface at the base of the protective enclosure. Provide spot elevations for MWB-3R concrete pad.
 - 4. Install staff gage per Note 3 on Sheet C-001 with vertical elevations verified by registered land surveyor.
 - 5. Identify horizontal and vertical location of proposed aluminum platform. Establish brass benchmark monument on existing wing-wall per Orange County standards.
 - 6. Maintain an accurate location of all buried piping and conduit 2-in in diameter and larger.
 - 7. All survey work shall reference vertical datum NAVD 88.

1.02 RELATED WORK

- A. Summary of Work is included in Section 01010
- B. Project Record Documents are included in Section 01720.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01300, name and address of registered land surveyor or professional engineer.
- B. On request of the Engineer, submit documentation to verify accuracy of field engineering work.

- C. Submit certificate signed by registered land surveyor certifying that elevations and locations of improvements are in conformance, or non-conformance, with Contract Documents.
- D. At the end of the project, and prior to final payment, submit certified drawings with the Surveyor's title block (signed and sealed by the registered land surveyor) of the items listed below. These drawings shall be included with, and made a part of, the project record documents.
 - 1. Certified site survey at 1-in = 5-ft scale on sheets 24-in by 36-in, indicating the building corners, sidewalks, paved areas and location of all above ground structures within the project site.

1.04 QUALIFICATIONS OF SURVEYOR

- A. Registered land surveyor of the discipline required for the specific service on the project, currently licensed in the State.

1.05 SURVEY REFERENCE POINTS

- A. Existing basic horizontal and vertical control points for the project are those designated on Drawings.
- B. Locate and protect control points prior to starting site work and preserve all permanent reference points during construction.
 - 1. Make no changes or relocations without prior written notice to the Engineer.
 - 2. Report to the Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 - 3. Require surveyor to correctly replace project control points which may be lost or destroyed.
 - a. Establish replacements based on original survey control.

1.06 RECORDS

- A. Maintain a complete, accurate log of all control and survey work as it progresses.
- B. Update the project record drawings on a monthly basis based on the work performed during the month ending at the pay request as a condition for approval of monthly progress payment requests.
- C. Maintain an accurate record of changes, revisions, and modifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials and equipment and perform all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Section, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.
- B. The control of environmental pollution requires consideration of air, water and land, and involves management of noise and solid waste, as well as other pollutants.
- C. Schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, synthetic bales, seeding, mulching or other special surface treatments as are required to prevent silting and muddying of wetlands, streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area.
- D. This Section is intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the Contractor's responsibility to determine the specific construction techniques to meet these guidelines.
- E. All phases of sedimentation and erosion control shall comply with and be subject to the approval of the Florida Department of Environmental Protection. The contractor shall implement sedimentation and erosion controls as shown on the drawing meeting the requirements of the law. Upon approval, furnish two copies of the approved Drawing to the Engineer.

1.02 APPLICABLE REGULATIONS

- A. Comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

1.03 NOTIFICATIONS

- A. The Owner will notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectional acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Engineer, of any non-compliance with State or local requirements. After receipt of such notice from the Engineer or from the regulatory agency through the Engineer, immediately take corrective action. Such

notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

1.04 IMPLEMENTATION

- A. Prior to commencement of the work, meet with the Owner to develop mutual understandings relative to compliance with these provisions and administration of the environmental pollution control program.
- B. Remove temporary environmental control features, when approved by the Owner and incorporate permanent control features into the project at the earliest practicable time.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EROSION CONTROL

- A. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures, such as siltation basins, check dams, mulching, jute netting and other equivalent techniques, shall be used as appropriate. Flow of surface water into excavated areas shall be prevented. **At a minimum, Contractor shall install silt fence and turbidity barriers (FDOT Index 102 and 103, respectively) within the water way to provide sedimentation and erosion control in accordance with best management practices (BMPs).**

3.02 PROTECTION OF SURFACE WATERS

- A. Take all precautions to prevent, or reduce to a minimum, any damage to any stream or surface water from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments shall be contained and disposed of at a permitted facility.
- B. Do not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.
- C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action plan approved by the Florida Department of Environmental Protection. Contractor shall submit two copies of approved contingency plans to the Engineer.

3.03 PROTECTION OF LAND RESOURCES

- A. Restore land resources within the project boundaries and outside the limits of permanent work to a condition, after completion of construction, that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings.
- B. Outside of areas requiring earthwork for the construction of the new facilities, do not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by the Engineer. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall in any event be responsible for any damage resulting from such use.
- C. Before beginning operations near them, protect trees that may possibly be defaced, bruised, injured, or otherwise damaged by the construction equipment, dumping or other operations, by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly.
- D. Any trees or other landscape features scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to their original condition. The Engineer will decide the method of restoration to be used and whether damaged trees shall be treated and healed or removed and disposed of.
 - 1. All scars made on trees by equipment, construction operations, or by the removal of limbs larger than 1-in in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.
 - 2. Climbing ropes shall be used where necessary for safety. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Engineer, shall be immediately removed and replaced.
- E. The locations of the Contractor's storage and other construction material, required temporarily in the performance of the work, shall be cleared portions of the job site as accepted by the Owner and shall not be within wetlands or floodplains. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings. Drawings showing storage facilities shall be submitted for approval of the Owner.
- G. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by the Engineer. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be sodded as described in Section 02932, or as approved by the Engineer.
- H. All debris and excess material will be disposed of offsite at a permitted facility.

3.04 PROTECTION OF AIR QUALITY

- A. Burning – The use of burning at the project site for the disposal of refuse and debris will not be permitted.
- B. Dust Control – Maintain all excavations, embankment, stockpiles, access roads, plant sites, waste areas, borrow areas and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded and which would cause a hazard or nuisance to others.
- C. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust. The use of petroleum products is prohibited.
- D. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor shall have sufficient competent equipment on the job to accomplish this. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the Engineer.

3.05 NOISE CONTROL

- A. Make every effort to minimize noises caused by the construction operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with Federal and State regulations.

3.06 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

- A. Maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A. This Section specifies the general methods and requirements of submissions applicable to Shop Drawings, Product Data, Samples, Construction Photographs, Construction or Submittal Schedules. Detailed submittal requirements are specified in the technical Sections.
- B. All submittals shall be clearly identified by reference to Section Number, Paragraph, Drawing Number or Detail as applicable. Submittals shall be clear and legible and of sufficient size for presentation of data.

1.02 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

- A. Shop Drawings
 - 1. Shop drawings as specified in individual Sections include, custom-prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the work.
 - 2. All shop drawings submitted by subcontractors shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.
 - 3. Check all subcontractor's shop drawings regarding measurements, size of members, materials and details to make sure that they conform to the intent of the Drawings and related Sections. Return shop drawings found to be inaccurate or otherwise in error to the subcontractors for correction before submission thereof.
 - 4. All details on shop drawings shall show clearly the relation of the various parts to the main members and lines of the structure and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted.
 - 5. Submittals for equipment specified under Divisions 13 and 16 shall include a listing of all installations where identical or similar equipment has been installed and been in operation for a period of at least one year.
- B. Product Data
 - 1. Product data as specified in individual Sections include, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams

and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the work.

C. Samples

1. Samples specified in individual Sections include, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the work.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. Review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:
 1. Field measurements
 2. Field construction criteria
 3. Catalog numbers and similar data
 4. Conformance with related Sections
- B. Each shop drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11-in x 17-in and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the Resident Project Representative a copy of each transmittal sheet for shop drawings, product data and samples at the time of submittal to the Engineer.
- C. The Contractor shall utilize a 10-character submittal identification numbering system in the following manner:
 1. The first character shall be a D, S, P, M, or R, which represents Shop/Working Drawing and other Product Data (D), Sample (S), Preliminary Submittal (P), Operating/Maintenance Manual (M), or Request for Information (R).
 2. The next five digits shall be the applicable Section Number.
 3. The next three digits shall be the numbers 001 to 999 to sequentially number each initial separate item or drawing submitted under each specific Section Number.

4. The last character shall be a letter, A to Z, indicating the submission, or resubmission of the same Drawing, i.e., "A=1st submission, B=2nd submission, C=3d submission, etc. A typical submittal number would be as follows:

D-03300-008-B

- D. = Shop Drawing
- 03300 = Section for Concrete
- 008 = The eighth initial submittal under this section
- B. = The second submission (first resubmission) of that particular shop drawing]

- D. Notify the Engineer in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents.
- E. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from the responsibility for the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will have no responsibility therefore.
- F. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.
- G. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

1.04 SUBMISSION REQUIREMENTS

- A. Make submittals promptly in accordance with approved schedule and in such sequence as to cause no delay in the Work or in the work of any other contractor.
- B. Each submittal, appropriately coded, will be returned within 15 business days following receipt of submittal by the Engineer.
- C. Number of submittals required:
 1. Shop Drawings: Eight copies.
 2. Product Data: Three copies.
 3. Samples: Submit the number stated in the respective Sections.
- D. Submittals shall contain:
 1. The date of submission and the dates of any previous submissions.
 2. The Project title and number.
 3. Contractor identification.

4. The names of:
 - a. Contractor
 - b. Supplier
 - c. Manufacturer
5. Identification of the product, with the section number, page and paragraph(s).
6. Field dimensions, clearly identified as such.
7. Relation to adjacent or critical features of the work or materials.
8. Applicable standards, such as ASTM or Federal Standards numbers.
9. Identification of deviations from Contract Documents.
10. Identification of revisions on resubmittals.
11. An installation list stating where identical equipment has been installed and in operation for at least five years.
12. An 8-in by 3-in blank space for Contractor and Engineer stamps.

1.05 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

- A. The review of shop drawings, data and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:
 1. as permitting any departure from the Contract requirements;
 2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;
 3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.
- B. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.
- C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or Contract Time, the Engineer may return the reviewed drawings without noting an exception.

D. Submittals will be returned to the Contractor under one of the following codes.

- Code 1 - “APPROVED” is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.
- Code 2 - “APPROVED AS NOTED”. This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.
- Code 3 - “APPROVED AS NOTED/CONFIRM”. This combination of codes is assigned when a confirmation of the notations and comments IS required by the Contractor. The Contractor may, at his own risk, release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within 15 calendar days of the date of the Engineer's transmittal requiring the confirmation.
- Code 4 - “APPROVED AS NOTED/RESUBMIT”. This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the Engineer within 15 calendar days of the date of the Engineer’s transmittal requiring the resubmittal.
- Code 5 - “NOT APPROVED” is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.
- Code 6 - “COMMENTS ATTACHED” is assigned where there are comments attached to the returned submittal which provide additional data to aid the Contractor.

Codes 1 through 5 designate the status of the reviewed submittal with Code 6 showing there has been an attachment of additional data.

- E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall identify all revisions made to the submittals, either in writing on the letter of transmittal or on the shop drawings by use of revision triangles or other similar methods. The resubmittal shall clearly respond to each comment made by the Engineer on the previous submission. Additionally, the Contractor shall direct specific attention to any revisions made other than the corrections requested by the Engineer on previous submissions.
- F. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor and will be considered “Not Approved” until resubmitted. The Engineer may at his option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

G. Repetitive Review

1. Shop drawings and other submittals will be reviewed no more than twice at the Owner's expense. All subsequent reviews will be performed at times convenient to the Engineer and at the Contractor's expense, based on the Engineer's then prevailing rates. The Contractor shall reimburse the Owner for all such fees invoiced to the Owner by the Engineer. Submittals are required until approved.
2. Any need for more than one resubmission, or any other delay in obtaining Engineer's review of submittals, will not entitle Contractor to extension of the Contract Time.

H. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least 7 working days prior to release for manufacture.

I. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.06 DISTRIBUTION

A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer. Number of copies shall be as directed by the Engineer but shall not exceed six.

1.07 CONSTRUCTION PHOTOGRAPHS

A. Progress Photographs: The Contractor shall employ a competent photographer regularly engaged in the business to take construction record photographs periodically during the course of the Work.

1. Prints: Date imprinted 3-inch x 5-inch high resolution glossy single weight color print paper; two (2) sets, bound in 3 ring binders to be provided to the Owner with each respective Application for Payment and distributed by the Owner as follows:
 - a. Owner (2 sets)
 - b. Contractor (1 set)
 - c. Project Record Data (1 set stored by Contractor to be furnished to Owner upon Closeout) In lieu of hard copy prints, Contractor may submit Construction photographs in digital format (DVD). Digital copies must meet all requirements as specified in Paragraphs 1.07 A.2."
2. Required Photographs and Views: Provide two (2) views each at the completion of the following stages of construction for each structure.
 - a. Site clearing
 - b. Excavation
 - c. Foundation

- d. Framing
- e. Enclosure
- f. Site restoration and landscaping
- g. Installation of equipment and facilities

Additionally, four (4) views (N, S, E, & W), of the overall project site shall be provided on a monthly basis as directed by the Owner field representative. The Owner may substitute color aerial photograph upon prior approval.

- 3. Photo Identification (data permanently printed on back):
 - a. Name of Project
 - b. Name of Structure
 - c. Orientation of View
 - d. Date & Time of Exposure
 - e. Name and address of photographer
 - f. Film numbered identification of exposure

1.08 SCHEDULES

- A. While the General Contractor bears full responsibility for scheduling all phases and stages of the work to ensure its successful prosecution and completion within the time specified in accordance with all provisions in all related Sections, the General Contractor is specifically required to complete fully or complete such stages of work to enable other Contractors to complete their work within the respective times specified.
- B. Following receipt and preliminary approval by the Engineer of the General Contractor's CPM Schedule, copies will be sent to the other Contractors for their comments. A preconstruction conference will then be held between the Owner, Engineer and all involved Contractors to review and, if necessary, revise the Schedule to afford all Contractors ample time to perform their work in the proper sequence of construction operations. In case of disputes between Contractors over allotted time for various items of work, the Engineer shall decide and his decision shall be final and binding on all. The Engineer shall give final approval to the CPM Schedule before any construction is begun.

1.09 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

- A. If specifically required in other related Sections, submit a P.E. Certification for each item required, in the form attached to this Section, completely filled in and stamped.

1.10 GENERAL PROCEDURES FOR SUBMITTALS

- A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work of other related Sections, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

P.E. CERTIFICATION FORM

The undersigned hereby certifies that he/she is a professional engineer registered in the State of Florida and that he/she has been employed by

_____ to design
(Name of Contractor)

(Insert P.E. Responsibilities)

in accordance with Section _____ for the

(Name of Project)

The undersigned further certifies that he/she has performed the design of the _____
_____, that said design is in conformance
(Name of Project)

with all applicable local, state and federal codes, rules, and regulations, and that his/her signature and P.E. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the

(Insert Name of Owner)

or Owner's representative within seven days following written request therefore by the Owner.

P.E. Name

Contractor's Name

Signature

Signature

Address

Title

Address

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SECTION 01310

CONSTRUCTION SCHEDULE

PART 1 GENERAL

1.01 DESCRIPTION

- A. Prepare and provide projected construction schedules for entire work in a logic bar graph, Critical Path Method (CPM) or combination thereof in a format which will be acceptable to the Owner. Revise monthly or as directed by the Owner.
- B. Within ten days of the Notice to Proceed, the Contractor shall submit the initial milestone schedule to the Owner and Engineer for acceptance. The Contractor shall revise the milestone schedule as necessary to gain Owner and Engineer acceptance. Within 14 calendar days of the Owner's acceptance of the milestone schedule, the Contractor shall submit the detailed network schedule. The Contractor shall similarly revise the network schedule as needed to gain Owner and Engineer acceptance.
- C. No Periodic Pay Estimates will be accepted until both the initial milestone schedule and the corresponding detailed network schedule are accepted by the Owner and Engineer.
- D. Coordination:
 - 1. It will be the responsibility of the Contractor to coordinate schedules of its own and its subcontractor's schedules as well as construction efforts by others as directed by the Owner.
 - 2. Schedules are subject to concurrence by the Owner with regards to activity description, logic, sequence, duration and resources required.

1.02 FORM OF SCHEDULES

- A. Contractor shall prepare and provide the following construction schedule in a format and system acceptable to the Owner.
 - 1. Summary Milestone Schedule: Submit a computer generated bar chart schedule broken down by the major project areas. Required milestones will be subject to Owner's acceptance.
 - 2. Detailed Network Schedule: Either overall basis and/or by subnetworks as may be requested by the Engineer. Manpower resources by activity should be indicated.
 - 3. Horizontal Bar Chart:
 - a. Provide separate Horizontal Bar Column for each trade or operation indicating manpower resources.
 - b. Order: Chronological order of beginning of each item of work.
 - c. Identify each bar column by distinct graphic delineation.

- d. Horizontal Time Scale: Identify first work day of each week, length of work week, and shifts involved.
- e. Scale and Spacing: To allow space for updating.

1.03 CONTENT OF SCHEDULES

- A. Provide complete sequence of construction by activity.
 - 1. Shop Drawings, product data and samples, submittal dates and dates approved copies will be required, etc., should be indicated.
 - 2. Product procurement, fabrication duration, shipping dates and on-site availability should be indicated. Contractor will prepare format which shall include names of subcontractors; description of material; manufacturers and vendors with address, phone number and person to contact, order number, shop drawings and samples status, manufacturing lead time, shipping dates, proposed delivery date, format of shipping, date material is required and commitments from manufacturers or vendors on their letterhead.
 - 3. Dates for beginning and completion of each element of construction.
 - 4. Decision dates for selection of finishes and products.
 - 5. Restraints reflecting impact of related work.
 - 6. Activities as directed by the Owner or Engineer when required to interface activities performed by the Owner or other Contractors.
 - 7. Detailed sub-schedule and special area schedules as directed by the Owner to define critical areas of work.
 - 8. The Engineer shall receive and review updates from the Contractor each month indicating the ACTUAL work status or more/less often when directed to do so by the Owner.
 - a. Schedule submission shall be made with the Periodic Pay Estimate.
 - b. If the Contractor does not gain Owner acceptance of any schedule update, the following Periodic Pay Estimate will not be considered until such acceptance is obtained.

1.04 CONTRACTOR'S RESPONSIBILITIES

- A. Coordinate the scheduled work of all its subcontractors.
- B. Incorporate the work of all subcontractors into the construction schedules.
- C. Provide schedule update information of all subcontractors.
- D. Maintain a management organization to fulfill the requirements of this Section.
- E. Attend and participate in scheduling meetings as may be requested by the Owner or Engineer.

1.05 OWNER'S RESPONSIBILITIES

- A. Owner may provide technical assistance to Contractor in preparation of its construction schedule.

1.06 SCHEDULE MAINTENANCE PROCEDURES

- A. At or before the Pre-Construction Meeting, provide a draft summary bar chart schedule for the major breakdown activities outlined in the Bid Proposal.

- B. Milestone Schedule: Within 10 calendar days of Notice to Proceed, the Contractor shall provide the following to the Owner and Engineer:

1. A Summarized Milestone Schedule, prepared as a computer generated time-scaled CPM diagram in precedence diagramming format, identifying the major areas of the Project. Milestone Schedule shall identify all established milestones specified in the Contract Documents, to constitute one complete program for the entire work.
2. The Summarized Milestone Schedule shall be used for the life of the Contract to delineate the interdependence and order of construction of the project Work areas.
3. The Owner reserves the right to reject any submitted schedule by the Contractor, if, in the view of the Owner, said schedule reflects unreasonable assumptions on the part of the Contractor, its subcontractors or Owner's other Contractors. The Contractor shall be responsible for resubmitting within five (5) working days the actual reflection of current and projected status.
4. The initial schedule shall include an overall project duration consistent with the specified contract time. Schedules with any but the specified contract duration period will not be accepted.
5. The schedule shall include a minimum of 10 days of float due to inclement weather or other delays normally associated with construction work of this nature.

- C. Network Schedule: Within 14 calendar days of Owner's and Engineer's approval of the Summary Milestone Schedule, the Contractor shall provide the following:

1. A Detailed Network Schedule shall be prepared as a CPM logic diagram in precedence diagramming format. The detailed network schedule shall identify the work to be performed in order to support the Master Milestone Schedule.
2. The Detailed Network Schedule shall be utilized to monitor progress and shall, therefore, be maintained throughout the duration of the Project.
3. Activities represented on the Detailed Network Schedule shall dovetail the summary milestone schedule so as to constitute one complete program for the whole of the project.
4. The Contractor shall provide a detailed successor/predecessor report, in a format acceptable to the Owner, sorted by major project area. This report shall also include the duration of each activity and logic relationship.
 - a. The Contractor shall submit both a printed copy and electronic copy to the Owner and Engineer containing this information.

D. Updating:

1. Show all changes which have occurred since the previous update and submittal. Provide the following update information:
 - a. Progress of each activity.
 - b. Completion dates.
 - c. Activities modified.
 - d. Revision of schedule restraints.
 - e. Revision in duration to any activities.
 - f. Revision of resources.
2. With each schedule update provide a NARRATIVE REPORT, including:
 - a. Discussion of problem areas, including current and anticipated delay factors and their impact on the schedule.
 - b. Corrective action taken or proposed and its effect or intended effect on schedule.
 - c. Detailed description of revisions to schedule.

1.07 SUBMITTALS

- A. Submit to the Owner, three copies and one electronic file of the Summary Milestone Schedules within 10 days after Notice to Proceed.
- B. Submit to the Owner, three copies and one electronic file of the Detailed Network Schedule within 14 calendar days of approval of Summary Milestone Schedule.
- C. Each month (along with the monthly Periodic Pay Estimate), submit one print of the previous Detailed Network Schedule with annotations showing status and changes.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01370

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit to the Owner a Schedule of Values allocated to the various portions of the work, within 21 days after the effective date of the Agreement.
- B. Upon request of the Owner, support the values with data which will substantiate their correctness.
- C. The accepted Schedule of Values shall be used only as the basis for the Contractor's Applications for Payment.

1.02 RELATED REQUIREMENTS

- A. Standard General Conditions of the Construction Contract are included in Part F of Division 0.
- B. Application for Payment is included in Section 01152.

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Type schedule on an 8-1/2-in by 11-in or 8-1/2-in by 14-in white paper furnished by the Owner; Contractor's standard forms and automated printout will be considered for approval by the Engineer upon Contractor's request. Identify schedule with:
 - 1. Title of Project and location.
 - 2. Engineer and Project number.
 - 3. Name and Address of Contractor.
 - 4. Contract designation.
 - 5. Date of submission.
- B. Schedule shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction.
- C. Identify each line item with the number and title of the respective Section.
- D. For each major line item list sub-values of major products or operations under the item.

- E. For the various portions of the work:
 - 1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
 - 2. For items on which progress payments will be requested for stored materials, break down the value into:
 - a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by the Engineer.
 - b. The total installed value.
- F. The sum of all values listed in the schedule shall equal the total Contract Sum.

1.04 SUBSCHEDULE OF UNIT MATERIAL VALUES

- A. Submit a sub-schedule of unit costs and quantities for:
 - 1. Products on which progress payments will be requested for stored products.
- B. The form of submittal shall parallel that of the Schedule of Values, with each item identified the same as the line item in the Schedule of Values.
- C. The unit quantity for bulk materials shall include an allowance for normal waste.
- D. The unit values for the materials shall be broken down into:
 - 1. Cost of the material, delivered and unloaded at the site, with taxes paid.
 - 2. Copies of invoices for component material shall be included with the payment request in which the material first appears.
 - 3. Paid invoices shall be provided with the second payment request in which the material appears or no payment shall be allowed and/or may be deleted from the request.
- E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01570

TRAFFIC CONTROL

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall be responsible for providing safe and expeditious movement of traffic through construction zones. A construction zone is defined as the immediate areas of actual construction and all abutting areas which are used by the Contractor and which interfere with the driving or walking public.
- B. Remove temporary equipment and facilities when no longer required; restore grounds to original, or to specified conditions.

1.02 TRAFFIC CONTROL

- A. The necessary precautions shall include, but not be limited to, such items as proper construction warning signs, signals, lighting devices, markings, barricades, channelization, and hand signaling devices. The Contractor shall be responsible for installation and maintenance of all devices and requirements for the duration of the construction period.
- B. The Contractor shall provide at least 72 hours notification to the applicable City or County Highway Department of the necessity to close any portion of a roadway carrying vehicles or pedestrians so that the final approval of such closings can be obtained at least 48 hours in advance. At no time will more than one (1) lane of a roadway be closed to vehicles and pedestrians. With any such closings adequate provision shall be made for the safe expeditious movement of each.
- C. The Contractor shall also be responsible for notifying Fire and Ambulance Departments whenever roads are impassable.
- D. The Contractor shall be responsible for removal, relocation, or replacement of any traffic control device in the construction area which exists as part of the normal pre-construction traffic control scheme. Any such actions shall be performed by the Contractor under the supervision, and in accordance with the Specifications, of the Owner, unless otherwise specified.
- E. The Contractor shall immediately notify the Owner of any vehicular or pedestrian safety or efficiency problems incurred as a result of the construction of the project.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

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SECTION 01600

DELIVERY, STORAGE AND HANDLING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.02 TRANSPORTATION AND DELIVERY

- A. Transport and handle items in accordance with manufacturer's instructions.
- B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.
- C. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.
- D. Deliver products to the site in manufacturer' original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.
- E. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.
- F. Provide necessary equipment and personnel to unload all items delivered to the site.
- G. Promptly inspect shipment to assure that products comply with requirements, quantities are correct and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.

1.03 STORAGE AND PROTECTION

- A. Store and protect products in accordance with the manufacturer' instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Engineer by him/her. Instruction shall be carefully followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.
- B. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- C. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease and in a position to prevent

accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in a manner to reduce breakage, cracking and spalling to a minimum.

- D. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere if stored outdoors (even though covered by canvas) shall be stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Engineer. Building shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer.
1. All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer.
 2. Moving parts shall be rotated a minimum of once weekly to ensure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.
 3. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.
 4. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01630

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish and install Products specified, under options and conditions for substitutions stated in this Section.
- B. Whenever a product, material or item of equipment is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, followed by the phrase "or equal," the specific item mentioned shall be the basis upon which bids are to be prepared, and shall be understood as establishing the type, function, dimension, appearance and quality desired. Other manufacturer's or vendor's products not named will be considered as substitutions, provided the required information is submitted in the manner set forth in this section and provided the substitution will not require substantial revision to the Contract Documents.

1.02 RELATED WORK

- A. Section C, Division 0: Instructions to Bidders -- Substitutions during the Bidding Period.
- B. Section D, Division 0: Bid Form.
- C. Section 01600: Delivery Storage and Handling.

1.03 SUBMITTALS

- A. Bidders shall submit their list of proposed substitutions and the proposed monetary changes associated therewith to the Owner on the standard form provided together with their bids.

1.04 CONTRACTOR'S OPTIONS

- A. For Products specified only by reference standard, select product meeting that standard, by any manufacturer.
- B. For Products specified by naming several products or manufacturers, select any one of products and manufacturers named which complies with Specifications.
- C. For Products specified by naming one or more products or manufacturers and stating "or accepted equal," submit a request as for substitutions, for any product or manufacturer which is not specifically named.
- D. For Products specified by naming only one product and manufacturer, there is no option and no substitution will be allowed.

1.05 SUBSTITUTIONS

- A. In order for substitutions to be considered, the Contractor shall submit, within 30 days of issuance of Notice of Award, complete data as set forth herein to permit complete analysis of all proposed substitutions noted on his substitutions list. No substitution shall be considered unless the Contractor provides the required data in accordance with the requirements of this Section within the 30 day period.
- B. Submit separate request for each substitution. Support each request with:
1. Complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature; identify:
 - 1) Product description.
 - 2) Reference standards.
 - 3) Performance and test data.
 - 4) Operation and maintenance data.
 - c. Samples, as applicable.
 - d. Name and address of similar projects on which product has been used, and date of each installation.
 2. Itemized comparison of the proposed substitution with product specified; List significant variations. Substitution shall not change design intent and shall perform equal to that specified.
 3. Data relating to impact on construction schedule occasioned by the proposed substitution.
 4. Any effect of substitution on separate contracts.
 5. List of changes required in other work or products.
 6. Accurate cost data comparing proposed substitution with product specified.
 - a. Amount of any net change to Contract Sum.
 7. Designation of required license fees or royalties.
 8. Designation of availability of maintenance services, sources of replacement materials.

- C. Substitutions will not be considered for acceptance when:
1. They are indicated or implied on shop drawings or product data submittals without a formal request from Contractor.
 2. They are requested directly by a subcontractor or supplier.
 3. Acceptance will require substantial revision of Contract Documents.
- D. Requests for substitutions submitted after Notice of Award will not be considered unless evidence is submitted to the Engineer that all of the following circumstances exist:
1. The specified product is unavailable for reasons beyond the control of the Contractor. Such reasons shall consist of strikes, bankruptcy, discontinuance of manufacturer, or acts of God.
 2. The Contractor placed, or attempted to place, orders for the specified products within 10 days after Notice of Award.
 3. Request for substitution is made in writing to the Engineer within 10 days of the date on which the Contractor ascertains that he cannot obtain the item specified.
 4. Complete data as set forth herein to permit complete analysis of the proposed substitution is submitted with the request.
- E. The Engineer's decision regarding evaluation of substitutions shall be considered final and binding. Requests for time extensions and additional costs based on submission of, acceptance of, or rejection of substitutions will not be allowed. All approved substitutions will be incorporated into the Agreement by Change Order.

1.06 CONTRACTOR'S REPRESENTATION

- A. In making formal request for substitution, Contractor represents that:
1. He has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.
 2. He will provide same warranties or bonds for substitution as for product specified.
 3. He will coordinate installation of accepted substitution into the Work, and will make such changes as may be required for the Work to be complete in all respects.
 4. He waives claims for additional costs caused by substitution which may subsequently become apparent.
 5. Cost data is complete and includes related costs under his Contract, but not:
 - a. Costs under separate contracts.
 - b. Engineer's costs for redesign or revision of Contract Documents.

1.07 ENGINEER DUTIES

- A. Review Contractor's requests for substitutions with reasonable promptness.
- B. Notify Contractor, in writing, of decision to accept or reject requested substitution.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Closeout procedures.
 - 2. Final cleaning.
 - 3. Adjusting.
 - 4. Project Record documents.
 - 5. Spare parts and maintenance materials.

1.02 RELATED WORK

- A. Section 01740: Warranties and Bonds

1.03 RECORD DOCUMENTS

- A. Maintain on site, one set of the following documents; actual revisions to the Work shall be recorded in these documents:
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other Modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
- B. Store Record Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.

3. Changes made by Addenda and Modifications.
- E. Contract Drawings and Shop Drawings - legibly mark each item to record actual construction including:
1. Measured horizontal and vertical locations of monitor well MWB-3R, wetland outfall stage recorder structures and equipment, underground utilities and appurtenances, referenced to permanent surface improvements.
 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
 3. Field changes of dimension and detail.
 5. Details not on original Contract Drawings.
- F. Submit documents to Engineer with Application for Final Payment. See Section 1050 for project survey requirements.

1.04 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.
- B. Provide submittals to Engineer that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.05 FINAL CLEANING

- A. Complete the following cleaning operations prior to final completion or owner occupancy.
 1. Remove labels that are not permanent labels.
 2. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances.
 3. Wipe surface of mechanical and electrical equipment. Remove excess lubrication and other substances.
 4. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

1.06 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01710

CLEANING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Execute cleaning, during progress of the work, and at completion of the work, as required by General Conditions.

1.02 RELATED WORK

- A. Standard General Conditions of the Construction Contract are included in Section F, Division 0.
- B. Each Section: Cleaning for specific products or work.

1.03 DISPOSAL AND CLEANING

- A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations and anti-pollution laws.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.
- B. Provide on-site containers for the collection of waste materials, debris and rubbish.
- C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

- A. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.
- B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight-exposed interior and exterior surfaces.
- C. Wash and shine glazing.
- D. Polish glossy surfaces to a clear shine.
- E. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- F. Prior to final completion, or Owner occupancy, conduct an inspection of sight-exposed interior and exterior surfaces and all work areas, to verify that the entire work is clean.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 OVERVIEW

- A. These standards and procedures are for integration of digital engineering CAD drawings and attribute data into the database environments, while maintaining the integrity and positional accuracy of the data.

1.02 DESCRIPTION

- A. Scope of Work

- 1. Drawings;
- 2. Specifications;
- 3. Addenda;
- 4. Change Orders and other modifications to the contract;
- 5. Engineer's Field Orders or written instructions;
- 6. Approved Shop Drawings, Working Drawings and Samples; and
- 7. Field Test Records.

- B. Related Requirements Described Elsewhere

- 1. Submittals: Section 01300.

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store Documents and samples in Contractor's field office apart from documents used for construction.

- 1. Provide files and racks for storage of documents; and
- 2. Provide locked cabinet or secure storage space for storage of samples.

- B. File documents and samples in accordance with CSI format with section numbers as provided herein.

- C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.

- D. Make documents and samples available at all time for inspection by the Engineer.
- E. As a prerequisite for monthly progress payments, the Contractor is to exhibit the currently updated “Record Documents” for review by the Owner. Payment will be withheld if record documents are not satisfactorily maintained.

1.04. RECORDING

- A. Stamp each document “PROJECT RECORD” with a rubber stamp having 1-1/2-inch high letters.
- B. Record Drawings shall include the following:
 - 1. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
 - 2. Legibly and clearly mark, to scale, each drawing to record actual construction.
 - 3. Depths of various elements of foundation in relation to finish first floor datum;
 - 4. All underground piping uncovered in the trench with elevations and dimensions; change in piping location; horizontal and vertical locations of underground utilities and appurtenances, actual installed pipe material, class, utility owner, size, etc.;
 - 5. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure;
 - 6. Field changes of dimension and detail;
 - 7. Changes made by Field Order or by Change Order;
 - 8. Details not on original contract drawing;
 - 9. Equipment and piping relocations; and
 - 10. Recording of existing utilities if different than shown on the drawings.
- C. Specifications and Addenda: Legibly mark each section to record.
 - 1. Manufacturer, trade name, catalog number, and Supplier of each product and item of equipment actually installed; and
 - 2. Changes made by Field Order or by Change Order.

1.05 RECORD DOCUMENTS SUBMITTAL

- A. Contactor shall submit one set of hard copy drawings, digitally scanned set, revised digital CAD and ASCII format asset table shall comprise the RECORD Drawing submittal.

PART 2 GENERAL

2.01 RECORD DOCUMENTS SUBMITTAL REQUIREMENTS

Record documents submittal to the County is required prior to the issuance of certificate of completion for the improvements.

A. RECORD DOCUMENTS SUBMITTAL

1. The Contractor shall submit the following.
 - a. One certified, full size, hard copy of the RECORD DRAWING.
 - b. One scanned digital version of the certified hard copy RECORD DRAWING in Adobe Acrobat protected document file (pdf) format and comprised of the tagged information file format (tif).
 - c. One revised digital Record Drawing (County's current version of AutoCAD drawing (dwg) file; and
 - d. One digital Coordinate Asset Table shall be provided in ASCII file format.
2. RECORD DRAWINGS shall comply with the following requirements:
 - a. RECORD DRAWINGS shall include certifications from the Surveyor, and the Contractor.
 - b. The Contractor shall be responsible for recording information on the approved PLANS concurrently with construction progress.
 - c. Drawings shall be legibly marked to record actual construction.
 - d. Drawings shall clearly show all field changes of dimension and detail including changes made by field order or by change order.
 - e. Drawings shall clearly show all details not on original contract drawings but constructed in the field. All equipment and piping relocation shall be clearly shown.
 - f. State Plane Coordinates shall depict actual horizontal and vertical locations of utility assets as well as existing utilities encountered during construction. A Surveyor shall certify the State Plane Coordinates, provide the coordinates on the RECORD DRAWINGS and provide the coordinate attribute tables in an electronic database submittal. Asset coordinates shall be shown on the plans adjacent to the asset and in a table with an asset number corresponding to the plans.
 - g. Each sheet of the PLANS shall be signed, sealed and dated by the licensed Surveyor as being RECORD DRAWINGS.
 - h. The scanned RECORD DRAWING PLAN sets shall be complete and include the title sheet, plan/profile sheets, cross-sections, and details. Each individual sheet contained in the printed set of the drawings shall be included in the electronic

submittal, with each sheet being converted into an individual tif (tagged image file). The plan sheets shall be scanned in tif format Group 4 at 400 dpi resolution to maintain legibility of each drawing. Then, the tif images shall be embedded into a single pdf (Adobe Acrobat) file representing the complete plan set.

2.02 CONVENTIONAL AND GPS SURVEY STANDARDS

A. Acceptable Technology

Submittal of survey data shall be gathered by at least one of the following three methods.

1. Real-Time Differential (RTD) GPS:

RTD is a survey technique that uses either a government-established base station that broadcasts corrections or a subscription to a private satellite service. In the state of Florida, the US Coast Guard's navigation beacons are typically used since the entire state is covered by a number of beacons. In coastal lands and inland states where the US Coast Guard's beacons aren't available, a subscription to a private service is required. The antenna that is used in the RTD equipment combines the GPS antenna and a differential correction antenna in a single housing. This method allows users to have a convenient, lightweight GPS package that fits inside of a small backpack. The Coast Guard and private satellite subscription services offer mapping-grade horizontal positions that are typically within three feet. Accurate vertical data is not available when using RTD methods.

2. Total Station, Conventional Survey Methods:

Total Station surveying is the civil engineering standard survey for land development and gives sub-centimeter accuracy to a local benchmark or nationally recognized survey point. Total Station surveying calculates coordinates base on angles, elevations, horizontal and vertical distances.

3. Real-Time Kinematic (RTK) GPS:

RTK is similar to RTD in that a base station broadcasts positional corrections to a roving GPS receiver. The primary differences are that the base receiver is established by the user, and the range, or distance, of the corrections is much more limited. In order to use the RTK technique, the user must establish a base station, a rover and a communication link between them. Unlike RTD where a user simply operates a roving receiver and receives corrections automatically, additional equipment, personnel and training are required to ensure that the RTK technique will be successful. The rewards for using this technique, however, are greater horizontal accuracy and accurate elevations can be obtained. The accuracies obtained are typically plus/minus three centimeters horizontal and plus/minus five centimeters vertical.

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1.02 RELATED WORK

- A. Refer to Conditions of Contract for the general requirements relating to warranties and bonds.
- B. General closeout requirements are included in Section 01700 Contract Closeout.
- C. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Division 2 through 16.

1.03 SUBMITTALS

- A. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Owner.
- B. When a designated portion of the work is completed and occupied or used by the Owners, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within fifteen days of completion of that designated portion of the work.
- C. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner for approval prior to final execution.
- D. Refer to individual Sections of Divisions 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.
- E. At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- F. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents and sized to receive 8-1/2-in by 11-in paper.

- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification Section in which specified and the name of the product or work item.
- H. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address and telephone number of the installer, supplier and manufacturer.
- I. Identify each binder on the front and the spine with the typed or printed title “WARRANTIES AND BONDS”, the project title or name and the name, address and telephone number of the Contractor.
- J. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.04 WARRANTY REQUIREMENT

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- D. Owner’s Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
- E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the contract Documents.
- F. The Owner reserves the right to refuse to accept work for the project where a special warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- G. Disclaimers and Limitations: Manufacturer’s disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.05 DEFINITIONS

- A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 02221

TRENCHING, BACKFILLING AND COMPACTION

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals necessary to perform all trenching for pipelines and appurtenances, including drainage, filling, backfilling, disposal of surplus material and restoration of trench surfaces and easements.
- B. Excavation shall extend to the width and depth shown on the Drawings or as specified and shall provide suitable room for installing conduit, structures and appurtenances.
- C. All excavation, trenching and related sheeting, bracing, etc shall conform to the requirements of the Florida "State Safety Act" (CS/SB 2626) which incorporates, by reference, OSHA's excavation safety standards, 29 CFR 1926.650 Subpart P.
- D. Wherever the requirement for 95 percent compaction is referred to herein it shall mean "at least 95 percent of maximum density as determined by ASTM D1557, Method D".

1.02 RELATED WORK

- A. Section 01110: Environmental Protection Procedures

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 TRENCH EXCAVATION

- A. Trench excavation shall include material of every description and of whatever substance encountered, except rock and boulders.
- B. Strip and stockpile topsoil from grassed areas crossed by trenches. At the Contractor's option, topsoil may be otherwise disposed of and replaced, when required, with approved topsoil of equal quality.
- C. While excavating and backfilling is in progress, traffic shall be maintained, and all utilities and other property protected as provided in the General Conditions and General Requirements.
- D. Trenches shall be excavated to the depth indicated on the Drawings and in widths sufficient for installing the ducts within the trenches for bracing and supporting. The bottom of the excavations shall be firm and dry and in all respects acceptable to the Engineer. Trench width shall be practical minimum.
- E. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. The trench may be excavated by machinery to, or just below the designated subgrade, provided that material remaining in the bottom of the trench is no more than slightly disturbed. Subgrade soils which become soft, loose, "quick",

or otherwise unsatisfactory as a result of inadequate excavation, dewatering or other construction methods shall be removed and replaced by screened gravel fill as required by the Engineer at the Contractor's expense.

- F. Clay and organic silt soils are particularly susceptible to disturbance due to construction operations. When excavation is to end in such soils, use a smooth-edge bucket to excavate the last one foot of depth.
- G. Where pipe is to be laid directly on the trench bottom, final excavation at the bottom of the trench so that pipe or duct can be evenly supported, shall be performed manually, providing a flat-bottom true to grade upon undisturbed material. Bell holes shall be made as required.
- H. Rock shall be removed to a minimum 8-inch clearance around the bottom and sides of all the pipe being laid.

3.02 DISPOSAL OF MATERIALS

- A. Excavated material shall be stacked without excessive surcharge on the trench bank or obstructing free access to hydrants and gate valves. Inconvenience to traffic and abutters shall be avoided as much as possible. Excavated material shall be segregated for use in backfilling as specified below.
- B. It is expressly understood that no excavated material shall be removed from the site of the work or disposed of, except as directed by the Engineer. When removal of surplus materials has been accepted by the Engineer, dispose of such surplus material in approved designated areas.
- C. Should conditions make it impracticable or unsafe to stack material adjacent to the trench, the material shall be hauled and stored at a location provided. When required, it shall be re-handled and used in backfilling the trench.

3.03 TEST PITS

- A. Excavation of test pits may be required for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work.
- B. Test pits shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as specified.

3.04 EXCAVATION BELOW GRADE AND REFILL

- A. Whatever the nature of unstable material encountered or the groundwater conditions, trench drainage shall be complete and effective.
- B. If the Contractor excavates below grade through error or for the Contractor's own convenience, or through failure to properly dewater the trench, or disturbs the subgrade before dewatering is sufficiently complete, he may be directed by the Engineer to excavate below grade as set forth in the following paragraph, in which case the work of excavating below grade and furnishing and placing the refill shall be performed at his own expense.
- C. If the material at the level of trench bottom consists of fine sand, sand and silt or soft earth which may work into the screened gravel notwithstanding effective drainage, the subgrade material shall be removed to the extent directed and the excavation refilled with a 6-in layer of coarse sand, or a mixture graded from coarse sand to the fine peastone, as accepted by the Engineer, to form a filter layer preserving the voids in the gravel bed of the pipe. The

composition and gradation of gravel shall be approved by the Engineer prior to placement. Screened gravel shall then be placed in 6-in. layers thoroughly compacted up to the normal grade of the pipe. If directed by the Engineer, bank-run gravel shall be used for refill of excavation below grade.

- D. Geotextile filter fabric may be substituted for filter layer if accepted by the Engineer. Filter fabric shall be Mirafi 140N, Supac equivalent, or equal.

3.05 BACKFILLING

- A. As soon as practicable after the pipe/conduit has been laid and jointed, backfilling shall begin and thereafter be prosecuted expeditiously. If required, screened gravel shall be placed around the pipe to mid-diameter. As the screened gravel is placed, it shall be compacted by suitable tools.
- B. Where the pipes are laid in unpaved areas, the remainder of the trench shall be filled with common fill in layers not to exceed 1-ft and thoroughly compacted by rolling ramming or puddling, as the Engineer may direct, sufficiently to prevent subsequent settling. The backfill shall be mounded 6-in above the existing grade or as directed. Wherever a loam or gravel surface exists prior to excavations, it shall be removed, conserved and replaced to the full original depth as part of the work under the pipe items. In some areas it may be necessary to remove excess material during the clean-up process, so that the ground may be restored to its original level and condition. If the Contractor prefers not to store loam, gravel, or topsoil he shall replace it with material of equal quality and in equal quantity.
- D. Where the pipes are laid in streets, or other paved areas, the remainder of the trench above the bedding and up to a depth of 1-ft below the bottom of the specified paving shall be backfilled with common fill in 1-ft layers thoroughly compacted by rolling, or ramming as the Engineer may direct. The 1-ft layer below the bottom of the specified paving shall be of limerock base material compacted in 6-in layers.
- E. After the screened gravel bedding (if required) has been placed to the mid-diameter of the pipe, selected common fill as shown shall be placed to a depth of 1-ft over the top of the pipe. Material shall be thoroughly compacted by hand-tamping as placed with at least one man tamping for each man shoveling material into the trench.
- F. The method and degree of compacting backfill will be governed by the type of material and the extent to which any subsequent settlement can be permitted. All compaction shall be to 95 percent of maximum density as determined by ASTM D1557, Method D.

3.06 RESTORING TRENCH SURFACE

- A. Where the trench occurs adjacent to paved streets, in shoulders, sidewalks, or in cross-country areas, the contractor shall thoroughly consolidate the backfill and shall maintain the surface as the work progresses. If settlement takes place, immediately deposit additional fill to restore the level of the ground.
- B. The surface of any driveway or any other area which is disturbed by the trench excavation and which is not a part of the paved road shall be restored to a condition at least equal to that existing before work began.

- C. In sections where the pipeline passes through grassed areas, and at the Contractor's own expense, remove and replace the sod the surface to the satisfaction of the Engineer.

END OF SECTION

SECTION 02999

MISCELLANEOUS WORK AND CLEAN-UP

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes operations which cannot be specified in detail as separate items but can be sufficiently described as to the kind and extent of work involved. The Contractor shall furnish all labor, materials, equipment and incidentals to complete the work under this Section.
- B. The work of this Section includes, but is not limited to, the following:
 - 1. Cooperation with other Contractors.
 - 2. Restoring of sidewalks, driveways, and fences.
 - 3. Crossing utilities.
 - 4. Cleaning up.
 - 5. Incidental work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials required for this Section shall be of the same quality as materials that are to be restored. Where possible, the Contractor shall reuse existing materials that are removed and then replaced.

PART 3 EXECUTION

3.01 COOPERATION WITH OTHER CONTRACTORS

- A. It will be necessary for the Contractor to plan his work and cooperate with other Contractors insofar as possible to prevent any interference and delay.

3.02 RESTORING OF SIDEWALKS, DRIVEWAYS, AND FENCES

- A. Existing public and private sidewalks and driveways disturbed by the Contractor shall be replaced. Paved sidewalks and drives shall be repaved to the limits and thicknesses existing prior to construction. **All disturbed areas shall receive sod.**
 - 1. Sod shall be scarified Argentine Bahia of firm texture having a compacted growth and good root development as approved.
 - 2. Sod shall be certified to meet Florida State Plant board specifications, absolutely true to varietal type, and free from weeds or other objectionable vegetation, fungus, insects and disease of any kind.

3. Before being cut and lifted, the sod shall have been mowed three (3) times, with the final mowing not more than a week before cutting into uniform dimensions.
 4. It is the Contractor's responsibility to supply all water to the site as required during sodding operations until the work is accepted. The Contractor shall make whatever arrangements may be necessary to ensure an adequate supply of water to meet the needs for his work. He shall also furnish all necessary hose, equipment, attachments, and accessories for the adequate irrigation of lawns and planted areas as may be required. Water shall be suitable for irrigation and free from ingredients harmful to plant life.
 5. Maintain landscape work until Owner accepts project. Watering, weeding, cultivating, restoration of grade, mowing and trimming grass, protection from insects and diseases, fertilizing and similar operations as needed to ensure normal growth and good health for live plant material shall be the responsibility of the Contractor and at no additional cost to the Owner. Sodded areas shall receive no less than 1.5 inches of water per week.
- B. It may be necessary for the Contractor to remove, store and replace existing fences during construction. Only the sections directed by the Engineer shall be removed. If any section of fence is damaged due to the Contractor's negligence, it shall be replaced with fencing equal to or better than that damaged, and the work shall be satisfactory to the Engineer.

3.03 CROSSING UTILITIES

- A. This item shall include any extra work required in crossing culverts, water courses, drains, gas mains, and other utilities, including all sheeting and bracing, extra excavation and backfill, or any other work required for the crossing, whether or not shown on the Drawings.

3.04 RELOCATIONS OF EXISTING UTILITIES

- A. The Contractor shall notify the Owner and proper authority of the utility involved when relocation of existing utilities is required. The Contractor shall coordinate all work by the utility so that the progress of construction will not be hampered.

3.05 CLEANING UP

- A. The Contractor shall remove all construction material, excess excavation, buildings, equipment and other debris remaining on the job as a result of construction operations and shall render the site of the work in a neat and orderly condition.

3.06 INCIDENTAL WORK

- A. Do all incidental work not otherwise specified, but obviously necessary for the proper completion of the contract as specified and as shown on the Drawings.

END OF SECTION

SECTION 03301

CONCRETE AND REINFORCING STEEL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install all concrete work complete as shown on the Drawings and as specified herein.

1.02 SUBMITTALS

- A. Submit, in accordance with Section 01300, shop drawings and product data for:
 - 1. Placing drawings and bar bending details in conformity with the recommendations of ACI 315.
 - 2. Technical data on all materials and components.
 - 3. Material Safety Data Sheets (MSDS) for all concrete admixtures and curing agents.
- B. Test Reports
 - 1. Sieve analysis, mechanical properties and deleterious substance content for fine and coarse aggregates.
 - 2. Concrete mixes: For each formulation of concrete proposed for use, submit constituent quantities per cubic yard, water cementitious ratio, concrete slump, type and manufacturer of cement. Provide either a. or b., below, for each mix proposed.
 - a. Standard deviation data for concrete mixes based on statistical records.
 - b. Water cementitious ratio curve for concrete mixes based on laboratory tests. Provide average cylinder strength test results at 7 and 28 days for laboratory concrete mix designs. Provide results of 14 day tests if available.
- C. Certifications
 - 1. Certify that admixtures used in the same concrete mix are compatible with each other and the aggregates.
 - 2. Certify admixtures are made for use in concrete in contact with potable water after 30 days of concrete curing.
 - 3. Certify that the Contractor is not associated with the independent testing laboratory proposed for use by the Contractor nor does the Contractor or officers of the Contractor's organization have a beneficial interest in the laboratory.

1.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
3. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
4. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
5. ASTM C33 - Standard Specification for Concrete Aggregates.
6. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
7. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
8. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete
9. ASTM C150 - Standard Specification for Portland Cement
10. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
13. ASTM C311 - Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete.
14. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
15. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Portland Cement Concrete.

B. American Concrete Institute (ACI).

1. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
2. ACI 232.2R - Use of Fly Ash in Concrete
3. ACI 301 - Specification for Structural Concrete.

4. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
5. ACI 305R - Hot Weather Concreting.
6. ACI 306R - Cold Weather Concreting.
7. ACI 315 - Details and Detailing of Concrete Reinforcement.
8. ACI 318 - Building Code Requirements for Structural Concrete.

C. Concrete Reinforcing Steel Institute (CRSI)

1. MSP - Manual of Standard Practice

- D. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.04 QUALITY ASSURANCE

- A. Comply with ACI 318 and other stated specifications, codes and standards. Apply the most stringent requirements of stated specifications, codes, standards, and this Section when conflicts exist.
- B. If, during the progress of the work, it is impossible to secure concrete of the specified workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the specified properties. Make all changes so ordered at the no additional cost to the Owner.
- C. All field testing and inspection services and related laboratory tests required will be provided by the Contractor. The cost of such work will be paid for by the Contractor. Methods of testing will comply with the latest applicable ASTM methods.
- D. Develop concrete mixes and their testing by an independent testing laboratory engaged by and at the expense of the Contractor. Methods of testing shall comply with the latest applicable ASTM methods.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Ship and store reinforcing steel with bars of the same size and shape fastened in bundles with durable tags, marked in a legible manner with waterproof markings showing the same designations as those shown on the submitted placement drawings. Provide reinforcing steel free from mill scale, loose rust, mud, dirt, grease, oil, ice or other foreign matter. Store off the ground, protect from moisture and keep free from rust, mud, dirt, grease, oil, ice or other injurious contaminants.
- B. Store products in conformity with the manufacturer's recommendations.
- C. Store or stockpile sand, aggregates, cement and fly ash in conformity with ACI 301.

PART 2 PRODUCTS

2.01 GENERAL

- A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. Like items of materials shall be the end products of one manufacturer in order to provide standardization for appearance, maintenance and manufacturer's service.
- C. Materials shall comply with this Section and any applicable State or local requirements.

2.02 MATERIALS

- A. Cement: Domestic portland cement conforming to ASTM C150. Do not use air entraining cements. The allowable types of cement for each class of concrete are shown in Table 1.
- B. Fine Aggregate: Washed inert natural sand conforming to ASTM C33.
- C. Coarse Aggregate: Well-graded crushed stone or washed gravel conforming to ASTM C33, size 57. Limits of deleterious substances and physical property requirements as listed in ASTM C33, Table 3 for severe weathering regions.
- D. Water: Potable water free of oil, acid, alkali, salts, chlorides, (except those attributable to drinking water) organic matter, or other deleterious substances.
- E. Admixtures: Use admixtures free of chlorides and alkalis (except for those attributable to drinking water). The admixtures shall be from the same manufacturer when it is required to use more than one admixture in the same concrete mix. Use admixtures compatible with the concrete mix including other admixtures.
 - 1. Air Entraining Admixture: Conforming to ASTM C260. Proportion and mix in accordance with manufacturer's recommendations.
 - 2. Water Reducing Admixture: Conforming to ASTM C494, Type A. Proportion and mix in accordance with manufacturer's recommendations.
 - 3. Do not use admixtures causing retarded or accelerated setting of concrete without written approval from the Engineer. Use retarding or accelerating water reducing admixtures when so approved.
- F. Fly Ash: Class F fly ash complying with ASTM C618, including the requirements of Table 1 but with the Loss of Ignition (LOI) limited to 3 percent maximum and the optional physical requirements of Table 3.
- G. Deformed Concrete Reinforcing Bars: ASTM A615, Grade 60 deformed bars.
- H. Welded Steel Wire Fabric: Conforming to ASTM A185.

I. Reinforcing Steel Accessories

1. Plastic Protected Wire Bar Supports: CRSI Bar Supports, Class 1 - Maximum Protection.
2. Stainless Steel Protected Wire Bar Supports: CRSI Bar Supports, Class 2 - Moderate Protection with legs made wholly from stainless steel wire.
3. Precast Concrete Bar Supports: CRSI Bar Supports, Precast Concrete Bar Supports. Precast concrete blocks that have equal or greater strength than the surrounding concrete.

J. Tie Wires for reinforcement: 16 gauge or heavier black annealed wire.

2.03 MIXES

- A. Select proportions of ingredients to meet the design strength and materials limits specified in Table 1 and to produce placeable, durable concrete conforming to these Specifications. Proportion ingredients to produce a homogenous mixture which will readily work into corners and angles of forms and around reinforcement without permitting materials to segregate or allowing free water to collect on the surface.
- B. Base concrete mixes on standard deviation data of prior mixes with essentially the same proportions of the same constituents or, if not available, develop concrete mixes by laboratory tests using the materials proposed for the work.
- C. Compression Tests: Provide testing of the proposed concrete mix or mixes to demonstrate compliance with the compression strength requirements in conformity with the provisions of ACI 318.
- D. Entrained air, as measured by ASTM C231, shall be as shown in Table 1.
- E. Slump of the concrete as measured by ASTM C143, shall be as shown in Table 1.
- F. Proportion admixtures according to the manufacturer's recommendations. Two or more admixtures specified may be used in the same mix provided that the admixtures in combination retain full efficiency and have no deleterious effect on the concrete or on the properties of the other admixture(s).

TABLE 1

Class (1)	Design Strength	Cement ASTM C150	Cementitious Content (2) (5)	W/C (3)	WR (4)	Slump Range Inches
A	2500	Type II	440	0.62 max.	Yes	1-4
B	3000	Type II	480	0.54 max.	Yes	1-4
D	4000	Type II	560	0.44 max.	Yes	3-5

All concrete classes shall have 3.5 to 5 percent air entrainment.

NOTES:

- (1) Minimum compressive strength in psi at 28 days
- (2) Minimum cementitious content in lbs per cubic yard (where fly ash is used, cementitious content is defined as cement content plus fly ash content)
- (3) W/C is Maximum Water Cementitious ratio by weight
- (4) WR is water reducing admixture
- (5) Fly ash content in the range of 20-25 percent of the total cement content plus fly ash content, by weight

2.04 MEASURING, BATCHING, MIXING AND TRANSPORTING CONCRETE

- A. Measure, batch, mix and transport concrete in conformance with ASTM C94 and the requirements herein or as otherwise approved in writing by the Engineer.
- B. Ready-mixed concrete, whether produced by a concrete supplier or the Contractor shall conform to the requirements above. Do not hand mix.
- C. Dispense admixtures into the batch in conformity with the recommendations of the admixture manufacturer.
- D. Mix concrete until there is uniform distribution of the materials and discharge completely before the mixer is recharged. The mixer shall be rotated at a speed recommended by the mixer manufacturer and mixing shall be continued for at least 1-1/2 minutes after all the materials are in the mixer. Place concrete within 1-1/2 hours of the time at which water was first added, otherwise it will be rejected. Concrete which has been remixed or retempered, or to which an excess amount of water has been added, will also be rejected.

2.05 FORMS

- A. Provide forms free from roughness and imperfections, watertight and braced and tied to prevent motion when concrete is placed. Wooden spreaders will not be allowed in the concrete.
- B. Wire ties will not be allowed. Metal ties or anchorages which are necessary within the forms shall be so constructed that the metal work can be removed for a depth of at least 1-1/2-in from the concrete surface without damage by spalling. Clean forms before using and treat with form release agent, or other approved material.
- C. All exposed edges of the finished concrete shall be chamfered 3/4-in.

PART 3 EXECUTION

3.01 CONSTRUCTION JOINTS

- A. Locate construction joints where indicated or where approved by the Engineer.
- B. Continue all reinforcing steel through the joint.

- C. At construction joints and at concrete joints indicated to be "roughened", uniformly roughen the surface of the concrete to a full amplitude (distance between high and low points and side to side) of 1/4-in with chipping tools to expose a fresh face. Thoroughly clean joint surfaces of loose or weakened materials by waterblasting or sandblasting and prepare for bonding. At least two hours before and again shortly before the new concrete is deposited, saturate the joints with water. After glistening water disappears, coat joints with neat cement slurry mixed to the consistency of very heavy paste. The surfaces shall receive a coating at least 1/8-in thick, scrubbed-in by means of stiff bristle brushes. Deposit new concrete before the neat cement dries.

3.02 REINFORCING STEEL

- A. Fabricate reinforcing steel accurately to the dimensions shown. Bend bars around a revolving collar having a diameter of not less than that recommended in ACI 318. All bars shall be bent cold.
- B. Provide tension lap splices in compliance with ACI 318. Stagger splices in adjacent bars where possible. Provide Class B tension lap splices at all locations unless otherwise indicated.
- C. Lap splices in welded wire fabric in accordance with the requirements of ACI 318 but not less than 12-in. Tie the spliced fabrics together with wire ties spaced not more than 24-in on center and lace with wire of the same diameter as the welded wire fabric. Offset splices in adjacent widths to prevent continuous splices.
- D. Use precast concrete blocks where the reinforcing steel is to be supported over soil. Use plastic protected bar supports or steel supports with plastic tips where the reinforcing steel is to be supported on forms for a concrete surface that will be exposed to weather, high humidity, or liquid. Use stainless steel supports or plastic tipped metal supports in all other locations unless otherwise noted on the Drawings or specified herein.
- E. Before placing in position, clean reinforcement of loose mill scale and rust, mud, dirt, grease, oil and other coatings, including ice that reduce or destroy bond. When there is a delay in depositing concrete after the reinforcement is in place, bars shall be reinspected and cleaned again when necessary.
- F. Coat reinforcement which is to be exposed for a considerable length of time after being placed with a heavy coat of cement grout.
- G. Do not cover any reinforcing steel with concrete until the amount and position of the reinforcement has been checked and the Engineer has given permission given to proceed.

3.03 INSPECTION AND COORDINATION

- A. Batching, mixing, transporting, placing and curing of concrete shall be subject to the inspection of the Engineer at all times. Advise the Engineer of readiness to proceed at least six working hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing and the alignment, cleanliness and tightness of formwork. Do not place concrete without the inspection and acceptance of the Engineer.

3.04 CONCRETE APPEARANCE

- A. Remix concrete showing either poor cohesion or poor coating of the coarse aggregate with paste. If this does not correct the condition, the concrete shall be rejected.
- B. Provide concrete having a homogeneous structure which, when hardened, will have the specified strength, durability and appearance. Provide mixtures and workmanship such that concrete surfaces, when exposed, will require no finishing except as specified herein.

3.05 PLACING AND COMPACTING

- A. Do not place concrete until forms, condition of subgrade and method of placement have been approved by the Engineer. Remove all debris, foreign matter, dirt, ice and standing water from the forms before depositing concrete. Do not place concrete on frozen subgrade, snow or ice. The contact surface between concrete previously placed and new concrete shall be cleaned and brushed with cement paste. Concrete, except as indicated on the Drawings, shall not be placed in water or submerged within 24 hours after placing, nor shall running water be permitted to flow over the surface of fresh concrete within 4 days after its placing.
- B. Deposit concrete as near its final position as possible to prevent segregation due to rehandling or flowing. Pumping of concrete will be permitted when an approved design mix and aggregate sizes suitable for pumping are used. Do not deposit concrete which has partially hardened or which has been contaminated by foreign materials. If the section cannot be placed continuously, place construction joints as specified or as approved. Place concrete for walls using tremie tubes in 12-in to 24-in lifts, keeping the surface horizontal. Do not drop concrete more than 4-ft.
- C. Use high frequency mechanical vibrators to obtain proper consolidation of the concrete. Do not use vibrators to move or transport concrete in the forms. Do not over-vibrate so as to segregate. Continue vibration until the frequency returns to normal, trapped air ceases to rise and the surface appears liquefied, flattened and glistening. Use spades, rods or forks so that concrete is completely worked around reinforcement, embedded items, pipe stubs, and openings and into corners of forms.

3.06 CURING AND PROTECTION

- A. Protect all concrete work against injury from the elements and defacements of any nature during construction operations.
- B. Cure all concrete in conformance with ACI 301. Concrete that is to be used for the containment of water shall be water cured. Water curing shall be by ponding, by continuous sprinkling or by covering with continuously saturated burlap. Other concrete shall be cured by either water curing, sheet material curing or liquid membrane curing compound except that liquid membrane curing compound shall not be used on any concrete surface where additional concrete is to be placed or where the concrete surface is to be coated or painted.
- C. Protect finished surfaces and slabs from the direct rays of the sun to prevent checking and crazing.

- D. During cold weather concrete shall be batched, delivered, placed, cured and protected in compliance with the recommendations of ACI 306R. Do not use salt, manure or other chemicals for cold weather protection.
- E. During hot weather concrete shall be batched, delivered, placed, cured and protected in compliance with the recommendations of ACI 305R. The temperature of the concrete shall be such that it will cause no difficulties from loss of slump, flash set or cold joints. Immediately cover plastic concrete with sheet curing material during hot weather.

3.07 FIELD TESTS

- A. Sets of field control cylinder specimens will be taken by the Contractor during the progress of the work, in compliance with ASTM C31. The number of sets of concrete test cylinders taken of each class of concrete placed each day will not be less than one set per day, nor less than one set for each 150 cu yds of concrete nor less than one set for each 5,000 sq ft of surface area for slabs or walls. Specimens will be formed in 6-in diameter by 12-in long non-absorbent cylindrical molds.
 - 1. A "set" of test cylinders shall consist of four cylinders: one to be tested at seven days and two to be tested and their strengths averaged at 28 days. The fourth may be used for a special test at 3 days or to verify strength after 28 days if 28 day test results are low.
 - 2. When the average 28 day compressive strength of the cylinders in any set falls below the required compressive strength or below proportional minimum seven-day strengths (where proper relation between seven and 28 day strengths have been established by tests), change proportions, cementitious content, or temperature conditions to achieve the required strengths at no additional cost to the Owner.
- B. Provide an insulated closed curing box for the specimens and protect the specimens against injury or loss through construction operations. Furnish material and labor required for the purpose of taking concrete cylinder samples. All shipping of specimens will be paid for by the Contractor.
- C. Slump tests will be made in the field by the Contractor in conformity with ASTM C143.
- D. Tests for air content will be made in the field by the Engineer in compliance with either the pressure method (ASTM C231) or by the volumetric method (ASTM C173).

3.08 STRIPPING AND FINISHING CONCRETE

- A. Do not remove forms before the concrete has attained a strength of at least 30 percent of the specified design strength nor before reaching approximately "100 day-degrees" of moist curing (whichever is the longer). Degree-days are defined as the total number of 24 hour periods multiplied by the weighted average daily air temperature at the surface of the concrete (e.g., 7 days at an average 50 degrees F = 350 degree-days).
- B. Exercise care to prevent damaging edges or obliterating the lines of chamfers, rustications or corners when removing the forms or doing any other work adjacent thereto.
- C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the Engineer.

- D. Immediately after removal of forms remove tie cones and metal portions of ties. Fill holes promptly upon stripping as follows: Moisten the hole with water, followed by a 1/16-in brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1 to 1.5 mixture of cement and concrete sand mixed slightly damp to the touch (just short of “balling”). Hammer the grout into the hole until dense, and an excess of paste appears on the surface in the form of a spider web. Trowel smooth with heavy pressure. Avoid burnishing.
- E. Defective concrete and honeycombed areas: Chip down square and at least 1-in deep to sound concrete with hand chisels or pneumatic chipping hammers. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded in the parent concrete. If honeycomb exists around reinforcement, chip to provide a clear space at least 3/8-in wide all around the steel. For areas less than 1-1/2-in deep, the patch may be made in the same manner as described above for filling form tie holes, care being exercised to use adequately dry (non-trowelable) mixtures and to avoid sagging. Thicker repairs will require build-up in successive 1-1/2-in layers on successive days, each layer being applied (with slurry, etc.) as described above.
- F. Concrete to receive dampproofing and concrete not exposed in the finished work shall have off-form finish with fins and other projections removed and tie cones and defects filled as specified above.
- G. Screed top surface of slabs to the established grades and to a true plane with a tolerance of 1/8-in when checked with a 10-ft straightedge. Pitch surface to drain unless otherwise noted on the Drawings. Finish the surface to give a smooth, hard, even surface free from high or low spots or other defects. Concrete subject to pedestrian traffic shall be given a broom finish. Failure to meet these conditions shall be cause for removal, grinding, or other correction as directed by the Engineer.

3.09 SCHEDULE

- A. The following (Table 2) are the general applications for the various concrete design strengths to be used:

TABLE 2

<u>Class</u>	<u>Design Strength (psi)</u>	<u>Description</u>
A	2,500	Concrete fill and electrical raceway encasement
B	3,000	Concrete overlay slabs, sidewalks, bollard encasement, and pavements
D	4,000	Slabs on grade and all other structural concrete

END OF SECTION

SECTION 05500

MISCELLANEOUS METAL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install all miscellaneous metal complete as shown on the Drawings and as specified herein.

1.02 SUBMITTALS

- A. Submit, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installation for:
 - 1. Shop drawings, showing sizes of members, method of assembly, anchorage and connection to other members.
- B. Design Data
 - 1. Submit calculations or test data demonstrating that the railings will resist the loads specified in the 2007 Florida Building Code w/ 2009 Supplement and OSHA at the post spacing provided.
 - 2. Submit manufacturer's load and deflection tables for grating.
- C. Certificates
 - 1. Submit certification that the railing system is in compliance with OSHA requirements and 2007 Florida Building Code w/ 2009 Supplement.

1.03 REFERENCE STANDARDS

- A. Aluminum Association (AA)
 - 1. AA M31C22A41
 - a. M31: Mechanical Finish, Fine Satin
 - b. C22: Finish, Medium Matte
 - c. A41: Clear Anodic Coating, Class I
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
 - 2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

3. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
4. ASTM B429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
5. ASTM C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

D. American Welding Society (AWS)

1. AWS D1.1 - Structural Welding Code - Steel.
2. AWS D1.2 - Structural Welding Code - Aluminum.
3. AWS D1.6 - Structural Welding Code - Stainless Steel

E. Federal Specifications

1. FS-FF-B-575C - Bolts, Hexagonal and Square

F. Occupational Safety and Health Administration (OSHA)

G. Florida Building Code

H. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.04 QUALITY ASSURANCE

- A. The work of this Section shall be completely coordinated with the work of other Sections. Verify, at the site, both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.
- B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.
- C. All welding shall be performed by qualified welders and shall conform to the applicable AWS welding code. Welding of steel shall conform to AWS D1.1 and welding of aluminum shall conform to AWS D1.2 and welding of stainless steel shall conform to AWS D1.6.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver items to be incorporated into the work of other trades in sufficient time to be checked prior to installation.
- B. Repair items that have become damaged or corroded to the satisfaction of the Engineer prior to incorporating them into the work.

1.07 PROJECT/SITE REQUIREMENTS

- C. Machine bolts and nuts shall conform to Federal Specification FF-B-575C. Bolts and nuts shall be hexagon type. Bolts, nuts, screws, washers and related appurtenances shall be Type 316 stainless steel.
- D. Epoxy anchoring system shall be a two component epoxy based anchoring system meeting the requirements of ASTM C 881 Type IV, Grade 3. The anchoring system shall have IBC 2006 approval and have approval for cracked concrete. System shall be Hilti HIT-HY 150 MAX-SD, Hilti HIT-RE 500-SD, Simpson Strong-tie Set-XP, or equal. If system other than that shown on the drawings is selected, the Engineer reserves the right to modify the embedment, spacing, and edge distance from those shown on the drawings.

2.04 METAL GRATING

- A. Grating shall have rectangular, 3/16-in thick, bearing bars spaced 1-3/16-in on center with cross bars spaced at 4-in on center. All grating panels shall be banded with a bar the same size as the bearing bars.
 - 1. Grating shall be of the same depth shown on the Drawings, not exceed the fabricator's maximum recommended span, and meet or exceed the following load and deflection criteria for the maximum span length at the opening being covered by the grating.
 - a. The grating shall produce a deflection of 1/360 of the span or less under a uniform live load of 100 lbs/sq ft on the maximum span.
 - b. The grating shall produce a deflection of 1/360 of the span or less under a concentrated live load of 300 lbs applied at the mid point of the maximum span.
 - 2. Openings 2-in or greater in diameter/dimension and grating edges shall be banded with a bar of the same depth and thickness as the bearing bars. Cut bearing bars or cross bars shall be welded to the banding bar.
 - 3. Provide trench grating with symmetrical cross bar arrangement.
 - 4. Grating clamps, nuts, bolts, washers and other fastening devices for grating and grating supports shall be Type 316 stainless steel. All grating shall be anchored to the supporting system using saddle clips.
- B. Aluminum grating material shall be aluminum alloy 6063-T6 with a mill finish. Cross bars shall be attached to the bearing bars with interlocked swaged joints. The grating shall be Type BS by IKG Borden, Houston, TX; Type 19 SG-4 by Ohio Gratings, Inc., Canton, OH or equal.
- C. Metal frames and supports for grating shall be of the same material as the grating unless otherwise shown on the Drawings. Where aluminum supports are used, they shall be fabricated from aluminum alloy 6061-T6.

2.05 RAILINGS

- A. Handrail and guardrail systems shall comply with the requirements of OSHA and FBC.
- B. Aluminum guardrail and handrail shall be a welded or mechanically fastened, seamless, extruded aluminum pipe system. Rails shall be 6063-T6 alloy. Posts shall be 6061-T6 alloy.

Splice and reinforcing sleeves, brackets, end caps, toeboards, etc, shall be aluminum alloy 6063-T6 or 6061-T6. Cast fittings shall be aluminum alloy No. 214. Railing system fastening hardware shall be Type 316 stainless steel. Aluminum shall have a mill finish. After welding, aluminum shall be anodized.

- C. Railings shall be 2 guardrail railing systems, as shown on the Drawings, fabricated with 1-1/2-in nominal diameter pipe. Posts shall be Schedule 80 pipe, minimum and rails and handrail shall be Schedule 40 pipe, minimum. Posts and top rails shall be continuous. Spacing of posts shall not exceed 5-ft on center and shall be uniformly spaced except as otherwise shown on the Drawings. All railing posts shall be vertical.
- D. Welds shall be circumferential welds ground smooth and even to produce a railing that is neat in appearance and structurally sound. Welding methods shall be in conformity with AWS standards for the materials being joined. All rails to post connections shall be coped and fastened by continuous welds. There shall be no burrs, sharp edges or protrusions on any weld on any part of the handrail system. After fabrication, the welds and surrounding area shall be cleaned and hand buffed to blend with the adjacent finish. All mechanical fasteners shall be unobtrusively located in countersunk holes with the top flush with the surface of the rail. Bends in the railing shall be as indicated by the Drawings. No distortion of the circular railing shape will be allowed. Bends and terminal sections shall be made without the use of fittings. Corner bends shall have a 3-in centerline radius
- E. Railing shall be assembled in sections as long as practical but shall not be greater than 24-ft in length. A field splice shall be used when an assembled section is to be attached to another section.
 - 1. Field splices shall use internal splice sleeves located within 8-in of railing posts. The sleeve shall be welded to the rail on one side and fastened with a set screw to the rail on other side. The field splice shall be detailed to take the differential expansion between the railing system and the supporting structure.
 - 2. When the field splice occurs in a railing panel crossing a structure expansion joint, the sleeve shall be welded to the rail on one side and be free to slide in the rail on other side. The field splice shall be detailed to take the same movement as the structure expansion joint.
- F. The bases or supports for railing posts and handrail shall be the types indicated on the Drawings.
 - 1. Stainless steel and aluminum railing posts, which may collect condensation, shall have a 3/16-in drain hole drilled immediately above the concrete encased area, the base flange, or supporting socket on the side away from the walking area. The bottom of the rail post between the drain hole and the bottom of the post shall be filled with an inert material such as a compressed closed cell neoprene rod.
- G. Safety gates, for railing openings, shall be fabricated of matching pipe and rail material and configuration. The gates shall be self-closing gates with approved stop, latch and stainless steel closure spring and hinges.
- H. Barrier chains, for railing openings, shall be fabricated of stainless steel chains. Chain shall be 1/4-in stainless steel links, with eleven links per foot as manufactured by Eastern Chain Works, Inc., NY; Lawrence Metal Products, Inc. or equal. Chains shall be fastened to the handrail posts

at the elevation of each rail. One end of each chain shall be connected to one post with a 1/4-in diameter stainless steel eye bolt and the other end shall be connected to the other post by means of a heavy chromium plated bronze swivel eye slide harness snap and a similar eye bolt.

- I. Toeboards shall be provided on all railing adjacent to a drop in elevation of 4-ft or more. Toeboards are not required on the inclined portion of stairway railings or where concrete or steel curbs, 4-in or more in height, are present. Toeboards shall be 4-in high channels of the same material as the railing. The channels shall have a minimum thickness of 1/8-in and have flanges of not less than 3/4-in nor more than 1-1/2-in in width. Toeboards shall be positioned with a maximum clearance of 1/4-in from the floor and fastened to railing posts with 1/4-in stainless steel U-bolts, with J-bolts at corner posts and with clip angles and two 1/4-in stainless steel expansion bolts at walls.
- J. All railings shall be properly protected by paper, or by an approved coating or by both against scratching, splashes or mortar, paint, or other defacements during transportation and erection and until adjacent work by other trades has been completed. After protective materials are removed, the surfaces shall be made clean and free from stains, marks, or defects of any kind.

2.06 MISCELLANEOUS ALUMINUM

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.
- B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Welding shall be on the unexposed side as much as possible in order to prevent pitting or discoloration of the aluminum exposed surface. Provide holes for temporary field connections and for attachment of the work of other trades.
- C. Miscellaneous aluminum items shall include: beams, angles, closure angles, grates, hatches, floor plates, stop plates, stair nosings and any other miscellaneous aluminum called for on the Drawings and not otherwise specified.
- D. Angle frames for hatches, beams, grates, etc, shall be complete with welded strap anchors attached.
- E. Stair treads for aluminum stairs shall have abrasive non-slip nosing as approved.
- H. Aluminum items shall have a cleaned and degreased mill finish.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install all items as shown on the Drawings.
- B. Abrasions in the shop primer shall be touched up immediately after erection. Areas left unprimed for welding shall be painted with primer after welding.
- C. Specialty products shall be installed in accordance with the manufacturer's recommendations.
- D. Expansion bolts shall be checked for tightness a minimum of 24 hours after initial installation.
- E. Install epoxy bonding systems in compliance with the manufacturer's recommendations.
- F. All railings shall be erected to line and plumb.
- G. All steel surfaces that come into contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation.
- H. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer followed by two coats of aluminum metal and masonry paint to the dissimilar metal.
- I. Where aluminum contacts masonry or concrete, apply a heavy coat of approved alkali resistant paint to the masonry or concrete.
- J. Where aluminum contacts wood, apply two coats of aluminum metal and masonry paint to the wood.
- K. Between aluminum gratings, aluminum stair treads, or aluminum handrail brackets and steel supports, insert 1/4-in thick neoprene isolator pads, 85 plus or minus 5 Shore A durometer, sized for full width and length of bracket or support.

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SECTION 13300

INSTRUMENTATION AND CONTROLS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall procure the services of a single Instrumentation System Supplier (ISS) to furnish and install all materials, equipment, labor and services, except for those services and materials specifically noted, required to achieve a fully integrated and operational system as specified herein and in other Specification Sections listed below.
- B. Auxiliary and accessory devices necessary for system operation or performance, such as transducers, relays, signal amplifiers, intrinsic safety barriers, signal isolators, software, and drivers to interface with existing equipment or equipment provided by others under other Sections of these specifications, shall be included whether they are specifically called out or not.
- C. Substitutions on functions or type of equipment specified shall not be acceptable unless specifically noted. In order to confirm compatibility between all equipment, coordinate all interface requirements with mechanical and electrical systems and furnish any signal isolation devices that might be required.
- D. Equipment shall be fabricated, assembled, installed and placed in operating condition in full conformity with the project Specifications, Drawings, engineering data, instructions, and recommendations of the equipment manufacturer as approved by the Engineer.
- E. To facilitate the Owner's future operation and maintenance, similar products shall be supplied from the same manufacturer.
- F. All equipment and installations shall satisfy applicable Federal, State and local codes.
- G. The responsibilities of the ISS shall include, but not be limited to, the following:
 1. Furnish and install an ultrasonic level instrument for stage measurement, as specified in this Section, in the location shown in the Drawings.
 2. Furnish and install the Outfall Control Panel, as specified in this and related Sections. This control panel shall be located as shown in the Drawings and shall include the following devices:
 - a. PLC
 - b. Ethernet-based radio
 - c. Media converters, power supplies, etc. as needed
 3. Furnish and install the radio antenna and tower, and establish communication with the Eastern Water Reclamation Facility (EWRF), in accordance with Section 13335. The Outfall Control Panel radio will communicate to an existing radio and antenna at EWRF.

- a. It is anticipated that the antenna will be mounted on a tower located adjacent to the Outfall Control Panel, not more than 20 feet in height. The tower is detailed in the Drawings and Specifications.
 - b. Coordinate with the electric utility to determine whether the antenna can be mounted on a tower as described, at the height necessary to establish proper communications as specified herein, in the location shown, and still remain within power line clearances. If not, it may be necessary to mount the antenna on a power pole in accordance with utility specifications. Contact the electric utility for more information: Orlando Utilities Commission, Chris Taylor (407-434-4151) or Chris Fatkin (407-423-9100 x44150).
4. Applications software programming, including alterations to EWRF PLC-01A and the Human-Machine Interface (HMI) graphics and database, will be provided by the Owner.
- a. The list of real and calculated tags to be provided in the PLC program is provided in Appendix A of this Section.

1.02 RELATED WORK

- A. The ISS shall furnish all materials, labor and services specified in the following Specification Sections as required to ensure a single, coordinated system is supplied:
 1. Section 13325 – Control Panels and Panel Mounted Equipment
 2. Section 13335 – Radio Telemetry Equipment
- B. Anchoring requirements are in Divisions 1 and 5.
- C. Electrical specifications are in Division 16.

1.03 SUBMITTALS

- A. General submittal requirements include:
 1. Refer to Section 01300 for general submittal requirements.
 2. Shop drawings shall be submitted as detailed herein. Shop drawings shall demonstrate that the equipment and services to be furnished comply with the provisions of these specifications and shall provide a complete record of the equipment as manufactured and delivered.
 3. Submittals shall be complete; giving equipment specifications, details of connections, wiring, ranges, installation requirements, and specific dimensions. Submittals consisting of only general sales literature shall not be acceptable.
 4. Submittals shall be bound in separate three-ring binders, with an index and sectional dividers, with all drawings reduced to a maximum size of 11-inch by 17-inch, then folded to 8.5 inch by 11 inch for inclusion within the binder. Maximum binder size shall be 3 inches.

5. The submittal drawings' title block shall include, as a minimum, the ISS's registered business name and address, Owner and project name, drawing name, revision level, and personnel responsible for the content of the drawing.
6. Incomplete or partial submittals not complying with the submittal arrangements outlined in this Section will be returned without review.
7. Submittals shall be made as follows:
 - a. Field Instrument Submittal
 - b. Hardware, Panel Drawings and Wiring Diagram Submittal
 - c. Radio System Submittal. Refer to Section 13335 for requirements.
 - d. Testing Plans Submittal
 - e. Training Plan Submittal
 - f. Spares, Expendables, and Test Equipment Submittal
 - g. Final System Documentation

B. Field Instruments Submittal

1. Submit complete documentation of all field instruments using ISA-TR20 data sheet formats and manufacturer catalog cuts. Submit a complete Bill of Materials (BOM) or Index that lists all instrumentation equipment ordered by the loop numbering system as shown in the Contract Documents.
2. Submit separate data sheets for each instrument including:
 - a. Plant Equipment Number and ISA tag number per the drawings
 - b. Product (item) name used herein and on the Contract Drawings
 - c. Manufacturer's complete model number
 - d. Location of the device
 - e. Input - output characteristics
 - f. Range, size, and graduations in engineering units.
 - g. Physical size with dimensions, enclosure NEMA classification and mounting details in sufficient detail to determine compliance with the requirements of the Contract Documents.
 - h. Materials of construction for enclosure and wetted parts.
 - i. Instrument or control device sizing calculations where applicable

- j. Certified calibration data for all flow metering devices.
- k. Two-wire or four-wire device type as applicable.

C. Hardware, Panel Layout Drawings and Wiring Diagrams Submittal

1. For each hardware component supplied, submit a cover page that lists, at a minimum, date, specification number, product name, manufacturer, model number, Location(s), and power required. Preferred format for the cover page is ISA TR20, general data sheet; however, other formats will be acceptable provided they contain all required information.
2. Provide catalog cuts for each hardware component supplied.
3. Provide a complete system architecture diagram showing in schematic form, the interconnections between major hardware components. The system architecture shall be complete and shall depict all required cables, media type between components, network protocol used at each network level, details on connection requirements such as cable pin-outs, port numbers, and rack slot numbers. The intent of this specification requirement is for the ISS to develop a diagram that is complete in every aspect to allow purchase of all required equipment by part number, and to allow a qualified technician to interconnect all equipment without having to refer to additional manuals or literature.
4. Panel Layout Drawings: Drawings shall be furnished for all panels, consoles, and equipment enclosures specified. Panel assembly and elevation drawings shall be drawn to scale and detail all equipment in or on the panel. Panel drawings shall be 11"x17" minimum in size. As a minimum, the panel drawings shall include the following:
 - a. Interior and exterior panel elevation drawings to scale.
 - b. Nameplate schedule.
 - c. Conduit access locations.
 - d. Panel construction details.
 - e. Cabinet assembly and layout drawings to scale. The assembly drawing shall include a bill of material on the drawing with each panel component clearly defined. The bill of material shall be cross-referenced to the assembly drawing so that a non-technical person can readily identify any component of the assembly by manufacturer and model number. Dimensional drawings shall include sunshields, as applicable.
 - f. Submit construction details, NEMA ratings, intrinsically safe barrier information, gas sealing recommendations, purging system details, etc. for panels located in hazardous locations or interfacing to equipment located in hazardous areas.
 - g. For backup batteries, provide calculations of total load and battery run time.
 - h. Heating and cooling calculations for each panel supplied indicating conformance with cooling requirements of the supplied equipment and environmental conditions. Calculations shall include the recommended type of equipment required for both heating and cooling. The calculations must demonstrate that the temperature ratings of all panel components are not exceeded.

- i. Submit evidence that all control panels shall be constructed in conformance with UL 508 and bear the UL seal confirming the construction. Specify if UL compliance and seal application shall be accomplished at the fabrication location or by field inspection by UL inspectors. All costs associated with obtaining the UL seal and any inspections shall be borne by the Contractor and included in the Project Bid Price.

D. Testing Plan Submittals

1. Test Procedure Submittals: Submit the procedures proposed to be followed for each test. Procedures shall include test descriptions, forms, and checklists to be used to control and document the required tests. Include sign-off forms for each testing phase or loop with sign-off areas for the ISS, Engineer, and Owner.
2. Test Documentation: Upon completion of each required test, document the test by submitting a copy of the signed off test procedures. Testing shall not be considered complete until the signed-off test procedures have been submitted and favorably reviewed. Submittal of other test documentation is not acceptable substitute for the formal test documentation.
3. Each loop shall have a Loop Status signoff form to organize and track its inspection, adjustment and calibration. These forms shall include the following information and checkoff items:
 - a. Project Name.
 - b. Loop Number.
 - c. Detailed test procedure indicating exactly how the loop will be tested including all required test equipment, necessary terminal block numbers, and simulation techniques required.
 - d. Tag Number for each component.
 - e. Checkoffs/signoffs for each component.
 - i. Tag/identification
 - ii. Installation
 - iii. Termination - wiring
 - iv. Termination - tubing
 - v. Calibration/adjustment
 - f. Checkoffs/signoffs for the loop.
 - i. Panel interface terminations
 - ii. I/O interface terminations
 - iii. I/O signal operation

- iv. Inputs/outputs operational: received/sent, processed, adjusted
 - v. Total loop operation
 - vi. Space for comments.
 - vii. Sign off and date fields for the Contractor, the Engineer, and the ISS.
4. Each active analog subsystem element shall have a Component Calibration form. These forms shall have the following information including space for data entry:
- a. Project Name.
 - b. Loop Number.
 - c. ISA Tag Number and I/O Module Address.
 - d. Manufacturer.
 - e. Model Number/Serial Number.
 - f. Summary of Functional Requirements. For example:
 - i. For Indicators: Scale ranges
 - ii. For Transmitters/Converters: Scale and chart ranges
 - iii. For Computing Elements: Function
 - iv. For Controllers: Action (direct/reverse) control modes (PID)
 - v. For Switching Elements: Unit range, differential (FIXED/ADJUSTABLE), reset (AUTO/MANUAL)
 - vi. For I/O Modules: Input or output
 - g. Calibrations; for example:
 - i. For Analog Devices: Required and actual inputs and outputs at 0, 50 and 100 percent of span.
 - ii. For Discrete Devices: Required and actual trip points and reset points.
 - iii. For Controllers: Mode settings (PID).
 - iv. For I/O Modules: Required and actual inputs or outputs for 0, 50 and 100 percent of span.
 - h. Space for comments.
 - i. Sign off and date fields for the Contractor, the Engineer, and the ISS.

E. Training Plan Submittal

1. This submittal shall include:
 - a. Definitions, objectives, and target audience of each course.
 - b. Schedule of training courses including proposed dates, duration and locations of each class.
 - c. Complete copy of all proposed handouts and training materials. Training information shall be bound and logically arranged with all materials reduced to a maximum size of 11 inch by 17 inch, then folded to 8.5 inch by 11 inch for inclusion into the binder.

F. Spares, Expendables, and Test Equipment Lists Submittal

1. This submittal shall include for each Subsystem:
 - a. A list of, and descriptive literature for, spares, expendables, and test equipment as specified.
 - b. A list of, and descriptive literature for, additional spares, expendables, and test equipment recommended by the manufacturer.
 - c. Unit and total costs for the additional spare items specified or recommended for each subsystem.

G. Final System Documentation

1. The Final System Documentation shall consist of operations and maintenance manuals as specified herein. The manuals shall be bound in three-ring binders, maximum size of three inches, with Drawings reduced to 11 inch by 17 inch, then folded to 8.5 inch by 11 inch for inclusion. Each section shall have a uniquely numbered tab divider, and each component within each section shall have a separate binder tab divider.
2. The operations and maintenance manuals shall, at a minimum, contain the following information:
 - a. Table of Contents
 - i. A Table of Contents shall be provided for the entire manual with the specific contents of each volume clearly listed. The complete Table of Contents shall appear in each volume.
 - b. Instrument and Equipment Lists
 - i. The following lists shall be developed in Microsoft Excel format and provided not only as a hardcopy in O&M but also electronically on a CD.
 - ii. An instrument list for all devices supplied including tag number, description, specification section and paragraph number, manufacturer, model number, serial number, range, span, location, manufacturer phone number, local supplier name, local supplier phone number, completion year replacement cost, and any other pertinent data.

- iii. An equipment list for all non-instrument devices supplied listing description, specification section and paragraph number, manufacturer, model number, serial number, location, manufacturer phone number, local supplier name, local supplier phone number, completion year replacement cost, and any other pertinent data.
- c. Data Sheets with Vendor Operations and Maintenance Information
- i. ISA TR20 data sheets shall be provided for all field instruments. For non-field instrumentation devices, provide a cover page for each device, piece of equipment, and OEM software that lists, at a minimum, date, specification number, product name, manufacturer, model number, Location(s), and power required. Preferred format for the cover page is ISA TR20, general data sheet; however, other formats will be acceptable provided they contain all required information.
 - ii. Vendor O&M documentation for each device, piece of equipment, or OEM software shall be either new documentation written specifically for this project, or modified standard vendor documentation. All standard vendor documentation furnished shall have all portions that apply clearly indicated with arrows or circles. All portions that do not apply shall be neatly lined out or crossed out. Groups of pages that do not apply at all to the specific model supplied shall be removed.
 - iii. For any component requiring dip switch settings or custom software configuration, that information shall be included along with the corresponding data sheets and O&M information.
- d. As-Built Drawings
- i. Complete as-built drawings, including all drawings and diagram specified in this section under the "Submittals" section. These drawings shall include all termination points on all equipment the system is connected to, including terminal points of equipment not supplied by the ISS.
 - ii. As built documentation shall include information from submittals, as described in this Specification, updated to reflect the as-built system. Any errors in or modifications to the system resulting from the Factory and/or Functional Acceptance Tests shall be incorporated in this documentation.
- e. Original Licensed Software
- i. Submit original CDROMs or DVDs of all software provided under this Contract. Submit original paper based and electronic documentation for all software provided. Submit license agreement information including serial numbers, license agreements, User Registration Numbers and related information. All software provided under this Contract shall be licensed to the Owner at the time of purchase. Provide media in software sleeves within O&M manual.

- f. Electronic O&M Information
 - i. In addition to the hard copy of O&M data, provide an electronic version of all equipment manuals CDROM or DVD. Electronic documents shall be supplied in Adobe Acrobat format.
 - ii. Provide electronic files for all custom-developed manuals. Text shall be supplied in both Microsoft Office format and Adobe Acrobat format.
 - iii. Provide electronic files for all drawings produced. Drawings shall be in AutoCAD ".dwg" format and in Adobe Acrobat format. Drawings shall be provided using the AutoCAD eTransmit feature to bind external references, pen/line styles, and fonts into individual zip files along with the drawing file.
 - iv. Each computer system hardware device shall be backed up onto CDROM or DVD after Substantial Completion and shall be turned over to the Owner.
 - v. If specified in the training section, provide digital copies of all training videos. Videos shall be in a format that is readable by standard DVD players and by standard PC DVD drives. Format and shall be a minimum of 800 by 600 pixels and shall include sound.

3. The cover and edge of each volume shall contain the following information:

Project Name (refer to Contract Documents)
Contract Number (refer to Contract Documents)

Instrumentation and Control System
Hardware [or Applications Engineering] Operations and Maintenance Manual
Specification Sections _____, _____, _____

Subcontractor Name
Date
Volume X of Y
(Where X is the volume number and Y is the number of volumes)

1.04 COORDINATION MEETINGS

- A. Schedule the mandatory coordination meetings as described herein. The meetings shall be held at the Owner's designated location and shall include attendance by the Owner, the Engineer, the Contractor, and the ISS's Project Engineer. Prepare and distribute an agenda for this meeting a minimum of one week before the scheduled meeting date. Meeting shall be scheduled a minimum of one week before the requested meeting date.
 - 1. A project kickoff coordination meeting shall be held within two weeks after Notice To Proceed. The purpose of the meeting shall be to discuss the ISS's understanding of the project; discuss any proposed substitutions or alternatives; schedule testing and delivery deadline dates; provide a forum to coordinate hardware and software related issues; and request any additional information required from the Owner. The meeting will last up to one business day.

1.05 REFERENCE STANDARDS

- A. Publications are referred to in the text by basic designation only. Where a date is given for reference standards, that edition shall be used. Where no date is given for reference standards, the latest edition in effect at the time of bid opening shall apply.
- B. International Society of Automation (ISA)
 - 1. ISA S5.2, Binary Logic Diagrams for Process Operations
 - 2. ISA S5.3, Graphic Symbols for Distributed Control/Shared Display Instrumentation Logic and Computer Systems.
 - 3. ISA S5.4, Instrument Loop Diagrams.
 - 4. ISA TR20, Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.
 - 5. ISA RP60.3, Human Engineering for Control Centers
 - 6. ISA RP60.6, Nameplates, Labels, and Tags for Control Centers
- C. National Electrical Manufacturers Association (NEMA)
- D. National Fire Protection Agency (NFPA)
 - 1. NFPA 70, National Electrical Code (NEC).
- E. Underwriters Laboratories, Inc. (UL)
 - 1. UL 508 - Industrial Control Equipment - for custom fabricated equipment
 - 2. A nationally recognized testing laboratory, as approved by the Authority having jurisdiction, may substitute for UL listing on commercial off the shelf products.

1.06 QUALITY ASSURANCE

- A. The Instrumentation System Supplier (ISS) shall be a "systems integrator" regularly engaged in the design and the installation of instrumentation systems and their associated subsystems as they are applied to the municipal water and wastewater industry. For the purposes of this Specification Section, a "systems integrator" shall be interpreted to mean an organization that complies with all of the following criteria:
 - 1. Employs personnel on this project who have successfully completed ISA or manufacturers training courses on general process instrumentation and configuration and implementation of the specific programmable controllers, computers, and software proposed for this project. Key personnel shall hold ISA CCST Level 1 certification or have a minimum of 10 years of verifiable plant startup experience. Key personnel shall include, as a minimum, the lead field technician.
 - 2. Has successfully completed work of similar or greater complexity on at least three previous projects within the last five years. Successful completion shall be defined as a finished

project completed on time, without any outstanding claims or litigation involving the ISS. Potential references shall be for projects where the ISS's contract was of similar size to this project.

3. Has been actively engaged in the type of work specified in this Specification Section for a minimum of five years.
- B. The ISS shall maintain a permanent, fully staffed and equipped service facility within 200 miles of the project site with full time employees capable of designing, fabricating, installing, calibrating, and testing the systems specified herein. At a minimum, the ISS shall be capable of responding to on-site problems within 12 hours of notice. Provide an on-site response within 4 hours of notification starting at two months before scheduled startup to twelve months after startup completion.
- C. ISS shall hold a valid UL-508 certification for their panel fabrication facility.
- D. Actual installation of the instrumentation system need not be performed by the ISS's employees; however, the ISS as a minimum shall be responsible for the technical supervision of the installation by providing on site supervision to the installers of the various components.
- E. The selected ISS shall be one of the following:
 1. CEC Controls
8128 Blaikie Ct.
Sarasota, FL 34240
TEL: (941) 556-9465
 2. Curry Controls
4245 South Pipkin Road
Lakeland, FL 33811
TEL: (863) 646-5781
 3. DCR Engineering
502 County Road 640 E
Mulberry, FL 33860
TEL: (863) 428-8080
 4. QuantumFlo
210 Springview Commerce Drive, Bldg #150
DeBary, FL 32713
TEL: (386) 753-9702

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery, storage, and handling shall be in accordance with Section 01600.
- B. Shipping Precautions
 1. After completion of shop assembly, factory test and approval of all equipment, cabinets, panels and consoles shall be packed in protective crates and enclosed in heavy duty (5 mil) polyethylene envelopes or secured sheeting to provide protection from damage, dust and moisture. Dehumidifiers shall be placed inside the polyethylene coverings. The

equipment shall then be skid-mounted for final transport. Lifting rings shall be provided for moving without removing protective covering. Boxed weights shall be shown on shipping tags together with instructions for unloading, transporting, storing and handling at the job site.

2. Manufacturer's special instructions for field handling, storage and installation required for protection, shall be securely attached to the packaging for each piece of equipment prior to shipment. The instructions shall be stored in resealable plastic bags or other means of protection.
3. If any apparatus has been damaged, such damage shall be repaired at no additional cost to the owner.

1.08 NOMENCLATURE AND IDENTIFICATION

A. Field Instrument Tags

1. A permanent stainless steel, phenolic, or other non-corrosive material tag firmly attached and permanently and indelibly marked with the instrument tag number, as indicated in the Drawings, shall be provided on each piece of equipment supplied under this Section. Equipment shall be tagged before shipping to the site.

1.09 WARRANTY

- A. Provide warranty per Section 01740, Warranties and Bonds, and as specified herein.

1.10 PROJECT/SITE REQUIREMENTS

- A. Environmental Requirements. Location is an outdoor NEMA 4X environment.
- B. Elevation: Equipment shall be designed to operate at the project ground elevation.
- C. Temperature: Outdoor areas' equipment shall operate between -10 and 50 C degrees ambient. Additional cooling or heating shall be furnished if required by the equipment as specified herein.
- D. Relative Humidity. Air conditioned area equipment shall operate between 20 to 95 percent relative, non-condensing humidity. All other equipment shall operate between 0 to 100 percent relative, condensing humidity.

PART 2 PRODUCTS

2.01 PRODUCTS GENERAL

- A. All instrumentation and electronic equipment shall be of the manufacturer's latest design, utilizing printed circuitry and epoxy or equal coating to prevent contamination by dust, moisture and fungus. The field mounted equipment and system components shall be designed for installation in dusty, humid and slightly corrosive service conditions.

- B. All instruments shall be provided with mounting hardware and floor stands, wall brackets, or instrument racks unless otherwise noted. Provide stainless steel fasteners only. Provide and size anchors in accordance with Division 1 as required per the seismic calculations. Provide minimum size anchor of 3/8-inch.
- C. All indicators shall be linear in process units, unless otherwise noted. All transmitters shall be provided with indicators in process units, accurate to two percent or better.
- D. All equipment, cabinets and devices furnished shall be heavy-duty type, designed for continuous industrial service. The system shall contain similar products of a single manufacturer, and shall consist of equipment models, which are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion.
- E. All electronic/digital equipment shall be provided with radio frequency interference protection.
- F. Electrical
 - 1. Equipment shall operate on a 60 Hertz alternating current power source at a nominal 120 volts, plus or minus 10 percent, except where specifically noted. Regulators and power supplies required for compliance with the above shall be provided between power supply and interconnected instrument loop. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.
 - 2. With the exception for field device network connected devices, all electronic instrumentation shall utilize linear transmission signals of isolated 4 to 20 mA DC (milliampere direct current) capable of driving a load up to 750 ohms, unless specified otherwise. However, signals between instruments within the same panel or cabinet may be 1-5 VDC (volts direct current).
 - 3. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standard signals for remote transmission. No zero based signals will be allowed.
 - 4. All switches shall have double-pole double-throw contacts rated at a minimum of 600 VA, unless noted otherwise.
 - 5. Switches and/or signals indicating an alarm, failure or upset condition shall be wired fail-safe to the SCADA system. A fail-safe condition is an open circuit when in an alarm state.
 - 6. Materials and equipment shall be UL approved. Where components are not available with UL approval, integrate the device with ground fault protective devices, isolation transformers, fuses, or other protective equipment necessary to achieve compliance with UL 508 requirements.
 - 7. All equipment furnished shall be designed and constructed so that in the event of power interruption, the systems specified herein shall go through an orderly shutdown with no loss of memory, and shall resume normal operation without manual resetting when power is restored, unless otherwise noted.
 - 8. All transmitter output signals shall include signal and power source isolation.

2.02 ELECTRICAL SURGE PROTECTION

- A. General - Surge protection shall be provided to protect the electronic instrumentation system from induced surges propagating along the signal and power supply lines from lightning, utility, or the plant electrical system. The protection systems shall be such that the protective level shall not interfere with normal operation, but shall be lower than the instrument surge withstand level. Protection shall be maintenance free and self-restoring. Devices shall have a response time of less than 50 nanoseconds and be capable of handling a discharge surge current (at an $8 \times 20 \mu\text{s}$ impulse waveform) of at least 8 kA. Ground wires for all instrumentation device surge protectors shall be connected to a low resistance ground.
- B. Provide protection of all 120 VAC power feeds into control panels, instruments, and control room equipment. Surge arresters shall be Transtector ACP-100BW Series, Phoenix Contact "Mains-PlugTrab", MCG Surge Protection 400 Series, or equal.
- C. 4-20 mA Signal Lines and Non-Fiber Based Data Highway Circuits – Provide protection on all signal and data highway circuits that leave a building or are routed external to a building. Circuit protection shall be provided at both ends of the signal or data highway lines within the control panel at one end and as close to the instruments or termination device as possible. Provide signal surge suppression devices as manufactured by Phoenix Contact, EDCO, Emerson Network Power Control Concepts, or equal.
- D. Non-Fiber Serial and Antenna Cabling – Provide protection on all communication and data highway circuits that leave the control panel or are routed external to it. Surge protection devices shall be Phoenix Contact PlugTrab Series, Transtector FSP Series, MTL Surge Technologies (Telematic) NP Series, or equal.

2.03 ULTRASONIC LEVEL METER

- A. Type
 - 1. Non-contact ultrasonic level sensor with integral loop-powered transmitter.
- B. Function/Performance
 - 1. Measuring Range: Range as indicated in the Drawings, up to 40 ft (12m).
 - 2. Accuracy: greater of ± 6 mm or $\pm 0.2\%$ of span.
 - 3. Operating Temperature: -40 to 60 degrees C.
 - 4. Power Requirement: 24 VDC loop powered.
 - 5. Output: 4-20 mA DC.
 - 6. Display: Local digital indicator displaying level in engineering units.
- C. Physical
 - 1. Instrument shall be provided with a stainless steel three-inch Class 150 (DN 80, PN16) mounting flange.

2. Housing shall be NEMA 4X (IP66). Where the instrument is installed in a hazardous area, the housing shall be explosion-proof, approved for Class I, Division 1, Groups C and D (EEx d IIB T4) installation.
3. Provide all necessary stainless steel hardware for mounting.

D. Manufacturer(s)

1. Endress+Hauser Prosonic M FMU40 series.
2. Siemens SITRANS LU.
3. Or approved equal.

2.04 PROGRAMMABLE LOGIC CONTROLLER (PLC)

- A. Provide Programmable Logic Controller equipment with the required memory and functional capacity to perform the specified sequence of operation with the scheduled input and output points.
- B. PLCs shall include processor, power supply, input/output modules, communication modules, redundancy modules, and remote interface modules as required to meet system requirements.
- C. Furnish products listed and classified by Underwriters Laboratories (UL) approval as suitable for purpose specified and indicated.
- D. All equipment and devices furnished hereunder shall be designed for continuous industrial service. The system shall contain products of a single manufacturer, insofar as possible, and shall consist of equipment models that are currently in production.
- E. All equipment furnished shall be designed and constructed so that in the event of power interruption the systems shall go through an orderly shutdown with no loss of memory, and resume normal operation without manually resetting when power is restored.
- F. The PLCs shall communicate between the operator workstation and field-mounted devices. Communications protocol shall be completely transparent to process operators at the Human Machine Interface (HMI).
- G. The PLC shall be capable of stand-alone operation in the event of failure of the communication link to the HMI subsystem.
- H. The PLC shall include input/output modules, interface modules, communication modules, and power supply as needed to meet system input and output requirements.
- I. Other specifications:
 1. Electrical supply voltage to the PLC shall be 24VDC. PLC system power supplies shall be fused for overload protection.
 2. Temperature: All PLC hardware shall operate at an ambient temperature of 0 to +55 degrees C (+32 to +140 degrees F), with an storage ambient temperature rating of -25 to +70 degrees C (-40 to +185 degrees F).

3. Relative Humidity: The Programmable Controller hardware shall function continuously in the relative humidity range of 30 percent to 95 percent non-condensing.
- J. All necessary cables shall be included. All cables and connectors shall be as specified by the manufacturer. Cables shall be assembled and installed per the manufacturer recommendations.
- K. Central Processing Unit (CPU)
1. The CPU shall be a microprocessor that provides system timing and is responsible for scheduling I/O updates, with no user programming required to ensure discrete or analog update. It shall execute user relay ladder logic programs, communicate with intelligent I/O modules, and perform on-line diagnostics. The CPU shall consist of a single module which solves application logic, stores the application program, stores numerical values related to the application processes and logic, and interfaces to the I/O.
 2. The CPU shall sample all the discrete and analog inputs and outputs including internal coils and registers, and service special function modules every scan. The CPU shall process the I/O with user program(s) stored in memory, then control the outputs based on the results of the logic operation.
 3. Supply the CPU with a battery-backed time of day clock and calendar.
- L. Diagnostics
1. The CPU shall perform on-line diagnostics that monitor the internal operation of the PLC. If a failure is detected, the CPU shall initiate system shutdown and fail-over. The following, at a minimum, shall be monitored: Memory failure, memory battery low, and general fault, communications port failure, scan time over run, I/O failure, and analog or special function I/O module failure.
 2. All diagnostic information shall be accessible to the host communications interfaces and to the PLC program.
 3. The PLC shall have indicators and on board status area to indicate the following conditions:
 - a. CPU run
 - b. CPU error or fault
 - c. I/O failure or configuration fault.
 - d. Battery good
 - e. Communications indicator
- M. Memory
1. The user program and data shall be contained in non-volatile battery backed memory.
 2. Type: CMOS RAM program memory.

3. Memory Backup: lithium battery backup or Flash memory system capable of retaining all memory for a minimum of three months.
4. Backup Battery: The backup battery shall be capable of being replaced without disrupting memory integrity. Provide a visual indication of low battery voltage and a low battery alarm contact.
5. Flash Memory: Upon power loss, the PLC shall transfer internal memory to flash memory before the PLC powers down.
6. The operating system shall be contained in non-volatile firmware. The memory containing the operating system shall be field updateable via a separate update tool.

N. Programming Environment

1. Programming port: The PLC shall utilize a serial, USB or Ethernet port for programming.
2. On-Line programming: Application programs may be modified or stored while the CPU is running, with minimal impact on the scan time.
3. IEC 61131-3 programming languages supported: Ladder logic, function block, sequential function chart, and structure text.
4. Supply all hardware and software necessary to program the CPU in these languages.

O. Communication Ports

1. The CPU shall be expandable and supplied with additional modules to support the required communication interfaces.

P. Manufacturer:

1. Provide all PLCs from a single manufacturer. If the PLC manufacturer has authorized third party vendors to provide modules that are compatible with their platforms, then products manufactured by these authorized third party vendors will be acceptable.
2. The PLC shall be Siemens Model 1214, or other 1200 series as required.

2.05 SPARE PARTS

- A. All spare parts shall be wrapped in bubble wrap, sealed in a polyethylene bag complete with dehumidifier, then packed in cartons and labeled with indelible markings. Complete ordering information including manufacturer's contact information (address and phone number), part name, part number, part ordering information, and equipment name and number(s) for which the part is to be used shall be supplied with the required spare parts. The spare parts shall be delivered and stored in a location directed by the Owner or Engineer.
- B. Furnish one spare of each type of installed Surge protection devices.
- C. Other spare parts are specified in Related Sections.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION

- A. Instrumentation and accessory equipment shall be installed in accordance with the manufacturer's instructions. The locations of equipment, transmitters, alarms and similar devices indicated are approximate only. Exact locations of all devices shall be as approved by the Engineer during construction. Obtain in the field, all information relevant to the placing of process control equipment and in case of any interference with other work, proceed as directed by the Contractor and furnish all labor and materials necessary to complete the work in an approved manner at no additional cost to the Owner.
- B. All equipment used in areas designated as hazardous shall be designed for the Class, Group and Division as required for the locations as shown on the Drawings and specified in Division 16. All work shall be in strict accordance with codes and local rulings.
- C. Unless specifically indicated, direct reading or electrical transmitting instrumentation shall not be mounted on process piping. Instrumentation shall be mounted on instrument racks or stands. All instrumentation connections shall be provided with shutoff and drain valves. For differential pressure transmitters, 5-valve manifolds for calibration, testing and blow down service shall also be provided. For chemical or corrosive fluids, diaphragm seals with flushing connections shall be provided.
- D. All piping and tubing to and from field instrumentation shall be provided with necessary unions, calibrations and test tees, couplings, adaptors, and shut-off valves. Process tubing shall be installed to slope from the instrument toward process for gas measurement service and from the process toward the instrument for liquid measurement service. Provide drain/vent valves or fittings at any process tubing points where the required slopes cannot be maintained.
- E. Brackets and hangers required for mounting of equipment shall be provided. They shall be installed as shown and not interfere with any other equipment.
- F. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded at only one ground point for each shield.
- G. Investigate each space in the building through which equipment must pass to reach its final location. If necessary, ship material in sections sized to permit passing through restricted areas in the building. Provide on-site service to oversee the installation, the placing and location of system components, their connections to the process equipment panels, cabinets and devices, subject to the Engineer's approval. Certify that field wiring associated with his/her equipment is installed in accordance with best industry practice. Schedule and coordinate work under this section with that of the electrical work specified under applicable Sections of Division 16.
- H. Installation of fiber optic cable within control panel and console assemblies. Refer to cable manufacturer's specifications for bend radius. Use cable breakout assembly as recommended by the cable manufacturer. Provide wire basket, strain relief as required to meet manufacturer's strain requirements.
- I. Provide sun shields for equipment mounted outdoors in direct sunlight. Sunshields shall include standoffs to allow air circulation around the cabinet.

3.02 TESTING

- A. As part of the requirement of this specification section, it is the responsibility of the ISS to provide a complete operational control system. Confirmation of an operational control system is dependent upon results derived from test procedures as specified in this Section. The ISS shall test all equipment at the factory prior to shipment. Unless otherwise specified in the individual specification sections, all equipment provided by the ISS shall be tested at the factory as a single fully integrated system.
- 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 and/or Owner-approved procedures, forms, and all checklists as submitted by the ISS under Part 1 of this Specification. Each test to be performed shall be described and a space provided after it for sign-off by the appropriate parties after its satisfactory completion. The ISS shall include "punchlist" forms with the test procedures to document issues that arise during the testing. Punchlist forms, at a minimum, shall include a specification cross reference; an issues description field; a resolution description field; and a sign-off area for the ISS, Owner, and Engineer.
- D. Copies of the signed-off test procedures, forms, and checklists will constitute the required testing documentation. The test result forms shall be submitted to the Engineer for approval within 10 days of completion of each test.
- E. The ISS shall 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. These simulation techniques shall be defined in the test procedures.
- F. The ISS shall coordinate all required testing with the Contractor, all affected Subcontractors, the Engineer, and the Owner.
- G. The ISS shall furnish the services of field service engineers, all special calibration and test equipment, and labor to perform the field tests.
- H. The Engineer reserves the right to test or retest all specified functions, whether or not explicitly stated on the Test Procedures, as required to determine compliance with the functional requirements of the overall system. Such testing required to determine compliance with the specified requirements shall be performed at no additional cost to the Owner. The Engineer's decision shall be final regarding the acceptability and completeness of all testing.
- I. No equipment shall be shipped until the Engineer and/or Owner has received all test results and approved the system is ready for shipment.
- J. Correction of Deficiencies
 - 1. All deficiencies in workmanship and/or items not meeting specified testing requirements shall be corrected to meet specification requirements at no additional cost to the Owner.

2. Testing, as specified herein, shall be repeated after correction of deficiencies is made until the specified requirements are met. This work shall be performed at no additional cost to the Owner.

K. At a minimum, the testing shall include the following:

1. Functional Demonstration Test (FDT)
 - a. Prior to startup, the entire installed instrument and control system shall be certified that it is ready for operation. All preliminary testing, inspection, and calibration shall be complete.
 - b. Once a process area has been started up and is operating, a witnessed functional test shall be performed on that system to demonstrate that it 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. Loop-specific and non-loop-specific tests shall test the entire installed system and all functions demonstrated using live field-based data to the greatest extent possible.
 - d. Updated versions of the documentation specified to be provided for during the factory tests shall be made available to the Engineer at the job site both before and during the tests. In addition, one copy of all O & M Manuals shall be available for reference at the job site, both before and during testing.
 - e. During the FDT, a demonstration of communication failure and recovery shall be accomplished. This test shall be scheduled and coordinated with Owner's personnel to minimize the impact on plant operations.
 - f. Following initial startup, the entire process control system shall operate for a continuous 100 hours without failure before this test will be started.
 - g. Punchlist items and resolutions noted during the test shall be documented on the Punchlist/Resolution form. In the event of rejection of any part or function test procedure, the ISS shall perform repairs, replacement, and/or retest within 10 days.
 - h. Upon successful completion of the FDT, the ISS shall submit a record copy of the test results to the Owner and Engineer.

3.03 TRAINING

A. General

1. The cost of the training programs shall be included in the Contract price. The training and instruction shall be directly related to the system being supplied. The training program shall represent a comprehensive program covering all aspects of the operation and maintenance of the system.
2. All training schedules shall be coordinated with and at the convenience of the OWNER. Shift training may be required to correspond to the OWNER'S working schedule.

3. All onsite instructors must be intimately familiar with the operation and control of the OWNER'S facilities.
4. Provide detailed training manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project. The manuals shall be provided for each student. Provide electronic copy of each training manual in PDF format for OWNER'S future use.
5. The trainer shall make use of teaching aids, manuals, slide/video presentations, etc. After the training services, all training materials shall be delivered to OWNER.
6. The OWNER reserves the right to video record all custom training sessions. All training videos shall become the sole property of the OWNER.
7. The system supplier shall be retained to provide operation and maintenance training for all plant monitoring and control system equipment as specified herein.
8. For equipment items not manufactured by the system supplier, on-site training shall be provided by an authorized representative of the equipment manufacturer. The manufacturer's representative shall be fully knowledgeable in the operation and maintenance of the equipment.

B. Training Summary

1. The following training courses listed in the summary table shall, as a minimum, be provided:

Description	Minimum Course Duration (hours)	Number of Trainees
Onsite Training		
Installed Control System	2	2
Instruments	2	2
RTU and Communications	2	2

2. Detailed training shall be provided on the actual configuration and implementation for this Contract. Training shall cover all aspects of the system that will allow the OWNER'S personnel to maintain, modify, troubleshoot, and develop future additions/deletions to the system. The training shall cover the following subjects, as a minimum:
 - a. System overview.
 - b. System hardware components and specific equipment arrangements and configuration.
 - c. Test, adjustment, and calibration procedures.
 - d. Periodic maintenance.

- e. Troubleshooting and diagnosis.
- f. Network configuration, communications, and operation.

END OF SECTION

**Appendix A:
 PLC Tag List**

TAG DESCRIPTION	TAG NAME
OUTFALL FLOW	ET01E_100FIT_OUTFALL_EFF_FI
OUTFALL VOLUME FLOW TOTAL 1	ET01E_100FIT_OUTFALL_EFF_FQI1
OUTFALL VOLUME FLOW TOTAL 2 (LIFE)	ET01E_100FIT_OUTFALL_EFF_FQI2
FLOW RAW INPUT	ET01E_100FIT_OUTFALL_FLOW_RAW
FLOW TRANSMITTER BROKEN	ET01E_100FIT_OUTFALL_FXMR_YA
HIGH FLOW ALARM	ET01E_100FIT_OUTFALL_FI_H_YA
HIGH FLOW ALARM SETPOINT	ET01E_100FIT_OUTFALL_FI_H_YA_SP
LOW FLOW ALARM	ET01E_100FIT_OUTFALL_FI_L_YA
LOW FLOW ALARM SETPOINT	ET01E_100FIT_OUTFALL_FI_L_YA_SP
OUTFALL VOLUME FLOW TOTAL 1 RESET	ET01E_100FIT_OUTFALL_FQI_RES
OUTFALL FLOW TOTAL PREV HOUR	ET01E_100FIT_OUTFALL_EFF_HFQI
OUTFALL FLOW TOTAL HOUR 0	ET01E_100FIT_OUTFALL_EFF_HFQI_0
OUTFALL FLOW TOTAL HOUR 1	ET01E_100FIT_OUTFALL_EFF_HFQI_1
OUTFALL FLOW TOTAL HOUR 2	ET01E_100FIT_OUTFALL_EFF_HFQI_2
OUTFALL FLOW TOTAL HOUR 3	ET01E_100FIT_OUTFALL_EFF_HFQI_3
OUTFALL FLOW TOTAL HOUR 4	ET01E_100FIT_OUTFALL_EFF_HFQI_4
OUTFALL FLOW TOTAL HOUR 5	ET01E_100FIT_OUTFALL_EFF_HFQI_5
OUTFALL FLOW TOTAL HOUR 6	ET01E_100FIT_OUTFALL_EFF_HFQI_6
OUTFALL FLOW TOTAL HOUR 7	ET01E_100FIT_OUTFALL_EFF_HFQI_7
OUTFALL FLOW TOTAL HOUR 8	ET01E_100FIT_OUTFALL_EFF_HFQI_8
OUTFALL FLOW TOTAL HOUR 9	ET01E_100FIT_OUTFALL_EFF_HFQI_9
OUTFALL FLOW TOTAL HOUR 10	ET01E_100FIT_OUTFALL_EFF_HFQI_10
OUTFALL FLOW TOTAL HOUR 11	ET01E_100FIT_OUTFALL_EFF_HFQI_11
OUTFALL FLOW TOTAL HOUR 12	ET01E_100FIT_OUTFALL_EFF_HFQI_12
OUTFALL FLOW TOTAL HOUR 13	ET01E_100FIT_OUTFALL_EFF_HFQI_13
OUTFALL FLOW TOTAL HOUR 14	ET01E_100FIT_OUTFALL_EFF_HFQI_14
OUTFALL FLOW TOTAL HOUR 15	ET01E_100FIT_OUTFALL_EFF_HFQI_15
OUTFALL FLOW TOTAL HOUR 16	ET01E_100FIT_OUTFALL_EFF_HFQI_16
OUTFALL FLOW TOTAL HOUR 17	ET01E_100FIT_OUTFALL_EFF_HFQI_17
OUTFALL FLOW TOTAL HOUR 18	ET01E_100FIT_OUTFALL_EFF_HFQI_18
OUTFALL FLOW TOTAL HOUR 19	ET01E_100FIT_OUTFALL_EFF_HFQI_19
OUTFALL FLOW TOTAL HOUR 20	ET01E_100FIT_OUTFALL_EFF_HFQI_20
OUTFALL FLOW TOTAL HOUR 21	ET01E_100FIT_OUTFALL_EFF_HFQI_21
OUTFALL FLOW TOTAL HOUR 22	ET01E_100FIT_OUTFALL_EFF_HFQI_22
OUTFALL FLOW TOTAL HOUR 23	ET01E_100FIT_OUTFALL_EFF_HFQI_23
STATION POWER LOSS	ET01E_OUTFALL_PWR_YA
TVSS ALARM	ET01E_OUTFALL_TVSS_YA
LOW BATTERY ALARM	ET01E_OUTFALL_BAT_YA
RTU SCADA PANEL INTRUDER ALARM	ET01E_OUTFALL_INT_YA
PLC OR MODULE FAIL	ET01E_OUTFALL_PLC_YA
COMMUNICATION FAIL ALARM	ET01E_OUTFALL_SYSTEM_ERROR
CRITICAL COMM. FAILURE	ET01E_OUTFALL_COM01_YAC
RTU REAL TIME CLOCK DAY	ET01E_OUTFALL_RTC_DAY
RTU REAL TIME HOUR	ET01E_OUTFALL_RTC_HOUR
RTU REAL TIME CLOCK MINUTE	ET01E_OUTFALL_RTC_MINUTE
RTU REAL TIME CLOCK MONTH	ET01E_OUTFALL_RTC_MONTH
RTU REAL TIME CLOCK YEAR	ET01E_OUTFALL_RTC_YEAR

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SECTION 13325

CONTROL PANELS AND PANEL MOUNTED EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Refer to Section 13300.
- B. Furnish and install control panels and panel mounted equipment as specified herein and shown on the Drawings.
- C. Furnish the following panels and consoles. Each panel shall be supplied with full sub-panels and side panels as required.

Panel Designation	Minimum Panel Size	Maximum Space Available	Enclosure Rating & Type
Outfall Control Panel	48-inch high by 24-inch wide by 12-inch deep	72-inch high by 36-inch wide by 24-inch deep	NEMA Type 4X, stainless steel construction, front access only

1.02 RELATED WORK

- A. Refer to Section 13300.

1.03 SUBMITTALS

- A. Refer to Section 13300.

PART 2 PRODUCTS

2.01 GENERAL

- A. Refer to Section 13300.

2.02 LIGHTNING/SURGE PROTECTION

- A. Refer to Section 13300.

2.03 CONTROL PANEL GENERAL REQUIREMENTS

- A. The dimensions within this Section and on the Contract Drawings are for general reference only. Ensure that final enclosure sizing and panel arrangements accommodate all required equipment for a fully integrated and operational system as specified herein and in the Contract Documents.

- B. Each control panel and terminal cabinet shall bear the UL label. The UL label shall apply to the enclosure, the specific equipment supplied with the enclosure, and the installation and wiring of the equipment within and on the enclosure. If required for UL labeling, provide ground fault protective devices, isolation transformers, fuses and any other equipment necessary to achieve compliance with UL 508 requirement.
- C. All panel doors shall have a lock installed in the door handle, or a hasp and staple for padlocking. Locks for all panels provided under this Contract shall be keyed alike.
- D. The devices designated for rear-of-panel mounting shall be arranged within the panel according to respective panel drawings and in a manner to allow for ease of maintenance and adjustment. Heat generating devices such as power supplies shall be located at or near the top of the panel.
- E. The panels shall be completely fabricated, instruments and devices installed and wired at the ISS's facility.
- F. All components shall be mounted in a manner that shall permit servicing, adjustment, testing, and removal without disconnecting, moving, or removing any other component. Components mounted on the inside of panels shall be mounted on removable plates and not directly to the enclosure. Mounting shall be rigid and stable unless shock mounting is required otherwise by the manufacturer to protect equipment from vibration. Component mounting shall be oriented in accordance with manufacturer's recommendations. The internal components shall be identified with suitable plastic or metal engraved nametags mounted adjacent to (not on) each component identifying the component in accordance with the drawing, specifications, and ISS's data.
- G. All exterior panel mounted equipment shall be installed with suitable gaskets, faceplates, etc. required to maintain the NEMA rating of the panel.
- H. Nameplates
 - 1. All panels and panel devices shall be supplied with suitable nameplates, which identify the panel and individual devices as required.
 - 2. Nameplates shall be 3/32-inch thick, black and white, Lamicoid with engraved inscriptions. The letters shall be Black against a White background unless otherwise noted. Edges of the nameplates shall be beveled and smooth. Nameplates with chipped or rough edges will not be acceptable.
 - 3. Nameplate fasteners and mounting shall be epoxy adhesive.
 - 4. For every panel, provide a panel nameplate with a minimum of 1" high letters. Provide legend plates or 1-in by 3-in engraved nameplates with 1/4-in lettering for identification of door mounted control devices, pilot lights, and meters.

2.04 PANEL MATERIALS AND CONSTRUCTION

A. Structure and Enclosure

- 1. Panels shall be of NEMA 4X, 316 stainless steel construction. Panels shall be constructed of not less than 14 gauge material, suitably braced internally for structural rigidity and strength. Provide angle stiffeners as required on the back of the panel face to prevent panel deflection under instrument loading or operation. Internally the panels shall be supplied

with a structural framework for instrument support purposes and panel bracing. The internal framework shall permit panel lifting without racking or distortion. Provide removable lifting rings designed to facilitate simple, safe rigging, and lifting of the control panels during installation.

2. Each panel shall be provided with full height, fully gasketed access doors, and heavy duty stainless steel locking handle. Panel access doors shall be provided with full length, continuous, piano type stainless steel hinges with stainless steel pins.
3. The panels, including component parts, shall be free from sharp edges and welding flaws. Wiring shall be free from kinks and sharp bends and shall be routed for easy access to other components for maintenance and inspection purposes.
4. The panel shall be suitable for top and bottom conduit entry as required by the Electrical Drawings. For top mounted conduit entry, the panel top shall be provided with nominal one-foot square removable access plates, which may be drilled to accommodate conduit and cable penetrations. All conduit and cable penetrations shall be provided with ground bushings, hubs, gasketed locknuts, and other accessories as required to maintain the NEMA rating of the panel and electrical rating of the conduit system.

B. Finish Requirements

1. All sections shall be descaled, degreased, filled, ground and finished.
2. The panels shall have edges ground smooth and shall be sandblasted and then cleaned with a solvent. Surface voids shall be filled and ground smooth.
3. Immediately after cleaning, one coat of a rust-inhibiting primer shall be applied inside and outside, followed by an exterior intermediate and top coat of a two-component type epoxy enamel. A final sanding shall be applied to the intermediate exterior coat before top coating.
4. Apply a minimum of two coats of flat white lacquer on the panel interior after priming.
5. Unless otherwise noted, the finish exterior colors shall be ANSI 61 gray with a textured finish.

- C. Print storage pockets shall be provided on the inside of each panel. The storage pockets shall be steel, welded on to the door, and finished to match the interior panel color. The storage pocket shall be sufficient to hold all of the prints required to service the equipment, and to accommodate 8.5 inch by 11 inch documents without folding.

2.05 ENVIRONMENTAL CONTROL

- A. All panels shall be provided with sun shields, heat sinks, or air conditioning units as required to limit temperature buildup inside of panel. The internal temperature of all panels shall be regulated to a range of 45 Deg F to 104 Deg F under all conditions. Under no circumstances shall the panel cooling or heating equipment compromise the NEMA rating of the panel.
- B. ISS shall submit heat dissipation calculations for every control panel.

- C. Provide custom fabricated sun shields for all outdoor panels in accordance with the following requirements:
1. Sun shields shall be fabricated from minimum 12 gauge Type 316 stainless steel. Units shall be designed, fabricated, installed, and supported to fully cover and shade the top, sides and back of the enclosure, and to partially shade the front panel of the enclosure, from direct exposure to sunlight from sunrise to sunset.
 2. Depending on overall size, sun shields may be fabricated in single or multiple segments for attachment to the enclosure support framing or to separate free standing framing around the enclosure.
 3. Sun shields shall not be attached directly to the enclosure by drilling holes through, or welding studs to, the enclosure surfaces, and shall be designed and mounted to provide a minimum 3-inch air gap all around the enclosure for air circulation and heat dissipation.
 4. The top section of all sun shields shall be sloped at a minimum angle of 5 degrees from horizontal. For wall mounted enclosures, the top section shall slope downward away from the wall and towards the front of the enclosure. For free standing, floor mounted and frame mounted enclosures the top section shall slope downward towards the back side of the enclosure.
 5. The front edge of the top section of all sun shields shall incorporate a narrow and more steeply sloped drip shield segment which sheds water away from the front of the enclosure and prevents it from dripping or running directly onto the front panel of the enclosure.
 6. All seam welds used in sun shield fabrication shall be continuous and shall be ground smooth.
 7. All exposed corners, edges and projections shall be smooth rounded or chamfered to prevent injury.
- D. Provide an integral heater, fan, and adjustable thermostat to reduce condensation and maintain the minimum internal panel temperature. Mount the unit near the bottom of the enclosure with discharge away from heat-sensitive equipment. Heater shall be Hoffman DAH or equal.

2.06 CORROSION CONTROL

- A. Panels shall be protected from internal corrosion by the use of corrosion-inhibiting vapor capsules as manufactured by Northern Technologies International Corporation, Model Zerust VC; Hoffman Model AHCI; or equal.

2.07 CONTROL PANEL - INTERNAL CONSTRUCTION

A. Internal Electrical Wiring

1. All interconnecting wiring shall be stranded, type MTW, and shall have 600 volt insulation and be rated for not less than 90 degrees Celsius. Wiring for systems operating at voltages in excess of 120 VAC shall be segregated from other panel wiring either in a separate section of a multi-section panel or behind a removable Plexiglas or similar dielectric barrier. Panel layout shall be developed such that technicians shall have complete access to 120 VAC and lower voltage wiring systems without direct exposure to higher voltages.

2. Power distribution wiring on the line side of fuses or breakers shall be 12 AWG minimum. Control wiring on the secondary side of fuses shall be 16 AWG minimum. Electronic analog circuits shall utilize 18 AWG shielded, twisted pair, cable insulated for not less than 600 volts.
3. Power and low voltage DC wiring systems shall be routed in separate wireways. Crossing of different system wires shall be at right angles. Different system wires routed parallel to each other shall be separated by at least 6-inches. Different wiring systems shall terminate on separate terminal blocks. Wiring troughs shall not be filled to more than 60 percent visible fill.
4. Terminations
 - a. All wiring shall terminate onto single tier terminal blocks, where each terminal is uniquely and sequentially numbered. Direct wiring between field equipment and panel components is not acceptable.
 - b. Multi-level terminal blocks or strips are not acceptable.
 - c. Terminal blocks shall be arranged in vertical rows and separated into groups (power, AC control, DC signal). Each group of terminal blocks shall have a minimum of 25 percent spares.
 - d. Terminal blocks shall be the compression type, fused, unfused, or switched as shown on the Contract Drawings or specified elsewhere in Division 13.
 - e. Discrete inputs and outputs (DI and DO) shall have two terminals per point with adjacent terminal assignments. All active and spare PLC and controller points shall be wired to terminal blocks.
 - f. Analog inputs and outputs (AI and AO) shall have three terminals per shielded pair connection with adjacent terminal assignments for each point. The third terminal is for shielded ground connection for cable pairs. Ground the shielded signal cable at the PLC cabinet. All active and spare PLC and controller points shall be wired to terminal blocks.
 - g. Wire and tube markers shall be the sleeve type with heat impressed letters and numbers.
 - h. Only one side of a terminal block row shall be used for internal wiring. The field wiring side of the terminal shall not be within 6-inches of the side panel or adjacent terminal or within 8-inches of the bottom of free standing panels, or within 3-inches of stanchion mounted panels, or 3-inches of adjacent wireway.
 - i. Circuit power from the control panel out to field devices (switches, dry contacts etc.) that are used as discrete inputs to the PLC input cards shall be isolated with an isolating switch terminal block with flip cover that is supplied with a dummy fuse. Isolation switch block shall be an Allen Bradley Model 1492-H7 or equal. One isolating switch terminal block per loop numbered piece of equipment and one per spare I/O point is acceptable.

- j. All PLC discrete outputs to the field shall be isolated with an isolating fuse switch terminal block with a flip cover and a neon blown fuse indicator. The single circuit fusible terminal block shall be an Allen Bradley 1492-H4 or equal.
5. All wiring to hand switches and other devices, which are live circuits independent of the panel's normal circuit breaker protection, shall be clearly identified as such.
6. All wiring shall be clearly tagged and color coded. All tag numbers and color coding shall correspond to the panel wiring diagrams and loop drawings prepared by the ISS. All power wiring, control wiring, grounding, and DC wiring shall utilize different color insulation for each wiring system used. The color coding scheme shall be:
 - a. Incoming 120 VAC Hot - Black
 - b. 120 VAC Hot wiring downstream of panel circuit breaker – Red
 - c. 120 VAC Hot wiring derived from a UPS system – Red with Black stripe
 - d. Three phase power – Brown, Orange, Yellow, and Green ground or as specified in Division 16.
 - e. 120 VAC neutral - White
 - f. Ground - Green
 - g. DC power or control wiring – Blue
 - h. DC analog signal wiring – Black (+), White (-)
 - i. Foreign voltage – Yellow
7. Provide surge protectors on all incoming power supply lines at each panel per the requirements of Section 13300.
8. Each field instrument furnished under Division 13 and shown on the Drawings as deriving input power from the control panel(s) shall have a separate power distribution circuit with a circuit breaker or fuse and blown fuse indication. All instruments requiring 120VAC power shall be powered from the UPS source in the panel where the instrument signals lands.
9. Provide redundant DC power supplies to power field instruments and panel devices, as specified in this Section.
10. Wiring trough for supporting internal wiring shall be plastic type with snap-on covers. The side walls shall be open top type to permit wire changing without disconnecting. Trough shall be supported to the subpanel by stainless steel screws. Trough shall not be bonded to the panel with glue or adhesives.
11. Each panel shall have a single tube, fluorescent light fixture, 20 Watt in size, mounted internally to the ceiling of the panel. Light fixture shall be switched and shall be complete with the lamp.

12. Each panel shall contain a door switch for generation of a panel intrusion alarm which shall be wired to the PLC for SCADA notification.
 13. Each panel shall have a specification grade duplex convenience receptacle with ground fault interrupter, mounted internally within a stamped steel device box with appropriate cover. Convenience receptacle shall not be powered from a UPS and shall be protected by a dedicated fuse or circuit breaker.
 14. Each panel shall be provided with an isolated copper grounding bus for all signal and shield ground connections. Shield grounding shall be in accordance with the instrumentation manufacturer's recommendations.
 15. Each panel shall be provided with a separate copper power grounding bus (safety) in accordance with the requirements of the National Electrical Code.
 16. Each panel shall have control, signal, and communication line surge suppression in accordance with Section 13300.
 17. Each panel shall be provided with a circuit breaker to interrupt incoming power.
 18. Additional electrical components including transformers, motor starters, switches, circuit breakers, etc. shall be in compliance with the requirements of Division 16.
- B. Relays not provided under Division 16 and required for properly completing the control function specified in Division 13, Division 16, or shown on the Drawings shall be provided under this Section.
- C. The orientation of all devices when installed shall be per the manufacturer's recommendations. No vertical orientation of PLC racks shall be allowed unless specifically indicated by the manufacturer as an acceptable mounting alternative and also approved by the Engineer.

2.08 DC POWER SUPPLY

- A. Provide a 24 VDC power supply and battery backup in the control panel to power field instruments, panel devices, etc., as required. Equip the power supply with a power on/off circuit breaker. Provide sealed high-temperature type battery and continuous charger for backup power.
- B. The 24 VDC power supply shall meet the following requirements:
1. Input power: 120 VAC, plus or minus 10 percent, 60 Hz.
 2. Output voltage: 24 VDC.
 3. Output voltage adjustment: 5 percent.
 4. Line regulation: 0.05 percent for 10 volt line change.
 5. Load regulation: 0.15 percent no load to full load.

6. Ripple: 3 mV RMS.
 7. Operating temperature: 32 to 140 degrees Fahrenheit.
- C. Size the 24 VDC power supply to accommodate the design load plus a minimum 25 percent spare capacity. Battery shall be sized to support full load operation for 30 minutes upon loss of power.
 - D. Provide output overvoltage and overcurrent protective devices with the power supply to protect instruments from damage due to power supply failure and to protect the power supply from damage due to external failure.
 - E. Provide an alarm contact output to the PLC upon low battery condition.
 - F. Mount the 24 VDC power supply such that dissipated heat does not adversely affect other panel components.

2.09 SPARE PARTS

- A. General requirements for spare parts are specified in Section 13300.
- B. The following control panel spare parts shall be furnished:
 1. Fuses and circuit breakers - 10% (minimum of 10 fuses and 2 circuit breakers) of each type and size installed.
 2. Panel Mounted power supplies - one of each type installed.
 3. Backup batteries – one of each type installed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The panels shall be installed at locations as shown on the Contract Drawings.
- B. Refer to Section 13300.

3.02 TESTING

- A. Refer to Section 13300.

END OF SECTION

SECTION 13335

RADIO TELEMETRY EQUIPMENT

PART 1 GENERAL

1.01 SCOPE

- A. This section describes the requirements for furnishing, installing, and starting up a Spread Spectrum (SS) Radio System for communications between the central SCADA system and the new remote site. The ISS shall supply a radio communication system that meets the system requirements for a polling SCADA system using Ethernet protocol.
- B. Refer to Section 13300.

1.02 SYSTEM DESCRIPTION

- A. The SS radio system shall be comprised of, but not limited to, the following (refer to the Drawings):
 - 1. Existing SS radio "Head-End" equipment located at the Eastern Water Reclamation Facility (EWRf).
 - 2. A remote SS radio installed at the outfall site.
 - 3. Omni-directional or directional (Yagi) antennas, coaxial cable, connectors, in-line coaxial cable surge protectors, and antenna mounting supports as required. Each antenna shall be mounted on a support structure which meets the requirements for that site as shown on the drawings. The Contractor shall be responsible for obtaining any and all required Construction Permits for the installation of equipment at the sites and shall meet all applicable codes and regulations. Refer to Section 13300 for coordination with electric utility (OUC) regarding antenna installation.
 - 4. The topography of the SCADA service area may not permit direct line of sight radio paths from the remote site to the head-end location. In this event, the SS radio network may require additional repeater sites than that covered under these Plans and Specifications. The quantity and location of repeater radios necessary to make the system operative shall be determined in the field by the ISS and shall be furnished and installed at the ISS's expense. The ISS shall hire a reputable firm to perform a field radio path analysis in order to make certain that the minimum signal strength requirements (Paragraph 1.03, A5 below) at each remote station are met. The results of the radio path analysis shall be submitted to the Engineer for review.
- B. All equipment furnished under this Section of the Specifications shall be the responsibility of the ISS. The ISS shall assume responsibility for the complete radio telemetry including radios, antennas, and radio diagnostic system. This shall include system testing and installation. The ISS shall furnish and install any additional equipment (e.g. repeaters, towers, etc.) necessary to provide a functional system. A functional system shall be defined as a system where the

received signal at any location not be less than 20 dB fade margin based on radio manufacturer's published receive sensitivity for 10^{-6} bit error rate for unfaded signal.

1.03 SUBMITTALS

- A. Include the following information for each product specified in this section in the submittal for this section.
 - 1. Data sheets and catalog literature for hardware (radios and accessories), and for the poll/response SCADA communications software that will be used.
 - 2. Physical dimension drawings.
 - 3. A complete set of installation and service manuals for the equipment specified in this section.
 - 4. Installation and interconnection/wiring diagrams depicting the proposed installation of the equipment, in conformance to the requirements specified on the Plans. These drawings shall be detailed to the extent that they may be modified after installation to serve as the "AS-BUILT" drawings.
 - 5. Radio survey results, as per paragraph 1.02.A.4.
 - 6. Antenna tower details and structural calculations, as per paragraph 2.02.D.

1.04 SPARE PARTS

- A. A total of two complete spread spectrum radios shall be furnished as unit-swappable spares. Radios and firmware for all system radios and spare radios must be identical to minimize spare parts stocking.

PART 2 PRODUCTS

2.01 SPREAD SPECTRUM RADIOS

- A. The 900 MHz Spread Spectrum (SS) radios shall operate under FCC Part 15 rules for unlicensed radio operation in the 902 MHz to 928 MHz band. The radio shall utilize the frequency-hopping technique to accomplish these functions.
- B. The following general requirements shall be met by the SS radio:
 - 1. Frequency Hopping Range: 1019 frequencies (channels), 25 Khz bandwidth per channel or 162 channels, 100 KHz spacing, over 902-928 MHz spread spectrum band
 - 2. Agency Approvals: FCC Part 15.247, FM
 - 3. Environmental: Full performance -30° to $+60^{\circ}\text{C}$
 - 4. Power Requirements: 24 VDC.
 - 5. RTU/PLC Interface: Ethernet 10-base T, RJ45 connector.

6. Data Rate: 1 Mbps/512 kbps, user configured.
7. System Gain: 139dB @ 512kbps; 134dB@1Mbps
8. Receiver Sensitivity: -97dBm @ 512kbps with 10^{-6} BER; -92dBm @ 1Mbps with 10^{-6} BER
9. Protocols: Wireless Ethernet TCP/IP.
10. Encryption: AES-128 with automatic key rotation.
11. Management: HTTPS.

C. Radios shall be Microwave Data Systems model GE MDS iNET II, or approved equal.

2.02 ANTENNAS AND TOWER

A. Antennas (Yagi directional antennas) shall be furnished as required based on path analysis data.

B. The antennas shall meet the following requirements:

1. Frequency Range: 900 to 960 Mhz
2. Gain: as required
3. Bandwidth: 60 Mhz
4. Maximum Power Input: 150 watts
5. VSWR: Less than 1.5
6. Lightning Protection: Direct ground
7. Connector: Type N female
8. Polarization: Vertical
9. Rated Wind Speed: 150 mph
10. Impedence: 50 Ohms
11. Mounting Hardware: Clamps, standoff hardware as recommended by the antenna manufacturer

C. Manufacturer: RFS Celwave. or approved equal.

- D. The antenna at the remote site shall be mounted on a hot-dipped galvanized steel support structure next to the RTU panel which meets the requirements shown on the Drawings. Tower and foundation shall be provided. All mounting hardware shall be made of stainless steel. Antenna height shall be as required, 20 feet nominal, to be verified by radio site survey. The mast and foundation shall meet or exceed the wind and debris requirements per Florida Building Code. Calculations for the antenna foundation must be submitted signed and sealed by a Florida Registered Professional Engineer for approval.

2.03 TRANSMISSION CABLE AND ACCESSORIES

- A. The transmission cable connecting the SS radio antenna port with the antenna shall be the low-loss foam-dielectric coaxial type. This cable shall be ½ inch diameter (Andrew LDF4-50A, or equal). A single continuous piece of coaxial cable shall be furnished for each radio. For coax runs exceeding 100 feet in length, furnish 7/8" diameter cable (Andrew LDF5-50A, or equal).
- B. Provide one three-foot section of "superflexible" transmission cable for coax interconnection at the radio antenna port. Provide standard Type N connectors at each end which will mate with the SS radio and the transmission cable.
- C. Furnish two N-type connectors for terminating both ends of each transmission cable.
- D. Coaxial cable grounding kits shall be furnished. Furnish Andrew, or equal. Furnish two kits per SS radio.
- E. One in-line coaxial cable surge protector shall be furnished for each cable. Furnish Polyphaser, or equal with N-connector mating.
- F. Provide Andrew coaxial cable hanger kits and clamping hardware. Adequate kits shall be installed to anchor the cables at three-foot intervals on the vertical antenna mast/tower.
- G. All outdoor coaxial connectors shall be wrapped with two layers of Scotch Super 88 UV resistant tape, and then coated with two layers of Scotch-Kote.

2.04 RADIO CONFIGURATION AND DIAGNOSTIC SYSTEM

- A. A radio configuration and diagnostics system shall be furnished with the SS radio system. This system shall be manufactured by the SS radio MANUFACTURER. The system shall provide configuration capabilities to set up and modify, if necessary, the operating parameters of each radio, and provide diagnostic features to test system performance. The system shall be integral to each SS radio and include centralized computer software for a Personal Computer running a current MS-Windows operating system.
- B. The radio system shall include diagnostic capabilities that enable the user to reconfigure the system in the field. Diagnostics must also monitor system communications and provide statistics on communications performance and throughput.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION

- A. All work shall be executed in full accordance with codes and local rulings. Should any work be performed contrary to said rulings, ordinances and regulations, the ISS shall bear full responsibility for such violations and assume all costs arising therefrom.

END OF SECTION

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SECTION 16020

ELECTRICAL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials and equipment required to install complete and make operational, electrical and process instrumentation systems for the Wetland Outfall Monitoring Station along Alafaya Trail in Orange County as specified and shown on the Drawings.
- B. The work shall include furnishing and installing the following:
 - 1. Electrical service from the Power Company.
 - 2. Conduit, wire and field connections for all devices, control panels and electrical equipment furnished under other Divisions of these Specifications.
 - 3. Conduit, wiring and terminations for all field-mounted instruments furnished and mounted under other Divisions of these Specifications, including process instrumentation primary elements, transmitters, local indicators and control panels. Lightning and surge protection equipment wiring at process instrumentation transmitters. Install vendor furnished cables specified under other Divisions of these Specifications.
 - 4. Furnish and install precast handholes as required.
 - 5. Grounding System
 - 6. Underground System
- C. Each bidder or their authorized representatives shall, before preparing their proposal, visit all areas where work is to be performed and inspect carefully the existing field conditions. The submission of the proposal by this bidder shall be considered evidence that they have visited the site and noted the locations and conditions under which the work will be performed and that they takes full responsibility for a complete knowledge of all factors governing his/her work.
- D. Excavation, bedding material, forms, concrete and backfill for underground raceways; forms and concrete for electrical equipment furnished under Division 16. The work shall be in accordance with Divisions 2 and 3.

1.02 RELATED WORK

- A. Excavation and backfilling, including gravel or sand bedding for underground electrical work is included in Division 2.

1.03 SUBMITTALS

- A. Submit, in accordance with Section 01300, shop drawings for equipment, materials and other items furnished under Division 16.
- B. Check shop drawings for accuracy and contract requirements prior to submittal. Shop drawings shall be stamped with the date checked and a statement indicating that the shop drawings conform to Specifications and Drawings. This statement shall also list all exceptions to the Specifications and Drawings. Shop drawings not so checked and noted shall be returned.
- C. The Engineer's check shall be for conformance with the design concept of the project and compliance with the Specifications and Drawings. Errors and omissions on approved shop drawings shall not relieve the Contractor from the responsibility of providing materials and workmanship required by the Specifications and Drawings.
- D. All dimensions shall be field verified at the job site and coordinated with the work of all other trades.
- E. Material shall not be ordered or shipped until the shop drawings have been approved. No material shall be ordered or shop work started if shop drawings are marked "APPROVED AS NOTED - CONFIRM," "APPROVED AS NOTED - RESUBMIT" or "NOT APPROVED."

1.04 CONTRACT PERFORMANCE REQUIREMENTS

- A. Electric equipment, materials and installation shall comply with the latest edition of the National Electrical Code (NEC) and with the latest edition of the following codes and standards:
 - 1. National Electrical Safety Code (NESC)
 - 2. Occupational Safety and Health Administration (OSHA)
 - 3. National Fire Protection Association (NFPA)
 - 4. National Electrical Manufacturers Association (NEMA)
 - 5. American National Standards Institute (ANSI)
 - 6. Insulated Cable Engineers Association (ICEA)
 - 7. Instrument Society of America (ISA)
 - 8. Underwriters Laboratories (UL)
 - 9. Factory Mutual (FM)
 - 10. National Electrical Testing Association (NETA)

- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 PRIORITY OF THE CONTRACT DOCUMENTS

- A. If, during the performance of the work, the Contractor finds a conflict, error or discrepancy between or among one or more of the Sections or between or among one or more Sections and the Drawings, furnish the higher performance requirements. The higher performance requirement shall be considered the equipment, material, device or installation method which represents the most stringent option, the highest quality or the largest quantity.
- B. In all cases, figured dimensions shall govern over scaled dimensions, but work not dimensioned shall be as directed by the Engineer and work not particularly shown, identified, sized, or located shall be the same as similar work that is shown or specified.
- C. Detailed Drawings shall govern over general drawings, larger scale Drawings take precedence over smaller scale Drawings, Change Order Drawings shall govern over Contract Drawings and Contract Drawings shall govern over Shop Drawings.
- D. If the issue of priority is due to a conflict or discrepancy between the provisions of the Contract Documents and any referenced standard, or code of any technical society, organization or association, the provisions of the Contract Documents will take precedence if they are more stringent or presumptively cause a higher level of performance. If there is any conflict or discrepancy between standard specifications, or codes of any technical society, organization or association, or between Laws and Regulations, the higher performance requirement shall be binding on the Contractor, unless otherwise directed by the Engineer.
- E. In accordance with the intent of the Contract Documents, the Contractor accepts the fact that compliance with the priority order specified shall not justify an increase in Contract Price or an extension in Contract Time nor limit in any way, the Contractor's responsibility to comply with all Laws and Regulations at all times

1.06 ENCLOSURE TYPES

- A. Unless otherwise specified electrical equipment enclosures shall be NEMA 3R.

1.07 SERVICE AND METERING

- A. The power company serving this project is Orlando Utilities Commission (OUC). Service will be obtained at 120/240-volts, single-phase, 3-Wire, 60 Hz from a pole mounted transformer furnished and installed by OUC.
- B. The power company will be responsible for the following work:
 - 1. Furnishing and installing the primary overhead conductors and pole line.
 - 2. Furnishing and installing the riser pole, primary cutouts, lightning arresters and grounding.
 - 3. Furnishing and installing the pole mounted transformer and transformer grounding.

4. Termination of primary and secondary cables at riser pole.
5. Furnishing meter, meter base and enclosure.

C. Provide the following coordination, work and materials:

1. Obtain an estimate from the power company for the work described in Paragraph 1.07B above and include the cost of the power company work in the Bid Price.
2. Make all arrangements with the power company for obtaining electrical service, pay all power company charges and furnish all labor and material required for the electrical service.
3. Furnishing secondary conduits and cables including handhole at base of utility pole.
4. Coordinate the exact location of the electrical equipment rack and antenna within the existing easement and avoid the existing overhead power lines. Comply with all power company requirements. Note there is no accurate survey available of the area.

1.08 CODES, INSPECTION AND FEES

- A. Equipment, materials and installation shall comply with the requirements of the local authority having jurisdiction.
- B. Obtain all necessary permits and pay all fees required for permits and inspections.

1.09 TESTS AND SETTINGS

- A. Test systems and equipment furnished under Division 16 and repair or replace all defective work and equipment.
- B. Test the grounding system using the three point fall in potential method.
- C. Test all 600 Volt wire insulation with a meg-ohm meter after installation. Make tests at not less than 500V. Submit a written test report of the results to the Engineer.
- D. Testing shall be scheduled and coordinated with the Owner at least two weeks in advance. Provide qualified test personnel, instruments and test equipment.

1.10 RECORD DRAWINGS

- A. As the work progresses, legibly record all field changes on a set of project contract drawings, hereinafter called the "record drawings."
- B. Record drawings shall accurately show the installed condition of the following items as applicable to this project:
 1. One-line Diagram(s).

2. Raceways and pullboxes.
3. Conductor sizes and conduit fills.
4. Panel Schedule(s).
5. Control Wiring Diagram(s).
6. Equipment and wiring device locations.
7. Underground raceway routing.

1.11 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be new.
- B. Material and equipment of the same type shall be the product of one manufacturer and shall be UL listed.
- C. Warrant all equipment furnished under Division 16 in accordance with Section 01740.

1.12 EQUIPMENT IDENTIFICATION

- A. Identify equipment (disconnect switches, separately mounted motor starters, control stations, etc) furnished under Division 16 with the name of the equipment it serves. Motor control centers, control panels, panelboards, switchboards, switchgear, junction or terminal boxes, transfer switches, etc, shall have nameplate designations as shown on the Drawings.
- B. Nameplates shall be engraved, laminated plastic, not less than 1/16-in thick by 3/4-in by 2-1/2-in with 3/16-in high white letters on a black background.
- C. Nameplates shall be bonded using an epoxy or similar permanent waterproof adhesive. Two sided foam adhesive tape is not acceptable. Where the equipment size does not have space for mounting a nameplate the nameplate shall be permanently fastened to the adjacent mounting surface.

1.13 INTERPRETATION OF DRAWINGS

- A. Unless specifically stated to the contrary, the Drawings are not intended to show exact locations of conduit runs. Coordinate the conduit installation with other trades and the actual supplied equipment.
- B. Install each circuit in a separate conduit unless otherwise shown on the Drawings.
- C. Unless otherwise approved by the Engineer, conduit shown exposed shall be installed exposed; conduit shown concealed shall be installed concealed.

- D. Where circuits are shown as "home-runs" all necessary fittings and boxes shall be provided for a complete raceway installation. Where home-runs indicate conduit is to be installed concealed or exposed the entire branch circuit shall be installed in the same manner. Unless otherwise indicated install branch circuit conduits exposed in process/industrial type spaces and concealed in finished spaces.
- E. Verify the exact locations and mounting heights of lighting fixtures, switches and receptacles prior to installation.
- F. Except where dimensions are shown, the locations of equipment, fixtures, outlets and similar devices shown on the Drawings are approximate only. Exact locations shall be determined by the Contractor and approved by the Engineer during construction. Obtain information relevant to the placing of electrical 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.
- G. Circuit layouts are not intended to show the number of fittings, or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting and other electrical systems shown.
- H. Redesign of electrical or mechanical work, which is required due to the Contractor's use of an alternate item, arrangement of equipment and/or layout other than specified herein, shall be done by the Contractor at his/her own expense. Redesign and detailed plans shall be submitted to the Engineer for approval. No additional compensation will be provided for changes in the work, either his/her own or others, caused by such redesign.
- I. It is the intent of these Specifications that the Electrical Systems shall be suitable in every way for the service required. All materials and all work that may be implied as being incidental to the work of this Section shall be furnished at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 RACEWAYS, BOXES, AND FITTINGS

- A. Rigid Aluminum Conduit
 - 1. Rigid aluminum conduit shall be 6063 alloy and shall be as manufactured by New Jersey Aluminum Corp.; AFC Co.; VAW of America, Inc. or equal.
- B. Rigid Nonmetallic Conduit
 - 1. PVC conduit shall be rigid polyvinyl chloride schedule 80 as manufactured by Carlon; An Indian Head Co.; Kraloy Products Co., Inc.; Highland Plastics Inc. or equal.
- C. Liquidtight Flexible Metal Conduit, Couplings and Fittings
 - 1. Liquidtight flexible metal conduit shall be Sealtite, Type UA, manufactured by the Anaconda Metal Hose Div.; Anaconda American Brass Co.; American Flexible Conduit Co., Inc.; Universal Metal Hose Co. or equal.

2. Fittings used with liquidtight flexible metal conduit shall be of the screw-in type as manufactured by the Thomas & Betts Co.; Crouse-Hinds Co. or equal.

D. Boxes and Fittings

1. NEMA 4X terminal boxes, junction boxes, pull boxes, etc, shall be 316 stainless steel unless otherwise shown on the Drawings. Boxes shall have continuously welded seams and mounting feet. Welds shall be ground smooth. Boxes shall be flanged and shall not have holes or knockouts. Box bodies shall not be less than 14 gauge metal. Covers shall have a continuous gasket on all four sides and be fastened with stainless steel clamps. Terminal boxes shall be furnished with hinged doors, terminal mounting straps and brackets. Terminal blocks shall be NEMA type, not less than 20 Amp, 600 Volt. Boxes shall be as manufactured by Hoffman Engineering Co.; Lee Products Co.; Keystone/Rees, Inc. or equal.
2. Cast aluminum device boxes shall be Type FD. All cast aluminum boxes and fittings shall be copper-free aluminum with cast aluminum covers and stainless steel screws as manufactured by the Killark Electric Co.; Crouse-Hinds Co.; L. E. Mason Co. or equal.
3. Conduit hubs shall be as manufactured by Myers Electric Products, Inc. or equal.

E. Conduit and Equipment Mounting Material

1. Type 316 stainless steel channel with stainless steel hardware shall be used.

F. Cold Galvanizing Compound

1. Cold galvanizing compound shall be as manufactured by ZRC Products Company, a division of Norfolk Corp. or equal.

2.02 WIRE, CABLE AND ACCESSORIES

- A. Wires and cables shall be of annealed, 98 percent conductivity, soft drawn copper.
- B. All conductors shall be stranded, except that lighting and receptacle wiring may be solid.
- C. Except for control, signal and instrumentation circuits, wire smaller than No. 12 AWG shall not be used.
- D. Power wiring shall be 600V, NEC Type THHN/THWN-2 as manufactured by Okonite Co.; Southwire Co.; Pirelli Corp., or equal.
- E. Wire for control, status and alarm circuits shall be No.14 AWG NEC type THHN/THWN-2, stranded as manufactured by the Okonite Co.; Carol Cable Co. Inc. West; Pirelli Cable Corp. or equal.
- F. Wire for 4-20 mA instrumentation circuits shall be No. 16 AWG tinned stranded copper, twisted shielded, 600V rated, XLPE jacket; Belden 9342 or equal.

- G. Termination connectors for control wiring shall be of the locking fork-end (upturned leg ends) type as manufactured by Ideal Industries; 3M Co.; Panduit Corp. or equal.
- H. Termination connectors for shielded instrumentation wiring shall be of the locking fork-end (upturned leg ends) type as manufactured by Ideal Industries; 3M Co.; Panduit Corp. or equal.
- I. Wire markers shall be "Omni-Grip" as manufactured by the W.H. Brady Co.; Thomas & Betts Co.; 3M Co. or equal.

2.03 WIRING DEVICES

- A. Switches and receptacles shall be heavy duty, 120-volt, 20 amp, specification grade.
- B. Switches shall conform to the latest revision of Federal Specification WS 896.
- C. Receptacles shall conform to Federal Specification WC596-F.
- D. GFCI receptacles shall be weather resistant type, UL 943 compliant, Cooper Industries WRVGF20 or equal.
- E. Device Plates
 - 1. Device plates for switches mounted outdoors or indicated as weatherproof shall be gasketed, cast aluminum with provisions for padlocking switches "On" and "Off," Crouse Hinds, No. DS185, or equal.
 - 2. Weatherproof, gasketed cover for GFCI receptacle mounted in an FD box shall be cast aluminum, weatherproof while in-use, lockable, Cooper Industries WIUMV-1 (Vertical), WIUMH-1 (Horizontal) or equal.

2.04 MISCELLANEOUS EQUIPMENT

- A. Load Center
 - 1. Enclosure: NEMA Type 3R.
 - 2. Rating: 120/240-volt, single phase, 3-wire, service entrance rated.
 - 3. Circuit breakers: interrupting rating of 10,000 Amps RMS symmetrical.
 - 4. Equipment ground bar
 - 5. Manufacturers: Eaton/Cutler-Hammer Co.; General Electric Company; Siemens Company or Square D.
- B. Surge Protective Device
 - 1. Square D SDSA 1175 or equivalent.

2.05 UNDERGROUND SYSTEM

- A. Excavation and backfilling, including gravel and sand bedding, are included in Division 2.
- B. All trenching and surface restoration shall be as specified in Division 2, but the responsibility of furnishing and installing the material shall be that of this Section.
- C. Handholes shall be precast concrete, heavy-duty type, designed for a Class H-20 wheel load and conform to ASTM C478. Precast units shall be as manufactured by Chase Precast Corp.; American Precast Co. or equal and constructed to dimensions as shown on the Drawings.
- D. Handhole frames and covers shall be cast iron, heavy duty type for Class H-20 wheel loading.
- E. Polyethylene Warning Tape
 - 1. Warning tape shall be 5 mil red polyethylene film, 6-in minimum width. Tape shall be capable of being detected or located by either conductive or inductive location techniques.
 - 2. Warning tape shall be Mutual Industries Part No. 17774 or equal.

2.06 GROUNDING

- A. Ground rods shall be 3/4-in by 20-ft copper clad steel and constructed in accordance with UL 467. The minimum copper thickness shall be 0.25 mm. Ground rods shall be Copperweld or equal.
- B. Grounding conduit hubs shall be malleable iron type similar to Thomas & Betts Co.; Cat No. 3940 (3/4-in conduit size) by Burndy; O.Z./Gedney Co. or equal, and of the correct size for the conduit.
- C. Waterpipe ground clamps shall be cast bronze saddle type, similar to Thomas & Betts Co. Cat. No. 2 (1/2-in, 3/4-in, or 1-in size) or equal by Burndy; O.Z./Gedney Co. or equal, and of the correct size for the pipe.
- D. Buried grounding connections shall be by Cadweld process, or equal exothermic welding system.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION

- A. Any work not installed according to the Specifications shall be subject to change as directed by the Engineer. No extra compensation will be allowed for making these changes.
- B. Electrical equipment shall be protected at all times against mechanical injury or damage by water. Electrical equipment shall not be stored outdoors. Electrical equipment shall be stored in dry permanent shelters. Do not install electrical equipment in its permanent location until structures are weather-tight. If any apparatus has been subject to possible injury by water, it

shall be thoroughly dried out and tested as directed by the Engineer, or shall be replaced at no additional cost at the Engineer's discretion.

- C. Equipment that has been damaged shall be replaced or repaired by the equipment manufacturer, at the Engineer's discretion.
- D. Repaint any damage to factory applied paint finish using touch-up paint furnished by the equipment manufacturer, at no additional cost to the Owner.
- E. Verify the exact locations and mounting heights of lighting fixtures, switches and receptacles prior to installation.
- F. Exact locations of electrical equipment shall be determined by the Contractor and approved by the Engineer during construction. Obtain information relevant to the placing of electrical 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.

3.02 RACEWAYS, BOXES, AND FITTINGS

- A. Rigid aluminum conduit shall be used at all exposed locations. The last underground elbow and all risers from underground shall be rigid aluminum conduit.
- B. PVC schedule 80 conduit shall be used for all underground locations and for grounding electrode conductors.
- C. All exposed boxes shall be metal.
- D. Exposed switch, receptacle and lighting outlet boxes and conduit fittings shall be cast aluminum.
- E. Conduit sealing bushings shall be used to seal conduit ends exposed to the weather.
- F. No conduit smaller than 3/4-in electrical trade size shall be used, nor shall any have more than the equivalent of three 90 degree bends in any one run. Pull boxes shall be provided as required or directed.
- G. No wire shall be pulled until the conduit system is complete in all details.
- H. The ends of all conduits shall be tightly plugged to exclude dust and moisture during construction.
- I. Conduit supports, other than for underground raceways, shall be spaced at intervals of 8-ft or less.
- J. Conduit hangers shall be attached to structural steel by means of beam or channel clamps. Where attached to concrete surfaces, concrete inserts of the spot type shall be provided.

- K. All conduits shall be run at right angles to and parallel with the surrounding wall and shall conform to the form of the ceiling. No diagonal runs will be allowed. Bends in parallel conduit runs shall be concentric. All conduits shall be run perfectly straight and true.
- L. Conduit terminating in NEMA 3R, 4, 4X and 12 enclosures shall be terminated with Myers type conduit hubs.
- M. Liquidtight flexible metal conduit shall be used for all motor terminations, the primary and secondary of transformers, generator terminations and other equipment where vibration is present.
- N. Aluminum fittings and boxes shall be used with aluminum conduit. Aluminum conduit shall not be imbedded in concrete. Aluminum conduit shall be isolated from other metals with plastic sleeves or plastic-coated hangers. Strap wrenches shall be used for tightening aluminum conduit.
- O. Where conduits pass through openings in walls or floor slabs, the remaining openings shall be sealed against the passage of flame and smoke.
- P. PVC conduit to non-metallic box connections shall be made with PVC socket to male thread terminal adapters with neoprene O-ring and PVC round edge bushings.
- Q. Conduit ends exposed to the weather shall be sealed with conduit sealing bushings.
- R. All conduit which may under any circumstance contain liquids such as water, condensation, liquid chemicals, etc, shall be arranged to drain away from the equipment served. If conduit drainage is not possible, conduit seals shall be used to plug the conduits.
- S. Where no type or size is indicated for junction boxes, pull boxes or terminal cabinets, they shall be sized in accordance with the requirements of N.E.C. Article 314.
- T. Miscellaneous steel for the support of fixtures, boxes, transformers, starters, contactors, panels and conduit shall be furnished and installed.
- U. Steel channels, flat iron and channel iron shall be furnished and installed for the support of all electrical equipment and devices, where required, including all anchors, inserts, bolts, nuts, washers, etc for a rigid installation.
- V. Conduits passing from heated to unheated spaces, at all exterior spaces, refrigerated spaces, cold air plenums, etc, shall be sealed with "Duxseal" as manufactured by Manville or seal fitting to prevent the accumulation of condensation.
- W. Coordinate the conduit installation with other trades and the actual supplied equipment.
- X. Conceal conduit to the maximum extent practicable.

3.03 WIRE, CABLE AND ACCESSORIES

- A. Uniquely identify all wires, cables and each conductor of multi-conductor cables (except lighting and receptacle wiring) at each end with wire and cable markers.
- B. Use lubrications to facilitate wire pulling. Lubricants shall be UL approved for use with the insulation specified.
- C. All wire shall be color coded or coded using electrical tape in sizes where colored insulation is not available. Where tape is used as the identification system, it shall be applied in all junction boxes, and other accessible intermediate locations as well as at each termination.

D. The following coding shall be used:

<u>System</u>	<u>Wire</u>	<u>Color</u>
240/120 Volts	Neutral	White
1-Phase, 3-Wire	Line 1	Black
	Line 2	Red

- E. Power conductors: Terminations shall be die type or set screw type pressure connectors as specified. Splices (where allowed) shall be die type compression connector and waterproof with heat shrink boot or epoxy filling.
- F. Control Conductors: Termination on saddle-type terminals shall be wired directly with a maximum of two conductors. Termination on screw type terminals shall be made with a maximum of two spade connectors. Splices (where allowed) shall be made with insulated compression type connectors.
- G. Instrumentation Signal Conductors (including graphic panel, alarm, low and high level signals): terminations same as for control conductors. Splices allowed at instrumentation terminal boxes only.
- H. Except where permitted by the Engineer no splices will be allowed in manholes, handholes or other below grade located boxes.
- I. Splices shall not be made in push button control stations, control devices (i.e., pressure switches, flow switches, etc), conduit bodies, etc.
- J. Instrumentation cables shall be installed in raceways as specified.
- K. Terminal blocks shall be provided at all instrument cable junction and all circuits shall be identified at such junctions.
- L. Shielded instrumentation wire, shall be run without splices between instruments, terminal boxes, or panels.
- M. Shields shall be grounded as recommended by the instrument manufacturer and isolated at all other locations. Terminal blocks shall be provided for inter-connecting shield drain wires at all

junction boxes. Where individual circuit shielding is required, each shield circuit shall be provided with its own block.

3.04 UNDERGROUND SYSTEM

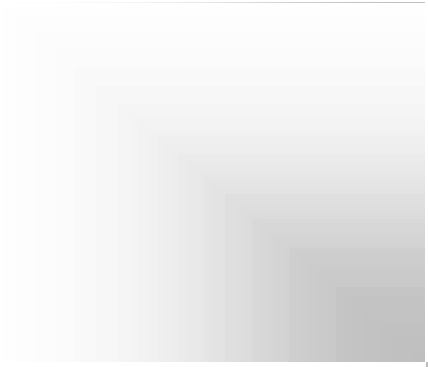
- A. Install raceways to drain away from buildings.
- B. Reinforce raceway banks when conduits pass over newly excavated pipes.
- C. The minimum cover for raceway banks shall be 24-in unless otherwise permitted by the Engineer.
- D. Swab all raceways clean before installing cable.
- E. Plug spare raceways and seal them watertight at all manholes, buildings and structures.
- F. Seal the ends of raceways and make watertight at all handholes, buildings and structures.

3.05 GROUNDING

- A. Installation shall conform to NEC Article 250.
- B. Run grounding electrode conductors in PVC conduits. Do not allow water pipe connections to be painted. If the connections are painted, disassemble them and re-make them with new fittings.
- C. Install equipment grounding conductors with all feeders and branch circuits.
- D. Test the grounding system. Resistance to ground testing shall be performed during dry season. Submit test results in the form of a graph showing the number of points measured (12 minimum) and the numerical resistance to ground.
- E. Testing shall be performed before energizing the distribution system.
- F. Notify the Engineer immediately if the resistance to ground for any building or system is greater than five ohms.

END OF SECTION

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**BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY, FLORIDA**

**ADDENDUM NO. 1
IFB NO. Y14-748**

**ORANGE COUNTY EASTERN WATER RECLAMATION FACILITY
PHASE V AND CENTRIFUGE DEWATERING IMPROVEMENTS**

**BID PACKAGE A, ATTACHMENT C:
HYDRO-INTERNATIONAL GRIT
REMOVAL SYSTEM PROPOSAL**



06/24/14

To: AECOM

**Re: Grit Removal, Washing & Dewatering System & Recessed Impeller Grit Pumps
Sections 11320 & 11314
Eastern WRF
Orange Co., FL
File #01-0390**

Hydro International is pleased to present our quote for a Eutek HeadCell® Grit Removal, Classification, Washing, and Dewatering System. The system will meet the requirements described in Sections 11320 & 11314 with comments noted below.

Comments / Exceptions

1. Screening with a 3/4 inch opening or better is necessary prior to the Hydro equipment.
2. Please see the exclusions detailed in the proposal below.

System Components

1. Three (3) 12' 13 tray Eutek HeadCell® Grit Concentrator units shall be supplied. Each Eutek HeadCell® shall consist of a stack of nested trays. The trays shall be fabricated from UV stabilized LDPE and shall be supported by a 316 SS frame integral to the unit. All flow passages shall be self-cleaning and free of sharp projections or fittings that may snag stringy or fibrous materials. The Eutek HeadCell® trays shall be constructed with a minimum ¼ inch material pans and sidewalls. The Tray Supports shall be fabricated to provide a means to independently support each tray and transfer the weight of each tray to the support structure frame. The Eutek HeadCell® will securely fit into a support structure frame containing the screened raw wastewater inlet connection, necessary hardware, and connections. The Eutek HeadCell® Concentrator shall be equipped with a settled solids underflow connection for collection and removal of settled solids. The settled solids are pumped to the Eutek SlurryCup™ Grit Washing units from each Eutek HeadCell® units.

Each unit shall remove 95% of all grit (S.G. 2.65) 106 micron and larger at a peak flow of 26.7 mgd. Each unit shall have 12 inches of headloss at the peak flow.

2. Four (4) 32" Eutek SlurryCup™ Solids Classifier units shall be provided. Each Eutek SlurryCup™ unit shall be fabricated from 316 SS and be self-standing and mounted on a support structure above the Eutek Grit Snail® clarifier to provide clearance between the bottom of the grit underflow pipes and the Dewatering Unit clarifier surface. Each unit shall have one (1) 6" flanged inlet connection and one (1) 8" flanged outlet connection. Flanges will be rotatable and conform to ANSI B16.1 bolt patterns. Each unit shall have one (1) - 1.5" grit underflow connection, one (1) - 3" threaded drain connection, and one (1) - 1.5" NPT fluidizing water for the Hydraulic Valve. Exterior surfaces shall be acid washed and bead blasted to a uniform finish.

Each unit shall remove 95% of all grit (S.G. 2.65) 75 micron and larger at flow of 280-400 gpm and a solids concentration not to exceed 1.0%. Each unit shall have a headloss of 15 ft at a flow rate of 300 gpm.

3. Two (2) 4.0yd³/hr Eutek Grit Snail® continuous dewatering units shall be supplied. Each unit shall be equipped with a 24" wide rubber belt, 72" square clarifier, and a 1/3 hp inverter duty motor. One (1) 6" flanged overflow discharge connection and one (1) 3" flanged drain connection shall be supplied.

Flanges will be rotatable and conform to ANSI B16.1 bolt patterns. Each unit shall be fabricated from 316 SS. The support structure at the head end shall be an A-frame.

Each unit shall remove 95% of all grit (S.G. 2.65) 75 micron and larger with less than 15% volatile solids and greater than 60% total solids.

4. Five (5) Hayward Gordon TORUS XR3-11 horizontal mount recessed impeller grit pumps shall be supplied for distribution of the Eutek HeadCell® underflow to the Eutek SlurryCup™ unit. Each pump shall have a Ni-hard (650 BHN) impeller, casing and wear plate, John Crane Type 1 single mechanical seal (SC faces). The motor shall be 15 hp, 1800 rpm, TEFC, 3 phase, 60 hertz, 480 volt. The pump uses a fixed speed V-belt and accommodates 0.5 to 2.0% solids concentrations.
5. Two (2) main control panel shall be supplied. Each control panel shall have a NEMA 4X 316 stainless steel enclosure, and shall be rated at three phase, 480 VAC, 60 hz. Each panel shall be relay logic and contain all relays, timers, switches, variable frequency drive, and indicator lights to operate two (2) Eutek SlurryCup™ units, one (1) Eutek Grit Snail® unit and three (3) grit pumps in either fully automated or manual mode. Grit pump starters are to be supplied by others and located remote from Hydro's panels.
 - a. Additionally, two (2) NEMA 4X local control stations shall be supplied for the Eutek Grit Snail® units.

Utility Requirements

Clarified NPW or Reuse Water:

Each Eutek HeadCell® unit requires continuous 20 gpm @ 50 +/- 10 psig of clarified water for "fluidizing" to function properly.

Each Eutek SlurryCup™ unit requires continuous 30 gpm @ 50 +/- 10 psig of clarified water to function properly.

Each Eutek Grit Snail® unit requires continuous 20 gpm @ 50 +/- 10 psig of clarified water for tail roll and belt rinse.

Each Eutek SlurryCup™ requires an additional intermittent 47 gpm @ 50 psig of clarified water for fluidizing and backwashing for 1-2 minutes every 2-4 hours.

Appurtenances Per Unit

Eutek HeadCell® Grit Concentrator

DESCRIPTION	QTY
Fluidizing Water Throttling Globe Valve 1" Globe Valve, Stainless Steel	1
Fluidizing Water Shut-off Valve 1" Ball Valve, Stainless Steel	1
Fluidizing Water Flow Meter 1" 4-80 Flow Meter, Stainless Steel	1
Pressure reducing valve, wye-strainer	1

Eutek SlurryCup™ Washing Unit

DESCRIPTION	QTY
Supply Water Flow Meter 1-1/2" Flow Meter, 3.5-35 gpm	1
Manual System Shut-Off Valve 1-1/2" Ball Valve, Stainless Steel	1
Supply Water Throttling Globe Valve 1-1/2" Globe Valve, Stainless Steel	1
Backwash Water Valve and Supply Water Shut-off 1-1/2" Solenoid Valve (NEMA 4X, 120VAC)	2
System Water Supply Pressure Gauge 0-100psi, w/ Diaphragm Seal	1
Inlet Pressure Gauge 0-30psi, w/ Diaphragm Seal	1
Backwash Pressure Gauge 0-30psi, w/ Diaphragm Seal	1
Gauge Isolation Valves ¼" Ball Valve, Stainless Steel	3
Pressure reducing valve, wye-strainer	1

Eutek Grit Snail® Dewatering Unit

DESCRIPTION	QTY
Rinse water Valve 1" Solenoid valve, Stainless Steel (NEMA 4X, 120VAC)	1
Manual Water and Tail Rinse Shut-off Valve 1" Ball Valve, Stainless Steel	2
Tail Rinse Flow Meter 1" Flow Meter, 1-10 gpm, Stainless Steel	1
Tail Rinse Throttling Valve 1" Globe Valve, Stainless Steel	1
Rinse Bar Shutoff Valves ¾" Ball Valve, Stainless Steel	1

Drain Valve 3" Eccentric Plug Valve, Cast Iron	1
Inductive Proximity Sensor	1
Inverter Duty Drive Motor 1/3 hp, 3 phase 230/460 VAC Motor, TENV	1
Gear Reducer	1

Spare Parts

The following control panel spare parts will be supplied:

1. 20% of each fuse size and type used
2. One (1) spare relay and relay socket for every ten (10) used
3. One (1) spare panel mounted lights and switches for every ten (10) used and 10 spare bulbs/colored lenses.
4. 20% of each size of power supply (minimum one).
5. 10 of each type of vapor capsule

Start-up

One (1) man, two (2) trips, for start-up and instruction services as required totaling four (4) days.

Anchorage Analysis

Seismic anchorage and bracing calculations in accordance with specification section 11320.Part 2.J.

Exclusions

Any item(s) not specifically described above are excluded and are not to be supplied by Hydro International including but not limited to the following:

- Erection and installation
- Interconnecting piping and valving not expressly stated above
- Pipe connections and fittings not expressly stated above
- All pipe supports, hangers and braces
- Controls, switches, control panels and instrumentation of any kind not expressly stated above
- Wiring and conduit
- Field or touch-up paint, painting, blasting and touch-up of surface finish
- Spare parts not specifically stated above
- Unloading, hauling and storage charge
- Lubricating oil and greases
- Field performance testing, laboratory testing and sample collection and analysis
- All concrete and grouting work
- Insulation and heat tracing of any kind
- Dumpsters of any kind
- Grit pump motor starters/VFD, associated piping and valving
- Access platforms, walkways, ladders, covers
- Anchor bolts
- Grit Study
- Extended discharge chutes

Limitations

- General Liability is limited to \$2,000,000 per each occurrence
- Products Completed & Operations Liability is limited to \$2,000,000 per each occurrence
- Worker's Compensation is limited to \$1,000,000 per each accident

Warranty

Hydro International's Warranty shall cover a period of 3 years starting from the date of substantial completion.

Delivery

Please allow 4 weeks after receipt of purchase order for approval drawings. Shipment is typically a maximum of 16 weeks after receipt of "Approved" or "Approved As Noted, Resubmittal Not Required" submittal package. The grit removal system shall be delivered to site fully fabricated, subject to size, packaging and transportation constraints. The General Contractor shall inspect equipment prior to unloading and notify Hydro International of any damage to equipment to effect proper remedial action. Failure to notify Hydro International of damage to equipment prior to unloading will void all warranties pertaining to subject equipment.

Terms & Conditions

Hydro International payment terms are detailed in the attached terms and conditions. Price includes truck freight to jobsite and does not include any state or local taxes if required. The prices quoted are firm based on a receipt of a purchase order by December 31, 2014 and shipment of the equipment prior to June 17, 2015.

Purchase Price: \$1,689,000.00

Purchase Order

Please make purchase orders to:
Hydro International
2925 NW Aloclek Drive
Suite #140
Hillsboro, OR 97124

Local Representative

Mr. Brian Schuette
Moss-Kelley, Inc.
725 Primera Blvd., Suite 155
Lake Mary, FL 32746
Ph: (407) 805-0063
Fx: (407) 805-0062
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If you have any questions or concerns, do not hesitate to contact me.

Regards,
Hydro International



Lindsey Schweitzer
Sr. Applications Engineer