



RFP for Pump Station #1 & #2 Rehabilitation

November 15, 2013

Addendum 1: Revisions to Construction Plans and Specifications

Description

The City of St. Pete Beach is releasing the following addendum to Pump Station No. 1 & 2 Rehabilitation Plans.

Bid date will be extended to 12/11/2013, at 10:00AM, to allow for time to modify bid proposals. All questions and comments are due by 11/25/13 – 12:00PM.

Construction Plan Revisions

The following sheets have been revised or added as an addendum to the original Bid Set of Construction plans. Revisions have been bubbled to show changes.

Sheets:

- G-0.1 – Cover Sheet
- G-0.2 – Drawing Index and General Notes
- G-0.5 – Bypass Pumping Plan
- D-0.2 - Pump Station 1 Demolition Plan
- D-0.3 - Pump Station 1 North Wetwell Demolition Section – (NEW PLAN SHEET)
- C-0.2 – Pump Station 1 Site Plan
- S-0.1 – Pump Station 2 Wetwell Plan and Sections
- S-0.2 – Pump Station 1 Top Slab Plan and Sections – (NEW PLAN SHEET)
- S-0.4 – Structural Details
- M-0.2 – Pump Station 1 Plan and Section
- M-0.21 – Pump Station 1 North Wetwell Section – (NEW PLAN SHEET)
- E-0.4 – Pump Station 1 Electrical Site Plan
- E-3.1 – Motor Control Center & One-Line Diagram
- E-3.2 – VFD Wiring Diagram
- E-3.6 – Pump Station 1 VFD Schematics and Diagrams
- I-3.2 – PLC Wiring Schematics

Specification Revisions

The following specifications have been revised or added as an addendum to the original Bid Set.

1. Revised specification section 9.01 General, changing the sentence from, “H2O load rated aluminum access frame and safety hatch from “EJCO” to “H2O load rated aluminum access frame and safety hatch.”
2. Revised specification section 9.03 Pumps under Other Design Data below Pump Station No. 1, the number of pumps from “2” to “4”.

3. Revised Table of Contents Section 4 from the following,

“SECTION 4 – PIPING MATERIALS: MISCELLANEOUS

4.01 GENERAL

4.02 VITRIFIED CLAY PIPE

4.03 CORRUGATED METAL PIPE

4.04 CORRUGATED ALUMINUM PIPE

4.05 ROADWAY UNDERDRAIN PIPE

4.06 CORRUGATED HIGH DENSITY POLYETHYLENE (CHDPE) DRAINAGE PIPE AND FITTINGS, SMOOTH INTERIOR

4.07 HIGH DENSITY POLYETHYLENE (HDPE) PROFILE WALL DRAINAGE PIPE AND FITTINGS SMOOTH INTERIOR

4.08 HIGH DENSITY POLYETHYLENE (HDPE) PRESSURE PIPE AND FITTINGS

4.09 FIBERGLASS REINFORCED POLYMER MORTAR PIPE (FRPMP)

4.10 EXECUTION”

TO

“SECTION 4 – PIPING MATERIALS: DUCTILE IRON PIPE

4.01 GENERAL

4.02 PIPE

4.03 FITTINGS

4.04 JOINTS – BURIED PIPE AND FITTINGS

4.05 JOINTS – EXPOSED PIPE AND FITTINGS”

4. Revised specification section 15.02 Description of Work, changing the sentence from, “The scope of the work under this section is to furnish all labor, materials, equipment and incidentals required to complete the installation of 12 pulse Clean Power VFDs....” to “The scope of the work under this section is to furnish all labor, materials, equipment and incidentals required to complete the installation of 18 pulse Clean Power VFDs....”
5. Revised specification section 15.02 Description of Work, changing the sentence from, “The Station shall require *two (2)* 140 hp VFD’s.” to “The Station shall require *four (4)* 140 hp VFD’s.”
6. Revised specification section 15.08 Variable Frequency Drive, changing the following list from,
 - “k. Motor Over Temp/Seal Failure pilot light (amber)*
 - l. No Flow Alarm pilot light (amber)*
 - m. Speed Pot”*

TO

“k. Motor Over Temp pilot light (amber)

l. Seal Failure pilot light (amber)

m. No Flow Alarm pilot light (amber)

n. Speed Pot”

7. Revised specification section 16.02 Description of Work, changing the sentence from, “...to complete the installation of 12 pulse Clean Power VFDs *or 6 pulse VFDs* with input line reactors and *active filters with* bypass starters as described with cabinetry...” to “...to complete the installation of 12 pulse Clean Power VFDs with input line reactors and bypass starters as described with cabinetry...”
8. Revised specification section 16.09 Description, deleting the sentence, “If a 6-pulse drive with active filter is provided, the active filter shall also be provided with a SPD.”
9. Revised specification section 16.09 Description, deleting the sentence, “Each 6-pulse drive supplied in "stand-alone" cabinets shall be provided with an isolation transformer with a minimum 5% impedance for harmonic reduction. Each 6-pulse drive supplied in MCC cabinets shall utilize 3% input line reactors in lieu of the isolation transformers. One (1) active filter shall be installed at each site and one (1) spare filter shall be provided to the Owner and stored as directed should 6 pulse drives be supplied on this project. Each active filter, excluding the spare, shall be furnished with a circuit breaker and SPD.”
10. Revised specification section 15.08 Variable Frequency Drive, changing the following list from,
*“Hand-Off-Auto
VFD/Bypass selector switches
Run, Fault, & Power On pilot lights
Keypad.
Speed Pot.”*

TO

“Hand-Off-Auto

VFD/Bypass selector switch

VFD Running, RVSS Running, VFD Fault, RVSS Fault, Motor Temp Alarm & Power On pilot lights

Keypad.

Speed Pot.”

Questions and Responses

1. *Sheet S-0.1, Note 7, Cast-in-Place TLock PVC Liner on interior of station, can Argu or HDPE liner be used also?*
Response: Contractor must use a Cast-in-Place liner that meets the specifications set in “SECTION 23 – PVC LINER.” If Argu or HDPE liner can meet these specifications they can be considered an approved equal, however, the contractor must submit documentation prior to bid, for review and approval, to support that the alternate liner can meet the specifications.

2. *The fillet in the wet well and grout in valve vault floor is saying Non-Shrink Grout, could this not be Portland cement grout?*

Response: No, the fillet in the wet well and grout in the valve vault should be non-shrink grout.

3. *Do we have to leave the sheets down the center of the road in place, or can they be pulled?*

Response: It is assumed that this is in reference to following the completion of Pump Station #2 improvements. Any temporary construction devices used during the demolition of the existing station and construction of the new station shall be removed by the contractor if they are not shown in the design to become a permanent part of the new facility.

4. *Are the wet wells at Lift Station #2 conventional or caisson as shown for lift station #1?*

Response: The method used for construction of the existing wet wells at Pump Station #2 is unknown. Pump Station #1 wet wells are existing and stay intact during this project. The new wet well at Pump Station #2 shall be constructed as shown on sheet S-0.1

5. *How many days will the City require the Contractor to hold their bid numbers?*

Response: The City will require the Contractor to honor their bid number for 90 days following the bid opening.

6. *Please provide details for bypass pumping at Station #1.*

Response: As stated during the pre-bid meeting, the contractor will be responsible for design, cost, maintenance, and operation of any bypassing operations and equipment during construction time. Bypass at Station #1 is currently in operation. It will be the contractor's responsibility to take over the bypass pumping when construction operations begin. The City currently has MWI Pumps on-site, however, the Contractor may choose an alternate vendor. Steve von Gontard, MWI Pumps, can be contacted at (813) 899-2863 or stevenv@mwicorp.com. The Contractor is responsible for all fuel or electrical charges associated with all bypass pumping operations. A copy of the "Yard Piping Plan", Sheet C-6, of the existing Pump Station #1 has been provided for reference. Please be advised that these record drawings may not be accurate and the contractor should field verify all conditions.

7. Please provide details for electrical underground work being completed by Duke Energy at Pump Station #2.

Response: Please refer to the **DRAFT** installation drawing provided with this addendum.

Alternate Material Requests

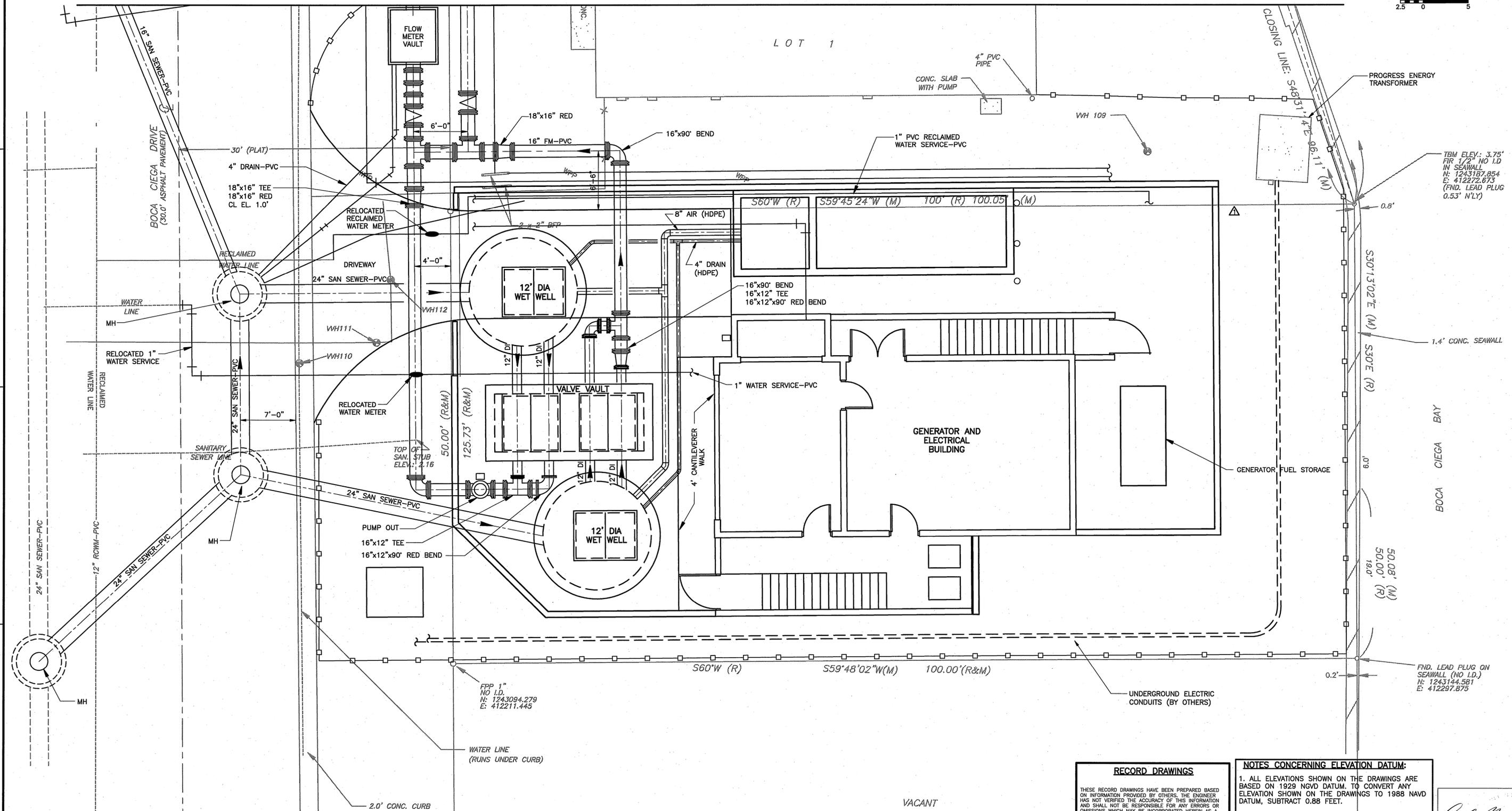
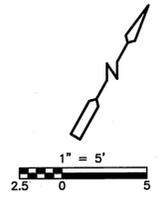
Florock is not an acceptable manufacturer for this project.

Purafil is not an acceptable manufacturer for this project.

General Notes

1. The Contractor shall supply and install the new hatches as indicated on drawing S-0.2 as issued in Addendum #1. The Contractor shall coordinate the size and opening location of the access hatch with the pump manufacturer. The Contractor shall take extra care during the removal of the existing lids at Station #1 as to not damage the wet well liners. If the liners or any other existing equipment, materials, or installations are damaged, the contractor will be responsible for replacement or repair.

MATCH LINE SEE C-5



RECORD DRAWINGS

THESE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. THE ENGINEER HAS NOT VERIFIED THE ACCURACY OF THIS INFORMATION AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

CAMP DRESSER & MCKEE INC. Date FEBRUARY 2009

NOTES CONCERNING ELEVATION DATUM:

1. ALL ELEVATIONS SHOWN ON THE DRAWINGS ARE BASED ON 1929 NGVD DATUM. TO CONVERT ANY ELEVATION SHOWN ON THE DRAWINGS TO 1988 NAVD DATUM, SUBTRACT 0.88 FEET.

2. BASE FLOOD ELEVATION IS 12.88 FEET NGVD AND 12 FEET NAVD BASED ON MAP NO. 12103C0194G (EFFECTIVE DATE: SEPTEMBER 3, 2003).

RECORD DRAWING

Craig C. Montgomery
CRAIG C. MONTGOMERY
 P.E. NO. 45953
 2/20/09

Xref's: [REDACTED] EX-SURVEY, CBASE... File name: P:\6069\41898\RECORD\CSTPLC06.dwg Last saved by: BANDAM Time: 2/16/2009 3:41:34 PM

REV. NO.	DATE	DRWN	CHKD	REMARKS
2/09	AMB	JAH		RECORD DRAWINGS
12/08	JDA	JAH		PRELIMINARY RECORD DRAWINGS
9/2005	JDA	WMS		REISSUED FOR CONSTRUCTION
6/05	DRS	WMS		CONFORMED DRAWINGS
5/12/05	DRS	WMS		ADDENDUM NO. 2

DESIGNED BY: AAMOD SONAWANE
 DRAWN BY: D. AUST
 SHEET CHK'D BY: W. SPRIGGS
 CROSS CHK'D BY: MONTGOMERY
 APPROVED BY: C. MONTGOMERY
 DATE: FEBRUARY 2005

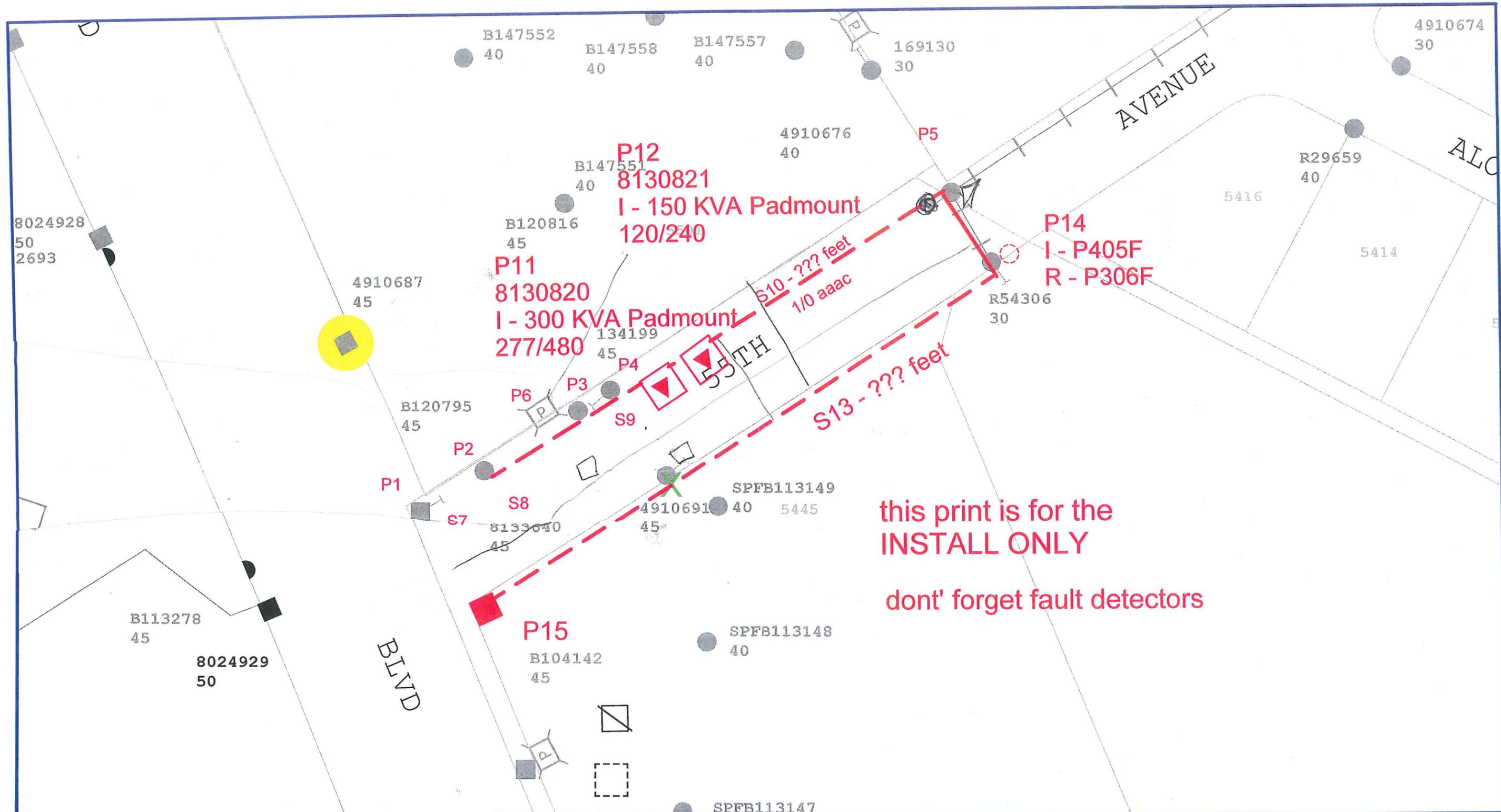
CDM Camp Dresser & McKee Inc.
 consulting engineering construction operations
 1715 NORTH WESTSHORE BOULEVARD, SUITE 875
 TAMPA, FLORIDA 33607
 Tel: 813-281-2900
 CERT. OF AUTHORIZATION NO. 20

CITY OF ST. PETE BEACH, FLORIDA

MASTER PUMP STATION REPLACEMENT

YARD PIPING PLAN - PUMP STATION

PROJECT NO. 6069-41898
 FILE NAME: CSTPLC06.dwg
 SHEET NO. **C-6**



this print is for the
INSTALL ONLY
 dont' forget fault detectors

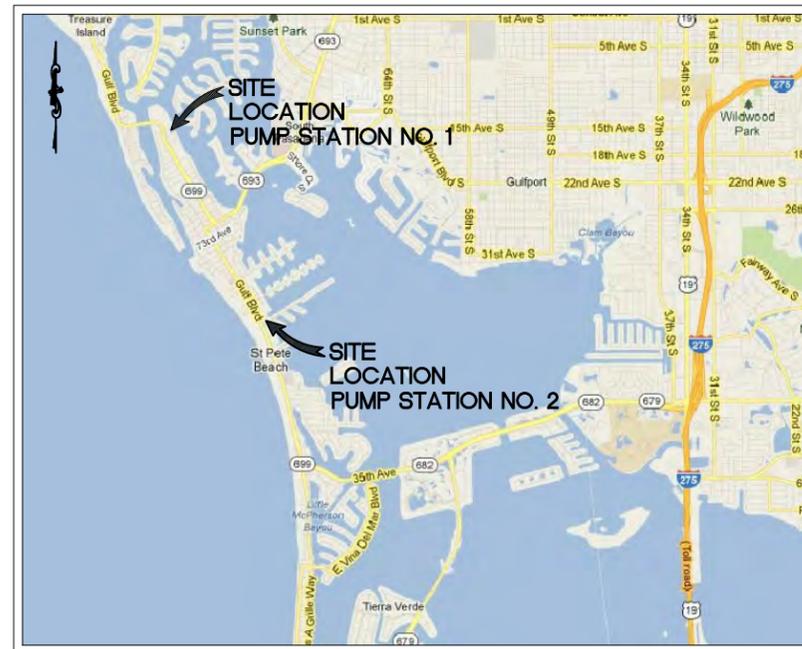
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PUMP STATION NO. 1 & 2 REHABILITATION

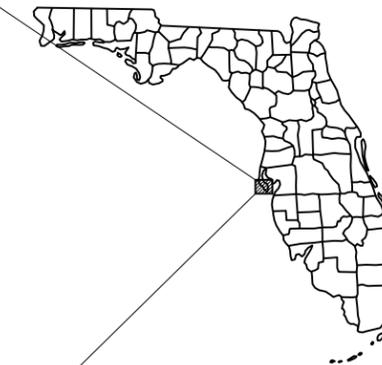
NOVEMBER 2013



CITY OF ST. PETE BEACH, FLORIDA



PROJECT VICINITY MAP



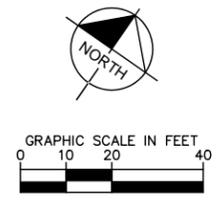
**BID SET
NOT FOR CONSTRUCTION**

ADDENDUM 1 REVISED 11/15/2013

PREPARED BY
 Kimley-Horn
and Associates, Inc.

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655 NORTH FRANKLIN STREET, SUITE 150,
TAMPA, FL 33602
PHONE (813) 823-1460
WWW.KIMLEY-HORN.COM CA 00000696

Drawing name: K:\TAM_Civil\148404 - City of St. Pete Beach\000 - Pump Station No. 2\CADD\PlanSheets\C-05 BYPASS PLAN.dwg BYPASS PLAN.dwg Nov 15, 2013 8:08am by: jordan.walker
 This document, together with the concepts and designs presented herein, is an instrument of service, as an instrument of service, is intended only for the specific purpose and client for which it was prepared. Release of and improper reliance on this document without written authorization and adaptation by Kimley-Horn and Associates, Inc. shall be without liability to Kimley-Horn and Associates, Inc.



- GENERAL NOTES:**
- CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
 - 6" WATER MAIN TO BE CONSTRUCTED FIRST TO MEET MOT PLANS AND LANE WIDTH REQUIREMENTS
 - CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
 - CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY PUMP STATION INTERRUPTION.
 - BY-PASS PUMPING WILL BE REQUIRED FROM TWO SEPARATE MANHOLES. COORDINATE ALL BY-PASS OPERATIONS WITH THE CITY OF ST. PETE BEACH.
 - CONTRACTOR TO REFER TO FDOT INDEX NO.S 613 AND 616 FOR DETAILS AND NOTES REGARDING MAINTENANCE OF TRAFFIC PLAN.
 - CONTRACTOR TO SUBMIT BYPASS PUMPING FOR REVIEW BY ENGINEER. INCLUDE ADDITIONAL PAVEMENT RESTORATION TO ACCOMMODATE BYPASS PLAN.
 - CONTRACTOR MUST MAINTAIN SOUND LEVELS BELOW THE LIMITATIONS SET IN ARTICLE IV SECTION 46-132 OF THE CITY OF ST. PETE BEACH'S CODE OF ORDINANCES.

BYPASS PUMP DESIGN REQUIREMENTS	
BYPASS	FLOW (GPM)
8" BYPASS	100 GPM
24" BYPASS	4000 GPM

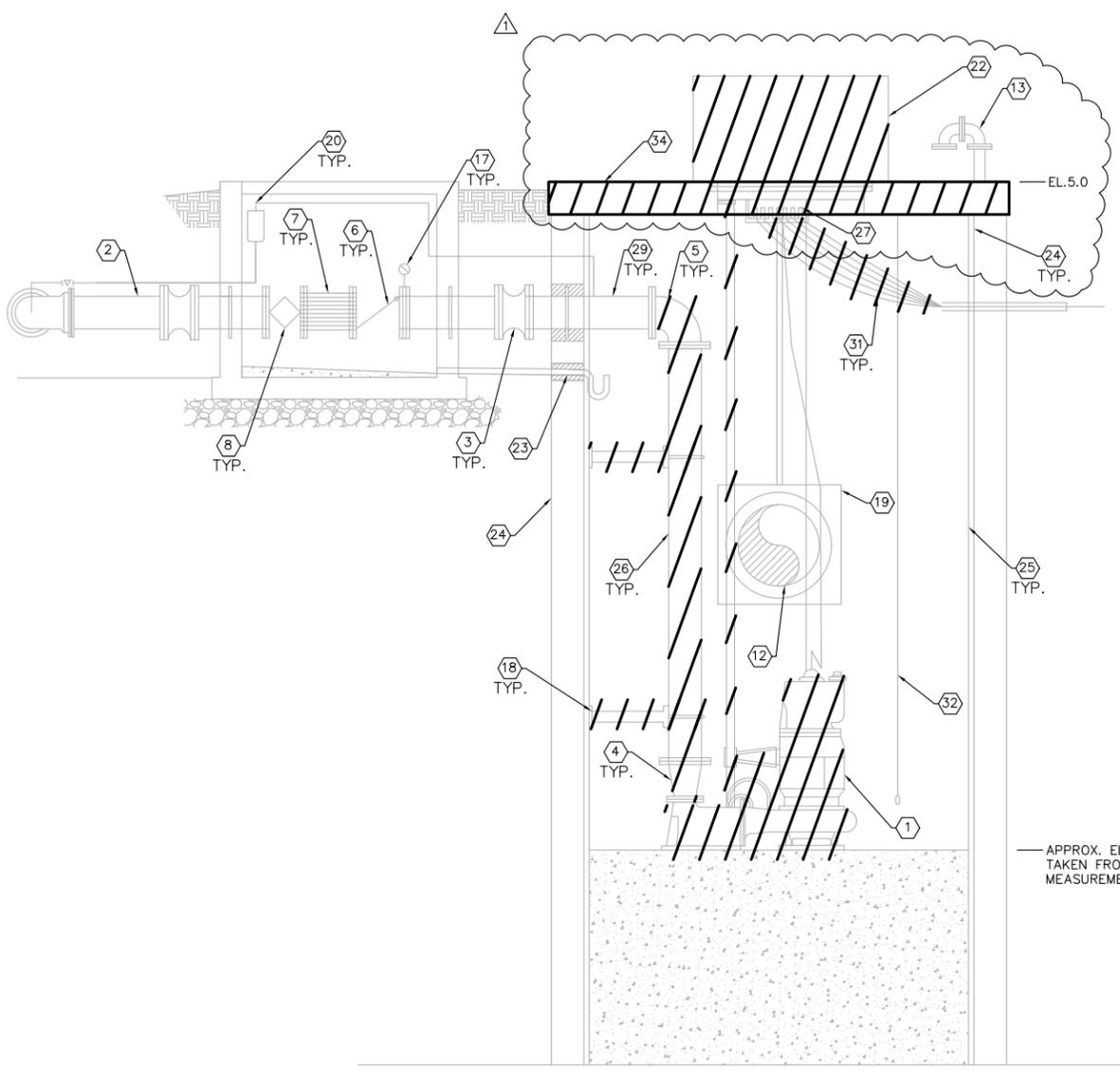
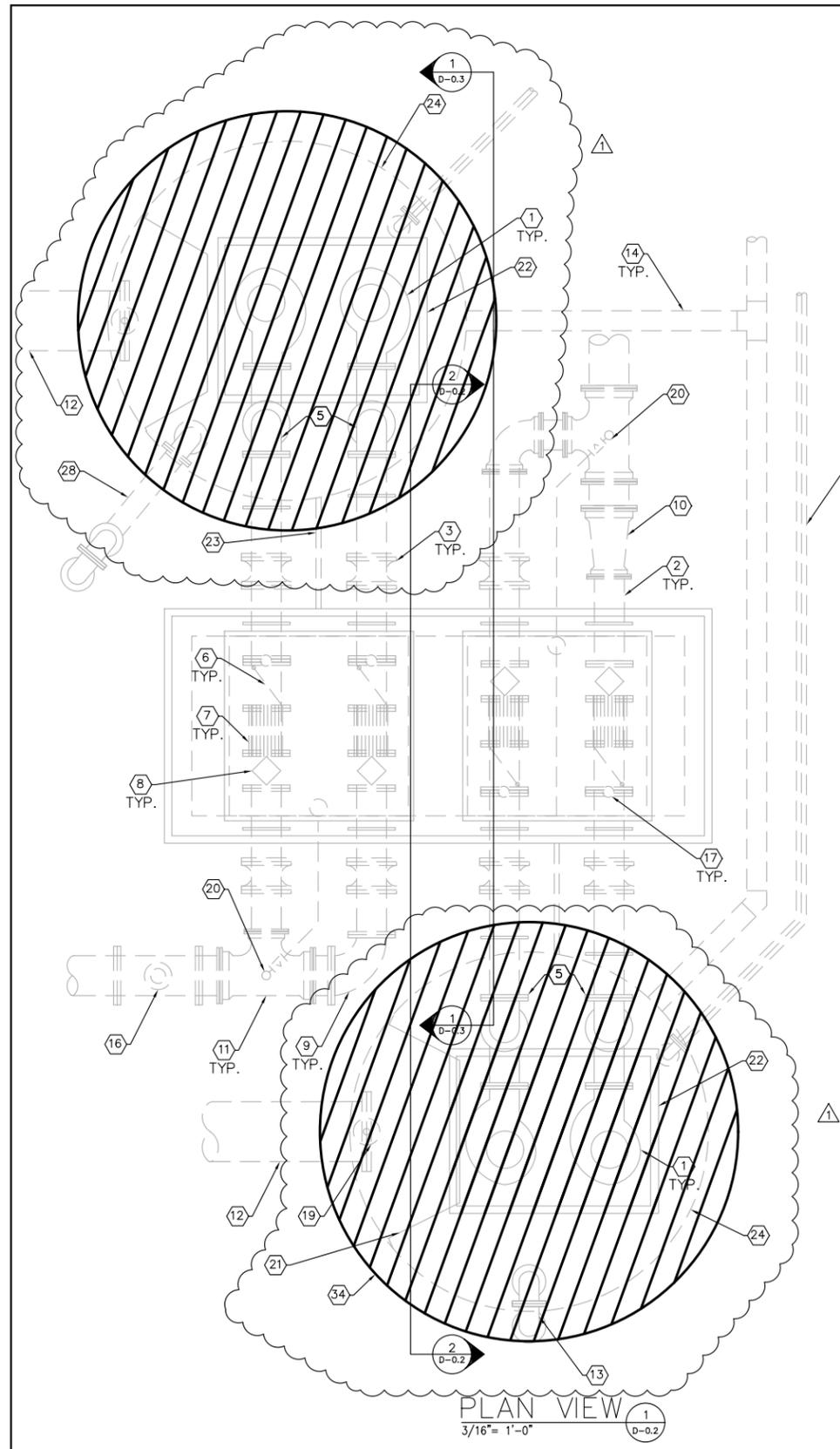
MH NUMBER	RIM (FT)	INVERT (FT)
MH#1	4.60	24" RCP(NE)=-7.17 15" RCP(SW)=-2.60 18" RCP(SE)=-6.90 10" (NE)=-6.65
MH#2	4.62	30" DIP(NE)=-7.00 21" VCP(SW)=-7.33 8" CLAY(NE)=UNCONFIRMED
MH#3	3.80	8" CLAY(SW)=-5.69

GROUNDWATER / DEWATERING NOTE:
 THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.



<p>BYPASS PUMPING PLAN</p>	<p>FLORIDA</p>						
<p>CITY OF ST. PETE BEACH PUMP STATION NO. 1 & 2 REHABILITATION</p>	<p>PINELLAS COUNTY</p>						
<p>DATE NOVEMBER 2013</p>	<p>PROJECT NO. 148404000</p>						
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Drawing name: K:\TAM_Civil\148404 - City of St. Pete Beach\001 - Pump Station No. 1\CADD\PlanSheets\D-01 - Replacement Plan.dwg PUMP STATION 1 DEMOLITION PLAN Nov 15, 2013 8:08am by: jordan.walker
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SECTION VIEW 2
 N.T.S. D-0.2

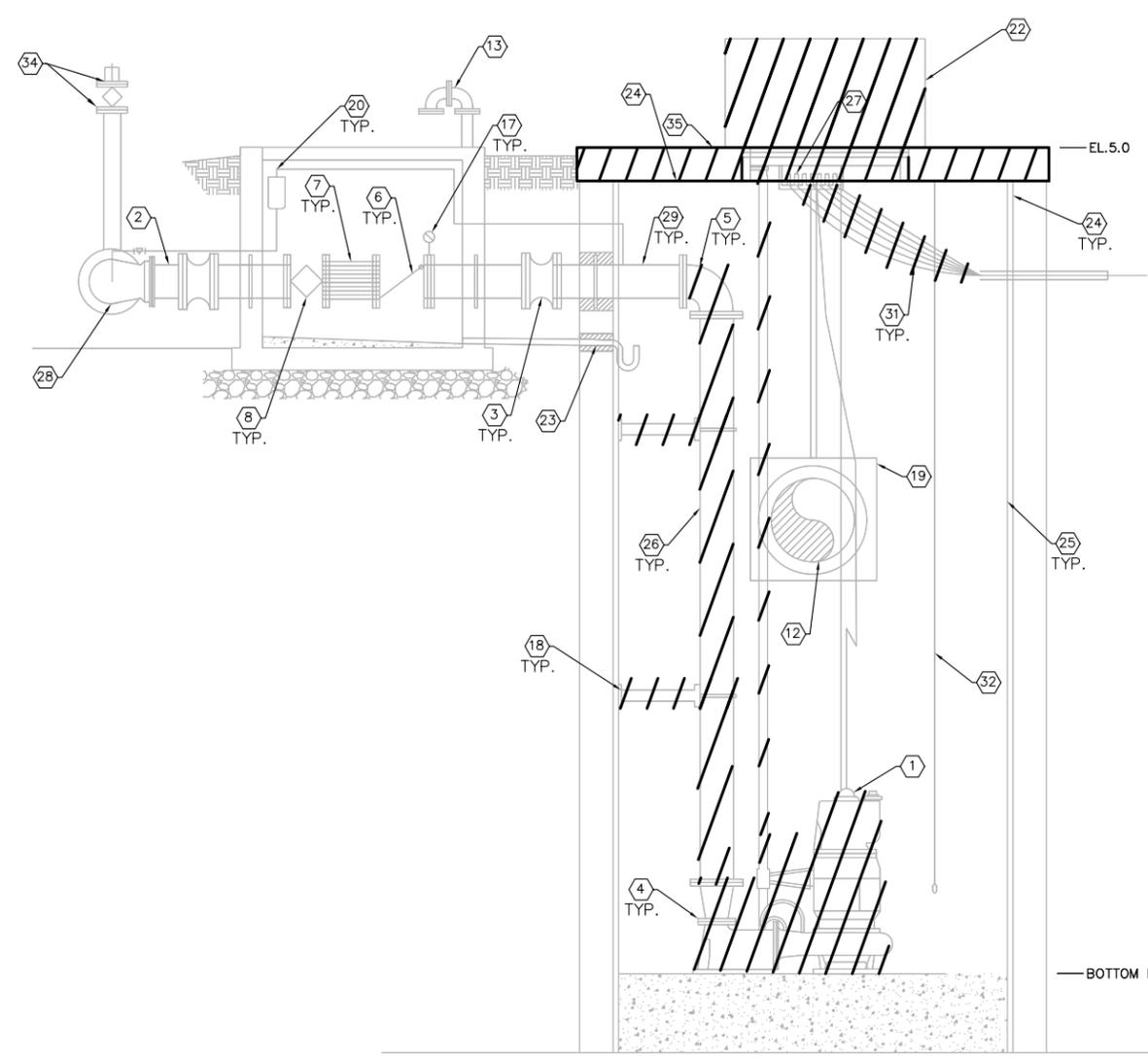
- GENERAL NOTES:**
- CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
 - CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
 - CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY FLOW INTERRUPTION.
 - UPON OWNER ACCEPTANCE OF THE NEW PUMP STATION, ALL EXISTING MECHANICAL PIPING AND EQUIPMENT SHALL BE REMOVED AND SALVAGED PER SPECIFICATIONS.
 - CONTRACTOR IS RESPONSIBLE FOR DISPOSAL OF DEMOLISHED MATERIAL. DISPOSAL SHALL BE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.
 - EXISTING DRAWING TRACED FROM FDEP PLANS PERMIT #C552-003369-030. DEVIATIONS FOUND FROM MEASUREMENTS ARE NOTED ON PLANS.
 - PRESSURE WASH AND CLEAN WETWELL ONCE EQUIPMENT IS REMOVED.

- KEY NOTES**
- REMOVE EXISTING PUMPS, GUIDE RAILS, POWER CABLES, LIFTING CHAIN, BASE ELBOWS AND ASSOCIATED APPURTENANCES
 - EXISTING 12" DIP TO REMAIN
 - EXISTING 12" SHORT BODY MJ SLEEVE TO REMAIN
 - EXISTING 12" X 8" DIP TO BE REMOVED
 - EXISTING 12" DIP 90° BEND TO BE REMOVED
 - EXISTING 12" CHECK VALVE TO REMAIN
 - EXISTING 12" HFAC TO REMAIN
 - EXISTING 12" PLUG VALVE TO REMAIN
 - EXISTING 16" X 12" DIP REDUCING 90° BEND TO REMAIN
 - EXISTING 16" X 12" DIP REDUCER TO REMAIN
 - EXISTING 16"x16"x12" DIP TEE TO REMAIN
 - EXISTING 24" PVC PIPE TO REMAIN
 - REMOVE EXISTING 8" DIP VENT AND ASSOCIATED BENDS
 - EXISTING 8" HDPE DUCT AND ASSOCIATED BENDS TO REMAIN
 - EXISTING 4" HDPE DRAIN PIPE AND ASSOCIATED BENDS TO REMAIN
 - EXISTING 16"x16"x6" TEE, 6" DIP, 6" PV, AND 6" CAMLOCK W/ CAP AND CHAIN TO REMAIN
 - EXISTING PRESSURE GAUGE TO REMAIN
 - EXISTING WALL MOUNTED PIPE SUPPORTS TO REMOVED
 - EXISTING 24" X 24" SLUICE GATE TO REMAIN
 - EXISTING SEWER LINE, 2" SCAV, 2" PV TO REMAIN
 - FIBERGLASS INLET BAFFLE TO REMAIN
 - REMOVE EXISTING ALUMINUM DOUBLE DOOR ACCESS HATCH
 - EXISTING 4" PVC DRAIN AND ASSOCIATED P-TRAP TO REMAIN
 - EXISTING 12' DIA. WET WELL TO REMAIN IN PLACE
 - EXISTING PVC LINER TO REMAIN
 - EXISTING 12" DIP TO BE REMOVED. SEE SHEET M-0.2
 - EXISTING CABLE HOLDER TO BE REMOVED
 - EXISTING 8" DIP VENT AND ASSOCIATED BENDS TO REMAIN
 - EXISTING 12" TO BE CUT. SEE SHEET M-0.2
 - NOT USED
 - EXISTING PUMP POWER CABLES TO BE REMOVED
 - EXISTING POWER TRANSDUCER AND MECHANICAL FLOATS TO REMAIN
 - NOT USED
 - SAWCUT AND REMOVE EXISTING CONCRETE TOP SLAB

GROUNDWATER / DEWATERING NOTE:
 THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

DESIGN ENGINEER:	WAYNE E. WHITE, P.E.	FLORIDA REGISTRATION NUMBER:	53232
DESIGNED BY:	JWW	DRAWN BY:	JRT
SCALE:	AS NOTED	CHECKED BY:	NEW
PUMP STATION 1 DEMOLITION PLAN			
CITY OF ST. PETE BEACH	PUMP STATION NO. 1 & 2	REHABILITATION	FLORIDA
DATE: NOVEMBER 2013			PROJECT NO.: 148404001
SHEET NUMBER: D-0.2			ADDENDUM 1
CITY OF ST. PETE BEACH			REVISIONS
PUMP STATION NO. 1 & 2			DATE
REHABILITATION			BY
PINELLAS COUNTY			11/15/2013 JWW

Drawing name: K:\TAM_Civil\148404 - City of St. Pete Beach\001 - Pump Station No. 1\CADD\North Wet Well\Plan Sheets\D-01 - N WET WELL DEMO.dwg PUMP STATION 1 NORTH WETWELL DEMOLITION SECTION Nov 15, 2013 8:08am by: jordan.walker
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SECTION VIEW 1
 N.T.S. 1
 D-0.3

- GENERAL NOTES:**
1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
 2. CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
 3. CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY FLOW INTERRUPTION.
 4. UPON OWNER ACCEPTANCE OF THE NEW PUMP STATION, ALL EXISTING MECHANICAL PIPING AND EQUIPMENT SHALL BE REMOVED AND SALVAGED PER SPECIFICATIONS.
 5. CONTRACTOR IS RESPONSIBLE FOR DISPOSAL OF DEMOLISHED MATERIAL. DISPOSAL SHALL BE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.
 6. EXISTING DRAWING TRACED FROM FDEP PLANS PERMIT #C552-003369-030. DEVIATIONS FOUND FROM MEASUREMENTS ARE NOTED ON PLANS.
 7. PRESSURE WASH AND CLEAN WETWELL ONCE EQUIPMENT IS REMOVED.

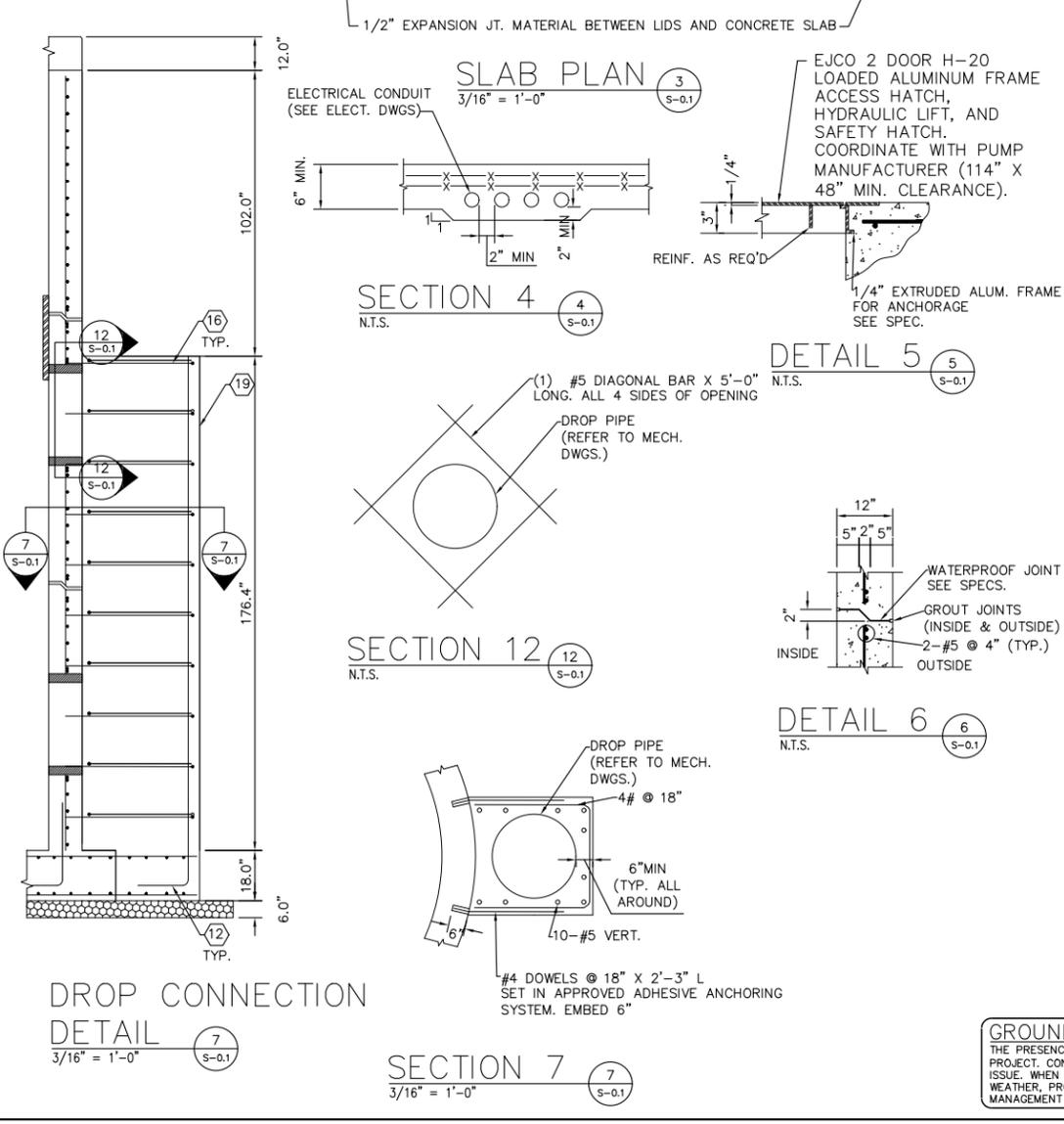
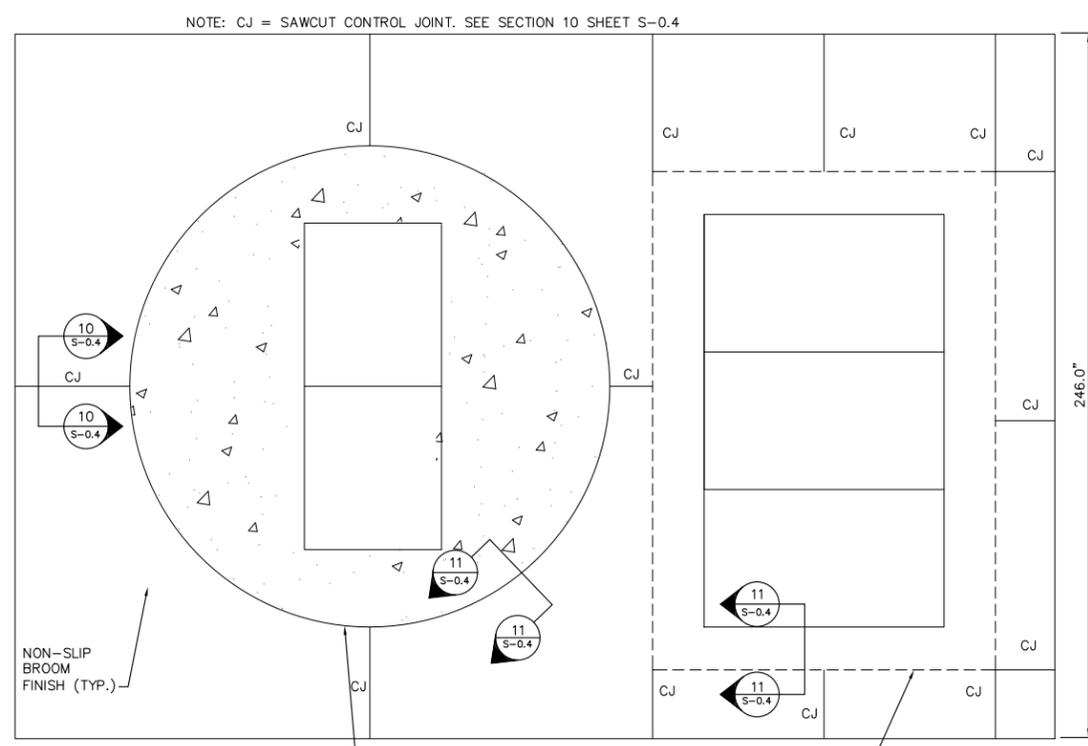
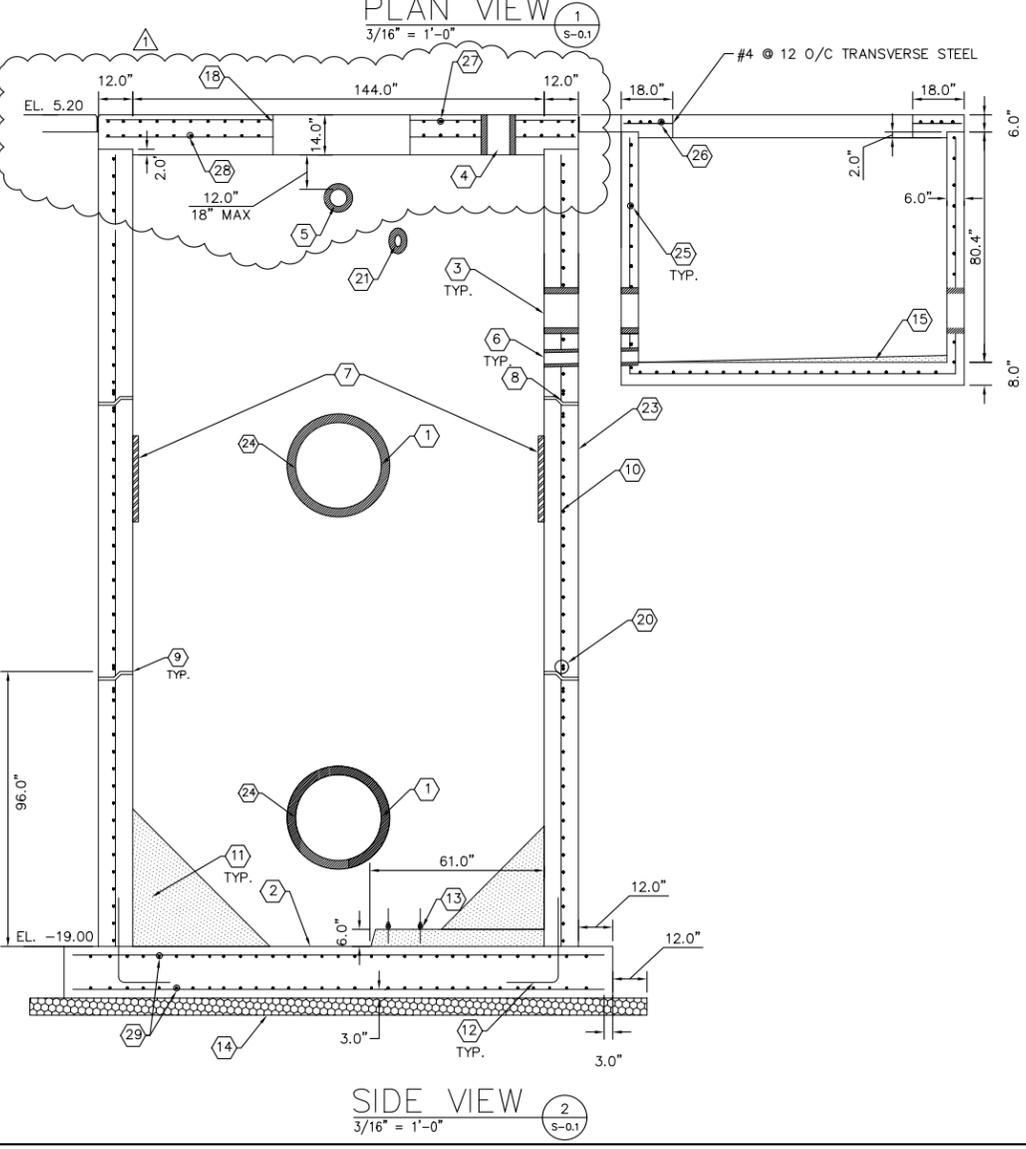
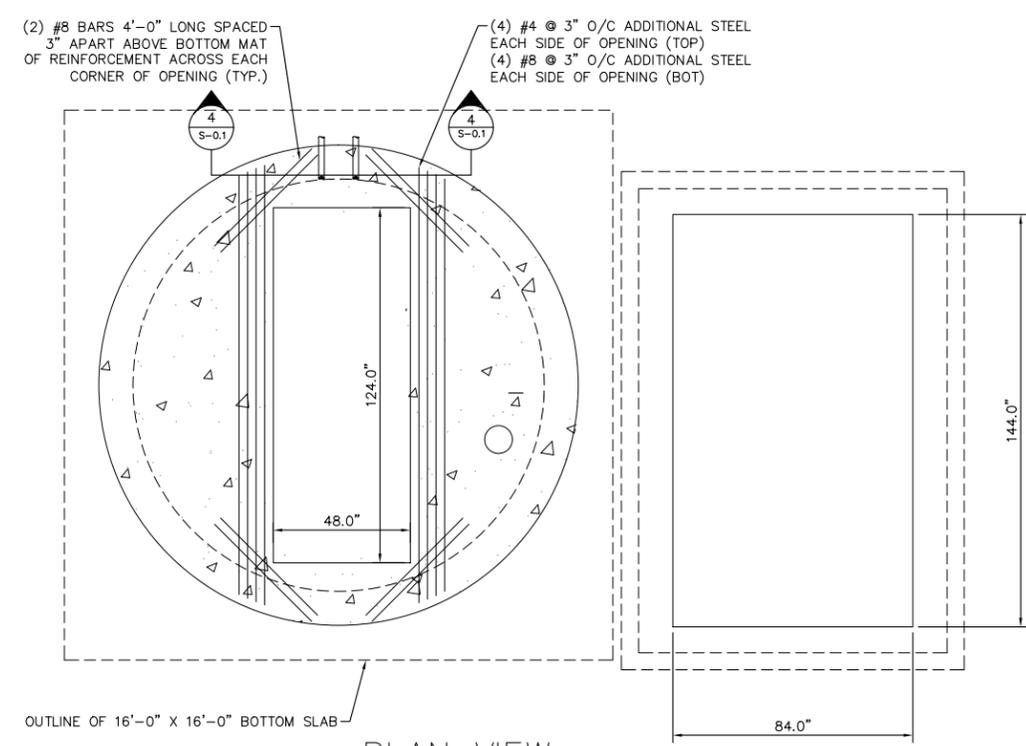
- KEY NOTES:**
- 1 REMOVE EXISTING PUMPS, GUIDE RAILS, POWER CABLES, LIFTING CHAIN, BASE ELBOWS AND ASSOCIATED APPURTENANCES
 - 2 EXISTING 12" DIP TO REMAIN
 - 3 EXISTING 12" SHORT BODY MJ SLEEVE TO REMAIN
 - 4 EXISTING 12" X 8" DIP TO BE REMOVED
 - 5 EXISTING 12" DIP 90° BEND TO BE REMOVED
 - 6 EXISTING 12" CHECK VALVE TO REMAIN
 - 7 EXISTING 12" HFAC TO REMAIN
 - 8 EXISTING 12" PLUG VALVE TO REMAIN
 - 9 NOT USED
 - 10 NOT USED
 - 11 NOT USED
 - 12 EXISTING 24" PVC PIPE TO REMAIN
 - 13 EXISTING 8" DIP VENT AND ASSOCIATED BENDS TO REMAIN
 - 14 NOT USED
 - 15 NOT USED
 - 16 NOT USED
 - 17 EXISTING PRESSURE GAUGE TO REMAIN
 - 18 EXISTING WALL MOUNTED PIPE SUPPORTS TO REMOVED
 - 19 EXISTING 24" X 24" SLUICE GATE TO REMAIN
 - 20 EXISTING SEWER LINE, 2" SCAV, 2" PV TO REMAIN
 - 21 NOT USED
 - 22 REMOVE EXISTING ALUMINUM DOUBLE DOOR ACCESS HATCH
 - 23 EXISTING 4" PVC DRAIN AND ASSOCIATED P-TRAP TO REMAIN
 - 24 EXISTING 12' DIA. WET WELL TO REMAIN IN PLACE
 - 25 EXISTING PVC LINER TO REMAIN
 - 26 EXISTING 12" DIP TO BE REMOVED. SEE SHEET M-0.21
 - 27 EXISTING CABLE HOLDER TO BE REMOVED
 - 28 EXISTING 16 X 12" DIP REDUCING 90° BEND TO REMAIN
 - 29 EXISTING 12" TO BE CUT. SEE SHEET M-0.21
 - 30 NOT USED
 - 31 EXISTING PUMP POWER CABLES TO BE REMOVED
 - 32 EXISTING POWER TRANSDUCER AND MECHANICAL FLOATS TO REMAIN
 - 33 NOT USED
 - 34 6" PV, CAMLOCK, & DUST VENT TO REMAIN
 - 35 SAWCUT AND REMOVE EXISTING CONCRETE TOP SLAB

GROUNDWATER / DEWATERING NOTE:
 THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.



PUMP STATION 1 NORTH WETWELL DEMOLITION SECTION		SCALE AS NOTED DESIGNED BY JWW DRAWN BY JRT CHECKED BY JWW	DESIGN ENGINEER: WAYNE E. WHITE, P.E. FLORIDA REGISTRATION NUMBER: 53232	DATE: 11/15/2013 BY: JWW
CITY OF ST. PETE BEACH PUMP STATION NO. 1 N. WET WELL REHABILITATION		PINELLAS COUNTY FLORIDA		REVISIONS No. 1 ADDENDUM 1
DATE: NOVEMBER 2013 PROJECT NO.: 148404001		SHEET NUMBER D-0.3		

Drawing name: K:\TAM_Civil\148404 - City of St. Pete Beach\000 - Pump Station No. 2\CADD\PlanSheets\S-02 WETWELL SECTION.dwg WETWELL SECTION Nov 15, 2013 8:09am by: jordan.walker
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- GENERAL NOTES:**
- CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
 - CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
 - CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY PUMP STATION INTERFERENCE.
 - CONTRACTOR TO COORDINATE ALL PIPE AND CONDUIT LOCATIONS WITH MECHANICAL AND ELECTRICAL DRAWINGS PRIOR TO PLACING CONCRETE. MECHANICAL CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR EQUIPMENT AND ANCHOR BOLT LOCATIONS.
 - STRUCTURAL DRAWINGS SHALL BE WORKED TOGETHER WITH MECHANICAL AND ELECTRICAL DRAWINGS TO PROPERLY LOCATE WALL PIPES, PIPE SLEEVES, ANCHOR BOLTS, BLOCKOUTS, ETC. DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER OF RECORD BEFORE PROCEEDING WITH THE WORK. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT FLOATION OF STRUCTURES FULLY UNTIL CONSTRUCTED AND BACKFILL IS IN PLACE AND COMPACTED.
 - DESIGN CRITERIA AND LOADS:
 ACI 350-CONCRETE SANITARY ENGINEERING STRUCTURES
 ACI 318-BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE
 ASTM C 478-STANDARD SPECIFICATIONS FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS.
 DESIGN LIVE LOADS: AASHTO HS-20.
 REQUIRED ALLOWABLE SOIL BEARING CAPACITY= 1600 PSF.
 CONTRACTOR'S GEOTECHNICAL ENGINEER TO VERIFY PRIOR TO FABRICATION AND CONSTRUCTION.
 - CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH PER SPECIFICATIONS.
 - REINFORCING STEEL SHALL CONFORM TO ASTM 615 GRADE 60.
 - WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185.
 - CLEARANCE OF REINFORCING STEEL FROM THE FACE OF CONCRETE TO THE OUTERMOST TIE OR BAR SHALL BE 2", UNLESS OTHERWISE NOTED ON THE DRAWINGS.
 - REMOVE ALL ORGANIC TOPSOIL, SURFACE VEGETATION, DEBRIS, ETC. A MINIMUM OF 6 INCH LIMEROCK BEDDING COMPACTED TO 98% RELATIVE DENSITY SHALL BE PLACED UNDER THE WET WELL BASE SLABS. DEWATER EXCAVATION DURING WET WELL INSTALLATION. ALL WORK TO BE DONE IN THE "DRY".
- KEY NOTES:**
- OPENING FOR 30" DIP INFLUENT
 - BASE SLAB
 - OPENING FOR 12" DIP DISCHARGE
 - OPENING FOR 8" PVC VENTILATION PIPE
 - OPENING FOR 6" DIP ODOR CONTROL
 - OPENING FOR 2" PVC DRAIN PIPE
 - INSTALL CAST-IN-PLACE TLOCK PVC LINER ON ENTIRE INTERIOR SURFACE OF WETWELL
 - FOR WALL REINFORCEMENT USE #5 @ 6" FOR HORIZONTAL AND #3 @ 6" FOR VERTICAL. CENTERED IN WALL
 - CONTROL JOINTS SPACED EVERY 8FT STARTING FROM BOT. ELEVATION
 - CENTER REINFORCEMENT (TYP.)
 - NON-SHRINK GROUT FILLET ALL AROUND, SLOPE OF 1:1 (MAX HEIGHT 2'-FT), TO BE COATED WITH INTERIOR WETWELL PROTECTIVE COATING.
 - #3 DOWELS WITH STD ACI HOOK. LAP VERTICAL STEEL 18" MIN. (TYP.)
 - 316 SS ANCHOR BOLTS LOCATION & SIZE PER PUMP MANUFACTURERS REQUIREMENTS
 - LIMEROCK BASE COMPACTED TO 98% MODIFIED PROCTOR MAX DRY DENSITY - 6" MIN THICKNESS
 - NON-SHRINK GROUT SLOPED AT 2% TO PVC DRAIN
 - #4 DOWELS @ 18" SET IN EPOXY
 - NOT IN USE
 - SEE DETAIL 5 ON THIS SHEET
 - DROP CONNECTION ENCASEMENT - CAST IN PLACE W/ 30" DIP
 - SEE DETAIL 6 ON THIS SHEET
 - OPENING FOR 4" PVC DRAIN
 - NOT IN USE
 - PRECAST REINFORCED CONCRETE WALLS
 - ADD 4-#5 BARS X 5'-0" L DIAGONAL AT OPENING GREATER THAN 12" AT WALLS (TYP.)
 - #5 BARS @ 12" O.C. E.W CENTERED IN WALL OR SLAB
 - 4-#7 CONT. AROUND OPENING, EQUALLY SPACED (TYP. 4 SIDES) CENTERED IN SLAB
 - #4 @ 6" E.W TOP
 - #8 @ 6" E.W BOTTOM
 - #5 @ 6" E.W T&B RECTANGULAR PATTERN
- GROUNDWATER / DEWATERING NOTE:**
 THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

DESIGN ENGINEER:	SETH E. SCHMID, P.E.
DESIGNED BY:	JWW
DRAWN BY:	JRT
CHECKED BY:	NEW
DATE:	11/15/2013
REVISIONS:	ADDENDUM 1
NO.	1
DATE	
BY	

Kimley-Horn and Associates, Inc.
 2013 KIMLEY-HORN AND ASSOCIATES, INC.
 655 NORTH FRANKLIN STREET, SUITE 150, TAMPA, FL 33602
 PHONE: 813-820-1460
 WWW.KIMLEY-HORN.COM CA 00006986

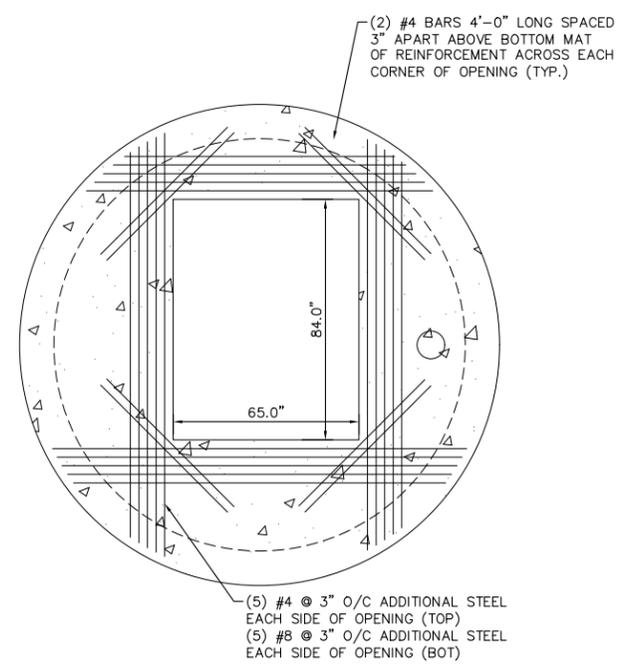
PUMP STATION 2 WETWELL PLAN AND SECTIONS

CITY OF ST. PETE BEACH PUMP STATION NO. 1 & 2 REHABILITATION

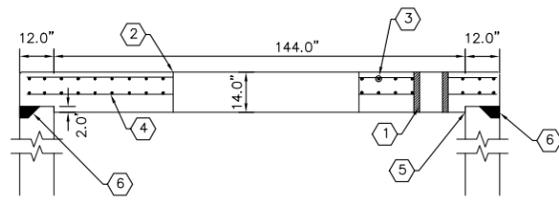
FLORIDA
 PINELLAS COUNTY

DATE NOVEMBER 2013
 PROJECT NO. 148404000
 SHEET NUMBER **S-0.1**

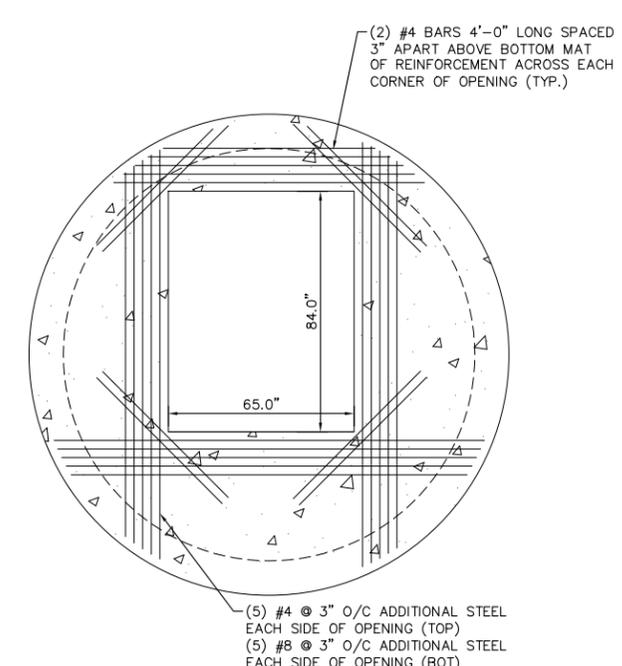
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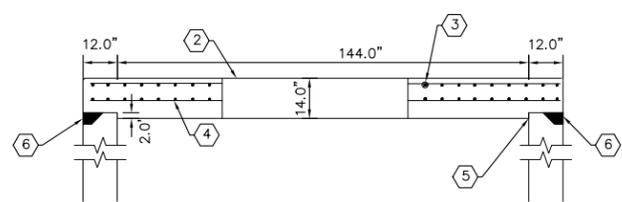
**SOUTH WETWELL
 PLAN VIEW**
 3/16" = 1'-0" (1) S-0.2



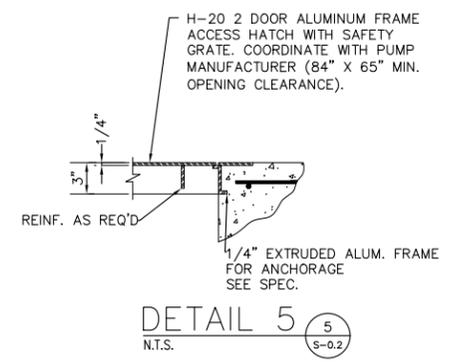
**SOUTH WETWELL
 SIDE VIEW**
 3/16" = 1'-0" (2) S-0.2



**NORTH WETWELL
 PLAN VIEW**
 3/16" = 1'-0" (3) S-0.2



**NORTH WETWELL
 SIDE VIEW**
 3/16" = 1'-0" (4) S-0.2



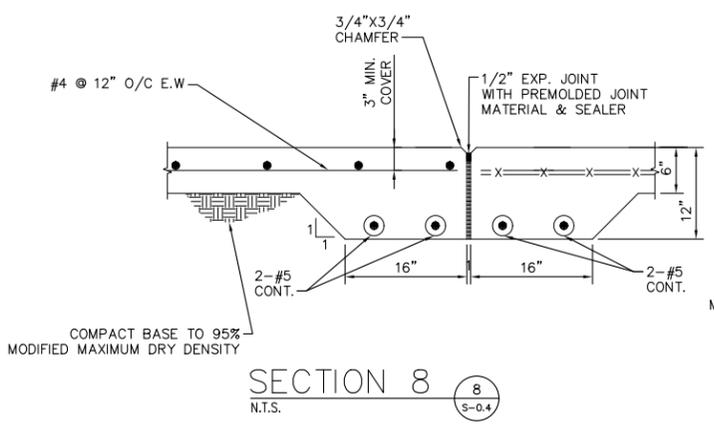
- GENERAL NOTES:**
- CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
 - CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
 - CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY PUMP STATION INTERRUPTION.
 - CONTRACTOR TO COORDINATE ALL PIPE AND CONDUIT LOCATIONS WITH MECHANICAL AND ELECTRICAL DRAWINGS PRIOR TO PLACING CONCRETE. MECHANICAL CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR EQUIPMENT AND ANCHOR BOLT LOCATIONS.
 - STRUCTURAL DRAWINGS SHALL BE WORKED TOGETHER WITH MECHANICAL AND ELECTRICAL DRAWINGS TO PROPERLY LOCATE WALL PIPES, PIPE SLEEVES, ANCHOR BOLTS, BLOCKOUTS, ETC. DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER OF RECORD BEFORE PROCEEDING WITH THE WORK.
 - CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT FLOATATION OF STRUCTURES FULLY UNTIL CONSTRUCTED AND BACKFILL IS IN PLACE AND COMPACTED.
 - DESIGN CRITERIA AND LOADS:
 ACI 350-CONCRETE SANITARY ENGINEERING STRUCTURES
 ACI 318-BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE
 ASTM C 478-STANDARD SPECIFICATIONS FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS
 DESIGN LIVE LOADS: AASHTO HS-20
 REQUIRED ALLOWABLE SOIL BEARING CAPACITY= 1600 PSF.
 CONTRACTOR'S GEOTECHNICAL ENGINEER TO VERIFY PRIOR TO FABRICATION AND CONSTRUCTION.
 - CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH PER SPECIFICATIONS.
 - REINFORCING STEEL SHALL CONFORM TO ASTM 615 GRADE 60.
 - WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185.
 - CLEARANCE OF REINFORCING STEEL FROM THE FACE OF CONCRETE TO THE OUTERMOST TIE OR BAR SHALL BE 2", UNLESS OTHERWISE NOTED ON THE DRAWINGS.
 - REMOVE ALL ORGANIC TOPSOIL, SURFACE VEGETATION, DEBRIS, ETC. A MINIMUM OF 6 INCH LIMEROCK BEDDING COMPACTED TO 98 % RELATIVE DENSITY SHALL BE PLACED UNDER THE WET WELL BASE SLABS. DEWATER EXCAVATION DURING WET WELL INSTALLATION. ALL WORK TO BE DONE IN THE "DRY".

- KEY NOTES:**
- OPENING FOR 8" PVC VENTILATION PIPE
 - SEE DETAIL 5 ON THIS SHEET
 - #4 @ 6" O.C. E.W. TOP
 - #8 @ 6" O.C. E.W. BOTTOM
 - CONTRACTOR MUST SIZE LIP OF TOP SLAB TO PROVIDE SPACE FOR EXISTING LINER INSIDE WETWELL.
 - FILL KEY IN EXISTING WALLS WITH NON-SHRINK GROUT PRIOR TO PLACING NEW LID.

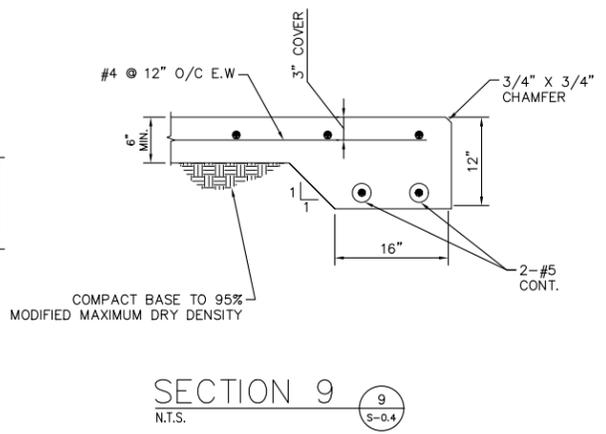
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PUMP STATION 1 TOP SLAB PLAN AND SECTIONS				DATE NOVEMBER 2013
CITY OF ST. PETE BEACH PUMP STATION NO. 1 & 2 REHABILITATION				PROJECT NO. 148404000
PINELLAS COUNTY FLORIDA				SHEET NUMBER S-0.2
KIMLEY-HORN AND ASSOCIATES, INC. 2013 KIMLEY-HORN AND ASSOCIATES, INC. 655 NORTH FRANKLIN STREET, SUITE 150, TAMPA, FL 33602 PHONE: 813-620-1460 WWW.KIMLEY-HORN.COM CA 00006986				REVISIONS No. 1 DATE 11/15/2013 JWW

GROUNDWATER / DEWATERING NOTE:
 THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

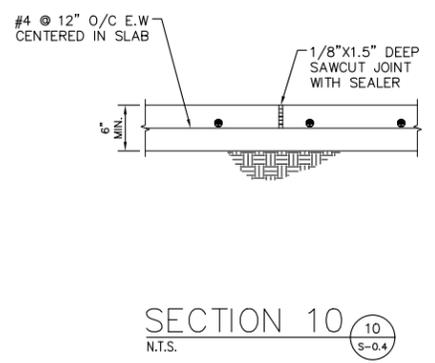
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 Nov 15, 2013 8:09am by: jordan.walker
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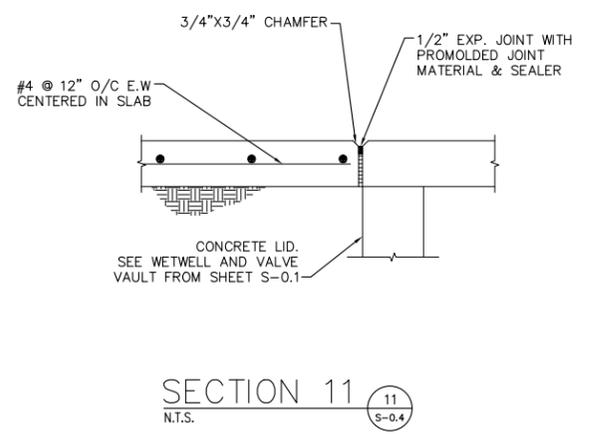
SECTION 8
N.T.S. 8 S-0.4



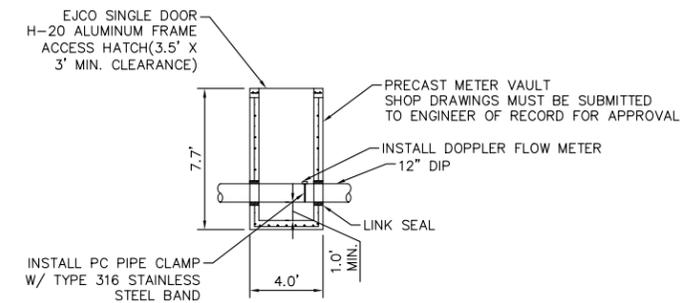
SECTION 9
N.T.S. 9 S-0.4



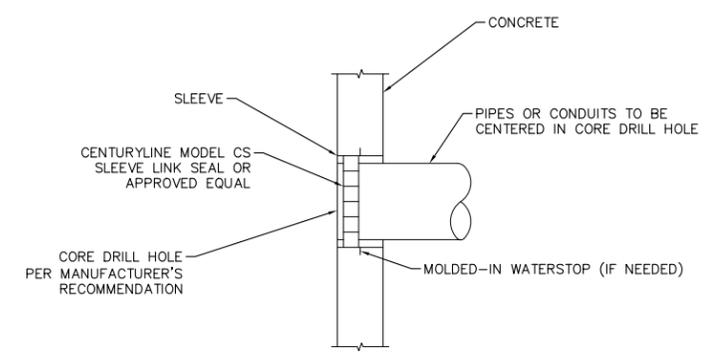
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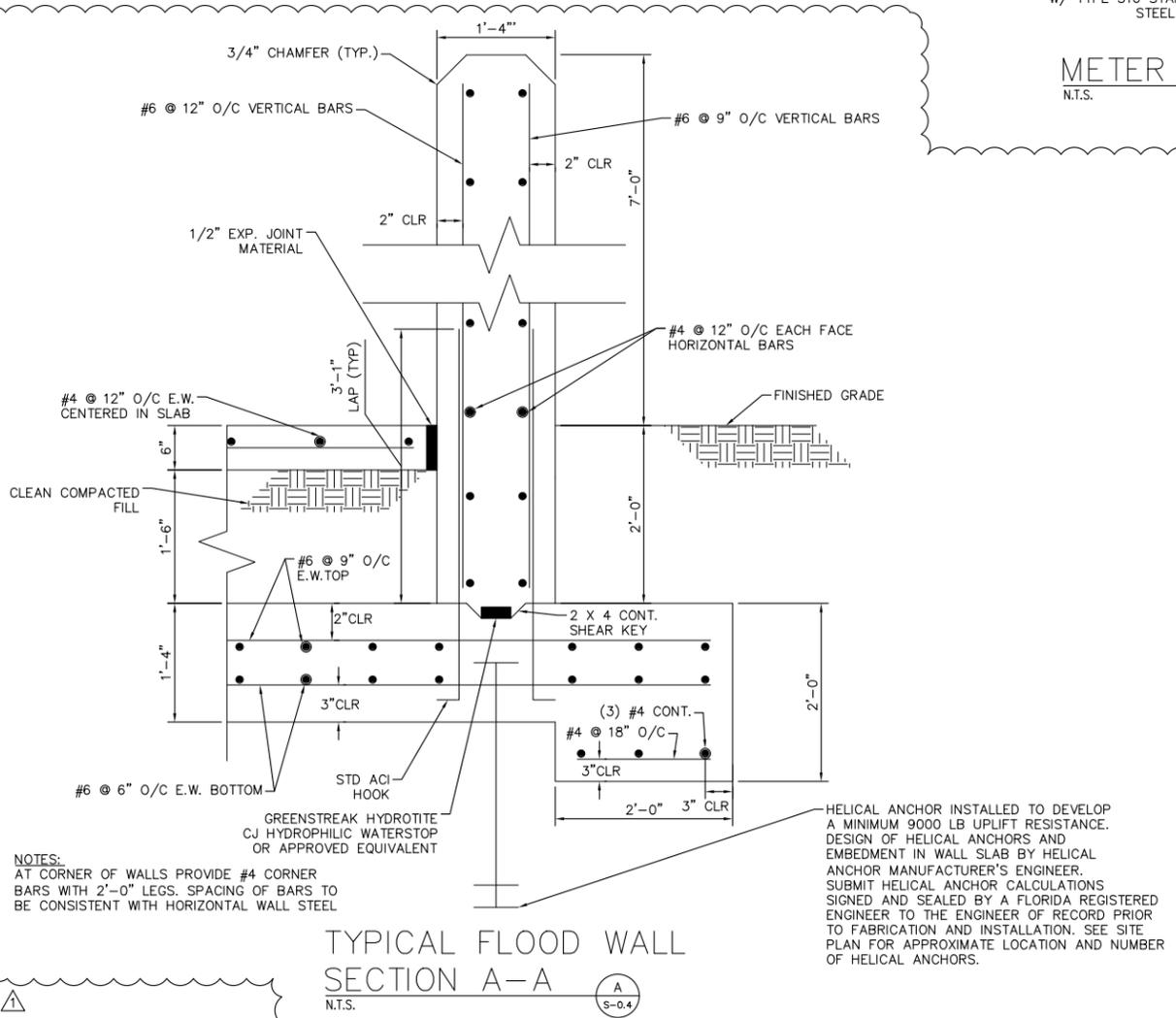
SECTION 11
N.T.S. 11 S-0.4



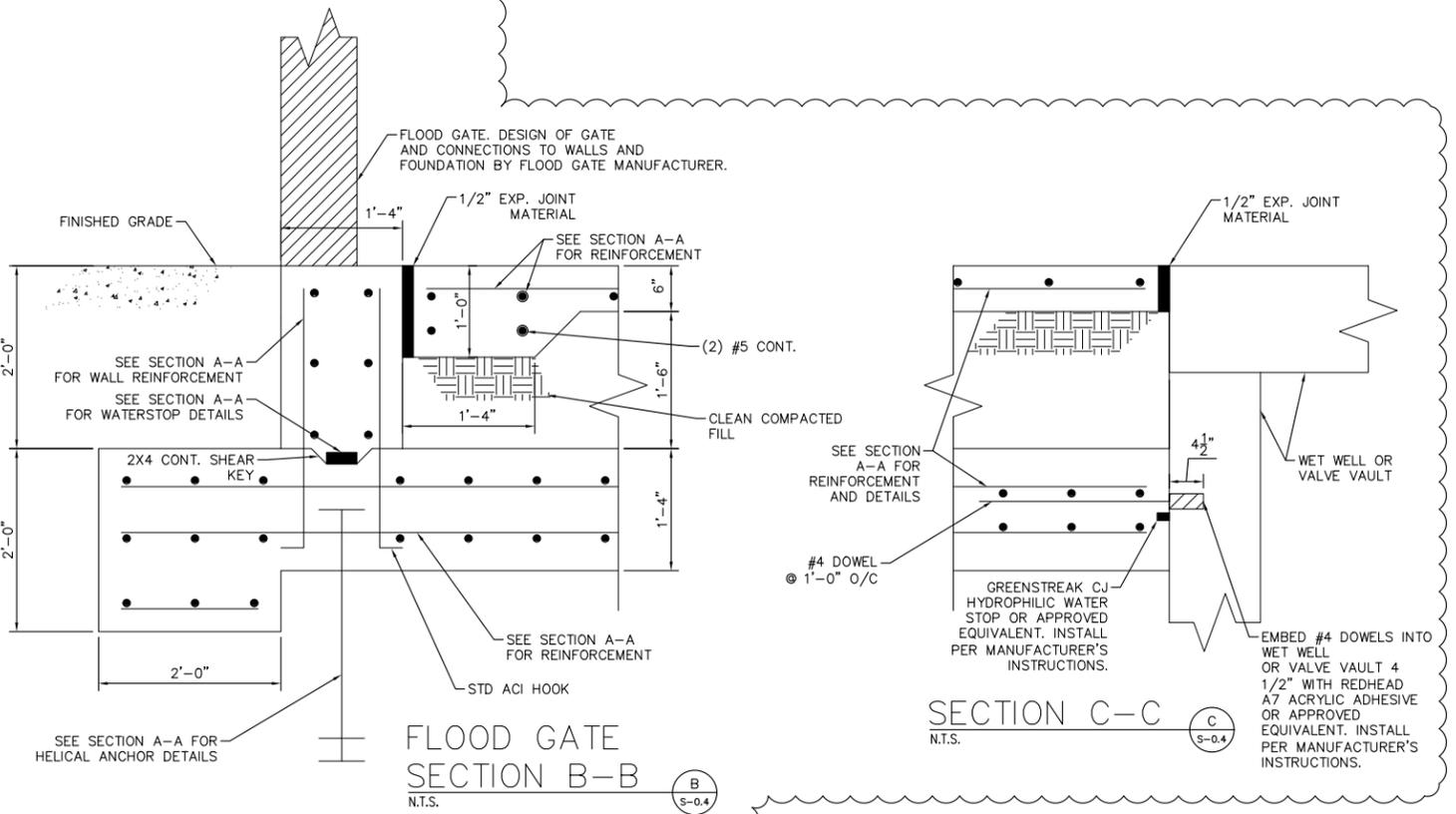
METER VAULT DETAIL
N.T.S. 12 S-0.4



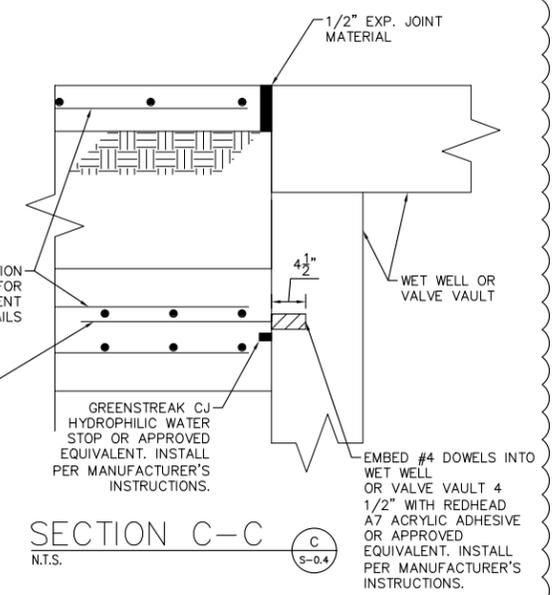
PIPE PENETRATION
N.T.S. 13 S-0.4



TYPICAL FLOOD WALL
SECTION A-A
N.T.S. A S-0.4



FLOOD GATE
SECTION B-B
N.T.S. B S-0.4



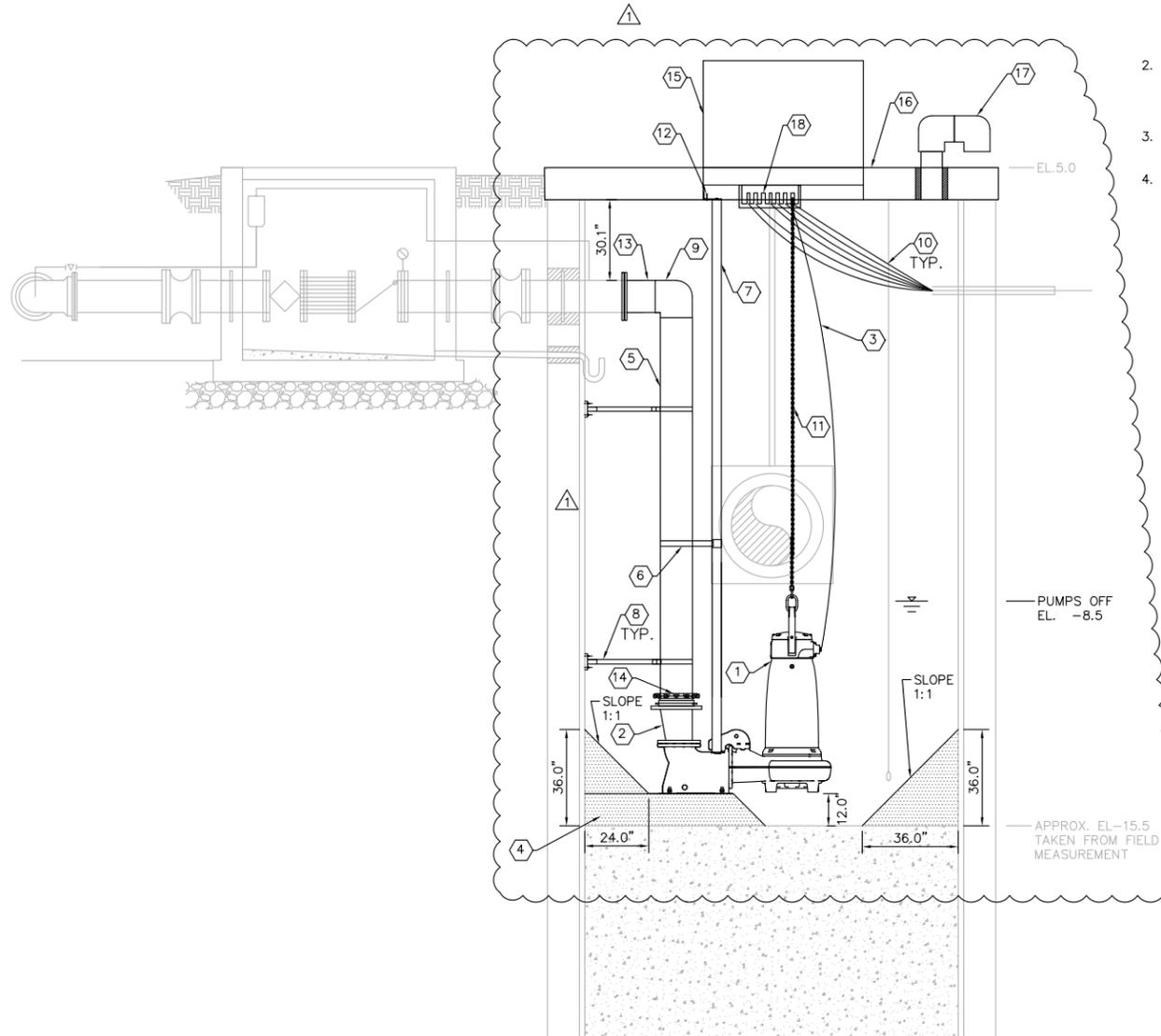
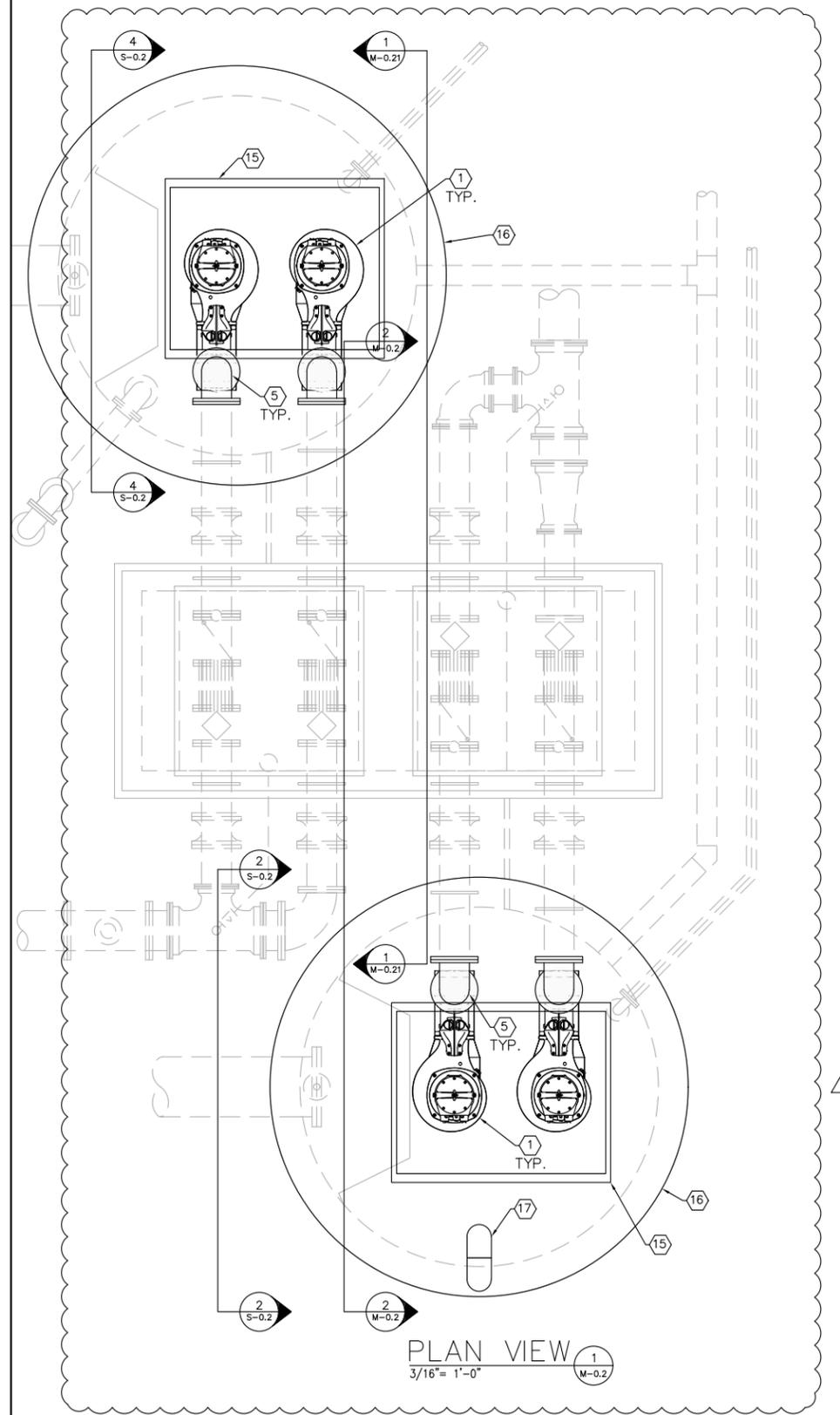
SECTION C-C
N.T.S. C S-0.4

GROUNDWATER / DEWATERING NOTE:
 THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.



DESIGNED BY	JWW	FLORIDA REGISTRATION NUMBER	54640
DRAWN BY	JRT	DATE	11/15/2013
CHECKED BY	WEW	REVISIONS	
SCALE	AS NOTED	PROJECT NO.	148404000
DESIGN ENGINEER	SETH E. SCHMID, P.E.	SHEET NUMBER	S-0.4
Kimley-Horn and Associates, Inc.		CITY OF ST. PETE BEACH PUMP STATION NO. 1 & 2 REHABILITATION	
655 NORTH FRANKLIN STREET, SUITE 150, TAMPA, FL 33602		FLORIDA	
PHONE: 813-820-1460		PINELLAS COUNTY	
WWW.KIMLEY-HORN.COM		DATE	
		NOVEMBER 2013	

Drawing name: K:\TAM_Civil\148404 - City of St. Pete Beach\001 - Pump Station No. 1\CADD\PlanSheets\M-0.1 PLAN AND SECTION.dwg PUMP STATION 1 PLAN AND SECTION Nov 15, 2013 8:09am by: Jordan Walker
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SECTION VIEW 2
 N.T.S. M-0.2

- GENERAL NOTES:**
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 - EXISTING DRAWING TRACED FROM FDEP PLANS PERMIT #C552-003369-030. DEVIATIONS FOUND FROM FIELD MEASUREMENTS ARE NOTED ON PLANS.

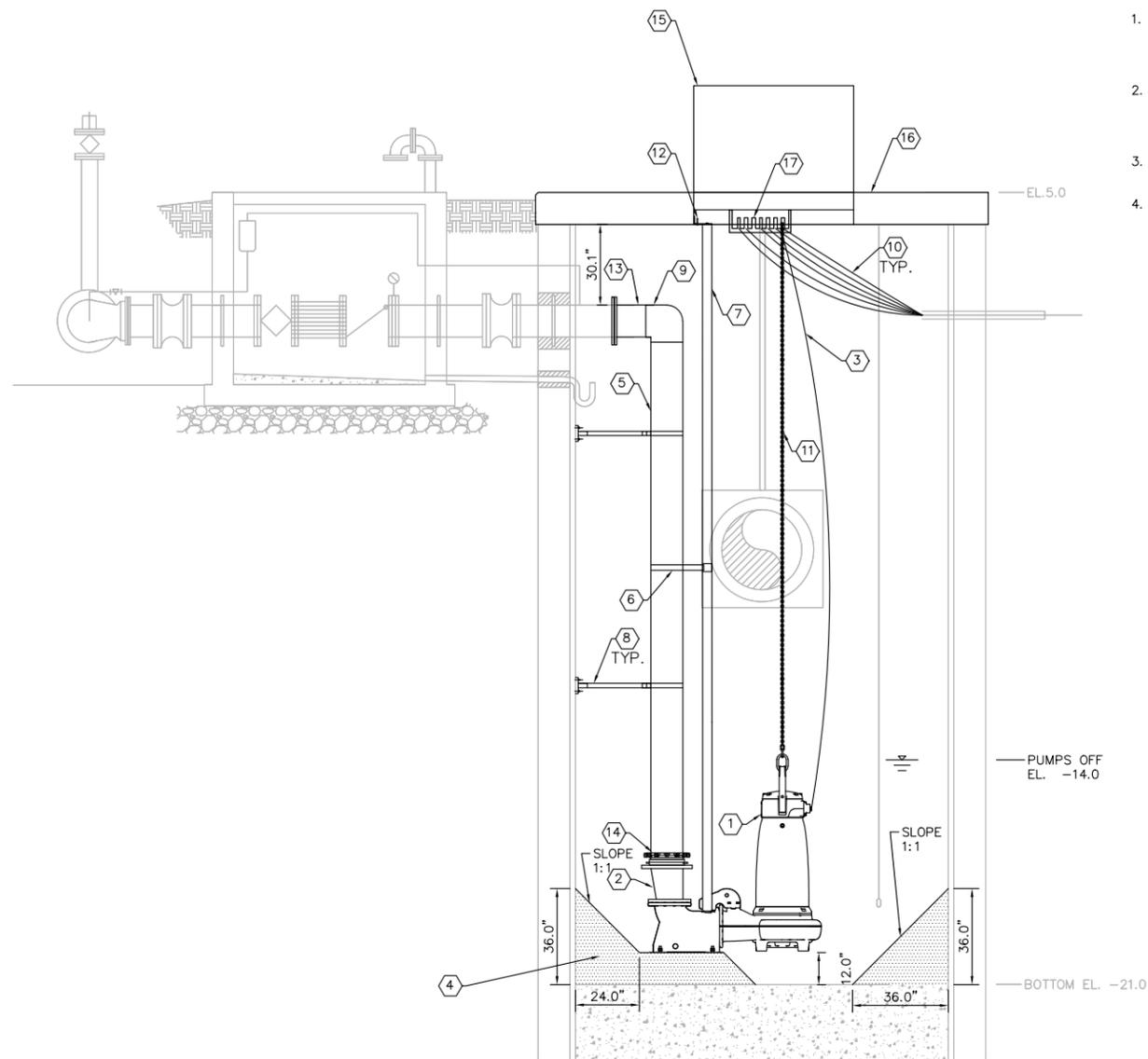
- KEY NOTES**
- INSTALL SUBMERSIBLE PUMP, AND ASSOCIATED CONTROLS AND PIPING
 - INSTALL 12" X 10" DIP ECCENTRIC REDUCER
 - INSTALL PUMP POWER CABLE AND MOUNT TO EXISTING CABLE HOLDER
 - INSTALL NON-SHRINK GROUT
 - INSTALL 12" HDPE DR 11
 - INSTALL INTERMEDIATE GUIDE BAR BRACKET. SEE DETAIL 9 ON SHEET M-0.3.
 - INSTALL 3" 316 SS GUIDE RAILS
 - INSTALL WALL MOUNTED PIPE SUPPORT ASSEMBLY. SEE DETAIL 1 ON SHEET M-0.3
 - INSTALL 12" HDPE DR 11 MOLDED 90° BEND
 - INSTALL PUMP POWER CABLES
 - INSTALL 316 SS LIFTING CHAIN AND MOUNT TO HATCH FRAME. 6" LONGER THAN WETWELL DEPTH
 - INSTALL 3" UPPER GUIDE BAR BRACKET. SEE DETAIL 4 ON SHEET M-0.3
 - CUT EXISTING 12" DIP AS NEEDED TO INSTALL 12" DIPS BELL MJ ADAPTER TO PLAIN END OF PIPE
 - INSTALL 12" RESTRAINED FLANGED ADAPTER
 - INSTALL H-20 2 DOOR ALUMINUM FRAME ACCESS HATCH WITH SAFETY GRATE. COORDINATE WITH PUMP MANUFACTURER (84" X 60" MIN. OPENING CLEARANCE)
 - INSTALL PROPOSED TOP SLAB. SEE STRUCTURAL DETAILS ON SHEET S-0.2 - PUMP STATION 1 TOP SLAB PLAN AND SECTIONS
 - INSTALL 8" PVC VENTILATION PIPE
 - INSTALL CABLE HOLDER. SEE DETAIL 5 ON SHEET M-0.3 - MECHANICAL DETAILS

GROUNDWATER / DEWATERING NOTE:
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CITY OF ST. PETE BEACH PUMP STATION NO. 1 & 2 REHABILITATION		FLORIDA	DATE NOVEMBER 2013
PINELLAS COUNTY		PROJECT NO. 148404001	SHEET NUMBER M-0.2
DESIGN ENGINEER: WAYNE E. WHITE, P.E.		FLORIDA REGISTRATION NUMBER: 53232	DATE: 11/15/2013
SCALE AS NOTED DESIGNED BY: JWW DRAWN BY: JRT CHECKED BY: WEW		DESIGNER: Kimley-Horn and Associates, Inc.	REVISIONS
© 2013 KIMLEY-HORN AND ASSOCIATES, INC. 655 NORTH FRANKLIN STREET, SUITE 150, TAMPA, FL 33602 PHONE: 813-820-1460 WWW.KIMLEY-HORN.COM CA 00006986		ADDENDUM 1	BY

Drawing name: K:\TAM_Civil\148404 - City of St. Pete Beach\001 - Pump Station No. 1\CADD\North Wet Well\Plan Sheets\M-0.1 PSI NORTH WET WELL.dwg PUMP STATION 1 NORTH WETWELL SECTION Nov 15, 2013 8:09am by: jordan.walker
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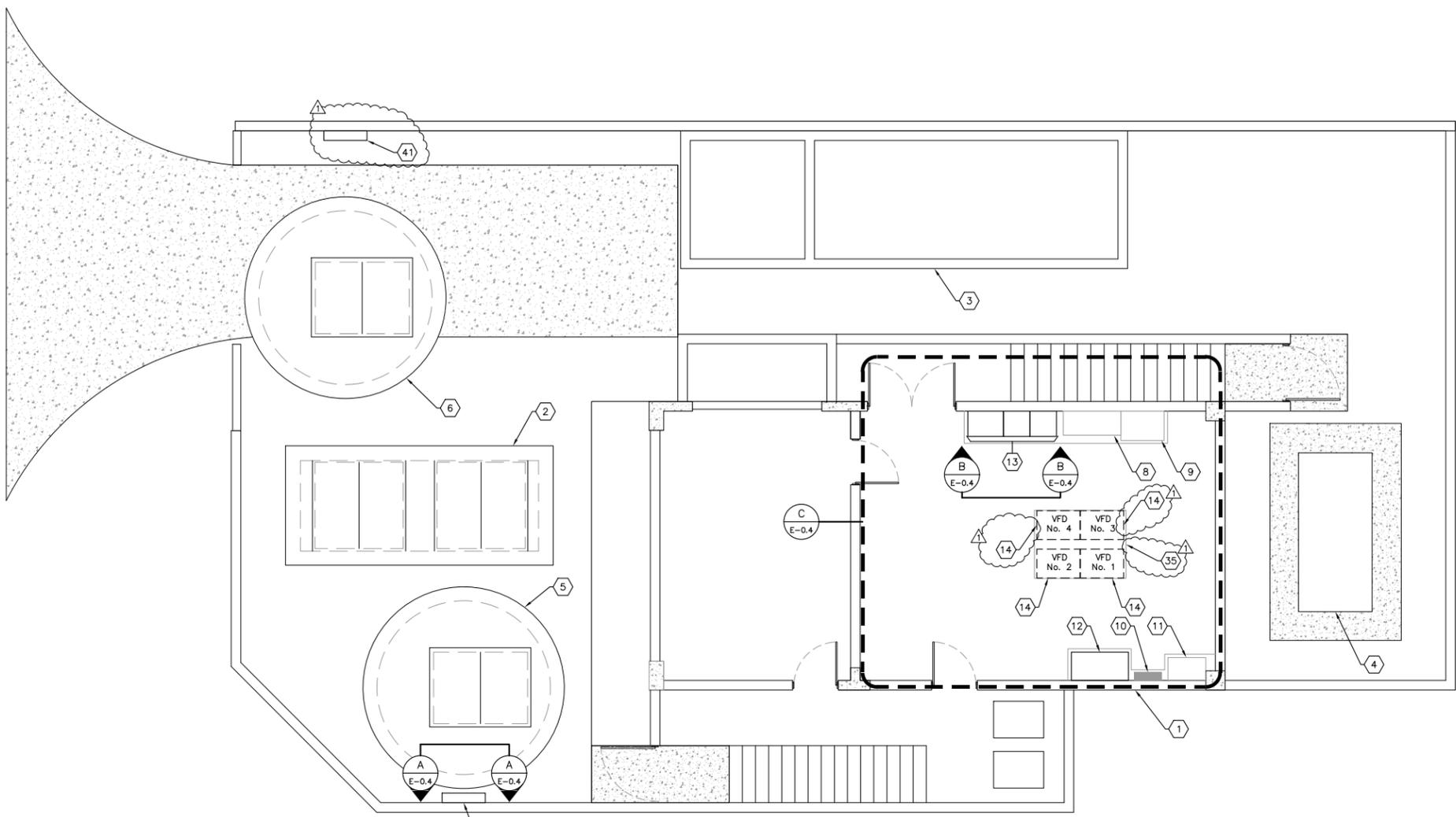


SECTION VIEW 1
 N.T.S. M-0.21

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 - INSTALL 12" HDPE DR 11
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 - INSTALL PROPOSED TOP SLAB. SEE STRUCTURAL DETAILS ON SHEET S-0.2 - PUMP STATION 1 TOP SLAB PLAN AND SECTIONS
 - INSTALL CABLE HOLDER. SEE DETAIL 5 ON SHEET M-0.3 - MECHANICAL DETAILS

CITY OF ST. PETE BEACH PUMP STATION NO. 1 N. WET WELL REHABILITATION		FLORIDA	
PINELLAS COUNTY		DATE NOVEMBER 2013	
PROJECT NO. 148404001		SHEET NUMBER M-0.21	
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DESIGN ENGINEER: WAYNE E. WHITE, P.E. FLORIDA REGISTRATION NUMBER: 5			



GENERAL NOTES:

- CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
- CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
- CONTRACTOR SHALL PROVIDE AND INSTALL NEW SEAL FITTINGS FOR ALL EXISTING RACEWAYS IN WHICH NEW CONDUCTORS ARE TO BE INSTALLED. NEW SEAL FITTING SHALL MATCH EXISTING.

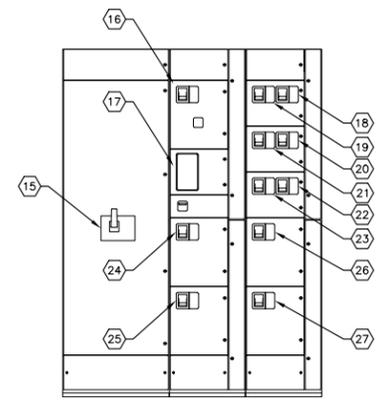
KEY NOTES:

- EXISTING ELECTRICAL AND GENERATOR BUILDING.
- EXISTING VALVE VAULT. CONTRACTOR TO PROVIDE 2-#14 + 1-#4 GND FROM EXISTING LIMIT SWITCH AND 2-#14 + 1-#14 GND FROM EXISTING PRESSURE SWITCH TO NEW VFD. TYPICAL ALL VFDs (VFD #1, VFD #2, VFD #3 AND VFD #4). ALL CONDUCTORS SHALL BE INSTALLED IN EXISTING CONDUIT.
- EXISTING ODOR CONTROL SCRUBBER VESSEL. NO WORK REQUIRED.
- EXISTING GENERATOR FUEL STORAGE TANK. NO WORK REQUIRED.
- EXISTING WET WELL FOR PUMP No. 1 AND PUMP No. 2.
- EXISTING WET WELL FOR PUMP No. 3 AND PUMP No. 4.
- EXISTING JUNCTION BOX FOR VFD #1 AND VFD #2 PUMP FEEDERS AND CONTROL WIRING. REFER TO PUMP JUNCTION BOX ELEVATION ON THIS SHEET.
- EXISTING TRANSFER SWITCH. NO WORK REQUIRED.
- EXISTING MAIN CIRCUIT BREAKER. NO WORK REQUIRED.
- EXISTING LIGHTING PANEL "LP-1". NO WORK REQUIRED.
- EXISTING TRANSFORMER. NO WORK REQUIRED.
- EXISTING MASTER PUMP STATION CONTROL PANEL "MPCP". CONTRACTOR SHALL INSURE EXISTING CONTROL METHODOLOGY IS MAINTAINED.
- EXISTING MOTOR CONTROL CENTER "MCC-1". CONTRACTOR TO INSTALL NEW 480V FEEDERS FOR VFD #1, VFD #2, VFD #3 AND VFD #4. 3-#250 kcmil + 1-#4 GND (TYPICAL FOR EACH VFD). CONTRACTOR SHALL UTILIZE EXISTING CONDUITS FOR NEW CONDUCTORS.
- EXISTING 130 HP VFD TO BE REPLACED WITH NEW 480V, 3-PHASE, 140 HP VFD. CONTRACTOR SHALL PROVIDE AND INSTALL NEW VFD FEEDERS (AND PUMP FEEDERS) CONSISTING OF 3-#250 kcmil + 1-#4 GND. NEW CONDUCTORS TO BE INSTALLED IN EXISTING CONDUITS. NEW VFD'S SHALL BE PROVIDED WITH WIRING TROUGH ON VFD BOTTOM TO ACCOMMODATE EXISTING CONDUIT STUB-UP LOCATIONS. REFER ALSO TO SPECIFICATIONS.
- EXISTING 1000 AMP, 480V, 3-POLE MAIN CIRCUIT BREAKER. NO WORK REQUIRED.
- EXISTING SIZE 1 3-POLE SPARE. NO WORK REQUIRED.
- EXISTING POWER METERING EQUIPMENT. NO WORK REQUIRED.
- EXISTING 20A, 480V, 3-POLE CIRCUIT BREAKER FOR ODOR CONTROL PANEL. NO WORK REQUIRED.
- EXISTING 20A, 480V, 3-POLE CIRCUIT BREAKER FOR JACKET WATER HEATER. NO WORK REQUIRED.
- EXISTING 30A, 480V, 3-POLE CIRCUIT BREAKER FOR ELECTRIC GATE OPERATOR. NO WORK REQUIRED.
- EXISTING 30A, 480V, 3-POLE CIRCUIT BREAKER FOR SURGE PROTECTION DEVICE. NO WORK REQUIRED.
- EXISTING 30A, 480V, 3-POLE SPARE CIRCUIT BREAKER. NO WORK REQUIRED.
- EXISTING 20A, 480V, 3-POLE SPARE CIRCUIT BREAKER. NO WORK REQUIRED.
- EXISTING 250 AMP FRAME, 250 AMP TRIP, 480V, 3-POLE CIRCUIT BREAKER FOR WASTEWATER PUMP No. 1 (VIA VFD No. 1).
- EXISTING 250 AMP FRAME, 250 AMP TRIP, 480V, 3-POLE CIRCUIT BREAKER FOR WASTEWATER PUMP No. 2 (VIA VFD No. 2).
- EXISTING 250 AMP FRAME, 250 AMP TRIP, 480V, 3-POLE CIRCUIT BREAKER FOR WASTEWATER PUMP No. 3 (VIA VFD No. 3).
- EXISTING 250 AMP FRAME, 250 AMP TRIP, 480V, 3-POLE CIRCUIT BREAKER FOR WASTEWATER PUMP No. 4 (VIA VFD No. 4).
- EXISTING JUNCTION BOX FOR VFD #1 AND VFD #2 PUMP FEEDERS AND CONTROL WIRING. CONTRACTOR TO INSTALL WASTEWATER PUMP POWER/CONTROL CABLE (CABLE INTEGRAL TO PUMP AND SUPPLIED BY PUMP MANUFACTURER). CONTRACTOR SHALL UTILIZE EXISTING TERMINAL BLOCKS FOR POWER CONDUCTORS. CONTRACTOR TO PROVIDE NEW TERMINAL BLOCKS FOR MINICAS II SENSORS CONDUCTORS. SEPARATE SENSOR TERMINAL BLOCKS FROM POWER CONDUCTOR TERMINAL BLOCKS AND PROVIDE METAL BARRIER ADJACENT TO MINICAS II TERMINAL BLOCKS. BARRIER SHALL BE THE SAME DEPTH AS JUNCTION BOX. CONTRACTOR SHALL PROVIDE AND INSTALL THE SAME EQUIPMENT AND CONDUCTORS IN JUNCTION BOX FOR VFD #3 AND VFD #4 (NOTE #41).

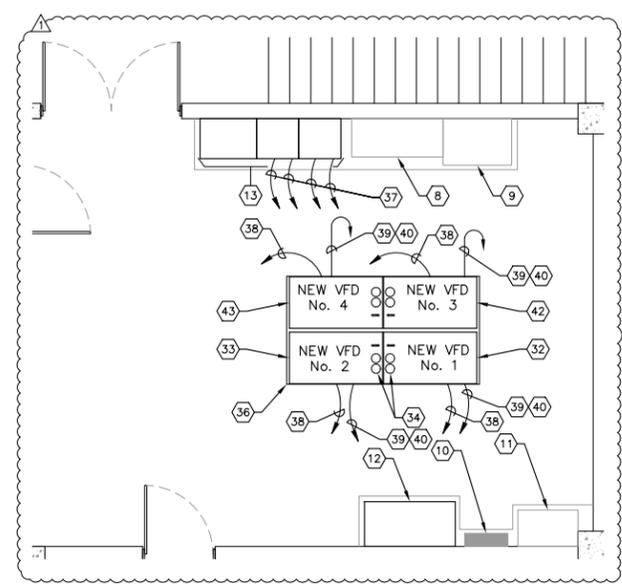
- EXISTING CONDUITS TO WET WELL. CONTRACTOR TO INSTALL WASTEWATER PUMP POWER/CONTROL CABLE (CABLE INTEGRAL TO PUMP AND SUPPLIED BY PUMP MANUFACTURER) IN EXISTING CONDUIT. CONTRACTOR SHALL PROVIDE AND INSTALL NEW SEAL FITTINGS TO MATCH EXISTING. TYPICAL FOR PUMP #1, PUMP #2, PUMP #3 AND PUMP #4.
- EXISTING CONDUITS TO VFD. CONTRACTOR TO INSTALL NEW 3-#250 kcmil + 1-#4 GND IN EXISTING CONDUIT. TYPICAL FOR PUMP #1, PUMP #2, PUMP #3 AND PUMP #4.
- EXISTING JUNCTION BOX (SIMILAR FOR PUMPS #3 AND #4) CONDUCTORS FOR FLOW AND PRESSURE SWITCHES TO BE REPLACED (REFER TO NOTE #2). CONTRACTOR TO UTILIZE EXISTING CONDUITS FOR NEW CONDUIT INSTALLATION. CONTRACTOR SHALL FIELD VERIFY IF FLOW AND PRESSURE SWITCH CONDUCTORS PASS THROUGH JUNCTION BOX SHOWN. CONTRACTOR SHALL PROVIDE AND INSTALL NEW SEAL FITTINGS AS REQUIRED.
- NEW VFD FOR PUMP #1. NEW VFD SHALL BE PHYSICALLY LARGER THAN EXISTING VFD. CONTRACTOR SHALL MODIFY EXISTING HOUSEKEEPING PAD TO ACCOMMODATE NEW VFD DIMENSIONS. NEW VFD WILL BE PROVIDED WITH 10" WIRE TROUGH ON BOTTOM TO ACCOMMODATE THE EXISTING CONDUIT STUB-UP LOCATIONS (REFER ALSO TO SPECIFICATIONS).
- NEW VFD FOR PUMP #2. NEW VFD SHALL BE PHYSICALLY LARGER THAN EXISTING VFD. CONTRACTOR SHALL MODIFY EXISTING HOUSEKEEPING PAD TO ACCOMMODATE NEW VFD DIMENSIONS. NEW VFD WILL BE PROVIDED WITH 10" WIRE TROUGH ON BOTTOM TO ACCOMMODATE THE EXISTING CONDUIT STUB-UP LOCATIONS (REFER ALSO TO SPECIFICATIONS).
- APPROXIMATE LOCATION OF EXISTING CONDUIT STUB-UPS. CONTRACTOR SHALL FIELD VERIFY LOCATIONS.
- EXISTING HOUSEKEEPING PAD TO BE ALTERED.
- EXISTING HOUSEKEEPING PAD TO BE EXTENDED TO ACCOMMODATE NEW VFD DIMENSIONS.
- CONTRACTOR SHALL PROVIDE AND INSTALL NEW 3-#250 kcmil + 1-#4 GND IN EXISTING CONDUIT FOR NEW VFD FEEDER.
- CONTRACTOR SHALL PROVIDE AND INSTALL NEW 3-#250 kcmil + 1-#4 GND AND NEW 2/C-#18 TWISTED SHIELDED (BELDEN 8719) IN EXISTING CONDUIT TO PUMP JUNCTION BOX (REFER TO NOTES #7 AND #41) FOR NEW PUMP FEEDER AND MINICAS II SENSORS. CONTRACTOR SHALL ALSO INSTALL 4-#14 + 1-#14 GND IN EXISTING CONDUIT FOR PUMP FLOW AND PRESSURE SWITCHES (REFER TO NOTE #2).
- CONTRACTOR SHALL PROVIDE AND INSTALL NEW 12-#14 + 1-#4 GND TO EXISTING "MPCP" (REFER TO NOTE #12) IN EXISTING CONDUIT FOR NEW VFD CONTROL WIRING (CONDUCTOR COUNT INCLUDES SPARES).
- CONTRACTOR SHALL PROVIDE AND INSTALL TWO (2) : 2/C-#18 TWISTED SHIELDED (BELDEN 8760) TO EXISTING "MPCP" IN EXISTING CONDUIT FOR VFD 4-20mA SPEED CONTROL AND 4-20mA SPEED REFERENCE SIGNALS.
- EXISTING JUNCTION BOX FOR VFD #3 AND VFD #4 PUMP FEEDERS AND CONTROL WIRING. JUNCTION BOX TYPICAL OF ELEVATION SHOWN ON THIS SHEET.
- NEW VFD FOR PUMP #3. NEW VFD SHALL BE PHYSICALLY LARGER THAN EXISTING VFD. CONTRACTOR SHALL MODIFY EXISTING HOUSEKEEPING PAD TO ACCOMMODATE NEW VFD DIMENSIONS. NEW VFD WILL BE PROVIDED WITH 10" WIRE TROUGH ON BOTTOM TO ACCOMMODATE THE EXISTING CONDUIT STUB-UP LOCATIONS (REFER ALSO TO SPECIFICATIONS).
- NEW VFD FOR PUMP #4. NEW VFD SHALL BE PHYSICALLY LARGER THAN EXISTING VFD. CONTRACTOR SHALL MODIFY EXISTING HOUSEKEEPING PAD TO ACCOMMODATE NEW VFD DIMENSIONS. NEW VFD WILL BE PROVIDED WITH 10" WIRE TROUGH ON BOTTOM TO ACCOMMODATE THE EXISTING CONDUIT STUB-UP LOCATIONS (REFER ALSO TO SPECIFICATIONS).



PUMP JUNCTION BOX ELEVATION
N.T.S. A E-0.4



MCC-1 ELEVATION
N.T.S. B E-0.4



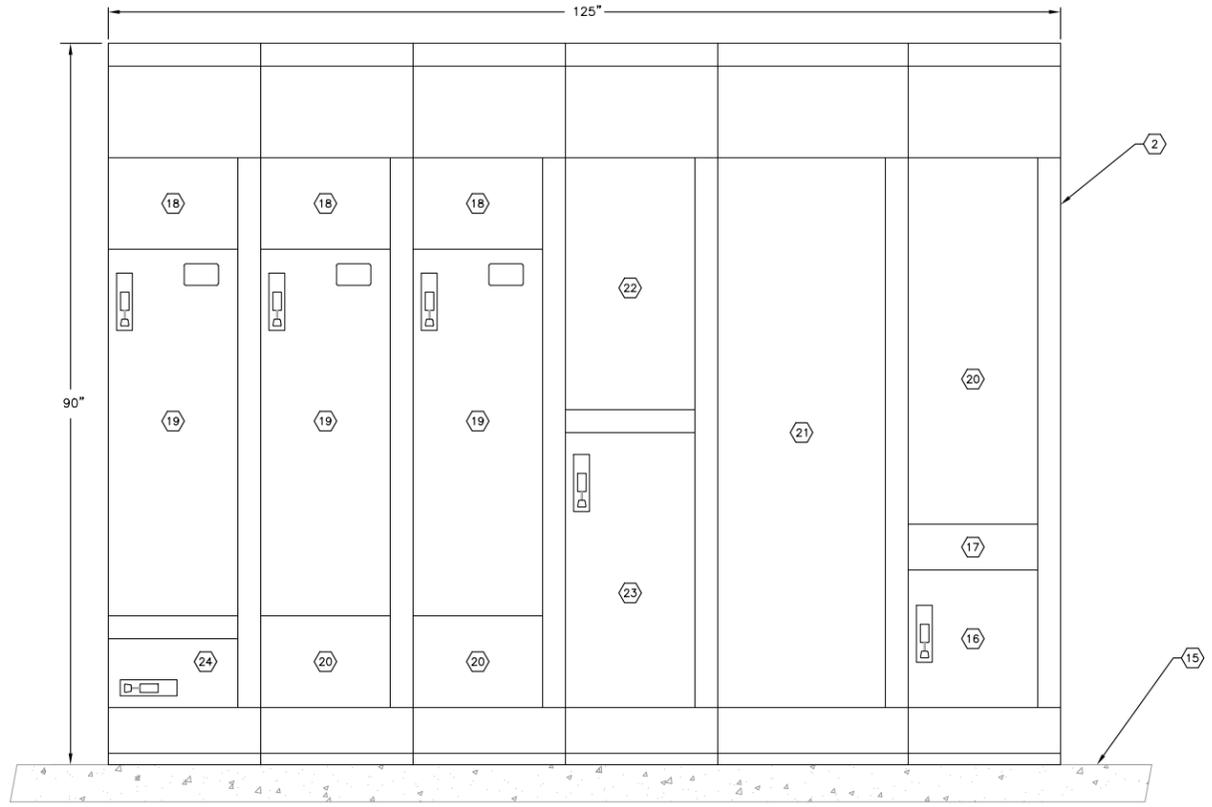
VFD PAD DETAIL
N.T.S. C E-0.4

DESIGNED BY	TIMOTHY THOMAS, P.E.	DATE	11/15/2013
DRAWN BY	TDT	REVISIONS	
CHECKED BY	EAK	No.	
DEV	DEV	DATE	
SCALE	AS NOTED	PROJECT NO.	148404001
DESIGNED BY	TDT	SHEET NUMBER	E-0.4
DRAWN BY	EAK	CITY OF ST. PETE BEACH	
CHECKED BY	DEV	PUMP STATION NO. 1	
DEV	DEV	REHABILITATION	
		PINELLAS COUNTY	
		FLORIDA	
		DATE	NOVEMBER 2013
		PROJECT NO.	148404001
		SHEET NUMBER	E-0.4



Kimley-Horn and Associates, Inc.
 2013 KIMLEY-HORN AND ASSOCIATES, INC.
 655 NORTH FRANKLIN STREET, SUITE 150, TAMPA, FL 33602
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 WWW.KIMLEY-HORN.COM CA 00006986

Drawing name: K:\TAM_Civil\148404 - City of St. Pete Beach\000 - Pump Station No. 2\CADD\Tricon\E-01 ELEC.dwg E-31 Nov 15, 2013 8:09am by: jordan.walker
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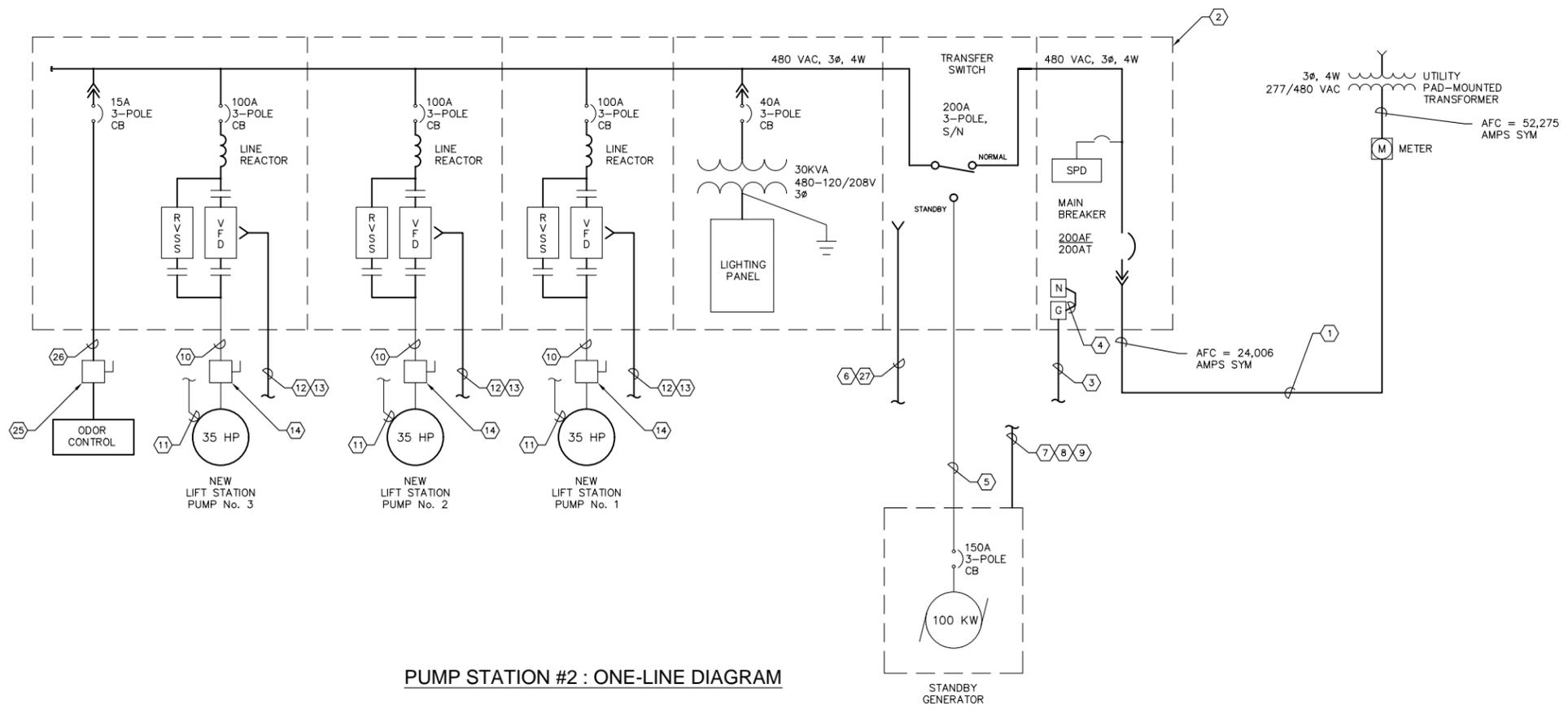


MCC- 1 ELEVATION
N.T.S. A
E-3.1

LOAD SUMMARY	
CONNECTED LOAD	
35 HP LIFT STATION VFD #1 =	42.0 AMPERES
35 HP LIFT STATION VFD #2 =	42.0 AMPERES
35 HP LIFT STATION VFD #3 =	42.0 AMPERES
+ 25% OF LARGEST MOTOR =	10.5 AMPERES
LOAD FROM PANEL 'A' (13.8 KVA @ 480, 3φ) =	16.6 AMPERES
ODOR CONTROL UNIT =	3.4 AMPERES
TOTAL =	156.5 AMPERES
DEMAND LOAD	
NOTE : THE PLC CONTROL SYSTEM SHALL NOT ALLOW MORE THAN TWO (2) VFD'S TO RUN AT ONE TIME.	
35 HP LIFT STATION VFD'S (2 X 42) =	84.0 AMPERES
+ 25% OF LARGEST MOTOR =	10.5 AMPERES
LOAD FROM PANEL 'A' =	16.6 AMPERES
ODOR CONTROL UNIT =	3.4 AMPERES
DEMAND TOTAL =	114.5 AMPERES
1. ELECTRICAL SERVICE WILL BE RATED FOR 200 AMPERES	
2. THE NEW GENERATOR WILL BE 100 KW AND WILL BE EQUIPPED WITH A 150 AMPERE CIRCUIT BREAKER	

SHORT CIRCUIT CALCULATION	
UTILITY SERVICE:	
480V, 3φ, 4-WIRE VIA 2,500 KVA PAD-MOUNTED TRANSFORMER.	
MAXIMUM AVAILABLE FAULT CURRENT AT SECONDARY SIDE OF THE UTILITY TRANSFORMER --	
52,275 AMP RMS SYM.	
SERVICE CONDUCTOR LENGTH: 65 FEET	
SERVICE CONDUCTOR SIZE: 3/0 THWN CU	
ISCA AT THE MAIN BREAKER:	
$ISCA = \left[\frac{1}{1 + \frac{(1.73)(65)(52,275)}{(10,400)(480)}} \right] \times (52,275)$	
ISCA = 24,006 AMPS RMS SYM.	
MAIN BREAKER RATED 35KAIC	
BUS RATED 42KAIC	

- GENERAL NOTES:**
- CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
 - CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
 - CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY TREATMENT PROCESS INTERRUPTION.
- KEY NOTES:**
- PROVIDE AND INSTALL NEW SERVICE ENTRANCE FEEDER. 3-#3/0 THWN CU + 1-#1/0 THWN CU NEUTRAL IN 2-1/2" C. CONTRACTOR SHALL COORDINATE NEW SERVICE ENTRANCE WITH JOHN KRUSZONA OF DUKE ENERGY (727) 409-5845.
 - PROVIDE AND INSTALL NEW MOTOR CONTROL CENTER ('MCC-1').
 - PROVIDE AND INSTALL NEW #2 CU GROUNDING ELECTRODE CONDUCTOR TO GROUNDING ELECTRODE SYSTEM.
 - PROVIDE AND INSTALL NEW #2 CU BONDING CONDUCTOR BETWEEN THE GROUND AND NEUTRAL BUS.
 - PROVIDE AND INSTALL NEW GENERATOR FEEDER. 3-#1/0 THWN CU + 1-#1/0 THWN CU NEUTRAL + 1-#6 THWN CU GND.
 - PROVIDE AND INSTALL 4-#12 THWN CU + 1-#12 CU GND. IN 3/4" C. FROM TRANSFER SWITCH TO GENERATOR FOR GENERATOR START SIGNAL. CONTRACTOR VERIFY CONTROL REQUIREMENTS WITH GENERATOR AND TRANSFER SWITCH MANUFACTURERS.
 - PROVIDE AND INSTALL 4-#14 THWN CU + 1-#14 THWN CU GND IN 3/4" C. FROM TRANSFER SWITCH TO PLC CONTROL CABINET (2-#14 FOR GENERATOR RUNNING SIGNAL, 2-#14 FOR GENERATOR FAULT SIGNAL).
 - PROVIDE AND INSTALL 4-#12 THWN CU + 1-#12 THWN CU GND IN 3/4" C. TO NEW PANEL 'A' (2-#12 FOR GENERATOR BATTERY CHARGER, 2-#12 FOR GENERATOR BLOCK HEATER).
 - PROVIDE AND INSTALL 2-#12 THWN CU + 1-#12 THWN CU GND IN 3/4" C. TO NEW GENERATOR EMERGENCY STOP PUSHBUTTON.
 - PROVIDE AND INSTALL 3-#6 THWN CU + 1-#8 GND IN 2" CONDUIT TO NEW LIFT STATION PUMP MOTOR.
 - PROVIDE AND INSTALL 2-#12 THWN CU + 1-#12 THWN CU GND IN 3/4" CONDUIT TO NEW PLC CONTROL CABINET FOR MINICAS II SENSOR.
 - PROVIDE AND INSTALL 24-#14 THWN CU (2-#14 PLC RUN COMMAND, 2-#14 VFD FAULTED, 2-#14 VFD RUNNING SIGNAL, 2-#14 DRIVE IN AUTO MODE SIGNAL, 2-#14 DRIVE IN HAND MODE SIGNAL, 2-#14 RVSS RUNNING SIGNAL, 2-#14 RVSS FAULTED, 2-#14 BYPASS SELECTED, 2-#14 MOTOR TEMP, 6-#14 SPARE) + 1-#14 THWN CU GND IN 1-1/4" CONDUIT TO NEW PLC CONTROL CABINET FOR VFD CONTROL SIGNALS.
 - PROVIDE AND INSTALL TWO (2) : 2/C-#18 TWISTED SHIELDED CABLES (BELDEN 8760, EACH) IN 1" CONDUIT TO NEW PLC CONTROL CABINET FOR VFD 4-20mA SPEED CONTROL AND 4-20mA SPEED REFERENCE SIGNALS.
 - PROVIDE AND INSTALL NEW 60A, 600V, NON-FUSED, 3-POLE DISCONNECT IN NEMA 4X STAINLESS STEEL ENCLOSURE.
 - 3" HOUSEKEEPING PAD.
 - NEW 200A, 480V, 3-POLE MAIN CIRCUIT BREAKER.
 - NEW SURGE PROTECTION DEVICE.
 - NEW LIFT STATION PUMP VFD LINE REACTOR.
 - NEW LIFT STATION PUMP VFD AND SOFTSTARTER BYPASS.
 - SPACE.
 - NEW 200A, 480V, 3-POLE, S/N TRANSFER SWITCH.
 - NEW 100A, 120/208V, 3φ, 4-WIRE PANELBOARD 'A'.
 - NEW 30KVA, 480V-120/208V, 3φ TRANSFORMER.
 - NEW 15A, 480V, 3-POLE CIRCUIT BREAKER FOR ODOR CONTROL UNIT
 - PROVIDE AND INSTALL NEW 30A, 600V, NON-FUSED, 3-POLE DISCONNECT IN NEMA 4X STAINLESS STEEL ENCLOSURE.
 - PROVIDE AND INSTALL 3-#12 THWN CU + 1-#12 THWN CU GND IN 3/4" CONDUIT.
 - PROVIDE AND INSTALL 2-#12 THWN CU + 1-#12 THWN CU GND IN 3/4" CONDUIT FROM TRANSFER SWITCH TO PLC CONTROL CABINET FOR LOSS OF NORMAL POWER SIGNAL.



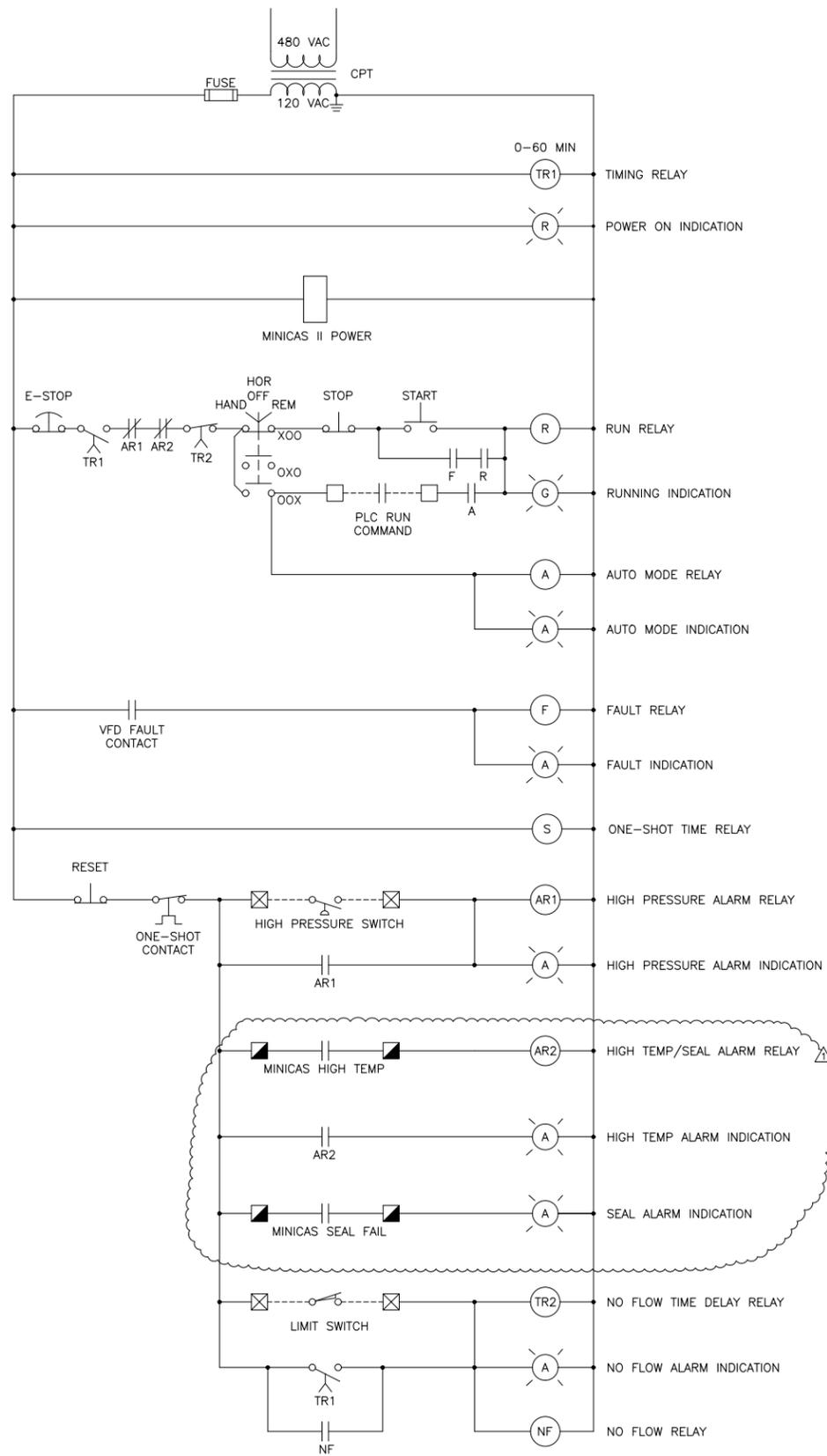
PUMP STATION #2 : ONE-LINE DIAGRAM

SCALE	AS NOTED	DESIGNED BY	TDT	DRAWN BY	EAK	CHECKED BY	DEV
		DESIGN ENGINEER:		TIMOTHY THOMAS, P.E.		FLORIDA REGISTRATION NUMBER:	
				47079		DATE:	
MOTOR CONTROL CENTER & ONE-LINE DIAGRAM				FLORIDA			
CITY OF ST. PETE BEACH PUMP STATION NO.2 REHABILITATION				PINELLAS COUNTY			
		DATE		NOVEMBER 2013		PROJECT NO.	
				148404000		SHEET NUMBER	
				E-3.1			



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Drawing name: K:\TAM_Civil\148404 - City of St. Pete Beach\000 - Pump Station No. 2\CADD\Tricon\E-0.4 PSI ELEC SITE PLAN.dwg SCHEMATICS Nov 15, 2013 8:09am by: jordan.walker
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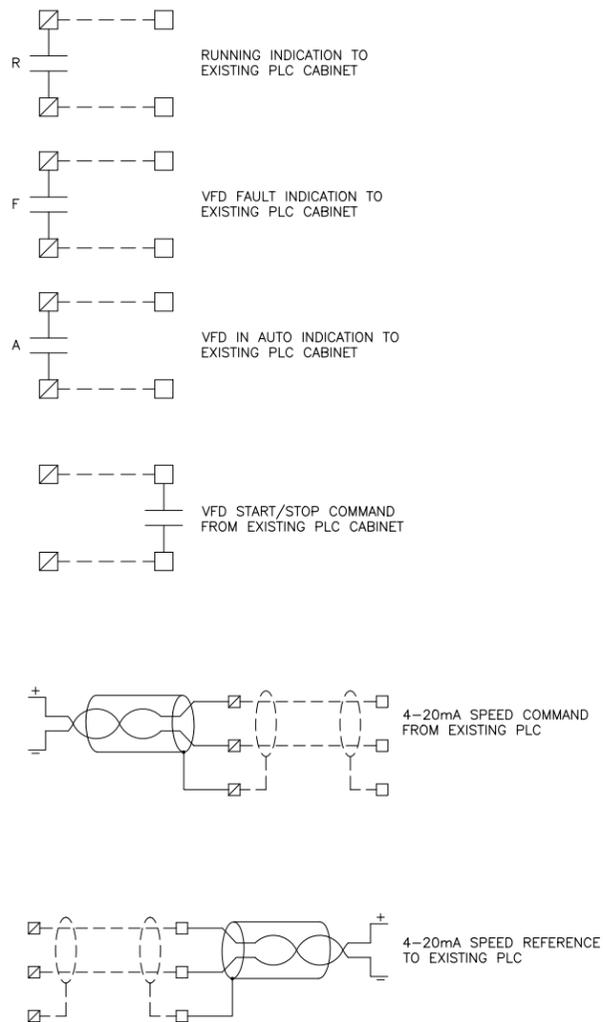


TYPICAL VFD WIRING SCHEMATIC
 BASED ON RECORD DRAWING INFORMATION

LEGEND

- DENOTES TERMINAL IN EXISTING PLC CABINET
- DENOTES EXISTING FIELD WIRING
- DENOTES TERMINAL ON MINICAS II UNIT
- ⊗ DENOTES TERMINAL EXISTING FIELD DEVICE
- ⊗ DENOTES TERMINAL IN NEW VFD

VFD I/O (TYPICAL)



GENERAL NOTES:

- CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
- CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
- CONTRACTOR SHALL PROVIDE AND INSTALL NEW CONDUCTORS FOR ALL CONTROL CIRCUITS AND 4-20mA SIGNALS FROM EACH NEW VFD TO THE EXISTING PLC CONTROL CABINET. THE CONTRACTOR SHALL UTILIZE THE EXISTING RACEWAYS FOR NEW CONDUCTOR INSTALLATION.
- CONTRACTOR SHALL PROVIDE AND INSTALL NEW CONDUCTORS FOR ALL 480V POWER FROM VFD'S TO EXISTING WET WELL JUNCTION BOX, AS WELL AS, 2/C-#16 TWISTED SHIELDED CABLE (BELDEN 8719) FOR MINICAS II SENSORS. THE CONTRACTOR SHALL UTILIZE THE EXISTING RACEWAYS FOR NEW CONDUCTOR INSTALLATION.
- CONTRACTOR SHALL PROVIDE AND INSTALL NEW CONDUCTORS FOR EXISTING FLOW AND PRESSURE SWITCHES. THE CONTRACTOR SHALL UTILIZE THE EXISTING RACEWAYS FOR NEW CONDUCTOR INSTALLATION.



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SCALE AS NOTED		DESIGNED BY TDT	FLORIDA REGISTRATION NUMBER: 47079	DESIGN ENGINEER: TIMOTHY THOMAS, P.E.
DRAWN BY EAK		CHECKED BY DEV	DATE:	DATE:
CITY OF ST. PETE BEACH PUMP STATION NO. 1 REHABILITATION		PUMP STATION 1 VFD SCHEMATICS AND DIAGRAMS		FLORIDA
PINELLAS COUNTY		NOVEMBER 2013		PROJECT NO. 148404001
SHEET NUMBER		E-3.6		REVISIONS
				DATE
				BY
				11/15/2013 TDT
				No.
				ADENDUM 1
				11/15/2013 TDT
				DATE
				BY

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SECTION 9 – SUBMERSIBLE SEWAGE PUMPS

9.01 GENERAL

The Contractor shall furnish and install, as described hereinafter and shown on the plans, three submersible non-clog wastewater pumps at Pump Station No. 2 following the demolition work and installation of the new wet well indicated by the Contract Documents. The principal items shall include explosion-proof submersible centrifugal sewage pumps, plus base elbows, discharge piping and valves, stainless steel guide rails, and all miscellaneous and associated equipment required for a complete operating installation.

Each pump shall be equipped with an 35 HP submersible electric motor, connected for operation on 460 volts, 3 phase, 60 hertz, with 100 feet of submersible cable (SUBCAB) suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards and also meet with P-MSHA Approval.

The Contractor also shall furnish and install, as described hereinafter and shown on the plans, two submersible non-clog wastewater pumps at Pump Station No. 1 following the demolition work indicated by the Contract Documents. The principal items shall include explosion-proof submersible centrifugal sewage pumps, plus base elbows, discharge piping, stainless steel guide rails, and all miscellaneous and associated equipment required for a complete operating installation.

Each pump shall be equipped with an 140 HP submersible electric motor, connected for operation on 460 volts, 3 phase, 60 hertz, with 100 feet of submersible cable (SUBCAB) suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards and also meet with P-MSHA Approval.

The Contractor shall also perform such start-up operations and tests as delineated.

Pumps shall be tested to Hydraulic Institute (HI) Standards; International Standards Organization (ISO) Standards are not acceptable. Certification must accompany pumps.

Each pump shall have a stainless steel nameplate indicating the design capacity in GPM, with one pump operating, the design TDH, with one pump operating, the RPM, Voltage, Full-Load Amperage, Date of Manufacture and Explosion-Proof Listing Organization. The nameplate GPM/TDH shall read the GPM and TDH noted in the approved shop drawing for the pump.

All metal components not specified otherwise shall be 316 stainless steel. The pumps, motors, control panel, and H2O load rated aluminum access frame and safety hatch, shall be coordinated with the pump supplier to insure compatibility of all these components as a system.

All equipment shall be installed by skilled workmen in accordance with the instructions of the equipment supplier.

All equipment supplied shall have ample means of lubrication for all bearings and other metal surfaces in sliding contact. The Contractor shall provide all lubricants, fuel and power necessary to start-up, test, and place the pumping facility in operation.

9.02 DATA TO BE SUBMITTED

Technical Specifications
Section 9 – Submersible Sewage Pumps
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2013-2014 CIP

The Contractor shall provide the following information and documents:

- A. Shop Drawings
 - 1. Make, model, weight and horsepower of each equipment assembly
 - 2. Complete catalog information, descriptive literature, specifications and identification of materials of construction.
 - 3. Performance data curves showing: head, capacity, horsepower demand and pump efficiency over the entire pump operating range, from shut-off to maximum capacity. Indicate separately the head, capacity, horsepower demand, overall efficiency and minimum submergence required at the guarantee point.
 - 4. Detailed structural, mechanical and electrical drawings, showing the equipment dimensions, size and locations of connections, and weights of associated equipment.
 - 5. Power and control wiring diagrams, including terminals and numbers.
 - 6. Complete motor nameplate data, as defined by the motor manufacturer, including any motor modifications.

- B. Quality Control Submittals
 - 1. Factory Functional, Performance Hydrostatic Test Reports and logs certified by pump manufacturer.
 - 2. Special shipping, storage and protection, and handling instructions.
 - 3. Manufacturer's printed installation instructions.
 - 4. Manufacturer's Certificate of Compliance that the factory finish system is identical to the requirements specified herein.
 - 5. Manufacturer's Certificate of Proper Installation.
 - 6. List of special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.
 - 7. Suggested spare parts list to maintain the equipment in service for a period through 5 years. Include a list of special tools required for checking, testing, parts replacement, and maintenance with current price information.
 - 8. Operation and Maintenance Manuals.
 - 9. Service records for maintenance performed during construction.
 - 10. Field Test Reports.

9.03 PUMPS

Pumps to be furnished and installed at each pump station shall be non-clog, heavy-duty municipal-type explosion-proof submersible pumps. Each pump shall have an eight or ten-inch diameter discharge and shall be capable of passing any trash, stringy material or three-inch solid. Each pump/motor unit must be non-overloading across the complete head capacity range of the pump.

Pumps shall meet the following listed minimum operating conditions:

Pump Station No. 2

Operating Points	1	2	3	4
Number of Pumps in Operation	2	2	1	1
Speed (hz)	60	54	50	35
Capacity (gpm)	4,420	3780	2350	1110
TDH (ft)	46.2	37.9	23.8	17
Total HP	63.9	44.8	18.8	5.9

Other Design Data:

Number of Pumps	3
Propeller Diameter- Inches	13.15
Electric Motor Characteristics	460v/3 Phase/60 Hertz
Maximum Motor Speed- RPM	1170
Pump Suction Pipe Diameter-Inches	8
Pump Discharge Pipe Diameter-Inches	8
Maximum Allowable Solid Size-Inches	4

Pump Station No. 1

Operating Points	1	2	3	4
Number of Pumps in Operation	2	2	1	1
Speed (hz)	60	50	50	40
Capacity (gpm)	5300	4200	2800	1600
TDH (ft)	125	110	80	60

Other Design Data:

Number of Pumps	4
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Technical Specifications
Section 9 – Submersible Sewage Pumps
Pump Station No. 1 & 2 Rehabilitation
2013-2014 CIP

Propeller Diameter- Inches	17.60
Electric Motor Characteristics	460v/3 Phase/60 Hertz
Maximum Motor Speed- RPM	1170
Pump Suction Pipe Diameter-Inches	10
Pump Discharge Pipe Diameter-Inches	10
Maximum Allowable Solid Size-Inches	4

Pump casing shall be of the volute-type and centerline discharge design to minimize clogging or flow interference. They shall be of one-piece construction made from cast iron, Class 30, in accordance with ASTM Specification A-48, latest revision.

Wet well pumps shall be easily removable for inspection/servicing without the necessity of personnel entering the wetwell and shall be equipped with a discharge connection having a 125-pound American Standard cast iron flange fitting. A 316 stainless steel wire rope of sufficient length shall be attached to each pump to permit withdrawal from the wetwell. The upper end of the wire rope shall be hung within the wetwell access from a stainless steel hook or hanger. The wire rope shall be 3/8-inch minimum diameter with three-inch opening (minimum) stainless steel lifting rings at the end and at the mid-point of the rope. Lifting rings shall be provided every ten feet on the rope if the rope is greater than 15 feet in total length. Pumps shall automatically connect to the discharge connections when lowered into place on the slide rail system. No part of the pump shall rest on the floor. The area under the pumps shall be free and clear of any support legs or pump guides.

Impellers shall be of the non-clog type, one-piece construction and mounted directly on a stainless steel pump motor shaft. Impellers shall be N-type impeller as manufactured by ITT-FLYGT.

For informational purposes, the design of these facilities and dimensional layouts are based on the pump model provided on the drawings.

FLYGT Pumps is the accepted pump manufacturer on this project. Base bids for the pumps shall be as manufactured by FLYGT Pumps. Pumps shall be as follows:

- Pump Station No. 2:
FLYGT Model NP-3202.185 MT (8-inch discharge w/ 13.15in impeller)
- Pump Station No. 1:
FLYGT Model NP-3315.095 MT (10-inch discharge w/ 17.60in impeller)

Contractors may provide a Deductive Alternate which must be a pre-approved deductive alternate manufacturer(s), as per 9.04 of this specification. The Base Bid equipment shall be FLYGT.

Pumps and motors shall be constructed as integral units and shall be the products of one manufacture/supplier. Each motor shall be UL listed, explosion-proof, hermetically sealed, submersible-type electric motors.

The pump system, including pump, motor and power cable, shall be approved for use in areas classified as hazardous locations in accordance with the NEC Class I, Division I, Group C and D service as determined and approved by a U.S. nationally recognized testing agency such as Factory Mutual.

9.04 ENGINEER’S PRE-APPROVAL OF DEDUCTIVE ALTERNATE EQUIPMENT

- A. Manufacturer of deductive alternate equipment shall submit a pre-approval submittal package to engineer at least fourteen (14) days prior to the bid date. Only approved deductive alternates listed by addendum will be acceptable. Deductive alternate manufacturer shall submit the following information and supporting documentation:
1. A complete set of drawings with dimensions specific to this project showing the individual pumps, their installation in the wetwell, specifications, catalog cut-sheets, and detailed descriptive material. Drawings shall show all relevant details of each unit. This information shall identify all technical and performance requirements stipulated on the drawings and in the specification. If the proposed equipment does not meet these specifications, any deviation from the specification must be expressly noted. All deviations shall be listed on a single document.
 2. Detailed installation drawings illustrating how the proposed pumps will fit in the wetwell and how it will mate to ancillary equipment. The drawings shall include dimensioned plan, and elevational and sectional views of each individual system as well as the overall installation.
 3. Hydraulic performance data showing the relationship of head loss (ft) versus discharge flow (gpm). See Section 9.04 – Basin of Design for Hydraulic performance data.
 4. Complete electrical and controls submittals including control schematics, PLC programming logic, detailed cut sheets on electrical components and a P&ID. Details of the control and instrumentation system including complete wiring diagrams per the wiring requirements shown on the drawings for this project.
 5. Motor characteristics and performance information.
 6. Complete reference list of all current and active installations of same and similar equipment including contact names and phone numbers, showing at least 5 installations.
 7. Complete bill of materials for all equipment, showing dimensions and materials of construction of all components.

The preapproval submittal shall be signed and sealed by a registered professional engineer in the State of Florida.

9.05 PUMP CONSTRUCTION

Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. The lifting handle shall be of stainless steel. All exposed nuts or bolts shall be of stainless steel construction. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

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Sealing design shall incorporate **metal-to-metal contact** between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile rubber O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

9.06 COOLING SYSTEM

Each pump motor shall be sufficiently cooled by the surrounding environment or by submergence in the pumped media.

9.07 CABLE ENTRY SEAL

The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of dual cylindrical elastomer grommets, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter. The grommets shall be compressed by the cable entry unit, thus providing a strain relief function. The assembly shall provide ease of changing the cable when necessary using the same entry seal. The cable entry junction chamber and motor shall be sealed from each other, which shall isolate the stator housing from foreign material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems shall not be considered equal.

9.08 MOTOR

The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31. The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of pins, bolts, screws or other fastening devices used to locate or hold the stator and that penetrate the stator housing are not acceptable. The motor shall be designed for continuous duty while handling pumped media of up to 104°F. The motor shall be capable of no less than 30 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of aluminum. Three thermal switches shall be embedded in the stator end coils, one per phase winding, to monitor the stator temperature. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the motor control panel.

The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables using threaded compression type terminals. The use of wire nuts or crimp-type connectors is not acceptable. The motor and the pump shall be produced by the same manufacturer.

The motor service factor (combined effect of voltage, frequency and specific gravity) shall be 1.15. The motor shall have a voltage tolerance of +/- 10%. The motor shall be designed for continuous operation in up to a 40°C. ambient and shall have a NEMA Class B maximum operating temperature rise of 80° C. A motor performance chart shall be provided upon request exhibiting curves for motor

torque, current, power factor, input/output kW and efficiency. The chart shall also include data on motor starting and no-load characteristics.

Motor horsepower shall be sufficient so that the pump is non-overloading throughout its entire performance curve, from shut-off to run-out. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

9.09 BEARINGS

The integral pump/motor shaft shall rotate on two bearings. The motor bearings shall be sealed and permanently grease lubricated with high temperature grease. The upper motor bearing shall be a two row angular contact ball bearing. The lower bearing shall be a two row angular contact ball bearing to handle the thrust and radial forces. The minimum L10 bearing life shall be 50,000 hours at any usable portion of the pump curve.

9.10 MECHANICAL SEALS

Each pump shall be provided with a positively driven dual, tandem mechanical shaft seal system consisting of two seal sets, each having an independent spring. The lower primary seal, located between the pump and seal chamber, shall contain one stationary and one positively driven rotating corrosion resistant tungsten-carbide ring. The upper secondary seal, located between the seal chamber and the seal inspection chamber, shall be a leakage-free seal. The upper seal shall contain one stationary and one positively driven rotating corrosion resistant tungsten-carbide seal ring. The rotating seal ring shall have small back-swept grooves laser inscribed upon its face to act as a pump as it rotates, returning any fluid that should enter the dry motor chamber back into the lubricant chamber. All seal rings shall be individual solid sintered rings. Each seal interface shall be held in place by its own spring system. The seals shall not depend upon direction of rotation for sealing. Mounting of the lower seal on the impeller hub is not acceptable. Shaft seals without positively driven rotating members or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces are not acceptable. The seal springs shall be isolated from the pumped media to prevent materials from packing around them, limiting their performance.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and shall provide capacity for lubricant expansion. The seal lubricant chamber shall have one drain and one inspection plug that are accessible from the exterior of the motor unit. The seal system shall not rely upon the pumped media for lubrication.

The area about the exterior of the lower mechanical seal in the cast iron housing shall have cast in an integral concentric spiral groove. This groove shall protect the seals by causing abrasive particulate entering the seal cavity to be forced out away from the seal due to centrifugal action.

A separate seal leakage chamber shall be provided so that any leakage that may occur past the upper, secondary mechanical seal will be captured prior to entry into the motor stator housing. Such seal leakage shall not contaminate the motor lower bearing. The leakage chamber shall be equipped with a float type switch that will signal if the chamber should reach 50% capacity.

9.11 PUMP SHAFT

The pump and motor shaft shall be a single piece unit. The pump shaft is an extension of the motor shaft. Shafts using mechanical couplings shall not be acceptable. The shaft shall be stainless steel

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– ASTM A479 S43100-T. Shaft sleeves will not be acceptable.

9.12 IMPELLER

High-chrome iron - .185 and .095 versions

The impeller shall be of ASTM A 532 (Alloy III A) , 25% chrome cast iron, dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The screw-shaped leading edges of the impeller shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 6% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The Impeller shall be locked to the shaft and held by an impeller bolt.

9.13 VOLUTE/SUCTION COVER

The pump volute shall be a single piece gray cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable volute insert ring containing spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide the relief path and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. The internal volute bottom shall provide effective sealing between the multi-vane semi-open impeller and the volute. The insert ring shall be cast of (ASTM A-48 Class 35B cast iron or ASTM A 532 (Alloy III A), 25% chrome cast iron).

9.14 PROTECTION

Each pump motor stator shall incorporate three thermal switches, one per stator phase winding and be connected in series, to monitor the temperature of the motor. Should the thermal switches open, the motor shall stop and activate an alarm. A float switch shall be installed in the seal leakage chamber and will activate if leakage into the chamber reaches 50% chamber capacity, signaling the need to schedule an inspection.

The thermal switches and float switch shall be connected to a Mini CAS control and status monitoring unit. The Mini CAS unit shall be designed to be mounted in the pump control panel.

9.15 TESTING

Upon completion of installation, the Contractor shall test the facilities to demonstrate that the station performs as specified. He shall perform the initial testing to assure himself that acceptance testing can be satisfactorily completed.

The Contractor shall then arrange for the equipment manufacturer to furnish a qualified representative to check the installation and conduct testing for final acceptance, and shall give the Engineer written notice as to the date and time of the test. An acceptance test shall demonstrate that all items are in compliance with the function as specified. Testing shall illustrate the following:

- A. That the quick-release lift-off feature functions properly and allows the pump to be raised and lowered without draining the pit.

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- B. That all units have been properly installed and are in correct alignment
- C. That all units operate without overheating or overloading any parts and without objectionable vibrations.
- D. That there are no mechanical defects in any of the parts.
- E. That all pumps can deliver that specified and certified pressure and quantity and have correct rotation, volts and amps as verified by a drawdown test and a closed discharge pressure test.
- F. That the pumps shall be capable of pumping raw, unscreened sewage.
- G. That all pumps, sensors, and controls perform satisfactory as to sequence control, correct start and stop elevations, and proper high level alarm functions.

In addition to furnishing, delivering, installing, and testing equipment, the Contractor shall provide the services or competent manufacturing representatives for the period indicated. Additional time, beyond that specified which is necessitated by installation or other non-City related requirements, shall be paid for by the Contractor. Such representatives shall assist the City's personnel on start-up, instructing operating personnel of the City in the maintenance and operation of the equipment, conducting tests, and making recommendations for producing the most efficient results. These services shall be made during the initial operation of the pumping station and shall be over and above any services necessary during construction and to correct defective materials or workmanship during the guarantee period. These representatives shall be specially trained and qualified for installation, adjustment, start-up and testing work and shall not be sales representatives only. The cost for such representation, including subsistence and travel, shall be included under this contract. The time required for instructing the City's personnel in the proper operation and maintenance of the stations, not to exceed one day.

9.16 WARRANTY

The pump manufacturer shall warrant pumps being supplied to the City against defects in workmanship for a period of five years under normal use, operation and service. In addition, the manufacturer shall replace certain parts which shall become defective through normal use and wear and on a progressive schedule of cost for a period of five years; parts included are the mechanical seal, impeller, pump housing, wear ring and ball bearings. The warranty shall be in published form and apply to all similar units.

9.17 SPARES

Contractor shall provide an additive optional price to the bid to furnish one spare pump for each station, delivered to the City's Public Services Yard at 7581 Boca Ciega Drive, St. Pete Beach, Florida.

END OF SECTION

SECTION 15 – VARIABLE FREQUENCY DRIVES – PUMP STATION No. 1

GENERAL

15.01 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 12 Specification sections, apply to work of this section.

15.02 DESCRIPTION OF WORK:

- A. This section covers the work necessary to furnish and install complete variable frequency drives (VFDs) for the proposed system as indicated on the Contract Documents. The scope of the work under this section is to furnish all labor, materials, equipment and incidentals required to complete the installation of 18 pulse Clean Power VFDs with input line reactors as described with cabinetry, wiring, manual and automatic circuitry, instrumentation and controls as necessary to fulfill the intent of these specifications for a complete system ready for operation.
- B. For this project, VFDs shall be furnished for the City of St. Pete Beach's Pump Station #1 Renovation. The Station shall require four (4) 140 hp VFD's.

15.03 REFERENCES:

- A. The VFD assembly must comply to all applicable design standards including the following:
 - 1. NEMA ICS 3.1 -Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.
 - 2. NEMA -Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 3. IEEE Standard 444 (ANSI-C343)
 - 4. IEEE 519 (1992) Recommended Practices for Electrical Harmonics
 - 5. IEC: 146A

15.04 SUBMITTALS:

- A. Submittal drawings shall include descriptive information as required to fully describe the VFD and associated components, circuit protection, solid state controllers, control logic, etc.
- B. Any proposed deviations or substitutions from the specification must be itemized and descriptive information provided to insure compliance with project requirements.
- C. Submittal data shall include; front and side views of enclosures, overall dimensions, conduit entrance locations, and requirements, nameplate legends, and enclosure details.

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- D. Submittal data shall include one-line diagram depicting all circuit protective, solid-state controllers, control logic, external control interface points, and power and harmonic filtering devices.
- E. A letter written on VFD Manufacturers letterhead stating the VFD MTBF (mean time between failure).
- F. Harmonic calculations showing VFD installation in conformance to IEEE519 (1992) shall be provided with submittals.
 - 1. Isc to IL ratio of 21 and fault current of 20,000 amps shall be used for all calculations.
 - 2. Calculations shall be made for all VFDs operating at full load.

15.05 QUALITY CONTROL AND QUALIFICATIONS:

- A. VFD shall have a minimum and documented MTBF (mean time between failure)rating of 28 years.
- B. Manufacturer must have a minimum of 10 (ten) years documented experience, specializing in VFDs.
- C. Manufacturer must have an authorized service technician within 200 miles of project job-site.

15.06 OPERATION AND MAINTENANCE DATA:

- A. Operation and Maintenance data will be submitted for approval after commissioning of VFDs and shall include all criteria listed in Specification Section 01730 in addition to the following:
 - 1. All data provided in the VFD submittal package shall be updated to as installed condition as part of final Operation and Maintenance data.
 - 2. Complete manufacturers technical manual covering VFD operation, programming, maintenance, and parts lists.
 - 3. Field harmonic test report showing compliance with IEEE 519 standards.
 - 4. List of all programmable parameters installed in VFD and any other configured device in VFD system.
 - 5. Statement of VFD warranty.

15.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site, under provisions of this section and instructions of VFD manufacturer. Accept VFD on site in original packing. Inspect for damage. Freight damage will be the responsibility of receiving on-site contractor.
- B. Store in a clean, dry non-condensing indoor space. Maintain factory wrapping, or provide an additional heavy canvas or heavy plastic cover, to protect units from dirt, water, construction debris, and traffic. Insure that VFD is not subject to moisture including condensation.

PRODUCTS

15.08 VARIABLE FREQUENCY DRIVE:

- A. The speed control for variable speed pumps shall be variable frequency drives suitable for installation as shown on the drawings.
- B. The variable frequency drives shall include all internal auxiliaries required to meet the functional specifications.
- C. The variable frequency drives shall conform to all requirements stipulated in this section and Division 16 - Electrical, and shall be designed for an extended speed range of 60% to 100% of full load motor speed.
- D. Each drive shall have the following design features.
 - 1. The drive shall employ microprocessor-based inverter logic isolated from power circuits.
 - 2. The drive shall employ a diode bridge on the input, SCR inputs are not acceptable.
 - 3. The drive shall employ a common Main Control Board.
 - 4. The drive shall employ a Pulse Width Modulated (PWM) inverter system using third generation IGBT's to minimize audible motor noise and increase overall performance.
 - 5. The drive shall employ a switching logic power supply operating from the DC bus.
 - 6. The drive shall employ phase to phase and phase to ground MOV protection.

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7. The drive shall have a documented 28 years mean time between failure. A letter certifying this shall be provided with the bid and as part of the formal submittals.
 8. The drive shall be designed to have a minimum of 2khz carrier frequency without de-rating and provide selectable PWM Swing carrier patterns to minimize audible motor noise.
 9. The drives shall be provided as 18-pulse dual rectifier input design. Passive harmonic filters are not acceptable. Multi-pulse technologies utilizing auto-wound transformers are not acceptable. Active harmonic rectification technology is not acceptable.
 10. The drive shall be designed to operate on an AC line which may contain line notching and up to 10% harmonic distortion.
 11. The drive shall be designed to shut down with no component failure in the event of an output phase to phase or phase to ground short circuit and provide annunciation of the fault condition.
 12. The drive shall be designed with a common control connection diagram for all ratings.
 13. The drive shall be designed such that the inverter section power semiconductors do not require commutation capacitors.
 14. The drive shall be designed to be variable torque rated. The drive shall supply 120% of rated current for up to one minute.
 15. The drive shall be designed to allow all parameter adjustments to be made with the door closed.
 16. The drive shall be designed with a common Customer Interface for all horsepower ratings. The Interface shall include an LCD digital display, programming keypad and operator keys option.
 17. The drive shall provide multiple programmable stop modes, including ramp, coast, brake and S-curve.
 18. The drive shall be designed to have an adjustable output frequency up to 60 Hz \pm 10%.
- E. The drives shall have the following features.
1. Interface: The drive shall provide a removable Human Interface Module with integral display to show drive operating conditions, adjustments, and fault indications. The display shall be removable under power without causing a drive fault and be visible and operable without opening the enclosure door. The display shall consist of three lines of 16-character, alphanumeric, back-lit LCD with the display being configurable for three

display values simultaneously with customized multi-lingual test, all scaled to user units.

2. Volts per Hertz Adjustment: Drive programming shall provide the ability to fully configure the volts per hertz for squared, cubed, straight line or full custom patterns.
3. Current Limit: The drive shall provide a programmable current limit from 20% to 150% of variable torque rating. Current limit shall be active for all drive states; accelerating, constant speed, and decelerating. The drive shall employ PI Regulation for smooth transition.
4. Acceleration/Deceleration: The Accel/Decel settings shall provide adjustments to allow either setting to be adjusted from 0 seconds to 600 seconds. The drive shall provide a second set of remotely selectable Accel/Decel settings.
5. Speed Regulation: The drive shall be capable of operating in a variety of speed regulation modes, including slip compensation with 0.5% speed regulation.
6. Speed Profiles: The drive shall be capable of producing speed profiles with linear acceleration/ deceleration or 'S-Curve' profiles that provide changing Accel/Decel rates. S-Curve profiles shall be selectable for fixed or adjustable values.
7. Adjustments: The digital interface shall be used for all set-up, operation, and adjustment settings. All adjustments shall be stored in non-volatile memory for factory default values as well as a programmable set of user defaults.
8. Auto Commissioning: The drive shall be capable of automatically determining the motor's stator resistance by outputting both an AC and DC voltage to the motor and monitoring motor current. Stator resistance shall be stored in drive memory for determining proper voltage and current requirements.
9. IR Compensation (DC Boost): The drive shall provide a selectable range for offsetting motor losses at low frequency operation DC Boost shall be current regulated and shall automatically adjust, on each start, to load changes. DC Boost shall be programmable from 15% to 120% of drive rated current.
10. Fault Reset/Run: The drive shall provide up to four automatic fault reset and restarts following a fault condition before locking out and requiring manual restart.

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11. Skip Frequencies: The drive shall provide three adjustable setpoints to lock out continuous operation at frequencies which may product mechanical resonance. The setpoints shall have an adjustable bandwidth of 0 Hz to 60 Hz.
12. Run On Power Up: The drive shall provide for automatic restart of equipment after restoration of power after an outage.
13. Fault Memory: The drive shall provide a means to store the last four faults as well as operating frequency, drive status, and power mode at time of fault. Information shall be maintained in the event of power loss.
14. Overload Protection: The drive shall provide NEC motor overload protection testing in accordance with UL Standard 991.
15. Terminal Blocks: The drive shall provide separate terminal blocks for control and power wiring.
16. Operator's Devices: The drive shall be provided with the following door mounted pilot devices in addition to the door mounted Human Interface Module:
 - a. Hand/Off/Auto selector switch
 - b. Maintained Emergency Stop (red mushroom head)
 - c. Start Pushbutton
 - d. Stop Pushbutton
 - e. Reset Pushbutton
 - f. Power On pilot light (red)
 - g. Run pilot light (green)
 - h. Fault pilot light (amber)
 - i. Auto Mode pilot light (amber)
 - j. High Pressure pilot light (amber)
 - k. Motor Over Temp pilot light (amber)
 - l. Seal Failure pilot light (amber)
 - m. No Flow Alarm pilot light (amber)
 - n. Speed Pot
17. Control Inputs: The drive shall provide a separate control input terminal block for customer wiring to remote start, stop, auxiliary, remote speed reference access and enable inputs. Four additional inputs shall be provided as programmable for functions such as preset speed access, job, second Accel and Decel time access and local control selection. Inputs shall be programmable to configure the drive for standard 3 wire, 2 wire, EC and serial operation requirements.
18. Ride Through: The drive shall be capable of control logic ride through in the event of power outages up to 2 seconds in duration.
19. Loss of Reference: In the event of loss of the 4 mA to 20 mA reference signal, the drive shall be user programmable to the following:

- a. Fault and stop
 - b. Alarm and maintain last reference (within 10%)
 - c. Alarm and go to preset speed
 - d. Alarm and go to minimum speed
 - e. Alarm and go to maximum speed.
20. Analog Output: The drive shall supply two analog outputs selectable 0 volt DC to 10 volt DC or 0 mA to 20 mA which shall be user programmable such that is proportional to output frequency, output current, bus voltage or output power, KW, output volts, or output current.
21. Digital I/O: The drive contact output ratings shall be 115 volt AC / 30 volt DC, 5.0 amps resistive, 2.0 amp inductive. The three contacts provided shall be as follows
- a. Form C Fault Contact
 - b. Two programmable Form A contacts.
22. Reference Signals:
- a. Analog: The drive shall be capable of operating from the following speed reference signals:
 - i. VFD Human Interface Module (Hand)
 - ii. 4 mA to 20 mA signal (Auto)
 - b. Analog inputs shall be programmable to include the following functions and digital display shall indicate the following condition status using the following English messages:
 - i. Speed referenece
23. The following pump specific control and protective features shall be provided. Protective features shall provide English language display on drive digital display when active:
- a. Loss of prime protection
 - b. Over Cycling protection
 - c. No flow detection
 - d. Thrust bearing start
 - e. Low input pressure
 - f. Low/high flow level
 - g. Anti Jam protection
 - h. De-scale operation

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24. In addition to the above functionality, provide control, power, and logic functionality as shown in applicable project drawings.
- F. Acceptable manufacturer for the variable frequency drive units is Yaskawa IQ Pump by ICON Technologies, no equal.

15.09 ENCLOSURE:

- A. Each VFD shall be pre-installed inside of a ventilated and filtered NEMA 1 enclosure.
- B. All VFD components must be contained internal to the enclosure.
- C. The manufacturer shall provide wire trough to allow for running power and control cable from existing conduit locations to the available bottom cable entry space in the variable frequency drive.
1. The wire trough shall be painted steel designed to support weight of the VFD. Width and depth of wire trough shall match VFD dimensions. Height of wire trough shall be designed to allow proper installation of power and control cables utilizing existing conduits.
 2. Variable frequency drive shall be no more than 84 inches in height to allow for wire trough such that proper height of VFD disconnect is maintained to applicable codes.
- D. Enclosure shall be designed to dissipate heat of VFD while operating at full load.
- C. Each VFD enclosure shall have the following:
1. Input circuit breaker disconnect.
 2. Each individual VFD shall be supplied with a surge protection device (SPD).
 3. Clean Power Harmonic Reduction Technology for each 18-pulse drive shall be provided by a full-kva rated, phase-shifting drive isolation transformer with a minimum 5% impedance.
 4. Phase shifting transformers shall be designed for convection cooling without the need for forced cooling airflow. The VFD phase shifting transformer system shall be designed for continuous operation.
 5. Output dv/dt filters should be provided if inverter duty motors are not supplied or if motor lead length is greater than 100 feet. If filters are to be provided, then they shall contain a 1.5% reactor and a resistive/capacitive network and they should be manufactured by TCI or equal.

- E. As a minimum, the VFD shall be provided with the following deadfront-mounted operator devices in addition to devices required by schematic diagrams that may be part of the project plans and specifications:

Hand-Off-Auto
Run, Fault, Power On, High Pressure Alarm, High Temp Alarm, High Motor
Temp/Seal Failure and No Flow Alarm pilot lights
Start Pushbutton
Stop Pushbutton
Reset Pushbutton
Maintained Emergency Stop Pushbutton (red mushroom head)
Keypad.
Speed Pot.

15.10 XYLEM MINICAS II UNIT:

- A. Each VFD shall accommodate one (1) Xylem MiniCAS II unit as indicated on the drawings. MiniCAS II units shall be supplied by the pump supplier and shall be installed by the VFD supplier. MiniCAS II unit input power shall be 120V AC.

15.11 POWER QUALITY AND TOLERANCES:

- A. VFD shall be rated for 460 plus 10% and minus 15% with full torque performance and operate in under-voltage conditions down to 270 volts (460 volt VFDs) without tripping.
- B. Displacement Power Factor: 0.98 over entire range of operating speed and load.
- C. Operating Ambient Temperature: -10 degrees C. to 45 degrees C.
- D. Humidity: non-condensing to 95%.
- E. Altitude: to 3300 feet, higher by derating.
- F. Minimum Efficiency: 96% at half speed; 98% at full speed.
- G. Starting Torque: 150% starting torque shall be available from 0.3 Hz to 60 Hz.
- H. Overload capability: 110% of rated FLA for 60 seconds for variable torque (centrifugal) and 150% FLA for 60 seconds for constant torque (positive displacement) loads. Instantaneous overload capacity shall be 180% of rated FLA.
- I. The VFD must meet the requirements for Radio Frequency Interference (RFI) above 7 MHz as specified by FCC regulations, part 15, subpart J, Class A devices.

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15.12 MANUFACTURES FIELD SERVICES:

- A. Field start-up assistance and customer on-site training will be included with the VFD quotation.
 - 1. Provide a minimum 3 days start-up assistance
 - 2. Provide training of City personnel. Minimum of one (1) – four (4) hour session.
- B. Harmonic Field measurements will be made and a report will be provided reviewing the installed VFD harmonic content and its conformance to IEEE-519 specifications.
 - 1. Measurements will be made with Reliable Power Meter Model 1656 or AEMC model 725 Harmonic Analyzer or Square D Power Logic Meter.
 - 2. Measurements shall be made and report generated by engineer or technician with background in Harmonic Analysis.
- C. The VFD supplier shall provide a pump vibration analysis. Vibration shall be monitored at all operating speeds. The drive shall be adjusted as necessary so as to minimize pump vibration.

EXECUTION

15.13 INSTALLATION

- A. The Drive manufacturer shall provide adequate drawings and instruction material to facilitate installation of the Drive by electrical and mechanical trades people employed by others.
- B. The new VFD's shall function in the exact same manner as the units to be replaced. The control wiring, I/O and connections to the existing PLC control system shall be identical to those that currently exist.

15.14 START UP

- A. Certified factory start-up shall be provided for each drive by a factory authorized service center. A certified start-up form shall be filled out for each drive with a copy provided to the owner, and a copy kept on file at the manufacturer.
- B. The factory will extend the normal warranty for the Drive with a certified factory start-up.

15.15 PRODUCT SUPPORT

- A. Factory trained application engineering and service personnel that are thoroughly familiar with the Drive products offered shall be locally available at both the specifying and installation locations.

15.16 WARRANTY

- A. Provide VFD warranty, for two years. Manufacturer's certification of warranty to be supplied in Operation and Maintenance data. Warranty shall include all parts, labor, and technician transportation costs and shall commence upon acceptance by the Owner (Date of Substantial Completion).

END OF SECTION

SECTION 16 – VARIABLE FREQUENCY DRIVES – PUMP STATION No. 2

GENERAL

16.01 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 12 Specification sections, apply to work of this section.

16.02 DESCRIPTION OF WORK:

- A. This section covers the work necessary to furnish and install complete variable frequency drives (VFDs) for the proposed system as indicated on the Contract Documents. The scope of the work under this section is to furnish all labor, materials, equipment and incidentals required to complete the installation of 12 pulse Clean Power VFDs with input line reactors and bypass starters as described with cabinetry, wiring, manual and automatic circuitry, instrumentation and controls as necessary to fulfill the intent of these specifications for a complete system ready for operation.
- B. For this project, VFDs shall be furnished for the City of St. Pete Beach's Pump Station #2 Renovation. The Station shall require three (3) 35 hp VFD's.

16.03 REFERENCES:

- A. The VFD assembly must comply to all applicable design standards including the following:
 - 1. NEMA ICS 3.1 -Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.
 - 2. NEMA -Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 3. IEEE Standard 444 (ANSI-C343)
 - 4. IEEE 519 (1992) Recommended Practices for Electrical Harmonics
 - 5. IEC: 146A

16.04 SUBMITTALS:

- A. Submittal drawings shall include descriptive information as required to fully describe the VFD and associated components, circuit protection, solid state controllers, control logic, etc.
- B. Any proposed deviations or substitutions from the specification must be itemized and descriptive information provided to insure compliance with project requirements.

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- C. Submittal data shall include; front and side views of enclosures, overall dimensions, conduit entrance locations, and requirements, nameplate legends, and enclosure details.
- D. Submittal data shall include one-line diagram depicting all circuit protective, solid-state controllers, control logic, external control interface points, and power and harmonic filtering devices.
- E. A letter written on VFD Manufacturers letterhead stating the VFD MTBF (mean time between failure).
- F. Harmonic calculations showing VFD installation in conformance to IEEE519 (1992) shall be provided with submittals.
 - 1. Isc to IL ratio of 21 and fault current of 20,000 amps shall be used for all calculations.
 - 2. Calculations shall be made for all VFDs operating at full load.

16.05 QUALITY CONTROL AND QUALIFICATIONS:

- A. VFD shall have a minimum and documented MTBF (mean time between failure)rating of 25 years.
- B. Manufacturer must have a minimum of 10 (ten) years documented experience, specializing in VFDs.
- C. Manufacturer must have an authorized service technician within 200 miles of project job-site.

16.06 OPERATION AND MAINTENANCE DATA:

- A. Operation and Maintenance data will be submitted for approval after commissioning of VFDs and shall include all criteria listed in Specification Section 01730 in addition to the following:
 - 1. All data provided in the VFD submittal package shall be updated to as installed condition as part of final Operation and Maintenance data.
 - 2. Complete manufacturers technical manual covering VFD operation, programming, maintenance, and parts lists.
 - 3. Field harmonic test report showing compliance with IEEE 519 standards.
 - 4. List of all programmable parameters installed in VFD, Bypass Starter, and any other configured device in VFD system.
 - 5. Statement of VFD warranty.

16.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site, under provisions of this section and instructions of VFD manufacturer. Accept VFD on site in original packing. Inspect for damage. Freight damage will be the responsibility of receiving on-site contractor.
- B. Store in a clean, dry non-condensing indoor space. Maintain factory wrapping, or provide an additional heavy canvas or heavy plastic cover, to protect units from dirt, water, construction debris, and traffic. Insure that VFD is not subject to moisture including condensation.

PRODUCTS

16.08 MANUFACTURERS:

- A. The following VFD suppliers have been pre-approved for this project:

Square D Altivar 58TRX
Yaskawa by ICON Technologies
- B. Any alternative products must be pre-approved by the project engineer at least 14 days from the original project bid date. This not extended should the project be postponed from initial advertised bid date.
- C. No other VFD suppliers or third party assemblers will be accepted unless pre-approved and named by addendum.

16.09 DESCRIPTION:

- A. Provide adjustable speed drives per operating and design conditions specified suitable for operating at the current, voltage, and horsepower indicated. All VFDs shall conform to requirements of NEMA ICS 3.1.
- A. Each VFD shall be pre-installed inside of a motor control center cabinet.
- C. Each VFD enclosure shall have the following:
 - 1. Input circuit breaker disconnect.
 - 2. Each individual VFD shall be supplied with a surge protection device (SPD).
 - 3. Clean Power Harmonic Reduction Technology for each 12-pulse drive shall be provided by a full-kva rated, phase-shifting drive isolation transformer with a minimum 5% impedance.

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4. Phase shifting transformers shall be designed for convection cooling without the need for forced cooling airflow. The VFD phase shifting transformer system shall be designed for continuous operation.
 5. Output dv/dt filters should be provided if inverter duty motors are not supplied or if motor lead length is greater than 100 feet. If filters are to be provided, then they shall contain a 1.5% reactor and a resistive/capacitive network and they should be manufactured by TCI or equal.
- D. Each VFD shall be provided with a bypass starter.
1. The bypass shall incorporate four contactors. VFD output isolation contactor, RVSS output contactor (these two contactors are to be mechanically and electrically interlocked), an input isolation contactor and a shorting/bypass contactor that has a function of taking the SCRs off line once the motor has reached full speed.
 2. RVSS shall be manufactured by MagneTek model RVS-DN, Square-D model ATS48, or equal subject to the same pre-approval conditions stated herein for the VFD.
 3. Each RVSS shall have the following capabilities:
 - 1.15 service factor
 - Internal motor overload protection.
 - 100% to 400% current limit
 - Phase loss and heat sink over temperature protection
 - The SSRV bypass system shall be mounted within the VFD enclosure.
- E. As a minimum, the VFD shall be provided with the following deadfront-mounted operator devices in addition to devices required by schematic diagrams that may be part of the project plans and specifications:
- Hand-Off-Auto
 - VFD/Bypass selector switch
 - VFD Running, RVSS Running, VFD Fault, RVSS Fault, Motor Temp Alarm & Power On pilot lights
 - Keypad.
 - Speed Pot.

16.10 POWER QUALITY AND TOLERANCES:

- A. VFD shall be rated for 460 plus 10% and minus 15% with full torque performance and operate in under-voltage conditions down to 270 volts (460 volt VFDs) without tripping.
- B. Displacement Power Factor: 0.98 over entire range of operating speed and load.
- C. Operating Ambient Temperature: -10 degrees C. to 45 degrees C.
- D. Humidity: non-condensing to 95%.
- E. Altitude: to 3300 feet, higher by derating.
- F. Minimum Efficiency: 96% at half speed; 98% at full speed.
- G. Starting Torque: 150% starting torque shall be available from 0.3 Hz to 60 Hz.
- H. Overload capability: 110% of rated FLA for 60 seconds for variable torque (centrifugal) and 150% FLA for 60 seconds for constant torque (positive displacement) loads. Instantaneous overload capacity shall be 180% of rated FLA.
- I. The VFD must meet the requirements for Radio Frequency Interference (RFI) above 7 MHz as specified by FCC regulations, part 15, subpart J, Class A devices.

16.11 DESIGN:

- A. Design Technology: VFD shall employ a voltage source PWM technology consisting of full-wave diode rectifier, fixed voltage DC link, and PWM output inverter section controlled by solid-state microprocessor based digital control platform isolated from all power circuits.
- B. Input AC to DC Diode Rectifier Section: VFD input power stage shall convert three-phase AC line power into a fixed DC voltage via a dual (12-pulse ready) full wave diode rectifier, using separately mounted MOV (metal oxide varistor) protection.
- C. Intermediate DC Link Section:
 - 1. DC bus as a supply to the VFD Output Section shall maintain a fixed voltage with filtering and short circuit protection.
 - 2. DC Bus shall be interfaced with the VFD diagnostic logic circuit, for continuous monitoring and protection of the power components.
 - 3. DC link shall be designed with circuit to allow a minimum of 2 seconds power-loss ride through without tripping via capturing motor rotational and

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DC link stored energy to keep VFD running during temporary loss of utility power and to allow time for standby generator starting.

- D. Output DC to AC Inverter Section:
1. Insulated gate bipolar transistors (IGBTs) shall convert DC bus voltage to variable frequency and voltage. Insulated gate bipolar transistors (IGBTs) shall convert DC bus voltage to variable frequency and voltage.
 2. All VFDs must be selected for operation at carrier frequencies at or above 4 kHz without de-rating; or shall utilize a noise cancellation technique for reducing noise. Audible motor noise, while operating under VFD control, shall be limited to 3 db above the amount of noise generated across the line measured at one meter from the motor. Should the motor generate more audible noise than specified the vendor shall, at no charge, provide sound shielding for the motor such that the installation meets the above performance specification.
 3. VFD shall have an adjustable carrier frequency: The carrier frequency shall have a minimum of five settings to allow adjustment in the field or shall utilize a noise cancellation technique for reducing motor noise.
- E. VFD Controls and System Interface (see electrical wiring diagram for controls specific to this project):
1. Circuit boards shall utilize surface-mount technology.
 2. All circuit boards shall be conformal coated to help protect microprocessors and complex integrated circuits from hydrogen sulfide and methane gasses.
 3. VFD shall include two independent remote reference inputs. One shall be 0-10 VDC. The other shall be programmable for either 0-10 VDC or 4-20 mA. Either input shall respond to a programmable bias and gain.
 4. VFD shall have two independent remote reference outputs capable of either 0-10 VDC or 4-20mA. Either output shall be programmable to model up to 10 VFD parameters.
 5. VFD shall include a minimum of five multi-function input terminals, capable of being programmed to determine their function when their state is changed. These terminals shall provide up to 20 functions, including, but not limited to:

Remote/Local operation selection.
Detection of external overheat condition.
Remote Reset
Multi-step speed commands
 6. VFD shall include two 4-20mA selectable analog output signals, proportional to output frequency, output current or output power, for either monitoring, or "speed tracking" the VFD.

7. VFD shall include at least one external fault input, which shall be programmable, for either a normally open, or a normally closed contact, for connection to system permissibles such as check-valves, pressure alarms, etc.
8. VFD shall include one fully rated form-"A" contact and one fully rated form "C" contact, capable of being programmed to determine what conditions must be met in order for them to change their state. These contacts shall be rated for at least 1A at 250 VAC. These terminals shall provide up to 15 functions, including, but not limited to:
 - a. HOA in Hand.
 - b. HOA in Auto.
 - c. Bypass selected.
 - d. VFD Running.
 - e. VFD Faulted.
 - f. RVSS Running.
 - g. RVSS Faulted.
9. VFD shall include a front mounted, deadfront panel, sealed keypad operator, with a digital display, to provide complete programming, operating, monitoring, and diagnostic capability.
10. The VFD shall be provide with a 3-position, maintained contact selector switch for Hand-Off-Auto selection. The VFD shall also include a 2-position, maintained contact selector switch for Bypass Starter selection.
11. A three line 16 character LCD display shall provide readouts of; output frequency in hertz, output voltage in volts, output current in amps, output power in kilowatts, DC bus voltage in volts, interface terminal status, and fault codes. All displays shall be labeled in easy-to-read English language. Codes are not acceptable.
12. VFD shall be capable of PID (Proportional, Integral, Derivative) logic, to provide closed-loop setpoint control capability, from a remote reference.
13. VFD shall include loss of input signal protection, with a speed default to 80% of the most recent speed.
14. The motors shall be supplied with a thermal switch to protect the motors from thermal overloads. The VFD and bypass starter control logic shall incorporate this switch as a system permissive.
15. VFD shall include electronic thermal overload protection for both the drive and motor, profilable for variable or constant torque. The electronic thermal

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motor overload shall be approved by UL. Otherwise, a separate UL approved thermal overload relay shall be provided in the VFD enclosure.

16. VFD shall include the following programming functions:
 - a. Critical frequency rejection capability: 2 selectable, adjustable bands.
 - b. Auto restart capability.
 - c. Stall prevention capability.
 - d. "s" curve soft start capability.
 - e. "Speed search" capability, in order to start a rotating motor.
 - f. Fifteen preset volts per hertz patterns.
 - g. One adjustable volts per hertz pattern.
 - h. Current limit adjustment capability, from 30 % to 200 % of rated full load current of the VFD.
 - i. Anti "wind milling" function capability.

F. Programming and Communications:

1. VFD shall include factory settings for all parameters, and the capability to be reset back to those settings.
2. VFD shall include the capability to adjust the following functions, while the VFD is running:

Acceleration adjustment from 0 to 3600 seconds.

Deceleration adjustment from 0 to 3600 seconds.

A minimum of five different preset speeds.

Analog output gain, to calibrate the signal for the application used.

16.12 ENCLOSURE:

- A. Each VFD and bypass starter shall be supplied inside of a Motor Control Center (MCC) assembly. The MCC dimensions shall be compatible with the pre-fabricated structure to provided and installed by others.
- B. All VFD and bypass starter components must be contained internal to the MCC and be operated at full load.
- C. Enclosure and MCC installations must be designed such that bypass starters can operate without air-conditioning inside the enclosure.
- D. Enclosure and MCC installations shall be designed to dissipate heat of VFD and bypass starters while operating at full load.
- E. Coordinate dimensions of cabinets with the Pre-Engineered, Pre-Assembled Electrical and Control Enclosure manufacturer.

16.13 MANUFACTURES FIELD SERVICES:

- A. Field start-up assistance and customer on-site training will be included with the VFD quotation.
 - 1. Provide a minimum 3 days start-up assistance
 - 2. Provide training of City personnel. Minimum of one (1) – four (4) hour session.
- B. Harmonic Field measurements will be made and a report will be provided reviewing the installed VFD harmonic content and its conformance to IEEE-519 specifications.
 - 1. Measurements will be made with Reliable Power Meter Model 1656 or AEMC model 725 Harmonic Analyzer or Square D Power Logic Meter.
 - 2. Measurements shall be made and report generated by engineer or technician with background in Harmonic Analysis.
- C. The VFD supplier shall provide a pump vibration analysis. Vibration shall be monitored at all operating speeds. The drive shall be adjusted as necessary so as to minimize pump vibration.

EXECUTION

16.14 INSTALLATION

- A. The Drive manufacturer shall provide adequate drawings and instruction material to facilitate installation of the Drive by electrical and mechanical trades people employed by others.

16.15 START UP

- A. Certified factory start-up shall be provided for each drive by a factory authorized service center. A certified start-up form shall be filled out for each drive with a copy provided to the owner, and a copy kept on file at the manufacturer.
- B. The factory will extend the normal warranty for the Drive with a certified factory start-up.

16.16 PRODUCT SUPPORT

- A. Factory trained application engineering and service personnel that are thoroughly familiar with the Drive products offered shall be locally available at both the specifying and installation locations.

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16.17 WARRANTY

- A. Provide VFD warranty, for two years. Manufacturer's certification of warranty to be supplied in Operation and Maintenance data. Warranty shall include all parts, labor, and technician transportation costs and shall commence upon acceptance by the Owner (Date of Substantial Completion).

END OF SECTION