A. Panel Builder

1. The panel builder shall be experienced in the construction of lift station control panels, shall have a UL approved shop. Panel shall be UL listed and UL labeled as service entrance equipment.
2. The panel builder shall warrant the panel for one (1) full year minimum from the date of final project certification.
3. The panel builder or qualified technical representative shall check-out and test the panel as part of the lift station start-up.

B. Panel Components

1. The panel components are specified on the drawings with the exception of items described in these specifications. Items are listed by manufacturer and catalog number, other equal quality components may be substituted but they must be fully interchangeable with those specified in size, function, mounting dimensions, plug in connections, and ampacity. Any substitutions or changes must be approved in advance and in writing by the utility department. All components shall be new with no signs or evidence of corrosion.

C. Enclosure

1. The panel with size 1, or 2 starters shall be minimum 36 inch wide x 60 inch high x 12 inch deep (36"W x 60"H x 12"D). The panel with soft starters shall be minimum 36 inch wide x 66 inch high x 16 inch deep (36"W x 66"H x 16"D). Larger panel may be installed if required by UL and NEC specifications for service intended. A shop drawing must be submitted prior to preconstruction meeting. Top of panel shall not be higher than 6'-6" above slab, unless approved in advance by the department. The panel shall be of a modified NEMA 3R construction with the following features:
   a. Constructed of 304 stainless steel 14 gauge. Enclosure shall have powder coated white stainless steel body and door. All seams to be continuously welded, spot welded panels will not be accepted.
   b. All external hardware shall be stainless steel with piano hinge, three-point latch with roller fitting top and bottom and single handle with padlock fitting and stainless steel external parts.
   c. Full length welded drip shield to deflect water from the door, a continuous closed cell neoprene gasket on the door.
   d. Blank outer door with dead front inner door of 1/8" thick aluminum hinged on the left with the operators controls mounted on or projecting through it.
   e. Provide stainless steel or Aluminum back mounting plate for heavy components (min. .090 thickness).
   f. A removable min. 1/8 inch thick lexan cover shall be provided on the incoming line terminals.
   g. The outer door is to have nine inch by eleven inch (9" x 11") stainless steel or aluminum pocket for log book, tack weld to door.
   h. Arms and latches shall hold both outer door and inner door in an open position, these must be sufficiently rigid and secure to hold doors open under windy weather conditions any may be placed one on top and one on bottom.
   i. Sliding locking bar to allow only main or emergency breaker to be closed. Bar shall be aluminum with stainless steel hardware.
   j. No penetration through the panel will be allowed except for conduits on bottom, and for generator receptacle and transformer conduit on the side, i.e. no screws through panel, outer door or frame.
2. The enclosure shall be the product of a UL approved manufacturer and shall be a modified NEMA-3R enclosure. Manufacturer shall be Hoffman or approved equal. Enclosure shall have lugs for mounting.

D. Wiring

1. All wiring shall be copper THWN or approved equal, AWG 14 minimum. Color code wires as follows:

Ground	–	Green
Grounded Neutral	–	White
120 Volt Power	–	Black
Control	–	Red
24 Volt Control	–	Blue

   Different control wiring colors are acceptable if clearly identified. Power wiring shall be kept separate from control wiring, and shall be identified by phase. The high leg shall be the center terminal on the main breaker.
2. All wires shall be numbered with machine made plastic wrap around labels at both ends.
3. All external connection and internal connections, where shown on the drawings, shall be brought to the numbered terminals. All PLC inputs and outputs shall be brought to the terminal blocks even if not used.
4. Wiring shall be enclosed in panduct or equivalent wireways and wiring between the doors and the panel shall be enclosed in a spiral wrap or approved equal with sufficient slack to allow full opening of the door.
5. Wiring shall be secured with screw-on tabs, tabs with adhesives shall not be used.
6. All wiring shall be front accessible.
7. All electrical wiring must meet or exceed National Electric Code and Local Code Standards.
8. Any place that electrical wire passes through a metal cover or shield, insulating grommet is required to protect the wire.

E. Component Mounting

1. All components shall be securely mounted with stainless steel hardware. Self tapping screws are not acceptable.
2. All relay bases shall be front mounted with screw terminals, no soldered connections shall be used. All base terminals shall be numbered to correspond to relay numbers. Where plug-in components are not firmly secured in bases, hold down clamps shall be provided.

F. Identification

1. All components shall be identified in accordance with the schematic diagram, using permanent name tags on the panel of laminated micarta or approved equal. The permanent name tags shall be securely attached and in a position where they are clearly visible.
2. All operator's controls shall be provided with laminated micarta name tags attached with stainless steel screws, with minimum lettering height of 1/8 inch.
3. Provide a laminated schematic drawing attached to the inside of the outer door – minimum size 11 inches by 17 inches (11" x 17").
4. Attach a separate stick-on label showing the following details:

PUMP		MOTOR	
a.	Brand	a.	Horsepower
b.	Catalog number	b.	Speed
c.	Impeller number and size	c.	Voltage
d.	Design head	d.	Full load amps
e.	G.P.M.	e.	Catalog number
f.	Serial numbers	f.	Serial numbers

5. Pump ID tags shall be provided by the PBCWUD and installed by the Contractor. Request via PBCWUD pump shop prior to pump installation.

G. Junction Box

1. The "RAIN TIGHT" junction box shall be NEMA-4X, 316 stainless steel, Hoffman or approved equal with padlock fitting, continuous hinge clamped cover construction. Junction box shall be minimum of 24 inches wide by 20 inches high by 8 inches deep (24" W x 20" H x 8" D) and shall have a stainless steel or aluminum back mounting plate for terminal blocks. Provide a stainless steel or aluminum partition between the control and power terminals as shown on the drawings. Junction box design shall allow for venting as required by code.
2. Provide gas sealing hubs, conduit, terminals, and wire as shown on the drawings. Provide four (4) extra wires for future control.
3. Pour seals into gas sealing hubs between panel and junction box with compound approved by seal manufacturer.
4. Provide plated copper ground lug and wire to the panel ground.

H. Drawings

1. Panel builder shall provide the following drawings:
   a. Schematic drawing showing all components. Components shall be properly identified by number and function. All connections shall be numbered to correspond to the component numbers. All wires and terminals shall be clearly numbered and identified.
   b. Bill of material listing all parts as follows, in tabular form:
      1) Drawing Reference
      2) Description
      3) Manufacturer
      4) Catalog Number
      5) Type
      6) Notes
   c. Layout drawing showing the front with the operators panel and with the panel open. Layout drawings shall also show the outside dimensions of the panels and dimensioned mounting supports.
   d. Plastic encased drawing inside the panel as previously noted herein.
2. Drawings shall be clear and readable and a minimum of 11 inches by 17 inches (11" x 17"). "Fuzzy" reductions will be rejected.

I. Loose Components

1. Ship the following for mounting by the site electrician.
   a. Alarm Light – Item 22
   b. Outside Floodlight – Item 12
   c. 120 Volt Transformer – Item 7
   d. Junction Box – Item 33
   e. Alarm Horn – Item 23
   f. Outlet 120V – Item 39

J. Soft Starters (SSRVS – item 41)

1. Soft Starters shall be provided in the control panel for the lift stations which have 20HP motors and larger. Soft Starters shall be solid state reduced voltage starter type with integral bypass, fan and display. Soft starters line voltage shall be rated from 240V to 480V, 3ø. Control supply voltage, control logic inputs and fan supply voltage for soft starters shall be 120V. Soft Starters shall be rated to operate at higher ambient temperature. Oversize soft starter rating minimum one size higher than motor HP. All soft starter settings shall be set and adjusted properly for functional operation of lift station. Set ramp up time to "5 sec", ramp down time to "Off", overload protection to "On", over current time delay to "5 sec", under and over voltage time delay to "10 sec", the line voltage, and motor full load amp per motor nameplate, etc. Disable all the protection features including phase loss, phase reverse, under, unbalance and ground current. Only overload protection shall be enable.

BILL OF MATERIALS (CONTROL PANEL)

(ALL ELECTRICAL COMPONENTS AND ASSEMBLIES MUST BE UL LISTED/APPROVED)

ITEM	NAME	DESCRIPTION	MANUFACTURER	TYPE
1	Main Breaker	3p-100 Amp, 240 volt w/ Auxiliary contact, 25k AIC (minimum)	Square D	Powerpact H-Frame
2	Generator Breaker	(Same as Main)		
3	Generator Receptacle	4-wire, 100 Amp	Russellstoll	JRS1034HR
4	TVSS/SPD	120/240 volt, 3 phase, 4 wire high leg delta	ASCO	430240HP10ACSJ1
5	Level Transmitter	Radar level sensor, two-wire Range: 0 – 23 feet Min. cable length 50 feet	Vega Endress & Houser	Vegapuls WL 61 FMR20
6	Motor Circuit Breaker	Magnetic only w/ Auxiliary Contact size per motor (25k AIC min.)	Square D	Powerpact H-Frame
7	120 volt Transformer	3 kVA, 240/480 to 120/240 Painted 316 Stainless Steel	Square D	9513T5S
8	Motor Starter	3p, NEMA size 1 (min.) w/Transient Suppression Module	Square D	Class 8536
9	Phase Monitor	Plug-in 8 pin 240 volt, 3p	Diversified	SUA-230-ALAU
10	Fuse	600 volt, amps as shown w/ Finger-safe Fuseholder	Bussmann	KTK for Phase Monitor
11	120V Circuit Breakers	Thermal Magnetic	Square D	Type QOU
12	Outside Floodlight	Par 38, LED 100W Equivalent Daylight Bulb	RAB Lighting	HB101W w/ HG1W guard
13	Panel Outlet	120V GFI Duplex, 20A, Spec Grade	Hubbell	GF 5362I
14	Control Relay 120Vac	Plug-in, Round Base, 11 Cylindrical Pin with LED light, 120V	Square D	RUMC3482F7
15	Pump Selector	Hand-Off-Auto (Manual Return)	Square D	SK5438
16	Power Distribution Block	3p – (2) 500KCM – #4, (6) #2/0 – #14	Marathon	1453586 with lexan cover
17	Running Time	2 inch Square, 120 volt	Redington	711-0190
18	Time Delay Relay Delay on Make	1 to 1023 Second, 8 Pin Base, 120 volt	SSAC Diversified	TDM120AL Delay on Make TBC-120-ABA
19	Transformer Breaker	2p-30 Amps, 25k AIC (Min.)	Square D	HGL 26030
20	Motor Temperature and Moisture Detector	Relay – 120Vac or 24Vdc (Provide if required)	As Specified by Pump Supplier	
21	Flasher	2 amp, 75 F.P.M.	SSAC	FS127
22	Outside Alarm Light	Red Globe with Guard, 100W Lamp	RAB Lighting	VX8R100DG w/ GL100R Globe
23	Outside Alarm Horn	120 volt Weatherproof	Edwards Signals	876-NO
24	TVSS/SPD Breaker	3p-30 Amps, 25k AIC (Min.)	Square D	HGL 36030
25	Pilot Lights 120 Volt	LED Pilot Light	Square D	Type 9K
26	Time Delay Relay On Break	1 to 1023 Second, 11 Pin Base, 120 volt	SSAC Diversified	TDB120ALD TBD-120-ABD
27	Control Relay 24Vdc	DPDT 8 Cylindrical Pin, Round base with LED light, 24Vdc	Square D	RUMC2ABZ8D
28	Silence Pushbutton	Oiltight	Square D	Type 9KR1UH5
29	Float Switch	Encapsulated Switch, Integral cord w/ NO and NC Contacts Min. 40' cord	Anchor Scientific Flygt	CS40NONC ENM-10
30	RTU Wire Terminal	Feed-Through Modular Block	Phoenix	UTTB4
31	Junction Box Power Terminal Blocks	Insulated Spole Power Splicer	Marathon	1320572 for phase 1320572 for ground
32	Control Panel	Min. 36"Wx60"Hx12"D	Hoffman	See Panel Specification
33	Junction Box	24"Wx20"HxD	Hoffman	See Panel Specification
34	Gas Sealing Hub	Sealing Hub, Size as shown	Crouse Hinds	ESS5 AND ESS3
35	Raintight Conduit Hub	Size as shown	O.Z. Gedney	CHM
36	Control Wire Terminal	Rail Mount w/ angled bracket	Square D	Class 9080 GR6
37	Ground Terminal	Copper Tin Plated	Square D	Class 9080
38	RTU	Remote Telemetry Unit	Curry Control Co. ESC PBCRTU2019 PBCRTU2019 C.C. Controls PBCRTU2019 AES PBCRTU2019 Unitron PBCRTU2019 Champion Controls Inc. PBCRTU2019	
39	Exterior Outlet	120V GFI Duplex, 20A, Spec Grade w/weatherproof box and cover	Hubbell Bryc Crouse Hinds Cover: Crouse Hinds	GF 5362I FD2 TP7240
40	DC Miniature Breaker	Pole and Amp As Shown	Square D	C60 Multi 9
41	Soft Starter/SSRVS	w/ integral bypass and optional fan	Square D	ATS22D75SU w/ fan
42	Motor Circuit Breaker w/ Shunt Trip	Magnetic only 3p 600 volt size per motor (25k AIC min.)	Square D	Powerpact H-Frame
43	Service Entrance Fused Disconnect Switch	600V, 3p, Nemo 4X 316SS w/ class RK1 fuses (size same as Main)	Square D	H363NSS
44	Service Fuse	600V, Dual element, time delay fuses class RK1 (size same as Main)	Bussmann	LPS-RK
45	RTU Fuse Terminal	Fuse terminal block w/ LED blown fuse indicator, Fuse size as shown	Phoenix	3046090
46	Pressure Transmitter	Range: 0-100 psi, w/ Display	Sprecher Schuh ABB	VT-H5 261GSDKTNS1EAL1M5

NOTES ON 240V PANELS:

A. This is the minimum size pump station panel for under 15 hp at 240 volts, 3p. For larger than 15 hp items 1, 2, 6, and 8 change. Minimum service size 100 AMP. Minimum service wires and conduit 3-#2, 1-#4G, 2"C. Minimum wires and conduits for motors between control panel and junction box are 3-#8, 1-#10G, 1 1/2"C plus 4-#14 for motor temperature and moisture sensors.

B. Short circuit amps rating of circuit breaker and panel shall equal or exceed system S.C. amps. Contractor shall confirm this value with the power company and order the panel accordingly. In addition, the minimum S.C. amp rating of the panel shall be as follows:

For 100 amps	25,000 amps
For 101 to 250 amps	42,000 amps

C. For two (2) motors 15 h.p. and up, size components per the following table for 240 volt 3 phase services. Soft Starters shall be provided for motors 20 h.p and up.

MOTOR H.P.	MOTOR AMPS	SERVICE MINIMUM MOTOR AMPS x2.25 + 12.5	MAIN BREAKER Item 1	MOTOR CIRCUIT BREAKER Item 6	MOTOR STARTER Item 8/ Item 41	SERVICE WIRES AND CONDUIT	MOTOR WIRES AND CONDUIT (BETWEEN C.P. AND J-BOX)
15	42	107	150	100	NEMA-2	3-#1/0, 1-#4, 2"C	3-#8, 1-#8, 1 1/2"C
20	54	134	175	100	ATS22D75SSU	3-#2/0, 1-#4, 2"C	3-#4, 1-#8, 1 1/2"C
25	68	165.5	200	100	ATS22D88SSU	3-#3/0, 1-#3, 2"C	3-#3, 1-#6, 1 1/2"C
30	80	192.5	250	125	ATS22C115SU	3-250KCM, 1-#2, 3"C	3-#2, 1-#6, 1 1/2"C

NOTES ON 480 VOLT PANELS:

A. The following components shall change:

ITEM	NAME	DESCRIPTION	MANUFACTURER	TYPE
3	Generator Receptacle	4 wire 200 amp	Russellstoll	JRS2034HR
4	TVSS/SPD	277/480v, 3 phase, 4 wire	ASCO	430277P10ACSJ1
9	Phase Monitor	Plug-in 8 pin 480 volt, 3p	MPE	001-480-118
19	Transformer Breaker	2p-15 Amps, 25k AIC (Min.)	Square D	HGL 26015

B. The 480 volt short circuit rating of panel shall equal or exceed system S.C. amps. Contractor shall confirm this value with the power company and order the panel accordingly. In addition, the minimum S.C. amp rating of the panel shall be as follows:

For 100 amp service	18,000 amps
For 200 to 250 amp service	42,000 amps

MOTOR H.P.	MOTOR AMPS	SERVICE MINIMUM MOTOR AMPS x2.25 + 6.25	MAIN BREAKER Item 1	MOTOR CIRCUIT BREAKER Item 6	MOTOR STARTER Item 8/ Item 41	SERVICE WIRES AND CONDUIT	MOTOR WIRES AND CONDUIT (BETWEEN C.P. AND J-BOX)
15	21	53.5	100	40	NEMA-2	3-#2, 1-#4, 2"C	3-#8, 1-#10, 1 1/2"C
20	27	67.0	100	50	ATS22D47SU	3-#2, 1-#4, 2"C	3-#8, 1-#10, 1 1/2"C
25	34	82.8	100	70	ATS22D47SU	3-#2, 1-#4, 2"C	3-#8, 1-#10, 1 1/2"C
30	40	96.3	125	80	ATS22D62SU	3-#1, 1-#4, 2"C	3-#6, 1-#8, 1 1/2"C
40	52	123.3	150	100	ATS22D75SU	3-#1/0, 1-#4, 2"C	3-#4, 1-#8, 1 1/2"C
50	65	152.5	200	100	ATS22D88SU	3-#3/0, 1-#3, 2"C	3-#3, 1-#6, 1 1/2"C
60	77	179.5	225	150	ATS22C115SU	3-#4/0, 1-#2, 2"C	3-#2, 1-#6, 1 1/2"C
75	96	222.3	250	200	ATS22C145SU	3-250KCM, 1-#2, 3"C	3-#1/0, 1-#6, 1 1/2"C

ELECTRICAL PANEL SPECIFICATIONS

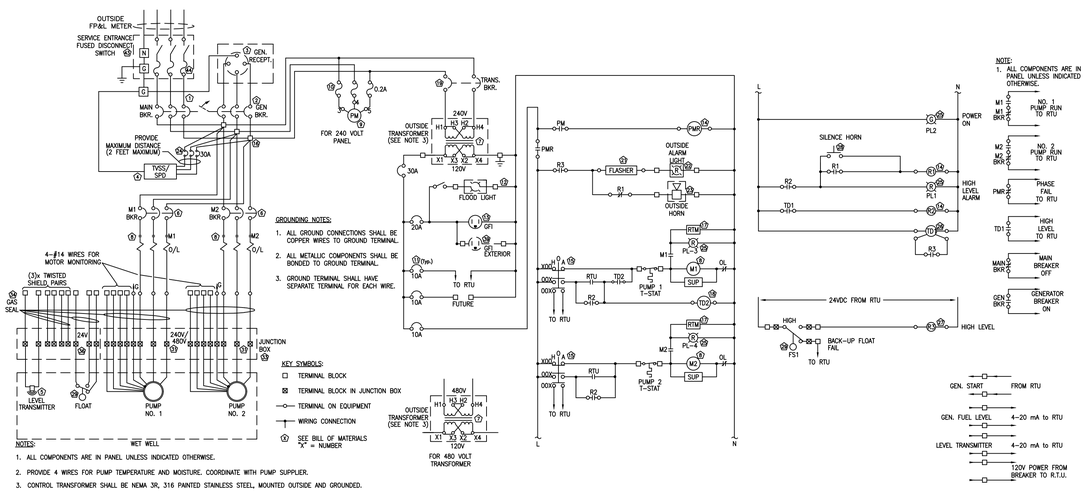
63S-65S

LIFT STATION CONTROL PANEL BILL OF MATERIALS

66S

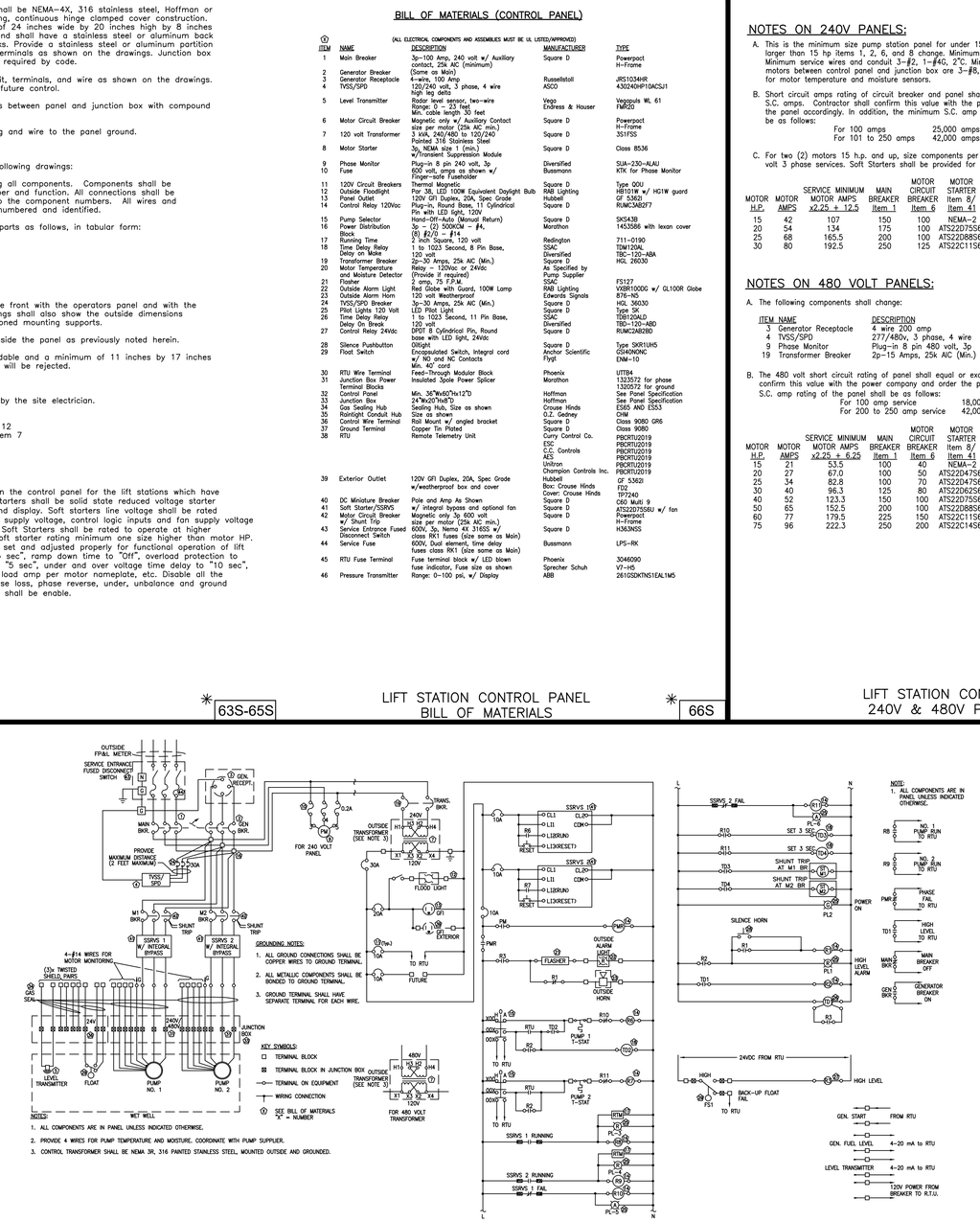
LIFT STATION CONTROL PANEL 240V & 480V PANEL NOTES

67S



LIFT STATION ELECTRICAL SCHEMATIC

68S-70S



LIFT STATION ELECTRICAL SCHEMATIC WITH SOFT STARTERS

71S-73S

WUD PROJECT No. 00-000

WUD PROJECT NAME

PALM BEACH COUNTY
WATER UTILITIES DEPARTMENT
P.O. BOX 16097
WEST PALM BEACH, FL 33416
(561)493-6000

NO.	DATE	REVISION / REMARKS	BY
	DEC 2021	GENERAL REVISION	J.L.
	JAN 2023	GENERAL REVISION	J.L.

LS ELEC. E-2

SHEET NUMBER 0 OF 0

LIFT STATION ELECTRICAL STANDARD DETAILS 2 OF 3

CONSULTANT:

IT'S THE LAW! CALL 48 HOURS BEFORE YOU DIG 1-800-432-4770 SUNSHINE STATE ONE CALL OF FLORIDA, INC. UTILITIES NOTIFICATION CENTER

DESIGNED BY:	WUD	
DRAWN BY:	M. BUCKNER	Palm Beach County
CHECKED BY:	J. LAMMERT	Water Utilities Department
APPROVED BY:	WUD	P.O.Box 16097 West Palm Beach, FL 33416-6097

SEAL

Mar 17, 2023

Drawing: W:_WUD 2023 STD DTL REVS\WUD 2023 STD DTL SHEETS\WUD 2023 STD DTLS - LIFT STATION (6 SHTS).dwg\4_WUD LS_E-2 - Last Modified: Fri, Mar 17, 2023 - 9:15am