

FINANCE & ADMINISTRATIVE SERVICES

Purchasing Office

Phone: 954-572-2274

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September 16, 2022

Stephen Polk, Vice President

Intercounty Engineering Inc.

1925 NW 18 Street

Pompano Beach, FL 33069

E-mail address: smcdougle@intercountyengineering.com

Vendor No. 45

Re: Letter of Award

Lift Station Rehabilitation and Repairs

Solicitation No. BID 22-17-03-MS

Resolution No: 22-112

Commission Approval:

Tuesday, September 13, 2022

Munis Contract No: 2022000363

Agenda Reference No:

C22175

Dear Contractor:

This notice is to advise you that the Sunrise City Commission approved the award of the above referenced bid to your firm as the **Primary Vendor**.

Pricing is as follows:

See Bid response.

Original Contract Period:	Start Date:	End Date:
	9/24/2022	9/23/2025

Renewal Options:

First Renewal Period:	9/24/2025	9/23/2026

Second Renewal Period:	9/24/2026	9/23/2027

Please e-mail a copy of your Certificate of Insurance per Bid document requirements. Provide Public Construction Bond when applicable, per bid document.

When all the required documents have been returned by your firm and reviewed by the City, the Procurement Manager will issue you a Purchase Order as needed. Should you have any questions, do not hesitate to contact me.

Sincerely,

Maria Salvatierra, CPPO
Procurement Specialist

Direct No: 954-572-2484.

Fax No: 954-578-4809

E-mail address: msalvatierra@sunrisefl.gov

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

SECTION 6 – BID SUBMISSION PACKAGE
BID SUBMISSION CHECK LIST

COMPANY NAME: (Please Print): Intercounty Engineering, Inc.
Phone: (954) 972-9800 **Fax:** smcdougla@intercountyengineering.com

BEFORE SUBMITTING YOUR BID, MAKE SURE YOU...

- ✓ 1. Carefully read the SPECIFICATIONS.
- ✓ 2. Properly fill out the BID SHEET and CERTIFICATION PAGE and (Schedule "A"). Upload Bid Form in Excel Format to www.demandstar.com
- ✓ 3. Fill out and sign the NON-COLLUSION AFFIDAVIT (Schedule "B") and have it properly notarized.
- ✓ 4. Sign the VENDOR DRUG FREE STATEMENT (Schedule "C").
- ✓ 5. Fill out the VENDOR QUALIFICATION STATEMENT (Schedule "D"), if required.
- ✓ 6. Include WARRANTY INFORMATION FORM AND EXHIBITS (Schedule "E"), if required.
- ✓ 7. CHECK THE INSURANCE and LICENSE requirements to be sure you comply, and submit PROOF of INSURANCES or LICENSES, if required, with your Bid (Schedule "F").
- n/a 8. Complete STATEMENT OF NO BID (Schedule "G"), if applicable.
- ✓ 9. Submit Electronically.
- n/a 10. Include a Bid Bond, if applicable.
- ✓ 11. Make sure your BID is submitted prior to the deadline. Late Bids will not be accepted.

FAILURE TO PROVIDE THE REQUESTED SCHEDULES MAY RESULT IN YOUR BID BEING DEEMED NON-RESPONSIVE.

THIS PAGE AND THE FOLLOWING PAGES ARE TO BE RETURNED WITH YOUR BID.

THIS SHOULD BE THE FIRST PAGE OF YOUR BID.

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

SECTION 6 – BID SUBMISSION PACKAGE

**SCHEDULE "A"
CITY OF SUNRISE
BID SHEET & CERTIFICATION**

Please go to www.Demandstar.com to download Schedule "A" – Bid Sheet & Certification form, fill out and upload as part of your bid response along with rest of schedules provided below.

1-Upload filled out Schedule A in Excel format to Demanstar.com.

2-Print filled out Schedule A, sign and upload to Demandstar.com.

SCHEDULE "A" - Addendum No. 2**BID SHEET & CERTIFICATION****ALL BIDS SHALL REMAIN VALID FOR NINETY (90) DAYS AFTER BID OPENING**

All bid items shall include costs for furnishing to the City all materials, equipment, and supplies and for all costs incurred in completing the work including installation of all materials, equipment, and supplies furnished, complete in place and ready for continued service, all other labor, permit fees, taxes, insurance, miscellaneous costs, overhead and profit.

It is the intent of the City to not use line items in this Bid Form as standalone projects, but rather for Lift Station Rehabilitation projects under a continuous contract for as needed services where Contractor will have an opportunity to visit the station/site intended for service and identify applicable line items in conjunction with the City to encompass Work Order(s) as needed. Bidder must bid on all items. Failure to bid all items will result in bidders bid response being considered non-responsive and thereby rejected. "Est. Qty" shall mean "Estimated Annual Quantity". It is the bidders' responsibility to make sure all the line items are calculated and totaled correctly.

GENERAL CONDITIONS

ITEM NO.	DESCRIPTION	UNIT	Est. Qty	UNIT PRICE	TOTAL PRICE
1	Site Mobilization/Demobilization (per station)	EA	10	\$17,120.00	\$171,200.00
2	City Approved Maintenance of Traffic per station (minor, no lane closure of intersection) - Up to 45 days	EA	8	\$3,060.00	\$24,480.00
3	City Approved Maintenance of Traffic per station (major, includes lane and sidewalk closures or disruption of traffic flow at a busy intersection) -Up to 45 days	EA	5	\$5,800.00	\$29,000.00
ROADWAYS					
4	Remove & Dispose of Existing Asphalt Section (varying thickness)	SY	100	\$70.00	\$7,000.00
5	Remove & Dispose of Existing Subgrade (varying thickness)	SY	275	\$36.00	\$9,900.00
6	1-1/2" Type S-3 Asphalt (2-3/4" lifts)	SY	1000	\$39.00	\$39,000.00
7	2" Type S-3 Asphalt (2-1" lifts)	SY	1000	\$46.00	\$46,000.00
8	Mill & Resurface asphalt roadway (1")	SY	1000	\$38.00	\$38,000.00
9	8" Limerock Base (LBR 100) (includes prime and tack coat)	SY	1000	\$53.00	\$53,000.00
10	12" Compacted Subgrade	SY	1000	\$28.00	\$28,000.00
11	Concrete Sidewalk (4" thick)	SY	250	\$67.00	\$16,750.00
12	Concrete Sidewalk (6" thick)	SY	250	\$90.00	\$22,500.00
13	Remove Existing Concrete (4" thick) (non-sidewalk)	SY	150	\$49.00	\$7,350.00
14	Remove Existing Concrete (6" thick) (non-sidewalk)	SY	150	\$52.00	\$7,800.00
15	Remove Existing Asphalt (1" thick) (non-roadway)	SY	600	\$24.00	\$14,400.00
16	Remove Existing Asphalt (1.5") (non-roadway)	SY	600	\$25.00	\$15,000.00
17	Remove Existing Asphalt (2" thick) (non-roadway)	SY	600	\$26.00	\$15,600.00
18	Remove Existing Asphalt (> 2" thick) (non-roadway)	SY	600	\$30.00	\$18,000.00
19	Flowable Fill (psi)	CY	10	\$390.00	\$3,900.00
WATER					

20	Relocate 3/4" PE Water Service (up to 30'), includes relocation of above grade water service components and supply and install of all below grade system components.	EA	1	\$3,460.00	\$3,460.00
21	Relocate 1" PE Water Service (up to 30'), includes relocation of above grade water service components and supply and install of all below grade system components.	EA	1	\$3,640.00	\$3,640.00
22	1" PE Water Service w/curb stop, w/1" RPZ assembly and hose bib (per City detail), (includes up to 30' of water service poly tubing and tapping mains up to 12" diameter)	EA	1	\$12,180.00	\$12,180.00
SEWER					\$0.00
23	By-Pass Pumping (4" pump) w/high level float and alarm	DAY	300	\$470.00	\$141,000.00
24	By-Pass Pumping (6" pump) w/high level float and alarm	DAY	150	\$580.00	\$87,000.00
25	By-Pass Pumping (8" pump) w/high level float and alarm	DAY	17	\$1,050.00	\$17,850.00
26	By-Pass Pumping (10" pump) w/high level float and alarm	DAY	17	\$1,280.00	\$21,760.00
27	Remove Wetwell Top Slab (6' square)	EA	3	\$860.00	\$2,580.00
28	Remove and Salvage Existing Pump and Deliver to the City	EA	25	\$630.00	\$15,750.00
29	4' Diameter Concrete Riser Ring	LF	1	\$1,160.00	\$1,160.00
30	6' Diameter Concrete Riser Ring	LF	10	\$1,590.00	\$15,900.00
31	8' Diameter Concrete Riser Ring	LF	10	\$2,290.00	\$22,900.00
32	10' Diameter Concrete Riser Ring	LF	1	\$3,170.00	\$3,170.00
33	12' Diameter Concrete Riser Ring	LF	1	\$3,950.00	\$3,950.00
34	6' Square Concrete Riser	LF	1	\$1,350.00	\$1,350.00
35	30"x36" Watertight (floodtight/gastight) Angle Frame, Single Cover, Access Door, w/H20 Wheel Loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.)	EA	1	\$4,770.00	\$4,770.00
36	30"x48" Watertight (floodtight/gastight) Angle Frame, Single Cover, Access Door, w/H20 Wheel Loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.)	EA	1	\$5,670.00	\$5,670.00
37	36"x36" Watertight (floodtight/gastight) Angle Frame, Single Cover, Access Door, w/H20 Wheel Loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.)	EA	1	\$5,640.00	\$5,640.00
38	36"x48" Watertight (floodtight/gastight) Angle Frame, Single Cover, Access Door, w/H20 Wheel Loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.)	EA	1	\$6,260.00	\$6,260.00

39	36"x60"Watertight (floodtight/gastight) Angle Frame, Single Cover, Access Door, w/H20 Wheel Loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.)	EA	1	\$7,680.00	\$7,680.00
40	48"x54"Watertight (floodtight/gastight) Angle Frame, Single Cover, Access Door, w/H20 Wheel Loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.)	EA	1	\$8,200.00	\$8,200.00
41	48"x72" Watertight (floodtight/gastight) Angle Frame, Single Cover, Access Door, w/H20 Wheel Loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.)	EA	1	\$10,000.00	\$10,000.00
42	60"x60" Watertight (floodtight/gastight) Angle Frame, Single Cover, Access Door, w/H20 Wheel Loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.)	EA	1	\$11,430.00	\$11,430.00
43	Grouting	GAL	100	\$130.00	\$13,000.00
44	High Pressure Injection Grouting	GAL	100	\$240.00	\$24,000.00
45	Concrete Top Slab for Valve Vault and/or Wetwell (6" thick) w/Rebar at 6" O.C.E.W.	CY	10	\$4,310.00	\$43,100.00
46	Concrete Top Slab for Valve Vault and/or Wetwell (8" thick) w/Rebar at 6" O.C.E.W.	CY	10	\$3,860.00	\$38,600.00
47	Concrete Top Slab in High Traffic Area for Valve Vault and/or Wetwell (12" thick) w/ Double Mat Rebar at 6" O.C.E.W.	CY	5	\$3,580.00	\$17,900.00
48	Furnish and Install 4" EZ Vent TM BioVent Package with 12" BioVent Cartridge (4"BVC412F)	EA	4	\$2,690.00	\$10,760.00
49	Furnish and Install 6" EZ Vent TM BioVent Package with 12" BioVent Cartridge (6"BVC612F)	EA	4	\$3,550.00	\$14,200.00
50	Remove Existing Concrete Fillet in 4' Diameter Wetwell	EA	1	\$1,670.00	\$1,670.00
51	Remove Existing Concrete Fillet in 6' Diameter Wetwell	EA	2	\$2,410.00	\$4,820.00
52	Remove Existing Concrete Fillet in 8' Diameter Wetwell	EA	2	\$3,140.00	\$6,280.00
53	Remove Existing Concrete Fillet in 10' Diameter Wetwell	EA	1	\$3,880.00	\$3,880.00
54	Remove Existing Concrete Fillet in 12' Diameter Wetwell	EA	1	\$4,230.00	\$4,230.00
55	Construct New Concrete Fillet in 4' Diameter Wetwell	EA	1	\$2,030.00	\$2,030.00
56	Construct New Concrete Fillet in 6' Diameter Wetwell	EA	2	\$2,530.00	\$5,060.00

57	Construct New Concrete Fillet in 8' Diameter Wetwell	EA	2	\$3,160.00	\$6,320.00
58	Construct New Concrete Fillet in 10' Diameter Wetwell	EA	1	\$3,510.00	\$3,510.00
59	Construct New Concrete Fillet in 12' Diameter Wetwell	EA	1	\$4,290.00	\$4,290.00
60	4" Underground DeZurik Plug Valve (restrained joint)	EA	8	\$3,250.00	\$26,000.00
61	6" Underground DeZurik Plug Valve (restrained joint)	EA	6	\$3,890.00	\$23,340.00
62	8" Underground DeZurik Plug Valve (restrained joint)	EA	2	\$6,000.00	\$12,000.00
63	10" Underground DeZurik Plug Valve (restrained joint)	EA	2	\$7,170.00	\$14,340.00
64	12" Underground DeZurik Plug Valve (restrained joint)	EA	2	\$9,690.00	\$19,380.00
65	4" Flanged DeZurik Plug Valve	EA	40	\$1,720.00	\$68,800.00
66	6" Flanged DeZurik Plug Valve	EA	26	\$2,440.00	\$63,440.00
67	8" Flanged DeZurik Plug Valve	EA	10	\$4,060.00	\$40,600.00
68	10" Flanged DeZurik Plug Valve	EA	6	\$5,680.00	\$34,080.00
69	4" Kennedy Check Valves (lever & weight)	EA	12	\$1,900.00	\$22,800.00
70	6" Kennedy Check Valves (lever & weight)	EA	6	\$2,510.00	\$15,060.00
71	8" Kennedy Check Valves (lever & weight)	EA	4	\$3,780.00	\$15,120.00
72	10" Kennedy Check Valves (lever & weight)	EA	2	\$4,950.00	\$9,900.00
73	DIP Fittings - This bid item includes all flanged and mechanical joint fittings 4" to 24" that are not called out in other bid items(epoxy lined)	TON	5	\$21,200.00	\$106,000.00
74	Epoxy coated 4" Ductile Iron Pipe (includes flanged piping inside wetwells, fittings and removal of existing pipe in wetwell)	LF	200	\$370.00	\$74,000.00
75	Epoxy coated 6" Ductile Iron Pipe (includes flanged piping inside wetwells, fittings and removal of existing pipe in wetwell)	LF	150	\$440.00	\$66,000.00
76	Epoxy coated 8" Ductile Iron Pipe (includes flanged piping inside wetwells, fittings and removal of existing pipe in wetwell)	LF	100	\$650.00	\$65,000.00
77	Epoxy coated 10" Ductile Iron Pipe (includes flanged piping inside wetwells, fittings and removal of existing pipe in wetwell)	LF	25	\$1,230.00	\$30,750.00
78	4" HDPE Pipe (includes fittings and removal of existing pipe in wetwell) (including bracing)	LF	300	\$160.00	\$48,000.00
79	6" HDPE Pipe (includes fittings and removal of existing pipe in wetwell) (including bracing)	LF 12	250	\$200.00	\$50,000.00

80	8" HDPE Pipe (includes fittings and removal of existing pipe in wetwell) (including bracing)	LF	125	\$280.00	\$35,000.00
81	10" HDPE Pipe (Includes fittings and removal of existing pipe in wetwell) (including bracing)	LF	55	\$390.00	\$21,450.00
82	Epoxy Coated 12" Ductile Iron Pipe (for minor FM connections or repairs; includes fittings)	LF	50	\$410.00	\$20,500.00
83	Epoxy Coated 14" Ductile Iron Pipe (for minor FM connections or repairs; includes fittings)	LF	25	\$540.00	\$13,500.00
84	Epoxy Coated 16" Ductile Iron Pipe (for minor FM connections or repairs; includes fittings)	LF	25	\$650.00	\$16,250.00
85	Epoxy Coated 18" Ductile Iron Pipe (for minor FM connections or repairs; includes fittings)	LF	25	\$760.00	\$19,000.00
86	Epoxy Coated 20" Ductile Iron Pipe (for minor FM connections or repairs; includes fittings)	LF	25	\$860.00	\$21,500.00
87	Epoxy Coated 24" Ductile Iron Pipe (for minor FM connections or repairs; includes fittings)	LF	25	\$1,170.00	\$29,250.00
88	Core Drill Into Existing Wetwell for 4" to 6" Ductile Iron Pipe	EA	40	\$830.00	\$33,200.00
89	Core Drill Into Existing Wetwell for 8" to 10" Ductile Iron Pipe	EA	8	\$1,270.00	\$10,160.00
90	Install City Furnished Pumps & Base Elbows for 4" Sewage Pumps	EA	18	\$1,130.00	\$20,340.00
91	Install City Furnished Pumps & Base Elbows for 6" Sewage Pumps	EA	10	\$1,130.00	\$11,300.00
92	Install City Furnished Pumps & Base Elbows for 8" Sewage Pumps	EA	4	\$1,630.00	\$6,520.00
93	Install City Furnished Pumps & Base Elbows for 10" Sewage Pumps	EA	4	\$1,630.00	\$6,520.00
94	Surface Prep and Coat the Interior Well Surface Per Coating for 6' Diameter Wetwell	LF	50	\$590.00	\$29,500.00
95	Surface Prep and Coat the Interior Well Surface Per Coating for 8' Diameter Wetwell	LF	50	\$660.00	\$33,000.00
96	Surface Prep and Coat the Interior Well Surface Per Coating for 10' Diameter Wetwell	LF	25	\$690.00	\$17,250.00
97	Surface Prep and Coat the Interior Well Surface Per Coating for 12' Diameter Wetwell	LF	25	\$760.00	\$19,000.00
98	Surface Prep and Coat the Interior Well Surface Per Coating for 6' Diameter Wetwell (GML System)	LF	50	\$1,050.00	\$52,500.00

99	Surface Prep and Coat the Interior Well Surface Per Coating for 8' Diameter Wetwell (GML System)	LF	50	\$1,400.00	\$70,000.00
100	Surface Prep and Coat the Interior Well Surface Per Coating for 10' Diameter Wetwell (GML System)	LF	25	\$1,760.00	\$44,000.00
101	Surface Prep and Coat the Interior Well Surface Per Coating for 12' Diameter Wetwell (GML System)	LF	25	\$2,110.00	\$52,750.00
102	Remove Existing Wetwell Coating	EA	5	\$6,050.00	\$30,250.00
103	Remove & Dispose Existing Valves, Piping, Sump Pump, and Miscellaneous Equipment From Valve Vault (Unless Notified Otherwise by the City)	LS	15	\$2,860.00	\$42,900.00
104	Remove & Dispose Existing Valves, Piping, Sump Pump, and Miscellaneous Equipment From Wet Well (Unless Notified Otherwise by the City)	LS	15	\$3,020.00	\$45,300.00
105	2" PVC Drain Line From Valve Vault to Wetwell and 2" Tideflex Check Valve, Including Core Drill of Existing Wetwell (per City detail)	EA	1	\$1,560.00	\$1,560.00
106	Pre-Fabricated Concrete Valve Vault with Bottom Slab (size:48"x48")	EA	1	\$8,850.00	\$8,850.00
107	Pre-Fabricated Concrete Valve Vault with Bottom Slab (size:58"x60")	EA	1	\$10,750.00	\$10,750.00
108	Pre-Fabricated Concrete Valve Vault with Bottom Slab (size:60"x84")	EA	1	\$12,070.00	\$12,070.00
109	Pre-Fabricated Concrete Valve Vault with Bottom Slab (size:72"x72")	EA	1	\$12,110.00	\$12,110.00
110	Cast-in-Place Concrete Valve Vault with Bottom Slab (size:48"x48")	EA	2	\$16,240.00	\$32,480.00
111	Cast-in-Place Concrete Valve Vault with Bottom Slab (size:58"x60")	EA	1	\$18,930.00	\$18,930.00
112	Cast-in-Place Concrete Valve Vault with Bottom Slab (size:60"x84")	EA	1	\$19,150.00	\$19,150.00
113	Cast-in-Place Concrete Valve Vault with Bottom Slab (size:72"x72")	EA	1	\$20,630.00	\$20,630.00
114	4" DIP Piping and Fittings, Pressure Gauges (Oil Filled), and Camlok Fitting w/dust Cover Inside Valve Vault or Above Ground Manifold Piping, Per City Details (duplex)	EA	10	\$17,620.00	\$176,200.00
115	6" DIP Piping and Fittings, Pressure Gauges (Oil Filled), and Camlok Fitting w/dust Cover Inside Valve Vault or Above Ground Manifold Piping, Per City Details (duplex)	EA	10	\$17,940.00	\$179,400.00

116	8" DIP Piping and Fittings, Pressure Gauges (Oil Filled), and Bauer Fitting w/dust Cover Inside Valve Vault or Above Ground Manifold Piping Per City Details (duplex)	EA	3	\$29,580.00	\$88,740.00
117	10" DIP Piping and Fittings, Pressure Gauges (Oil Filled), and Bauer Fitting w/dust Cover Inside Valve Vault or Above Ground Manifold Piping, Per City Details (duplex)	EA	1	\$41,170.00	\$41,170.00
118	6" DIP Piping and Fittings, Pressure Gauges (Oil Filled), and Camlock Fitting w/dust Cover Inside Valve Vault or Above Ground Manifold Piping, Per City Details (triplex)	EA	1	\$25,720.00	\$25,720.00
119	8" DIP Piping and Fittings, Pressure Gauges (Oil Filled), and Bauer Fitting w/dust Cover Inside Valve Vault or Above Ground Manifold Piping, Per City Details (triplex)	EA	1	\$39,210.00	\$39,210.00
120	Demolish existing can 4' below grade and cut a hole in the floor	EA	2	\$2,190.00	\$4,380.00
121	Install City provided Guide Rails Systems and Upper guide brackets(per pump) & Remove Existing Systems	EA	30	\$1,130.00	\$33,900.00
122	Furnish and Install SS Float and Cable Rack per pump	EA	30	\$480.00	\$14,400.00
123	Furnish and Install Pump Base Anchor Plate per the City Detail (size varies)	EA	30	\$2,190.00	\$65,700.00
124	Furnish and Install SS Anchor Plate and footer step for pump bases	EA	2	\$3,620.00	\$7,240.00
125	Furnish and Install new wetwell floor (6" height) and include bench wall	EA	1	\$6,220.00	\$6,220.00
126	Furnish Install new wetwell floor (8" height) and include bench wall	EA	1	\$6,300.00	\$6,300.00
127	Provide Start-Up Services for the Lift Station	EA	15	\$5,460.00	\$81,900.00
ELECTRICAL/INSTRUMENTATION					
128	Coordinate with FPL as Required to Complete Electrical Work - Pole mounted service	HR	1	\$150.00	\$150.00
129	Coordinate with FPL as Required to Complete Electrical Work - Pad mounted service	HR	1	\$150.00	\$150.00
130	Demo existing equipment Rack	EA	1	\$1,130.00	\$1,130.00
131	Demo meter can	EA	1	\$530.00	\$530.00
132	Demo main disconnect and associated phase monitor	EA	1	\$530.00	\$530.00
133	Demo Lift Station Control Panel	EA	1	\$850.00	\$850.00
134	Demo RTU	EA	1	\$850.00	\$850.00
135	Demo termination box and fittings	EA	1	\$530.00	\$530.00
136	Demo antenna and cable	EA	1	\$350.00	\$350.00
137	Demo antenna mast and footer	EA 12	1	\$850.00	\$850.00

138	Furnish and install complete electrical equipment rack	EA	1	\$5,270.00	\$5,270.00
139	Furnish and install meter can	EA	1	\$1,880.00	\$1,880.00
140	Furnish and install main phase monitor assembly	EA	1	\$4,830.00	\$4,830.00
141	Install Owner (City) furnished duplex control panel	EA	1	\$1,290.00	\$1,290.00
142	Install Owner furnished triplex control panel	EA	1	\$1,290.00	\$1,290.00
143	Furnish and install RTU	EA	1	\$31,630.00	\$31,630.00
144	Install Owner furnished RTU	EA	1	\$1,590.00	\$1,590.00
145	Furnish and install 8"x8"x6" explosion proof terminal boxes and fittings	EA	1	\$5,600.00	\$5,600.00
146	Furnish and Install 1" PVC Coated EYSR Fittings with Duct Seal or City approved equal	EA	1	\$1,530.00	\$1,530.00
147	Furnish and Install 2" PVC Coated EYSR Fittings with Duct Seal or City approved equal	EA	1	\$1,950.00	\$1,950.00
148	Furnish and Install 3" PVC Coated EYSR Fittings with Duct Seal or City approved equal	EA	1	\$2,300.00	\$2,300.00
149	Furnish and Install 1" PVC Coated EYS Fittings with Chico Cement	EA	1	\$760.00	\$760.00
150	Furnish and Install 2" PVC Coated EYS Fittings with Chico Cement	EA	1	\$950.00	\$950.00
151	Furnish and Install 3" PVC Coated EYS Fittings with Chico Cement	EA	1	\$1,170.00	\$1,170.00
152	Furnish and Install # 12 AWG - THNN	LF	1	\$4.40	\$4.40
153	Furnish and Install # 10 AWG - THNN	LF	1	\$5.70	\$5.70
154	Furnish and Install # 8 AWG - THNN	LF	1	\$7.40	\$7.40
155	Furnish and Install # 6 AWG - XHHW	LF	1	\$8.20	\$8.20
156	Furnish and Install # 4 AWG - XHHW	LF	1	\$11.20	\$11.20
157	Furnish and Install # 2 AWG - XHHW	LF	1	\$13.40	\$13.40
158	Furnish and Install # 1 AWG - XHHW	LF	1	\$15.50	\$15.50
159	Furnish and Install # 1/0 AWG - XHHW	LF	1	\$17.70	\$17.70
160	Furnish and Install # 2/0 AWG - XHHW	LF	1	\$19.60	\$19.60
161	Furnish and Install # 3/0 AWG - XHHW	LF	1	\$24.10	\$24.10
162	Furnish and Install # 4/0 AWG - XHHW	LF	1	\$27.10	\$27.10
163	Raise existing control panel	EA	1	\$3,950.00	\$3,950.00
164	Furnish and install new overloads - Size 2 starter	EA	1	\$1,690.00	\$1,690.00
165	Furnish and install new overloads - Size 3 starter	EA	1	\$1,690.00	\$1,690.00
166	Furnish and install 4" aluminum posts and SS unistrut for Existing Control Panel	EA	1	\$1,150.00	\$1,150.00

167	Install ground rods, test well and grid per City Detail	EA	1	\$2,860.00	\$2,860.00
168	Remove existing conduit	LF	1	\$7.70	\$7.70
169	Furnish and Install 1" PVC Coated Conduit	LF	1	\$77.00	\$77.00
170	Furnish and Install 1" PVC Schedule 80 Conduit	LF	1	\$32.00	\$32.00
171	Furnish and Install 2" PVC Coated Conduit	LF	1	\$102.00	\$102.00
172	Furnish and Install 2" PVC Schedule 80 Conduit	LF	1	\$41.00	\$41.00
173	Furnish and Install 3" PVC Coated Conduit	LF	1	\$205.00	\$205.00
174	Furnish and Install 3" PVC Schedule 80 Conduit	LF	1	\$67.00	\$67.00
175	Core drill Existing wetwell for conduit (1 core per wetwell for all conduit)	EA	1	\$1,814.00	\$1,814.00
176	Furnish and Install High level float	EA	1	\$730.00	\$730.00
177	Furnish and install Low level float	EA	1	\$730.00	\$730.00
178	Furnish and Install Ultrasonic Level transducer and transmitter	EA	1	\$12,380.00	\$12,380.00
179	Install Owner furnished Ultrasonic Level transducer and transmitter	EA	1	\$510.00	\$510.00
180	Furnish and Install Pressure Level transducer and transmitter	EA	1	\$10,890.00	\$10,890.00
181	Install Owner furnished Pressure Level transducer and transmitter	EA	1	\$510.00	\$510.00
MISCELLANEOUS					
182	Density Tests	EA	15	\$420.00	\$6,300.00
183	Bahia Sod	SF	1500	\$2.35	\$3,525.00
184	Floritam (St. Augustine) Sod	SF	1500	\$2.52	\$3,780.00
ALLOWANCE AND TIME-AND-MATERIALS ITEMS FOR WORK NOT COVERED BY OTHER PAY ITEMS					
185	Tree Removal and Disposal - For As Needed Services. Permits may be needed to remove trees	EA	6	\$2,480.00	\$14,880.00
186	Wellpoint Equipment, 50 Points, Operating	DAY	50	\$630.00	\$31,500.00
187	Set Up Well Point Equipment and Remove After Dewatering Operation is Finished, 50 Points, Complete	EA	5	\$8,640.00	\$43,200.00
188	Supervisor	HR	40	\$90.00	\$3,600.00
189	Foreman	HR	80	\$84.00	\$6,720.00
190	Pipe Layer	HR	80	\$42.00	\$3,360.00
191	Laborer	HR	80	\$36.00	\$2,880.00

192	Electrician - Entry Level Hourly rate	HR	80	\$40.00	\$3,200.00
193	Electrician - Journeyman Hourly rate	HR	80	\$48.00	\$3,840.00
194	Electrician - Master Electrician Hourly rate	HR	80	\$90.00	\$7,200.00
195	Integrator - Hourly Rate	HR	50	\$190.00	\$9,500.00
196	Single Axle Dump Truck, with Operator	HR	25	\$80.00	\$2,000.00
197	Double Axle Dump Truck, with Operator	HR	25	\$90.00	\$2,250.00
198	Crane Truck with Lifting Capacity Up To 30 Tons, with Operator	HR	80	\$133.00	\$10,640.00
199	Crew Truck	HR	80	\$33.00	\$2,640.00
200	Flatbed Truck, Under 25,000 Pounds (GVW) ,with Operator	HR	25	\$167.00	\$4,175.00
201	3/8-Yard Combination Backhoe, Front End Loader, Ford Model C-40 or Equal, with Operator	HR	80	\$50.00	\$4,000.00
202	Front End Loader, Caterpillar Model 930 or Equal, with Operator	HR	50	\$68.00	\$3,400.00
203	Excavator, Caterpillar Model 225 or Equal, with Operator	HR	50	\$177.00	\$8,850.00
204	Furnish and install 230 Volt 100 Amp Fused Disconnect	EA	1	\$3,640.00	\$3,640.00
205	Furnish and install 230 Volt 200 Amp Fused Disconnect	EA	1	\$5,620.00	\$5,620.00
206	Furnish and install 230 Volt 300 Amp Fused Disconnect	EA	1	\$9,010.00	\$9,010.00
207	Furnish and install 230 Volt 400 Amp Fused Disconnect	EA	1	\$12,080.00	\$12,080.00
208	Furnish and install 460 Volt 100 Amp Fused Disconnect	EA	1	\$4,070.00	\$4,070.00
209	Furnish and install 460 Volt 200 Amp Fused Disconnect	EA	1	\$6,090.00	\$6,090.00
210	Furnish and install 460 Volt 300 Amp Fused Disconnect	EA	1	\$10,030.00	\$10,030.00
211	Furnish and install 460 Volt 400 Amp Fused Disconnect	EA	1	\$12,430.00	\$12,430.00
212	Power Distribution Block	EA	1	\$1,000.00	\$1,000.00
213	Furnish & Install 8" Drop Bowl with pipe	EA	6	\$2,630.00	\$15,780.00
214	Furnish & Install 12" Drop Bowl with pipe	EA	6	\$4,170.00	\$25,020.00
215	Furnish & Install 16" Drop Bowl with pipe	EA	3	\$5,440.00	\$16,320.00
216	Furnish & Install 18" Drop Bowl with pipe	EA	1	\$7,420.00	\$7,420.00
217	Remove existing drop piping or baffling	EA	3	\$1,040.00	\$3,120.00
218	Fencing per City Detail	LF	500	\$150.00	\$75,000.00
219	Air Release Valve and piping back to wet well	EA	10	\$6,500.00	\$65,000.00

220	Relocate existing electrical panel, include wiring as needed and distances	EA	10	\$7,540.00	\$75,400.00
221	Provide 6" Suction Pipe and Fittings for Emergency Pump Out	LF	150	\$470.00	\$70,500.00
222	Provide 8" Suction Pipe and Fittings for Emergency Pump Out	LF	150	\$570.00	\$85,500.00
223	Core holes all sizes up to 24" (not included in other bid items)	EA	8	\$2,110.00	\$16,880.00
224	Epoxy paint all piping, including manifold	SF	4500	\$5.60	\$25,200.00
225	Provide Vector Services as needed (tie-ins and wet-well cleaning)	HR	80	\$370.00	\$29,600.00
226	Furnish and install line 4" Line Stop	EA	2	\$6,330.00	\$12,660.00
227	Furnish and install line 6" Line Stop	EA	2	\$7,240.00	\$14,480.00
228	Furnish and install line 8" Line Stop	EA	2	\$8,520.00	\$17,040.00
229	Furnish and install line 10" Line Stop	EA	2	\$10,940.00	\$21,880.00
230	Furnish and install line 12" Line Stop	EA	2	\$12,430.00	\$24,860.00
231	Furnish and install pressure gauge on discharge side of valves	EA	15	\$1,740.00	\$26,100.00
232	Replace 4" DIP (epoxy lined) piping between wet well and vault	LF	16	\$970.00	\$15,520.00
233	Replace 6" DIP (epoxy lined) piping between wet well and vault	LF	16	\$1,040.00	\$16,640.00
234	Replace 8" DIP (epoxy lined) piping between wet well and vault	LF	8	\$1,790.00	\$14,320.00
235	Replace 10" DIP (epoxy lined) piping between wet well and vault	LF	6	\$2,820.00	\$16,920.00
236	Replace 12" DIP (epoxy lined) piping between wet well and vault	LF	6	\$3,080.00	\$18,480.00
237	Furnish and install Control Panel - Duplex (≤ 7.5 HP) 240V/3 phase	EA	1	\$46,650.00	\$46,650.00
238	Furnish and install Control Panel - Duplex (> 7.5 HP ≤ 15 HP) 240V/3 phase	EA	1	\$47,410.00	\$47,410.00
239	Furnish and install Control Panel - Duplex (> 15 HP ≤ 30 HP) 240V/3 phase	EA	1	\$51,010.00	\$51,010.00
240	Furnish and install Control Panel - Duplex (> 30 HP ≤ 50 HP) 240V/3 phase	EA	1	\$57,410.00	\$57,410.00
241	Furnish and install Control Panel - Duplex (> 50 HP ≤ 75 HP) 240V/3 phase	EA	1	\$58,590.00	\$58,590.00
242	Furnish and install Control Panel - Duplex (≤ 7.5 HP) 480V/3 phase	EA	1	\$48,790.00	\$48,790.00
243	Furnish and install Control Panel - Duplex (> 7.5 HP ≤ 15 HP) 480V/3 phase	EA	1	\$49,340.00	\$49,340.00
244	Furnish and install Control Panel - Duplex (> 15 HP ≤ 30 HP) 480V/3 phase	EA	1	\$50,320.00	\$50,320.00

TOTAL BID FOR SCHEDULE "A" WRITTEN AMOUNT

12 of 12

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

SCHEDULE "C"
CITY OF SUNRISE

BIDDER'S DRUG - FREE WORKPLACE CERTIFICATION

Preference may be given to Vendors submitting a certification with their bid/Bid certifying they have a drug-free workplace in accordance with Section 287.087, Florida Statutes. This requirement affects all public entities of the State and becomes effective January 1, 1991. The special condition is as follows:

IDENTICAL SUBMISSIONS - Preference may be given to businesses with drug-free workplace programs. Whenever two or more bids, Bids or replies which are equal with respect to price, quality, and service are received by the State or by any political subdivision for the procurement of commodities or Contractual services, a bid received from a business that certifies that it has implemented a drug-free workplace program shall be given preference in the award process. Established procedures for processing tie bids will be followed if none of the tied Vendors have a drug-free workplace program. In order to have a drug-free workplace program, a business shall:

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or Contractual services that are under bid a copy of the statement specified in subsection (1).
4. In the statement specified in subsection (1), notify the employees that, as a condition of working on the commodities or Contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.
5. Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.
6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section. As the person authorized to sign the statement, I certify that this Vendor complies fully with the above requirements.

I hereby certify that the company submitting this Bid has established a Drug Free work place program in accordance with State Statute 287.087



VENDOR'S SIGNATURE

Intercounty Engineering, Inc.

COMPANY'S NAME
SCHEDULE "D"
CITY OF SUNRISE

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

BIDDER'S QUALIFICATION STATEMENT

The undersigned certifies under oath the truth and correctness of all statements and all answers to questions made hereinafter:

Company

Name: Intercounty Engineering, Inc.

Address:

1925 NW 18 StreetPompano BeachFL33069

Street

City

State

Zip Code

Telephone: (954) 972-9800Fax: (954) 974-0042

E-

Mail: smcdougle@intercountyengineering.comWeb Site: www.randallconstruction.comHow many years has your organization been in business under its present name? 28 years Yes

If Bidder is operating under Fictitious Name, submit evidence of compliance with Florida Fictitious Name Statute:

N/A

Under what former names has your business operated? :

N/A

At what address was that business located?

N/AAre You Certified? Yes X No _____ If Yes, ATTACH COPY OF LICENSEAre You Licensed? Yes X No _____ If Yes, ATTACH COPY OF LICENSE

Has your company or its senior officers ever declared bankruptcy?

Yes _____ No X If yes, explain:

Are you a sales representative, _____ distributor, _____ broker, _____ manufacturer _____ of the commodities/services bid upon? _____ Contractor

Have you ever received a Contract or a Purchase Order from the City of Sunrise or other government entity? Yes X No _____ If Yes, explain (date, service/project, bid title, etc.) _____

5071-SG, C20-42-04, C21-15-02, 2022000225

Have you ever received a complaint on a Contract or bid awarded to you by any government entity?

Yes _____ No X if yes, explain:

Have you ever been debarred or suspended from doing business with any government entity?

Yes _____ No X If Yes,

explain _____

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

Please identify each incident within the last five (5) years where a civil, criminal, administrative, other similar proceeding was filed or is pending; if such proceeding arises from or is a dispute concerning the Consultant's rights, remedies or duties under a Contract for the same or similar type services to be provided under this Bid:

N/A

(Attach additional sheets as necessary)

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

SCHEDULE "D"
(Continued)
REFERENCES:

List all pertinent government agencies and private firm(s) with whom you have done business within the past three (3) years:

Agency/Firm Name: City of Hollywood
Address: 1621 N. 14 Avenue

City/State/Zip Code: Hollywood, FL 33022
Phone: (954) 921-3930

Fax: _____
Contact: Feng (Jeff) Jiang P.E.
E-Mail: fjiang@hollywoodfl.org

Agency/Firm Name: City of Sunrise
Address: 777 Sawgrass Corporate Parkway

City/State/Zip Code: Sunrise, FL 33351
Phone: (954) 888-6017

Fax: _____
Contact: Fernando Pleitez, P.E.
E-Mail: fpleitez@sunrisefl.gov

Agency/Firm Name: City of Boca Raton
Address: 1401 Glades Road

City/State/Zip Code: Boca Raton, FL 33431
Phone: (561) 338-7329

Fax: _____
Contact: Todd Kiernan
E-Mail: tkiernan@ci.boca-raton.fl.us

Agency/Firm Name: City of Hollywood Utilities
Address: 1621 N. 14 Avenue

City/State/Zip Code: Hollywood, FL 33022
Phone: (954) 921-3930

Fax: _____
Contact: Coy Mathis
E-Mail: cmathis@hollywoodfl.org

Agency/Firm Name: City of Port Orange
Address: 1000 City Center Circle

City/State/Zip Code: Port Orange, FL 32129
Phone: (386) 506-5575

Fax: _____
Contact: Lynn Stevens
E-Mail: lstevens@port-orange.org

Agency/Firm Name: City of Boynton Beach
Address: 124 E Woolbright Road

City/State/Zip Code: Boynton Beach, FL 33435
Phone: (561) 742-6437

Fax: _____
Contact: Juan Cuesta
E-Mail: cuestaj@bbfl.us

YOUR COMPANY NAME Intercounty Engineering, Inc.
ADDRESS 1925 NW 18 Street, Pompano Beach, FL 33069

PHONE: (954) 972-9800 **FAX:** (954) 974-0042
EMAIL: smcdougale@intercountyengineering.com

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

SCHEDULE "E"

CITY OF SUNRISE

WARRANTY INFORMATION FORM

ALL BLANKS SHOULD BE FILLED IN AND SUBMITTED WITH BID
MINIMUM WARRANTY SHALL BE AS SPECIFIED HEREIN

MAKE AND MODEL OF ITEM PROPOSED:

Electrical Components & Instrumentation - tbd Submittal approval will be required by City.

DOES WARRANTY APPLY TO ENTIRE PACKAGE OR ONLY TO SPECIFIC PARTS? (State Explicitly)

Electrical Components & Instrumentation will apply to entire package.

DOES WARRANTY INCLUDE LABOR FOR REPLACEMENT OF DEFECTIVE PARTS?

☒ YES ☐ NO

WARRANTY PERIOD FOR PARTS REPLACEMENT One (1) year

WHO WILL PROVIDE LABOR, AND WHERE, IN THE EVENT OF FAILURE WITHIN WARRANTY PERIOD? All labor will be self-performed by Intercounty Engineering, Inc.

Electrical Labor by subcontractor and I&C by vendor.

TELEPHONE: (954) 325-7948 Luis Cordova FAX: _____

EMAIL: lfcordova@intercountyengineering.com

NEAREST SOURCE TO THE CITY OF SUNRISE FOR PARTS AND SERVICE AFTER WARRANTY PERIOD:

Intercounty Engineering, Electrical and I&C (tbd)

TELEPHONE: (954) 325-7948 FAX: _____

EMAIL: lfcordova@intercountyengineering.com

A COPY OF COMPLETE WARRANTY STATEMENT IS SUBMITTED HEREWITH:

☐ YES ☒ NO

NAME OF BIDDER: Intercounty Engineering, Inc.

SIGNATURE AND TITLE:

Stephen Polk, Vice President

TELEPHONE: (954) 972-9800 FAX: _____

DATE: 07/13/22

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

SCHEDULE "F"
CITY OF SUNRISE

PROOF OF INSURANCE, REQUIRED LICENSES AND CERTIFICATIONS

ATTENTION BIDDER:

ATTACH TO SCHEDULE "F":

1. PROOF OF INSURANCE AS SPECIFIED HEREIN
2. COPIES OF LICENSES, IF APPLICABLE
3. IRS FORM W-9
4. Proof firm is registered with the E-Verify system.

NOTE: Only the successful Bidder shall be required to provide a Certificate of Insurance naming the City of Sunrise as additional insured.



RANDMEC-02

SE05BSANDERS

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

2/28/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER License # L077730 AssuredPartners of Florida, Tampa 4600 West Cypress Street #550 Tampa, FL 33607	CONTACT NAME: Brittany Sanders, CLCS PHONE (A/C, No, Ext): (813) 424-3291 FAX (A/C, No): E-MAIL ADDRESS: Brittany.Sanders@assuredpartners.com												
INSURER(S) AFFORDING COVERAGE													
INSURED Intercounty Engineering, Inc. 1925 NW 18 Street Pompano Beach, FL 33069	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">INSURER A : National Union Fire Insurance</td> <td style="width: 20%; text-align: center;">19445</td> </tr> <tr> <td>INSURER B : The Continental Insurance Company</td> <td style="text-align: center;">35289</td> </tr> <tr> <td>INSURER C : New Hampshire Insurance Co</td> <td style="text-align: center;">23841</td> </tr> <tr> <td>INSURER D : AXIS Specialty Insurance Company</td> <td style="text-align: center;">15610</td> </tr> <tr> <td>INSURER E : Westchester Surplus Lines Insurance Company</td> <td style="text-align: center;">10172</td> </tr> <tr> <td colspan="2">INSURER F :</td> </tr> </table>	INSURER A : National Union Fire Insurance	19445	INSURER B : The Continental Insurance Company	35289	INSURER C : New Hampshire Insurance Co	23841	INSURER D : AXIS Specialty Insurance Company	15610	INSURER E : Westchester Surplus Lines Insurance Company	10172	INSURER F :	
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INSURER F :													

COVERAGES**CERTIFICATE NUMBER:****REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☒ POLICY ☒ PROJECT ☐ LOC OTHER:			GL4693519	3/1/2022	3/1/2023	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 300,000 MED EXP (Any one person) \$ 25,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000 EBL \$ 1,000,000
A	AUTOMOBILE LIABILITY ☒ ANY AUTO OWNED AUTOS ONLY ☐ SCHEDULED AUTOS ☒ HIRED AUTOS ONLY ☒ NON-OWNED AUTOS ONLY			BA5425646	3/1/2022	3/1/2023	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
B	☒ UMBRELLA LIAB ☒ OCCUR ☐ EXCESS LIAB ☐ CLAIMS-MADE DED ☒ RETENTION \$ 10,000			6080572968	3/1/2022	3/1/2023	EACH OCCURRENCE \$ 9,000,000 AGGREGATE \$ 9,000,000 \$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) ☒ Y ☐ N If yes, describe under DESCRIPTION OF OPERATIONS below		N/A	WC15853218	3/1/2022	3/1/2023	☒ PER STATUTE ☐ OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
D	Excess Liability			P-001-000530681-02	3/1/2022	3/1/2023	1,000,000
E	Pollution Liability			G71549951 003	10/15/2021	10/15/2022	2,000,000 Occurrence 2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

RE: Springtree WWTP PSW & GBT Pump Improvements Contract C 21-15-02-CM

City of Sunrise is additional insured for general liability per blanket form (attached) if required by written contract and subject to policy terms conditions, and exclusions. Waiver of subrogation for general liability per blanket form (attached) if required by written contract and subject to policy terms, conditions, and exclusions. Umbrella Follows form subject to policy terms, conditions, and exclusions.

CERTIFICATE HOLDER**CANCELLATION**

City of Sunrise Risk Management Division Attn: Risk Manager 10770 W. Oakland Park Blvd, 3rd Floor Sunrise, FL 33351	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE



ADDITIONAL REMARKS SCHEDULE

Page 1 of 1

AGENCY AssuredPartners of Florida, Tampa		License # L077730	NAMED INSURED Intercounty Engineering, Inc. 1925 NW 18 Street Pompano Beach, FL 33069
POLICY NUMBER SEE PAGE 1			
CARRIER SEE PAGE 1	NAIC CODE SEE P 1	EFFECTIVE DATE: SEE PAGE 1	

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: ACORD 25 FORM TITLE: Certificate of Liability Insurance

Coverages Continued:

INLAND MARINE Policy #6080755612 // Carrier: The Continental Insurance Company // Eff: 03/01/22-03/01/23 // Leased and Rented Equipment: \$1,000,000 Limit, \$5,000 Deductible // Property in Temporary Storage: \$350,000 Limit

*Waiver of subrogation for general liability, auto liability and workers compensation per blanket form (attached) if required by written contract and subject to policy terms, conditions, and exclusions.

* Certificate Holder listed above is additional insured for general liability including ongoing and products and completed operations on a primary and noncontributory basis per blanket form (attached) if required by written contract and subject to policy terms, conditions, and exclusions.

ENDORSEMENT

This endorsement, effective 12:01 A.M. 03/01/2022 forms a part of

policy No. 5425646 issued to

by NATIONAL UNION FIRE INSURANCE COMPANY OF PITTSBURGH, PA

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM

Section IV - Business Auto Conditions, A. - Loss Conditions, 5. - Transfer of Rights of Recovery Against Others to Us, is amended to add:

However, we will waive any right of recover we have against any person or organization with whom you have entered into a contract or agreement because of payments we make under this Coverage Form arising out of an "accident" or "loss" if:

- (1) The "accident" or "loss" is due to operations undertaken in accordance with the contract existing between you and such person or organization; and
- (2) The contract or agreement was entered into prior to any "accident" or "loss".

No waiver of the right of recovery will directly or indirectly apply to your employees or employees of the person or organization, and we reserve our rights or lien to be reimbursed from any recovery funds obtained by any injured employee.



AUTHORIZED REPRESENTATIVE

WAIVER OF OUR RIGHT TO RECOVER FROM OTHERS ENDORSEMENT

This endorsement changes the policy to which it is attached effective on inception date of the policy unless a different date is indicated below.

This endorsement, effective 12:01 AM 03/01/2022

forms a part of Policy No. WC 015-85-3218

Issued to

By NEW HAMPSHIRE INSURANCE COMPANY

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule. This agreement applies only to the extent that you perform work under a written contract that requires you to obtain this agreement from us.

This agreement shall not operate directly or indirectly to benefit any one not named in the Schedule.

Schedule

ANY PERSON OR ORGANIZATION TO WHOM YOU BECOME
OBLIGATED TO WAIVE YOUR RIGHTS OF RECOVERY
AGAINST, UNDER ANY WRITTEN CONTRACT OR AGREEMENT
YOU ENTER INTO PRIOR TO THE OCCURRENCE OF LOSS.

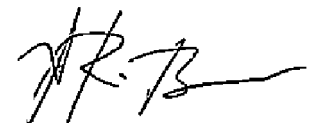
This form is not applicable in Kansas for private construction contracts as defined in K.S.A. 16-1801 through K.S.A. 16-1807 or public construction contracts as defined in K.S.A. 16-1901 through 16-1908, except where permitted by statute or other applicable law, such as for use in wrap-up insurance programs.

Any person or organization for which the employer has agreed by written contract, executed prior to loss, may execute a waiver of subrogation. However, for purposes of work performed by the employer in Missouri, this waiver of subrogation does not apply to any construction group of classifications as designated by the waiver of right to recover from others (subrogation) rule in our manual.

This form is not applicable in California, Kentucky, New Hampshire, New Jersey, Texas, or Utah.

WC 00 03 13
(Ed. 04/84)

Countersigned by



Authorized Representative

POLICY NUMBER: 4693519

COMMERCIAL GENERAL LIABILITY
CG 20 01 04 13

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

PRIMARY AND NONCONTRIBUTORY – OTHER INSURANCE CONDITION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

The following is added to the **Other Insurance** Condition and supersedes any provision to the contrary:

Primary And Noncontributory Insurance

This insurance is primary to and will not seek contribution from any other insurance available to an additional insured under your policy provided that:

- (1)** The additional insured is a Named Insured under such other insurance; and

- (2)** You have agreed in writing in a contract or agreement that this insurance would be primary and would not seek contribution from any other insurance available to the additional insured.

POLICY NUMBER: **4693519**

COMMERCIAL GENERAL LIABILITY
CG 24 04 05 09

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

SCHEDULE

Name Of Person Or Organization:

PURSUANT TO APPLICABLE WRITTEN CONTRACT OR AGREEMENT YOU ENTER INTO.

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

The following is added to Paragraph **8. Transfer Of Rights Of Recovery Against Others To Us** of **Section IV – Conditions**:

We waive any right of recovery we may have against the person or organization shown in the Schedule above because of payments we make for injury or damage arising out of your ongoing operations or "your work" done under a contract with that person or organization and included in the "products-completed operations hazard". This waiver applies only to the person or organization shown in the Schedule above.

POLICY NUMBER: 4693519

COMMERCIAL GENERAL LIABILITY
CG 20 10 04 13**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.****ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – SCHEDULED PERSON OR
ORGANIZATION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s)	Location(s) Of Covered Operations
Any person or organization whom you become obligated to include as additional insured as a result of any contract or agreement you have entered into.	By contract or agreement you have entered into
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured(s) at the location(s) designated above.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to "bodily injury" or "property damage" occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
2. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

- C. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or

2. Available under the applicable Limits of Insurance shown in the Declarations;
whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

POLICY NUMBER: 4693519

COMMERCIAL GENERAL LIABILITY
CG 20 37 04 13**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.****ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – COMPLETED OPERATIONS**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART**SCHEDULE**

Name Of Additional Insured Person(s) Or Organization(s)	Location And Description Of Completed Operations
Any person or organization whom you become obligated to include as additional insured as a result of any contract or agreement you have entered into.	By contract or agreement you have entered into
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the Schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following is added to Section III – Limits Of Insurance:

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or
2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

ENDORSEMENT

This endorsement, effective 12:01 A.M. 03/01/2022 forms a part of

policy No. 5425646 issued to

by NATIONAL UNION FIRE INSURANCE COMPANY OF PITTSBURGH, PA

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

INSURANCE PRIMARY AS TO CERTAIN ADDITIONAL INSURED

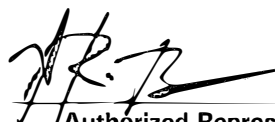
This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM

Section IV - Business Auto Conditions, B., General Conditions, 5., Other Insurance, c., is amended by the addition of the following sentence:

The insurance afforded under this policy to an additional insured will apply as primary insurance for such additional insured where so required under an agreement executed prior to the date of accident. We will not ask any insurer that has issued other insurance to such additional insured to contribute to the settlement of loss arising out of such accident.

All other terms and conditions remain unchanged.



Authorized Representative or
Countersignature (in States Where
Applicable)

ENDORSEMENT

This endorsement, effective 12:01 A.M. 03/01/2022 forms a part of

policy No. 5425646 issued to

by NATIONAL UNION FIRE INSURANCE COMPANY OF PITTSBURGH, PA

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED - WHERE REQUIRED UNDER CONTRACT OR AGREEMENT

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM

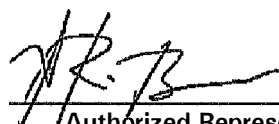
SCHEDULE

ADDITIONAL INSURED:

Any person or organization for whom you are contractually bound to provide Additional Insured status but only to the extent of such person's or organization's liability arising out of the use of a covered "auto".

I. SECTION II - LIABILITY COVERAGE, A. Coverage, 1. - Who Is Insured, is amended to add:

- d. Any person or organization, shown in the schedule above, to whom you become obligated to include as an additional insured under this policy, as a result of any contract or agreement you enter into which requires you to furnish insurance to that person or organization of the type provided by this policy, but only with respect to liability arising out of use of a covered "auto". However, the insurance provided will not exceed the lesser of:
- (1) The coverage and/or limits of this policy, or
 - (2) The coverage and/or limits required by said contract or agreement.



Authorized Representative or
Countersignature (in States Where
Applicable)



Ron DeSantis, Governor

Halsey Beshears, Secretary



STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION

CONSTRUCTION INDUSTRY LICENSING BOARD

THE GENERAL CONTRACTOR HEREIN IS CERTIFIED UNDER THE
PROVISIONS OF CHAPTER 489, FLORIDA STATUTES

POLK, STEPHEN G

INTERCOUNTY ENGINEERING INC.
3307 CLARCONA ROAD
APOPKA FL 32703

LICENSE NUMBER: CGC1528089

EXPIRATION DATE: AUGUST 31, 2022

Always verify licenses online at MyFloridaLicense.com



Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.



Ron DeSantis, Governor

Halsey Beshears, Secretary



STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION

CONSTRUCTION INDUSTRY LICENSING BOARD

THE UNDERGROUND UTILITY & EXCAVATION CO HEREIN IS CERTIFIED UNDER THE
PROVISIONS OF CHAPTER 489, FLORIDA STATUTES

POLK, STEPHEN G

INTERCOUNTY ENGINEERING INC.
3307 CLARCONA ROAD
APOPKA FL 32703

LICENSE NUMBER: CUC1225605

EXPIRATION DATE: AUGUST 31, 2022

Always verify licenses online at MyFloridaLicense.com



Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

▶ Go to www.irs.gov/FormW9 for instructions and the latest information.

Print or type.
See Specific Instructions on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank. INTERCOUNTY ENGINEERING, INC.	
2 Business name/disregarded entity name, if different from above	
3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes. ☐ Individual/sole proprietor or single-member LLC ☒ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate ☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____ Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner. ☐ Other (see instructions) ▶ _____	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ (Applies to accounts maintained outside the U.S.)
5 Address (number, street, and apt. or suite no.) See instructions. 1925 NW 18 STREET	Requester's name and address (optional)
6 City, state, and ZIP code POMPANO BEACH, FL 33069	
7 List account number(s) here (optional)	

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number									
or									
Employer identification number									
6	5		0	4	9	5	3	3	5

Part II Certification

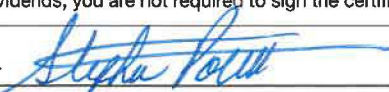
Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here

Signature of U.S. person ▶



Date ▶

01/03/22

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.

Company ID Number: 67641

THE E-VERIFY PROGRAM FOR EMPLOYMENT VERIFICATION

MEMORANDUM OF UNDERSTANDING

ARTICLE I

PURPOSE AND AUTHORITY

This Memorandum of Understanding (MOU) sets forth the points of agreement between the Social Security Administration (SSA), the Department of Homeland Security (DHS) and **Intercounty Engineering, Inc** (Employer) regarding the Employer's participation in the Employment Eligibility Verification Program (E-Verify). E-Verify is a program in which the employment eligibility of all newly hired employees will be confirmed after the Employment Eligibility Verification Form (Form I-9) has been completed.

Authority for the E-Verify program is found in Title IV, Subtitle A, of the Illegal Immigration Reform and Immigrant Responsibility Act of 1996 (IIRIRA), Pub. L. 104-208, 110 Stat. 3009, as amended (8 U.S.C. § 1324a note).

ARTICLE II

FUNCTIONS TO BE PERFORMED

A. RESPONSIBILITIES OF THE SSA

1. Upon completion of the Form I-9 by the employee and the Employer, and provided the Employer complies with the requirements of this MOU, SSA agrees to provide the Employer with available information that allows the Employer to confirm the accuracy of Social Security Numbers provided by all newly hired employees and the employment authorization of U.S. citizens.
2. The SSA agrees to provide to the Employer appropriate assistance with operational problems that may arise during the Employer's participation in the E-Verify program. The SSA agrees to provide the Employer with names, titles, addresses, and telephone numbers of SSA representatives to be contacted during the E-Verify process.
3. The SSA agrees to safeguard the information provided by the Employer through the E-Verify program procedures, and to limit access to such information, as is appropriate by law, to individuals responsible for the verification of Social Security Numbers and for evaluation of the E-Verify program or such other persons or entities who may be authorized by the SSA as governed by the Privacy Act (5 U.S.C. § 552a), the Social Security Act (42 U.S.C. 1306(a)), and SSA regulations (20 CFR Part 401).
4. SSA agrees to establish a means of automated verification that is designed (in conjunction with DHS's automated system if necessary) to provide confirmation or tentative nonconfirmation of U.S. citizens' employment eligibility and accuracy of SSA records for both citizens and aliens within 3 Federal Government work days of the initial inquiry.

Company ID Number: 67641

5. SSA agrees to establish a means of secondary verification (including updating SSA records as may be necessary) for employees who contest SSA tentative nonconfirmations that is designed to provide final confirmation or nonconfirmation of U.S. citizens' employment eligibility and accuracy of SSA records for both citizens and aliens within 10 Federal Government work days of the date of referral to SSA, unless SSA determines that more than 10 days may be necessary. In such cases, SSA will provide additional verification instructions.

B. RESPONSIBILITIES OF THE DEPARTMENT OF HOMELAND SECURITY

1. Upon completion of the Form I-9 by the employee and the Employer and after SSA verifies the accuracy of SSA records for aliens through E-Verify, DHS agrees to provide the Employer access to selected data from DHS's database to enable the Employer to conduct:

- Automated verification checks on newly hired alien employees by electronic means, and
- Photo verification checks (when available) on newly hired alien employees.

2. DHS agrees to provide to the Employer appropriate assistance with operational problems that may arise during the Employer's participation in the E-Verify program. DHS agrees to provide the Employer names, titles, addresses, and telephone numbers of DHS representatives to be contacted during the E-Verify process.

3. DHS agrees to provide to the Employer a manual (the E-Verify Manual) containing instructions on E-Verify policies, procedures and requirements for both SSA and DHS, including restrictions on the use of E-Verify.. DHS agrees to provide training materials on E-Verify.

4. DHS agrees to provide to the Employer a notice, which indicates the Employer's participation in the E-Verify program. DHS also agrees to provide to the Employer anti-discrimination notices issued by the Office of Special Counsel for Immigration-Related Unfair Employment Practices (OSC), Civil Rights Division, and U.S. Department of Justice.

5. DHS agrees to issue the Employer a user identification number and password that permits the Employer to verify information provided by alien employees with DHS's database.

6. DHS agrees to safeguard the information provided to DHS by the Employer, and to limit access to such information to individuals responsible for the verification of alien employment eligibility and for evaluation of the E-Verify program, or to such other persons or entities as may be authorized by applicable law. Information will be used only to verify the accuracy of Social Security Numbers and employment eligibility, to enforce the Immigration and Nationality Act and federal criminal laws, and to ensure accurate wage reports to the SSA.

7. DHS agrees to establish a means of automated verification that is designed (in conjunction with SSA verification procedures) to provide confirmation or tentative nonconfirmation of employees' employment eligibility within 3 Federal Government work days of the initial inquiry.

Company ID Number: 67641

8. DHS agrees to establish a means of secondary verification (including updating DHS records as may be necessary) for employees who contest DHS tentative nonconfirmations and photo non-match tentative nonconfirmations that is designed to provide final confirmation or nonconfirmation of the employees' employment eligibility within 10 Federal Government work days of the date of referral to DHS, unless DHS determines that more than 10 days may be necessary. In such cases, DHS will provide additional verification instructions.

C. RESPONSIBILITIES OF THE EMPLOYER

1. The Employer agrees to display the notices supplied by DHS in a prominent place that is clearly visible to prospective employees.

2. The Employer agrees to provide to the SSA and DHS the names, titles, addresses, and telephone numbers of the Employer representatives to be contacted regarding E-Verify.

3. The Employer agrees to become familiar with and comply with the E-Verify Manual.

4. The Employer agrees that any Employer Representative who will perform employment verification queries will complete the E-Verify Tutorial before that individual initiates any queries.

- A. The employer agrees that all employer representatives will take the refresher tutorials initiated by the E-Verify program as a condition of continued use of E-Verify.
- B. Failure to complete a refresher tutorial will prevent the employer from continued use of the program.

5. The Employer agrees to comply with established Form I-9 procedures, with two exceptions:

- If an employee presents a "List B" identity document, the Employer agrees to only accept "List B" documents that contain a photo. (List B documents identified in 8 C.F.R. § 274a.2 (b) (1) (B)) can be presented during the Form I-9 process to establish identity).
- If an employee presents a DHS Form I-551 (Permanent Resident Card) or Form I-766 (Employment Authorization Document) to complete the Form I-9, the Employer agrees to make a photocopy of the document and to retain the photocopy with the employee's Form I-9. The employer will use the photocopy to verify the photo and to assist the Department with its review of photo non-matches that are contested by employees. Note that employees retain the right to present any List A, or List B and List C, documentation to complete the Form I-9. DHS may in the future designate other documents that activate the photo screening tool.

6. The Employer understands that participation in E-Verify does not exempt the Employer from the responsibility to complete, retain, and make available for inspection Forms I-9 that relate to its employees, or from other requirements of applicable regulations or laws, except for the following modified requirements applicable by reason of the Employer's participation in E-Verify: (1) identity documents must have photos, as described in paragraph 5 above; (2) a

Company ID Number: 67641

rebuttable presumption is established that the Employer has not violated section 274A(a)(1)(A) of the Immigration and Nationality Act (INA) with respect to the hiring of any individual if it obtains confirmation of the identity and employment eligibility of the individual in compliance with the terms and conditions of E-Verify ; (3) the Employer must notify DHS if it continues to employ any employee after receiving a final nonconfirmation, and is subject to a civil money penalty between \$500 and \$1,000 for each failure to notify DHS of continued employment following a final nonconfirmation; (4) the Employer is subject to a rebuttable presumption that it has knowingly employed an unauthorized alien in violation of section 274A(a)(1)(A) if the Employer continues to employ any employee after receiving a final nonconfirmation; and (5) no person or entity participating in E-Verify is civilly or criminally liable under any law for any action taken in good faith on information provided through the confirmation system. DHS reserves the right to conduct Form I-9 compliance inspections during the course of E-Verify, as well as to conduct any other enforcement activity authorized by law.

7. The Employer agrees to initiate E-Verify verification procedures within 3 Employer business days after each employee has been hired (but after both sections 1 and 2 of the Form I-9 have been completed), and to complete as many (but only as many) steps of the E-Verify process as are necessary according to the E-Verify Manual. The Employer is prohibited from initiating verification procedures before the employee has been hired and the Form I-9 completed. If the automated system to be queried is temporarily unavailable, the 3-day time period is extended until it is again operational in order to accommodate the Employer's attempting, in good faith, to make inquiries during the period of unavailability. In all cases, the Employer must use the SSA verification procedures first, and use DHS verification procedures and photo screening tool only after the the SSA verification response has been given.

8. The Employer agrees not to use E-Verify procedures for pre-employment screening of job applicants, support for any unlawful employment practice, or any other use not authorized by this MOU. The Employer must use E-Verify for all new employees and will not verify only certain employees selectively. The Employer agrees not to use E-Verify procedures for re-verification, or for employees hired before the date this MOU is in effect. The Employer understands that if the Employer uses E-Verify procedures for any purpose other than as authorized by this MOU, the Employer may be subject to appropriate legal action and the immediate termination of its access to SSA and DHS information pursuant to this MOU.

9. The Employer agrees to follow appropriate procedures (see Article III.B. below) regarding tentative nonconfirmations, including notifying employees of the finding, providing written referral instructions to employees, allowing employees to contest the finding, and not taking adverse action against employees if they choose to contest the finding. Further, when employees contest a tentative nonconfirmation based upon a photo non-match, the Employer is required to take affirmative steps (see Article III.B. below) to contact DHS with information necessary to resolve the challenge.

10. The Employer agrees not to take any adverse action against an employee based upon the employee's employment eligibility status while SSA or DHS is processing the verification request unless the Employer obtains knowledge (as defined in 8 C.F.R. § 274a.1 (l)) that the employee is not work authorized. The Employer understands that an initial inability of the SSA or DHS automated verification to verify work authorization, a tentative nonconfirmation, or the finding of

Company ID Number: 67641

a photo non-match, does not mean, and should not be interpreted as, an indication that the employee is not work authorized. In any of the cases listed above, the employee must be provided the opportunity to contest the finding, and if he or she does so, may not be terminated or suffer any adverse employment consequences until and unless secondary verification by SSA or DHS has been completed and a final nonconfirmation has been issued. If the employee does not choose to contest a tentative nonconfirmation or a photo non-match, then the Employer can find the employee is not work authorized and take the appropriate action.

11. The Employer agrees to comply with section 274B of the INA by not discriminating unlawfully against any individual in hiring, firing, or recruitment or referral practices because of his or her national origin or, in the case of a protected individual as defined in section 274B(a)(3) of the INA, because of his or her citizenship status. The Employer understands that such illegal practices can include selective verification or use of E-Verify, discharging or refusing to hire eligible employees because they appear or sound "foreign", and premature termination of employees based upon tentative nonconfirmations, and that any violation of the unfair immigration-related employment practices provisions of the INA could subject the Employer to civil penalties pursuant to section 274B of the INA and the termination of its participation in E-Verify. If the Employer has any questions relating to the anti-discrimination provision, it should contact OSC at 1-800-255-7688 or 1-800-237-2515 (TDD).

12. The Employer agrees to record the case verification number on the employee's Form I-9 or to print the screen containing the case verification number and attach it to the employee's Form I-9.

13. The Employer agrees that it will use the information it receives from the SSA or DHS pursuant to E-Verify and this MOU only to confirm the employment eligibility of newly-hired employees after completion of the Form I-9. The Employer agrees that it will safeguard this information, and means of access to it (such as PINS and passwords) to ensure that it is not used for any other purpose and as necessary to protect its confidentiality, including ensuring that it is not disseminated to any person other than employees of the Employer who are authorized to perform the Employer's responsibilities under this MOU.

14. The Employer acknowledges that the information which it receives from SSA is governed by the Privacy Act (5 U.S.C. § 552a (i) (1) and (3)) and the Social Security Act (42 U.S.C. 1306(a)), and that any person who obtains this information under false pretenses or uses it for any purpose other than as provided for in this MOU may be subject to criminal penalties.

15. The Employer agrees to allow DHS and SSA, or their authorized agents or designees, to make periodic visits to the Employer for the purpose of reviewing E-Verify -related records, i.e., Forms I-9, SSA Transaction Records, and DHS verification records, which were created during the Employer's participation in the E-Verify Program. In addition, for the purpose of evaluating E-Verify, the Employer agrees to allow DHS and SSA or their authorized agents or designees, to interview it regarding its experience with E-Verify, to interview employees hired during E-Verify use concerning their experience with the pilot, and to make employment and E-Verify related records available to DHS and the SSA, or their designated agents or designees. Failure to comply with the terms of this paragraph may lead DHS to terminate the Employer's access to E-Verify.

Company ID Number: 67641

ARTICLE III

REFERRAL OF INDIVIDUALS TO THE SSA AND THE DEPARTMENT OF HOMELAND SECURITY

A. REFERRAL TO THE SSA

1. If the Employer receives a tentative nonconfirmation issued by SSA, the Employer must print the tentative nonconfirmation notice as directed by the automated system and provide it to the employee so that the employee may determine whether he or she will contest the tentative nonconfirmation.
2. The Employer will refer employees to SSA field offices only as directed by the automated system based on a tentative nonconfirmation, and only after the Employer records the case verification number, reviews the input to detect any transaction errors, and determines that the employee contests the tentative nonconfirmation. The Employer will transmit the Social Security Number to SSA for verification again if this review indicates a need to do so. The Employer will determine whether the employee contests the tentative nonconfirmation as soon as possible after the Employer receives it.
3. If the employee contests an SSA tentative nonconfirmation, the Employer will provide the employee with a referral letter and instruct the employee to visit an SSA office to resolve the discrepancy within 8 Federal Government work days. The Employer will make a second inquiry to the SSA database using E-Verify procedures on the date that is 10 Federal Government work days after the date of the referral in order to obtain confirmation, or final nonconfirmation, unless otherwise instructed by SSA or unless SSA determines that more than 10 days is necessary to resolve the tentative nonconfirmation..
4. The Employer agrees not to ask the employee to obtain a printout from the Social Security Number database (the Numident) or other written verification of the Social Security Number from the SSA.

B. REFERRAL TO THE DEPARTMENT OF HOMELAND SECURITY

1. If the Employer receives a tentative nonconfirmation issued by DHS, the Employer must print the tentative nonconfirmation notice as directed by the automated system and provide it to the employee so that the employee may determine whether he or she will contest the tentative nonconfirmation.
2. If the Employer finds a photo non-match for an alien who provides a document for which the automated system has transmitted a photo, the employer must print the photo non-match tentative nonconfirmation notice as directed by the automated system and provide it to the employee so that the employee may determine whether he or she will contest the finding.
3. The Employer agrees to refer individuals to DHS only when the employee chooses to contest a tentative nonconfirmation received from DHS automated verification process or when

Company ID Number: 67641

the Employer issues a tentative nonconfirmation based upon a photo non-match. The Employer will determine whether the employee contests the tentative nonconfirmation as soon as possible after the Employer receives it.

4. If the employee contests a tentative nonconfirmation issued by DHS, the Employer will provide the employee with a referral letter and instruct the employee to contact the Department through its toll-free hotline within 8 Federal Government work days.

5. If the employee contests a tentative nonconfirmation based upon a photo non-match, the Employer will provide the employee with a referral letter to DHS. DHS will electronically transmit the result of the referral to the Employer within 10 Federal Government work days of the referral unless it determines that more than 10 days is necessary.

6. The Employer agrees that if an employee contests a tentative nonconfirmation based upon a photo non-match, the Employer will send a copy of the employee's Form I-551 or Form I-766 to DHS for review by:

- Scanning and uploading the document, or
- Sending a photocopy of the document by an express mail account (furnished and paid for by DHS).

7. The Employer understands that if it cannot determine whether there is a photo match/non-match, the Employer is required to forward the employee's documentation to DHS by scanning and uploading, or by sending the document as described in the preceding paragraph, and resolving the case as specified by the Immigration Services Verifier at DHS who will determine the photo match or non-match.

ARTICLE IV

SERVICE PROVISIONS

The SSA and DHS will not charge the Employer for verification services performed under this MOU. The Employer is responsible for providing equipment needed to make inquiries. To access the E-Verify System, an Employer will need a personal computer with Internet access.

ARTICLE V

PARTIES

This MOU is effective upon the signature of all parties, and shall continue in effect for as long as the SSA and DHS conduct the E-Verify program unless modified in writing by the mutual consent of all parties, or terminated by any party upon 30 days prior written notice to the others. Any and all system enhancements to the E-Verify program by DHS or SSA, including but not limited to the E-Verify checking against additional data sources and instituting new verification procedures, will be covered under this MOU and will not cause the need for a supplemental MOU that outlines these changes. DHS agrees to train employers on all changes made to E-Verify through the use of mandatory refresher tutorials and updates to the E-Verify manual. Even

Company ID Number: 67641

without changes to E-Verify, the Department reserves the right to require employers to take mandatory refresher tutorials.

Termination by any party shall terminate the MOU as to all parties. The SSA or DHS may terminate this MOU without prior notice if deemed necessary because of the requirements of law or policy, or upon a determination by SSA or DHS that there has been a breach of system integrity or security by the Employer, or a failure on the part of the Employer to comply with established procedures or legal requirements. Some or all SSA and DHS responsibilities under this MOU may be performed by contractor(s), and SSA and DHS may adjust verification responsibilities between each other as they may determine.

Nothing in this MOU is intended, or should be construed, to create any right or benefit, substantive or procedural, enforceable at law by any third party against the United States, its agencies, officers, or employees, or against the Employer, its agents, officers, or employees.

Each party shall be solely responsible for defending any claim or action against it arising out of or related to E-Verify or this MOU, whether civil or criminal, and for any liability wherefrom, including (but not limited to) any dispute between the Employer and any other person or entity regarding the applicability of Section 403(d) of IIRIRA to any action taken or allegedly taken by the Employer.

The employer understands that the fact of its participation in E-Verify is not confidential information and may be disclosed as authorized or required by law and DHS or SSA policy, including but not limited to, Congressional oversight, E-Verify publicity and media inquiries, and responses to inquiries under the Freedom of Information Act (FOIA).

The foregoing constitutes the full agreement on this subject between the SSA, DHS, and the Employer.

The individuals whose signatures appear below represent that they are authorized to enter into this MOU on behalf of the Employer and DHS respectively.

To be accepted as a participant in E-Verify, you should only sign the Employer's Section of the signature page. If you have any questions, contact E-Verify Operations at 888-464-4218.

Employer Intercounty Engineering, Inc

Claudia M Tellez

Name (Please type or print)

Title

Electronically Signed

11/14/2007

Signature

Date

Department of Homeland Security – Verification Division

Company ID Number: 67641

USCIS Verification Division

Name (Please type or print)

Title

Electronically Signed

11/14/2007

Signature

Date

Company ID Number: 67641

**INFORMATION REQUIRED
FOR THE E-VERIFY PROGRAM**

Information relating to your Company:

Company Name: Intercounty Engineering, Inc

Company Facility Address: 1925 NW 18TH Street
Pompano Beach, FL 33069

Company Alternate Address: _____

County or Parish: BROWARD

Employer Identification Number: 650495335

North American Industry
Classification Systems Code: 237

Parent Company: _____

Number of Employees: 20 to 99 Number of Sites Verified for: 1

Are you verifying for more than 1 site? If yes, please provide the number of sites verified for in each State.

- FLORIDA 1 site(s)

Information relating to the Program Administrator(s) for your Company on policy questions or operational problems:

Name: **Claudia M Tellez**
Telephone Number: **(954) 972 - 9800 ext. 20** Fax Number: **(954) 974 - 0042**
E-mail Address: **patriciahynes@aol.com**



ADDENDUM No. 3

BID 22-17-03-MS

TITLE: Lift Station Rehabilitation and Repairs Services

DATE: 7/1/22

The following items are issued to, add to, delete from, modify and clarify the Bidding Documents. These items shall have full force and effect as the Bidding Documents, and cost involved shall be included in the bid prices. Bids to be submitted on the specified bid date shall conform to the additions and revisions listed.

The Bidder should acknowledge receipt of this Addendum by inserting its number and date on the Bid Form.

SUBSTITUTIONS

Section 3.16 BRAND NAMES / APPROVED EQUALS has been revised and will read as follows:

Whenever a material, article or piece of equipment is identified in the bid package, including drawings, plans, specifications and reference to manufacturers' or Bidders' name, trade name, catalog number, or otherwise, it is intended merely to establish a standard unless it is followed by words indicating that no substitution is permitted because of form, fit, function or quality. Any material, article or equipment of other manufacturers and Bidders which will perform or serve the requirements of the general design will be considered equally acceptable provided the material article or equipment so proposed is, equal in substance, quality and function. However, the City shall be the sole judge as to whether or not the submitted product is equal in substance, quality and function, and its decision shall be final. If the bidder does not indicate an alternate is being bid and identify the alternate, the Contractor must deliver the specified item identified in the Bid.

Unless expressly permitted or allowed by the bid Documents, substitutions of materials, articles, systems, equipment, or other components of the Work will not be considered. Where substitutions or approved equals are expressly permitted or allowed by the bid Documents, the Contractor must demonstrate to the City that a proposed substitution is equal in substance, quality and function to the material, article, or piece of equipment identified in the bid Documents. The City shall have no obligation to accept a proposed substitution and no substitution shall be allowed

without the prior written approval from the City. If the substitution results in a savings to the Contractor, the City shall be entitled to a credit for the amount saved as a result of the substitution. Requests for substitutions and approved equals must be submitted to the City for evaluation no later than 14 days after issuance of the Notice of Award.

QUESTIONS AND ANSWERS

Q.1: The plans call for the fence to be 6 foot high and the specifications called for the fence to be 8' high, please indicate which one is the correct high for the fence.

A.1: Fence shall be six (6) foot high, in accordance to plans.

All other items, conditions and specifications remain unchanged for this Bid.



ADDENDUM No. 2

BID 22-17-03-MS

TITLE: Lift Station Rehabilitation and Repairs Services

DATE: 6/29/22

The following items are issued to, add to, delete from, modify and clarify the Bidding Documents. These items shall have full force and effect as the Bidding Documents, and cost involved shall be included in the bid prices. Bids to be submitted on the specified bid date shall conform to the additions and revisions listed.

The Bidder should acknowledge receipt of this Addendum by inserting its number and date on the Bid Form.

INQUIRIES, ADDENDA AND MODIFICATIONS

1- Send all inquiries to:

Maria Salvatierra, CPPO, Procurement Specialist

Phone: (954) 572-2484

Fax: (954) 578-4809

Email: msalvatierra@sunrisefl.gov

SPECIFICATIONS

1- MEASUREMENT AND PAYMENT, Section 01025 – Rev 21 and Section 01025- Rev 22 have been revised. The revised sections are attached herein.

BID SHEET

1- Schedule A – Bid Sheet has been revised. Item 137 was renumbered and item 168 was revised. Please go to demandstar.com to download revised Schedule A per this Addendum No. 2.

QUESTIONS AND ANSWERS

Q.1: On bid item #1, do we have to consider a Superintendent for each station? Or can the Superintendent oversee other stations at the same time?

A.1: Use of a Superintendent for one or several lift stations at the same time is the Contractor's judgment.

Q.2: Bid items #11 and #12, called for sod as part of the restoration work. How do we know the limits of the sod that pertain to the removal of the sidewalk and the sod that pertain to the work at the station (items #183 & #184)? To avoid confusion and since we have items break down on Schedule "A", maybe the restoration work shall be removed from items #11 and #12.

A.2: Sod restoration (unquantified) is incidental to sidewalk construction in Items #11 and #12. There shall be no separate payment.

Q.3: Items #74 to #81 do not include the removal of the pipe fittings, so do we have to use Item #104 for the removal of the pipe fittings in the wet well?

A.3: Yes.

Q.4: Does item #73 include, the Flange Pipe, Flange fittings in valve vault or above ground, as well as the underground pipe and fittings to connect to the Force Main, 4" to 10" in size?

A.4: Yes, range 4" to 24" in size.

Q.5: Will the valve vaults will be coated or painted or neither?

A.5: Neither.

Q.6: Item #43 make a reference of section 02726. Article 2.05, and there is not article 2.05 in this section. Please specify what kind if grout do we have to consider for this bid item?

A.6: See paragraph 2.05 of Section 03732.

Q.7: Is there an item for install concrete slab around the station?

A.7: No, there is not.

Q.8: The following bid item description "Epoxy Coated XX" Ductile Iron Pipe (for minor FM connections or repairs; including fittings)", is a description for bid item #82 to #87, where the pipe diameter goes from 12" to 24". It appears that it is missing on the bid items for pipes diameter 4" to 10". Please advise.

A.8: Pipes diameter 4" to 10' are not called out for this item.

All other items, conditions and specifications remain unchanged for this Bid.

ITEM NO. 194 – ELECTRICIAN – ENTRY LEVEL

~~Payment for this item will be made on an Hourly (HR) basis. A qualified entry-level electrician shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.~~

ITEM NO. 195 – ELECTRICIAN – JOURNEYMAN

~~Payment for this item will be made on an Hourly (HR) basis. A qualified journeyman electrician shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.~~

ITEM NO. 196 – ELECTRICIAN – MASTER ELECTRICIAN

Payment for this item will be made on an Hourly (HR) basis. A qualified master electrician shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 195 – INTEGRATOR

Payment for this item will be made on an Hourly (HR) basis. A qualified integrator shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 196 – SINGLE AXLE DUMP TRUCK, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 197 – DOUBLE AXLE DUMP TRUCK, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 198 – CRANE TRUCK WITH LIFTING CAPACITY UP TO 30 TONS, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. ~~204~~ 199 – CREW TRUCK

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 200 – FLATBED TRUCK, UNDER 25,000 POUNDS (GVW), WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 201 – 3/8-YARD COMBINATION BACKHOE, FRONT END LOADER, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 202 – FRONT END LOADER, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 203 – EXCAVATOR, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 204, 205, 206 & 207 – PROVIDE AND INSTALL 230 VOLT, 100, 200, ETC... AMP FUSED DISCONNECT

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Furnish and install 230 Volt, 100, 200, 300 or 400 Amp fused disconnect switch. This item also includes the supply and install of all wiring, conduit and fittings from a source within 30' of the proposed disconnect location as well as mounting of the disconnect to an existing panel rack.



ADDENDUM No. 1

BID 22-17-03-MS

TITLE: Lift Station Rehabilitation and Repairs Services

DATE: 6/20/22

The following items are issued to, add to, delete from, modify and clarify the Bidding Documents. These items shall have full force and effect as the Bidding Documents, and cost involved shall be included in the bid prices. Bids to be submitted on the specified bid date shall conform to the additions and revisions listed.

The Bidder should acknowledge receipt of this Addendum by inserting its number and date on the Bid Form.

NON-MANDATORY PRE-BID MEETING

The time for the Non-Mandatory Pre-Bid Meeting has been changed from 10:00am to 11:00am of June 23, 2022. Location remains unchanged.

INDEMNIFICATION

Section 4.1 Indemnification has been revised and will read as follows:

4.1 INDEMNIFICATION

To the fullest extent permitted by law, the Contractor agrees to indemnify, defend and hold harmless the City of Sunrise, its officers, agents, volunteers, and employees from and against all claims, damages, losses, and expenses, including but not limited to attorneys' fees, court costs, or other alternative dispute resolution costs arising out of or resulting from the performance of Services under this Contract (1) provided that any such claims, damages, losses or expenses are attributable to bodily injury, sickness, disease, death, or personal injury, or property damage, and (2) are caused in whole or in part by the negligent acts, errors, or omissions of the Contractor, Contractor's subcontractor(s), or anyone directly or indirectly employed or hired by Contractor or anyone for whose acts Contractor may be liable, REGARDLESS OF WHETHER OR NOT CAUSED IN PART BY CITY OF SUNRISE, ITS OFFICERS, AGENTS, VOLUNTEERS, OR EMPLOYEES.

The City of Sunrise reserves the right, but not the obligation, to participate in the defense without relieving Contractor of any obligation hereunder. Contractor agrees this indemnity obligation shall survive the expiration or earlier termination of the Contract.

INSURANCE

Section 4.2 Insurance Requirements has been revised and will read as follows:

4.2 INSURANCE REQUIREMENTS

Contractor agrees, at its sole expense, to maintain on a primary, non-contributory basis during the life of this Contract, or the performance of work under this Project, insurance coverages, limits, and endorsements as required herein. The Contractor agrees the insurance requirements herein as well as City's review or acknowledgement, is not intended to and shall not in any manner limit or qualify the liabilities and obligations assumed by the Contractor under this Contract. Any coverage maintained by the City shall apply excess of, or contingent upon the absence of, insurance required or maintained by Contractor.

Commercial General Liability. Contractor agrees to maintain Commercial General Liability at a limit of liability not less than \$1,000,000 Each Occurrence \$2,000,000 Annual Aggregate. Contractor agrees its coverage will not contain any restrictive endorsement(s) excluding or limiting Product/Completed Operations, Independent Contractors, Broad Form Property Damage, X-C-U Coverage, Contractual Liability or Separation of Insureds.

Additional Insured Endorsement. Contractor agrees to endorse the City as an Additional Insured on the Commercial General Liability with the following Additional Insured endorsement, or similar endorsement providing equal or broader Additional Insured coverage, the CG 20 10 07 04 or GC 20 10 04 13 Additional Insured - Owners, Lessees, or Contractors – Scheduled Person or Organization endorsement in combination with the additional endorsement GC 20 37 10 01 or GC 20 37 04 13 Additional Insured – Owners, Lessees, or Contractors – Completed Operations. The name of the organization endorsed as Additional Insured for all endorsements shall read "City of Sunrise".

Business Automobile Liability. Contractor agrees to maintain Business Automobile Liability at a limit of liability not less than \$1,000,000 Each Occurrence. Coverage shall include liability for Owned, Non-Owned & Hired automobiles. In the event Contractor does not own automobiles, Contractor agrees to maintain coverage for Hired & Non-Owned Auto Liability, which may be satisfied by way of endorsement to the Commercial General Liability policy or separate Business Auto Liability policy.

Worker's Compensation & Employer's Liability. Contractor agrees to maintain Worker's Compensation & Employers Liability Insurance. Elective exemptions or coverage afforded through an employee leasing arrangement will NOT satisfy the contractual requirement.

Waiver of Subrogation. Contractor agrees by entering into this written Contract to a Waiver of Subrogation in favor of the City, Contractor, sub-contractor, architects, or engineers for each required policy providing coverage during the life of this Contract. When required by the insurer, or should a policy condition not permit the Contractor to enter into a pre-loss Contract to waive subrogation without an endorsement, the Contractor agrees to notify the insurer and request the policy be endorsed with a Waiver of Transfer of Rights of Recovery Against Others, or an equivalent endorsement. This Waiver of Subrogation requirement shall not apply to any policy, which includes a condition that specifically prohibits such an endorsement, or voids coverage should the Contractor enter into such Contract on a pre-loss basis.

Certificate of Insurance. Contractor agrees to provide City a Certificate of Insurance evidencing that all coverages, limits and endorsements required herein are maintained and in full force and effect, and Certificates of Insurance shall provide a minimum thirty (30) day endeavor to notify when a manuscript notice endorsement is available by Contractor's insurer. If the Contractor receives a non-renewal or cancellation notice from an insurance carrier affording coverage required herein, or receives notice that coverage no longer complies with the insurance requirements herein, Contractor agrees to notify the City by fax or email within five (5) business days with a copy of the non-renewal or cancellation notice, or written specifics as to which coverage is no longer in compliance. The Certificate Holder(s) address shall read:

Original to:

City of Sunrise
Purchasing Department
Attn: Purchasing Director
10770 W. Oakland Park Blvd, 3rd Floor
Floor
Sunrise, FL 33351
Fax (954) 572-2278

Copy to:

City of Sunrise
Risk Management Division
Attn: Risk Manager
10770 W Oakland Park Blvd, 3rd
Floor
Sunrise, FL 33351
riskmanagement@sunrisefl.gov

Right to Revise or Reject. Contractor agrees the City reserves the right, but not the obligation, to review or revise any insurance requirement, not limited to limits, coverages and endorsements based on insurance market conditions affecting the availability or affordability of coverage; or changes in the scope

of work / specifications affecting the applicability of coverage. Additionally, the City reserves the right, but not the obligation, to review and reject any insurance policies failing to meet the criteria stated herein, or any insurer(s) providing coverage due of its poor financial condition or failure to operating legally in the State of Florida. In such events, City shall provide Contractor written notice of such revisions or rejections.

All other items, conditions and specifications remain unchanged for this Bid.



INVITATION FOR BID

PURCHASING DIVISION

Mailing Address:

**10770 West Oakland Park Blvd.
Sunrise, Florida 33351**

Bid Data

Bid Number: BID 22-17-03-MS
Service or Commodity Title: Lift Station Rehabilitation and Repairs Services
Purchasing Agent: Maria Salvatierra, CPPO, Procurement Specialist
Phone: (954) 572-2484
Fax: (954) 578-4809
Email: vhernandez@sunrisefl.gov

Non-Mandatory Pre-bid Conference

Day/Date: Thursday, June 23, 2022
Time: 10:00am
Location: City Hall – First Floor
City Commission Chambers
10770 West Oakland Park Blvd.
Sunrise, FL 33351

Bid Opening

Day/Date: Wednesday, July 13, 2022
Time: 2:00 p.m.
Physical Location: City Hall
City Commission Chambers
10770 West Oakland Park Blvd.
Sunrise, FL 33351

Bid Contents

Section 1: [Specifications/Scope of Work](#)
Section 2: [Attachments](#)
Section 3: [Instructions to Bidders](#)
Section 4: [Terms and General Conditions](#)
Section 5: [Special Terms and Conditions](#)
Section 6: [Bid Submission Package](#)
Section 7: [Technical Specifications](#)

Bid packages and specifications are no longer available directly from the City of Sunrise Purchasing Division. The City is now using **Onvia DemandStar** for the posting and

distribution of all City Bids, RFPs, RFQs, RLLs and Quotations. This Bid may be obtained at www.demandstar.com. The City is not responsible for the accuracy of other means of distribution. Alteration of the content of this document shall result in disqualification.

NOTE: If not submitting a bid, fill out and return the "Statement of No Bid" Form of this document.

SPECIAL ACCOMMODATION:

If a person decides to appeal any decision made by the board, agency, or commission with respect to any matter considered at such meeting or hearing, he or she will need a record of the proceedings, and that, for such purpose, he or she may need to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is based F.S.S. 286.0105. The City does not tolerate discrimination in any of its programs, services or activities; and will not exclude participation in, deny the benefits of, or subject to discrimination anyone on the grounds of real or perceived race, color, national origin, sex, gender identity, sexual orientation, age, disability/handicap, religion, family or income status.

In compliance with the ADA and F.S.S. 286.26, any individual with a disability requesting a reasonable accommodation in order to participate in a public meeting should contact the City's ADA Coordinator at least 48 hours in advance of the scheduled meeting. Requests can be directed via e-mail to hr@sunrisefl.gov or via telephone to (954) 838-4522; Florida Relay: 711; Florida Relay (TIY/VCO): 1-800-955-8771; Florida Relay (Voice): 1-800-955-8770. Every reasonable effort will be made to allow for meeting participation.

OF SUNRISE

Lift Station Rehabilitation & Repair

Exhibit "A"

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END OF SECTION

SECTION 1 – SPECIFICATIONS

The City is requesting submittals from qualified contractors for Lift Station Rehabilitation and Repair services on an as-needed basis. The Work consists of, but is not limited to, furnishing all tools, equipment, materials, supplies, manufactured articles, and for furnishing all transportation and services, including fuel, power, water, and essential communications, and for the performance of all labor, work necessary for performing lift station rehabilitation and repair services and/or other operations, in accordance with the Bid Documents. The work will occur within the City of Sunrise Utilities service area and will be performed on an as needed basis utilizing work orders.

The Contractor shall perform all of the Work required, implied or reasonably inferable from, this Contract. The Contractor further declares that he has examined and is familiar with the provisions of Section 489.113(3), Florida statutes, and knowingly and specifically waives any rights he may have thereunder, and further agrees to be bound by the City's Policies, Procedures, Standard Details and Specifications for Water Distribution and Sewage Collection Systems, including but not limited to the requirement that all underground water and wastewater system work required herein shall be performed by a Contractor holding one of the following licenses pursuant to this section:

1. State of Florida Certified Underground Utility & Excavation Contractor
2. BC Certificate of Competency -General Engineered Construction
3. BC Certificate of Competency IA-Primary Pipe Lines

The Contractor agrees to comply with the City of Sunrise permitting requirements, including all licensing requirements associated with the Community Development Department - Engineering Division.

1. Work Orders:

Work will be accomplished by the issuance of a Purchase Order for each lift station (or group of lift stations) repair/rehab. Refer to **Section 7, Technical Specifications**. The City shall transmit to Contractor a written Notice to Proceed with instructions to begin work for specific Work Orders. The City reserves the right to direct the order in which work at various locations are to be completed. All such orders shall be confirmed on the Work Order, indicating the location of the work set forth, and be executed in duplicate by the City Representative and the Contractor.

2. Minimum Qualifications:

The Contractor shall have a valid State of Florida General Contractor's License or Underground Utility Contractor's License and shall have successfully completed at least five (5) projects of similar scope, size, type, and complexity in the State of Florida within the last five (5) years. Where bidder proposes to subcontract any of the specialty tasks, submittals shall be made for qualified subcontractors as specified in the bid documents. The City shall be the sole and final judge in determining if the Contractor meets the Qualification Requirement.

3. Contract Between City of Sunrise and Contractor and Order of Precedence:

This bid document inclusive of all specifications, terms, and requirements, Contractor submittal, award letter, and any resulting Work Orders and Purchase Orders will constitute the Contract Documents between the City of Sunrise and awarded Contractor. Bidder, Vendor, and Contractor are terms that may be used interchangeably throughout the documents.

In the event of any conflict in the Contract Documents, the following documents shall take precedence in the following order of precedence: Purchase Order, award letter, bid document, Contractor submittal.

4. Setup and Connections:

If applicable, all equipment is to be setup, connected to utilities, checked and demonstrated at no charge to the City. The Contractor shall be responsible for pick up, all transportation, off-loading, handling, storage and installation of any City furnished Contractor installed material and equipment.

5. Authorized Manufacturer's Installations:

Installation of any manufacturer's proprietary systems, products or equipment, specified or approved for this contract, shall be performed by duly authorized and approved manufacturer's representatives, dealers, applicators or installers if same is a condition of special, standard or implied manufacturer's warranty. Certification of said authorization shall be submitted to the City upon request.

6. Utility Connections:

If applicable, the Contractor shall provide for and make all final connections to required utilities, including but not limited to, water, sewer, electrical power, etc. and plumbing systems. State or County licensed contractors, electricians and plumbers shall be required to perform the Work where final connections are to be made.

7. Testing:

The Contractor shall be responsible for all tests and testing required by this contract unless otherwise specified. All testing shall be done in the presence of a representative of the City. The Contractor shall also be responsible for tests involving any City furnished equipment. The City reserves the right to test all materials, products, installations and equipment.

All equipment shall be started, tested, adjusted and placed in satisfactory operating condition by the Contractor prior to final payment, and the Contractor shall furnish a letter addressed to the City advising that the completed Work has been installed in accordance with the plans and specifications of this Invitation for Bid and that all items are in proper operating condition.

8. City's Right to Stop Work:

If the Contractor persistently fails or refuses to perform the Work in accordance with the contract documents, the City shall have the right, but not an obligation, to order the Contractor to stop the Work, or any described portion thereof, until the cause for stoppage has been corrected, no longer exists, or the City orders that the Work be resumed. In such event, the Contractor shall immediately obey such order. A stop work directive provided under this paragraph shall not entitle the Contractor to an extension of the completion date.

9. City's Right to Perform Work:

If the Contractor's Work is stopped by the City, or if the Contractor persistently fails or refuses to perform the Work in accordance with the contract documents, and the Contractor fails within Three (3) working days of such stoppage, failure, or refusal, to provide adequate assurance to the City that the cause of such stoppage, failure, or refusal will be eliminated or corrected, then the City may, without prejudice to any other rights or remedies the City may have against the Contractor, proceed to carry out the subject Work. In such a situation, an appropriate Change Order shall be issued deducting from the contract price the cost of correcting the subject deficiencies, plus compensation for the City's Consultant's additional services and expenses necessitated thereby, if any. If the unpaid portion of the contract price is insufficient to cover the amount due the City, the Contractor shall pay the difference to the City.

10. Completion:

Completion time to request for installation and/or repairs without limitation of any other provision of this Contract, Contractor agrees that routine work to be performed will be undertaken and completed within twenty (20) working days after Contractor's receipt of the order therefore, except as may be expressly provided by such order or in any writing accompanying the same.

11. Code Requirements:

The Contractor and their subcontractors on these services shall be familiar with the all applicable Federal, State, County, City and Local Laws, Regulations or Codes and be governed accordingly as they will apply to these services and the actions or operations of those engaged in the work or concerning materials used. Contractor shall ask for and receive any required inspections. The Contractor shall comply with the Florida Trench Safety Act, as applicable.

SECTION 2 - ATTACHMENTS

- *As listed below as appendices to [the Technical Specifications, Section 7 of this document.](#)*

Appendix 1 - Approved Utility Products List

Appendix 2 - General Water and Sanitary Sewer Details and Notes

Appendix 3 - Standard Sanitary Sewer Details and Notes

Appendix 4 - Standard Water Details and Notes

Appendix 5 - Standard Lift Station Details and Notes

Appendix 6 - Non-Standard Lift Station Details

SECTION 3 - INSTRUCTIONS TO BIDDERS

BIDDERS: TO ENSURE ACCEPTANCE OF THE BID, THE FOLLOWING INSTRUCTIONS MUST BE ADHERED TO:

This Request for Bid is to provide Lift Station Rehabilitation and Repair Services to the City of Sunrise. After receipt of an offer and acceptance by the City Commission, commodities or services will be provided as indicated below:

- ☐ A fixed purchase order for delivery of a commodity or service to a specified place at one time.
- ☐ A fixed purchase order for delivery or performance of a service on a scheduled basis.
- ☒ An award letter notifying the Bidder of acceptance of their Bid by the City Commission specifying duration of the Contract with extension periods if any, and the method of ordering.

(Note: Throughout this Invitation to Bid, all items preceded by a box (☐) are only applicable if the box is marked with an X.)

3.1 HOW TO SUBMIT A BID

Contractor's solicitation response must be submitted electronically through Demandstar, the City's designated electronic bidding system. It is solely the Contractors' responsibility to assure its response is submitted and received in Demandstar by the date and time specified in the solicitation. The City will not consider responses received by any other means. The official time for electronic submittals is the Demandstar server. All parties will, without reservation accept the official time. Any bid may be rejected for noncompliance to requirements after a full review by the Purchasing Office. Any request for an extension of time necessitated by an unforeseen emergency should be made prior to the Bid Opening and directed to the Purchasing Manager/Designee, City of Sunrise (954) 572-2274.

FAXED, MAILED, OR EMAILED BIDS WILL NOT BE ACCEPTED

3.2 THE BID PACKAGE

The bid package consists of Specifications, Additional Requirements, Attachments, Instructions to the Bidders, Terms and General Conditions, and the following Schedules:

Schedule "A" - Bid Sheet & Certification
Schedule "B" - Non-Collusion Affidavit
Schedule "C" - Bidder's Drug Free Statement
Schedule "D" - Bidder's Qualification Statement
Schedule "E" - Warranty Information Form (If Applicable)
Schedule "F" - Insurance & License Requirements
Schedule "G" - Statement of No Bid
Schedule "H" - Vendor Pass Request
Schedule "I" - List of Supervisory Personnel to be directly involved with the project
Schedule "J" - Trench Safety Form
Schedule "K" - List of Subcontractors
Schedule "L" - Certification of Opportunity to Subcontractors

Schedule "M"- Public Construction Bond
Schedule "N"- Final Receipt and Release

3.3 INQUIRIES, ADDENDA AND MODIFICATIONS

The Bidder must direct any inquiries on the specifications, additional requirements, attachments, terms and general conditions or instructions, in writing, either via U.S. Mail, Email or Fax, to the individual named on Page 1 at the Purchasing Division, City of Sunrise, 10770 West Oakland Park Blvd, Sunrise, Florida, 33351, Fax No. (954) 578-4809. All inquiries must be received by the Purchasing Division no later than 12:00 p.m. on the date listed on the cover page.

Any addenda or other modifications to the Documents will be made in writing, and issued by the City, prior to the time and date of Bid Opening. Such written addenda or modifications shall be part of the Documents and shall be binding upon each Bidder. No verbal addenda or modifications shall be allowed nor shall any Bidder rely upon any verbal addenda or modifications in preparing or submitting its bid.

3.4 EXECUTION OF BID

Bid must contain an original signature of an authorized representative of the company in the space provided. Failure to sign the bid shall invalidate it, and it will not be accepted. All bids must be completed in ink or typewritten. No erasures are permitted. If a correction is necessary, the bidder should draw a single line through the entered figure and enter the corrected figure above it. Corrections should be initialed by the person signing the bid, or a duly authorized representative of the firm submitting bid. Any illegible entries, pencil bids or corrections not initialed may not be accepted. Only corrections that show the clear intent of the bidder, in the sole discretion of the City of Sunrise, will be accepted.

3.5 NO BID

If not submitting a bid, respond by returning the "STATEMENT OF NO BID" Schedule G of this Invitation for Bid. Repeated failure to respond without sufficient justification may be cause from removal of a Bidder's name from future solicitations.

3.6 PRE-BID CONFERENCE

- ☐ Not applicable for this bid.
- ☐ Attendance at the Pre-Bid Conference is mandatory. This information session presents an opportunity for the Bidders to clarify any concerns regarding bid requirements. The time and place is given on Page 1 of the Invitation for Bid.
- ☒ Attendance at Pre-Bid Conference is optional. This information session presents an opportunity for the Bidders to clarify any concerns regarding bid requirements. The time and place is given on Page 1 of the Invitation for Bid.

3.7 PRICES BID

List both the unit price and the extended total, if applicable. Prices must be stated in the units specified on the Bid Sheet. In case of a discrepancy in computing the amount of the bid between the unit price bid and the extended total, the unit price will govern. When bids are awarded on the basis of Lump Sum, if there is a discrepancy between the written and numeric amount, the written amount prevails.

3.8 F.O.B. POINT

All bid prices shall be F.O.B. destination freight prepaid and delivered by Contractor to the City's specified location(s).

3.9 BID VALIDITY

All bids shall remain valid for ninety (90) days after the time of bid opening. After this time period the Bidder may request the Bid be withdrawn.

3.10 DELIVERY / COMPLETION TIME / RESPONSE TIME

Refer to Technical Specifications

3.11 SAMPLES

Not applicable to this bid.

3.12 WARRANTIES / GUARANTEES

Contractor warrants that the materials, goods, services and/or workmanship furnished and/or delivered pursuant to the Purchase Order shall:

Conform in all respects to the description, drawings and specifications contained in this Bid

Be merchantable and fit for the ordinary purpose for which such goods are used or intended to be used

Be new and unused, of good quality and free from defects whether latent or patent in material or workmanship

Be free from any security interests, liens or encumbrances. Contractor warrants that it has good and marketable title to the goods delivered

There is no infringement upon or violation of any copyrights or patent rights

Minimum warranty shall be one (1) year. The Bidder shall furnish with the bid all pertinent warranty data as it relates to the items bid upon. If requested, the Bidder is to complete Schedule "E".

3.13 ESTIMATED QUANTITIES

Estimated quantities represent a reasonable approximation of the number of units of each type or number of hours of item the City expects to purchase during a twelve (12) month period. Note: the estimated quantities do not constitute a guaranteed minimum order.

3.14 ADDITIONAL QUANTITIES/BALANCE OF LINE

The City reserves the right to buy additional quantities, if required, at the unit price quoted herein.

3.15 COMPLIANCE WITH LAWS

The Bidder and the Services must comply with all applicable federal, state, and local laws, codes, ordinances, rules, and regulations including, without limitation, American with Disabilities Act, 42 U.S.C. § 12101, Section 504 of the Rehabilitation Act of 1973, and any related federal, state, or local laws, rules, and regulations. Lack of knowledge on the part of the Bidder shall in no way relieve them from responsibility. The Bidder shall comply with all

laws, ordinances and governmental rules, regulations and orders now or at any time during the term of this Contract. Bidder agrees to provide to the City all necessary certifications required by any federal, state, and local laws, ordinances, codes, rules and regulations. The Bidder's obligations under this section shall survive termination, cancellation or expiration of this Contract.

3.16 BRAND NAMES / APPROVED EQUALS

Whenever a material, article or piece of equipment is identified in the bid package, including drawings, plans, specifications and reference to manufacturers' or Bidders' name, trade name, catalog number, or otherwise, it is intended merely to establish a standard unless it is followed by words indicating that no substitution is permitted because of form, fit, function or quality. Any material, article or equipment of other manufacturers and Bidders which will perform or serve the requirements of the general design will be considered equally acceptable provided the material article or equipment so proposed is, equal in substance, quality and function. However, if a product other than the specified is bid, it is the Bidder's responsibility to name such a product within their bid and to prove to the City that said product is equal to that specified and to submit brochures, samples and/or specifications in detail on item(s) bid. However, the City shall be the sole judge as to whether or not the submitted product is equal in substance, quality and function, and its decision shall be final. If the bidder does not indicate an alternate is being bid and identify the alternate, the Contractor must deliver the specified item identified in the Bid.

3.17 PAST PROBLEMS ON PRIOR CONTRACTS / LITIGATION

The Bidder shall disclose any pending or anticipated litigation between the Bidder and any other party or parties that might affect the performance of this Contract. Such litigation must be indicated on Schedule D. When the Bidder or a proposed sub-Contractor has previously worked for the City and has received complaints from the City or has been involved in disputes with the City about the work, the Bidder should submit with their bid an explanation of what, if anything, the Bidder has done or will do to avoid similar problems in the future. This explanation must deal specifically with the problems involved on the prior Contract and any organizational, operational or other changes which have been or will be implemented. If, in the sole judgment of the City, the Bidder has failed to provide an adequate plan to ensure that the Contractual dispute previously experienced by the City will not recur, the City reserves the right to reject the bid submitted by that Bidder.

3.18 BASIS OF AWARD

The City reserves the right to reject any and all bids, to waive any irregularity in bids received, to accept any item or group of items, unless qualified by the Bidder. The City reserves the right before recommending any award to inspect the Bidders' facilities or take any other action necessary to determine a Bidder's ability to perform in accordance with the specification, terms and conditions of the Invitation for Bid.

Award will be made:

- ☐ On a Total Bid basis to the lowest responsive and responsible Bidder. In the event no Bidder bids all items, the City may award on an item by item basis.
- ☐ On an item by item basis to the lowest responsive and responsible Bidder.

- ☐ On an all or none total per group basis to the lowest responsive and responsible Bidder. In the event no Bidder bids all items, the City may award on an item by item basis.
- ☐ To all responsive and responsible Bidders. It is the intent of the City to place orders with the lowest priced responsive and responsible Bidder for the desired product. The City reserves the right to place orders with other Bidders in ascending order of evaluated cost, in the case of immediate need or if product availability is affected.
- ☒ (OTHER) -The City may award to the lowest two (2) responsive and responsible Bidders, if needed. It is the intent of the City to place orders with the lowest priced responsive and responsible Bidder for the desired services, Primary Vendor. The City reserves the right to place orders with the second lowest priced responsive and responsible Bidder, Secondary Vendor, in ascending order of evaluated cost, in the case of immediate need, emergencies, performance issues or if product availability is affected. The Awarded Bid will become the Master Agreement.

In accordance with City of Sunrise Code Section 5-171, a *qualified bidder, responsible bidder, qualified offeror, or responsible offeror* means a person, firm or entity which is fully capable of meeting all requirements of the solicitation and subsequent contract. The qualified bidder, responsible bidder, qualified offeror, or responsible offeror must possess the full capability in all respects to perform fully the contract requirements, including but not limited to the financial resources, technical ability, business judgment, experience, qualifications, facilities, equipment, integrity, capacity and reliability, and must have the integrity and reliability which will assure good faith performance as determined by the city.

In accordance with City of Sunrise Code Section 5-171, a *responsive bid or responsive proposal* means a bid or proposal submitted by a responsive, and responsible or qualified, bidder or offeror which conforms in all material respects to the invitation to bid or request for proposals.

In accordance with City of Sunrise Code Section 5-171, a *responsive bidder or responsive offeror* means a person, firm or entity who has submitted a bid or proposal which conforms in all material respects to the invitation to bid or request for proposals.

In the event the successful bid is terminated or cancelled for any reason, the City reserves the right to make an award to the next lowest responsive and responsible Bidder, or re-bid the entire Contract or any part thereof, whichever is in the best interest of the City.

3.19 COST LIABILITY

The Bidder shall bear all costs associated with submitting the Bid, including preparation, site visitation or any travel connected with submittal of the Bid.

3.20 CONTENTS OF BID / PUBLIC RECORDS

Any material submitted in response to this Bid will become a public record pursuant to Chapter 119, Florida Statutes. No claim of confidentiality or trade secret will be honored unless a specific exemption from the public records law exists and the Florida or Federal statute identifying the exemption is identified in the Bid. An incorrectly claimed exemption

does not disqualify the firm, only the exemption claimed.

3.21 INVESTIGATIONS OF CONDITIONS AFFECTING OPERATIONS

Before submitting a Bid, each Bidder shall make all investigations and examinations necessary to ascertain conditions and requirements of the Bid. Failure to make investigations and examinations shall not relieve the successful Bidder from the obligation to comply in every detail with all provisions and requirements of the Bid nor shall it be a basis for any claim whatsoever for alteration in any term of or payment required by the Purchase Order or any subsequent Contract.

3.22 CONE OF SILENCE

This solicitation falls under Section 2-1 of the Code of Ordinances of the City of Sunrise, Florida, known as the Cone of Silence. After a Bid is opened, a person as defined in Section 2-1 may not seek information or clarification or in any way contact any official or employee of the City concerning this Bid with the exception of the City Attorney, the Procurement Manager or the contact person specifically designated in this Bid. A copy of any written communication shall be filed with the Purchasing Office and shall be made available to the public upon request. A violation of the Cone of Silence renders any award voidable at the sole discretion of the City Commission and may subject the Contractor to debarment in accordance with Section 2-1. Nothing in Section 2-1 prevents a Contractor or Contractor's representative from taking part in a public meeting concerning the Bid.

3.23 E-VERIFY – EMPLOYMENT ELIGIBILITY

*By submitting a response to this solicitation, you are obligated to comply with the provisions of Section 448.095, Fla. Stat., "Employment Eligibility." Further, by your response to this solicitation you affirm and represent that you are registered with the E-Verify system and are using same, and will continue to use same as required by Section 448.095, Fla. Stat. Compliance with Section 448.095 includes, but is not limited to, utilization of the E-Verify System to verify the work authorization status of all newly hired employees, and requiring all subcontractors to provide an affidavit attesting that the subcontractor does not employ, contract with, or subcontract with, an unauthorized alien. Failure to comply will lead to **disqualifying you for award of this solicitation, or, cancellation of an active contract**, or if your subcontractor knowingly violates the statute, the subcontract must be terminated immediately. Any challenge to termination under this provision must be filed in the Circuit Court no later than 20 calendar days after the date of termination. If terminated for a violation of the statute by the Vendor/Contractor, the Vendor/Contractor may not be allowed to do business with the City or be awarded a solicitation or contract for a period of 1 year after the date of termination. All costs incurred to initiate and sustain the aforementioned programs shall be the responsibility of the Vendor/Contractor.*

SECTION 4 - TERMS AND GENERAL CONDITIONS

4.1 INDEMNIFICATION

To the fullest extent permitted by law, Contractor shall indemnify and hold harmless City, its officers and employees, from liabilities, damages, losses and costs, including, but not limited to, reasonable attorneys' fees, to the extent caused by the negligence, recklessness or intentional wrongful misconduct of Contractor and persons employed or utilized by Contractor in the performance of this Contract. This indemnification shall survive the term of this Contract.

4.2 INSURANCE REQUIREMENTS

Contractor agrees at its sole expense to maintain on a primary basis, non-contributory basis during the life of this Contract the following insurance coverages, limits, including endorsements described herein. The requirements contained herein, as well as City's review or acceptance of insurance maintained by Contractor is not intended to and shall not in any manner limit or qualify the liabilities or obligations assumed by Contractor under the Contract. Any coverage maintained by the City shall apply excess of, or contingent upon the absence of, insurance required or maintained by Contractor.

Commercial General Liability. Contractor agrees to maintain Commercial General Liability at a limit of liability not less than \$1,000,000 Each Occurrence, \$2,000,000 Annual Aggregate. Contractor agrees its coverage shall not contain any restrictive endorsement(s) excluding or limiting Product/Completed Operations, Independent Contractors, Broad Form Property Damage, X-C-U Coverage, Contractual Liability or Separation of Insureds.

Additional Insured Endorsement. Contractor agrees to endorse the City as an Additional Insured on the Commercial General Liability with the following, or similar endorsement providing equal or broader Additional Insured coverage, the CG 20 26 07 04, or CG 20 26 04 13, Additional Insured – Designated Person or Organization endorsement; or the CG 20 10 07 04, or CG 20 10 04 13, Additional Insured – Owners, Lessees, or Contractors endorsement, including the additional endorsement of GC 20 37 07 04, or GC 20 04 13, Additional Insured – Owners, Lessees, or Contractors Completed Operations. The name of the organization endorsed as Additional Insured for all endorsements shall read "City of Sunrise".

Business Automobile Liability. Contractor agrees to maintain Business Automobile Liability at a limit of liability not less than \$1,000,000 Each Occurrence. Coverage shall include liability for Owned, Non-Owned & Hired automobiles. In the event Contractor does not own automobiles, Contractor agrees to maintain coverage for Hired & Non-Owned Auto Liability, which may be satisfied by way of endorsement to the Commercial General Liability policy or separate Business Auto Liability policy.

Worker's Compensation Insurance & Employers Liability. Contractor agrees to maintain Worker's Compensation Insurance & Employers Liability in accordance with Florida Statutes Chapter 440.

Pollution Legal and Remediation Liability. Contractor agrees to maintain Third-Party Pollution Legal and Remediation Liability at a limit of liability not less than \$1,000,000 Each Occurrence \$2,000,000 Annual Aggregate. The Contractor agrees the policy shall include a minimum three (3) year discovery (tail) reporting period, and a retroactive date that equals or precedes the effective date of the Contract, or the performance of Work hereunder. In the event the policy is cancelled, non-renewed, switched to an occurrence form, retroactive date advanced, or any other event triggering the right to purchase a supplemental extended

reporting period (SERP) during the life of this Contractor, Contractor agrees to purchase a SERP with a minimum reporting period not less than two (2) years. The requirement to purchase a SERP shall not relieve Contractor of the obligation to provide replacement coverage. The Contractor agrees the Self-Insured-Retention shall not exceed \$25,000. This coverage may be provided on a Per-Project Basis. The Third-Party Pollution Legal and Remediation Liability shall be endorsed to include City as an Additional Insured.

Waiver of Subrogation. Contractor agrees by entering into this Contract to a Waiver of Subrogation for each required policy herein. When required by the insurer, or should a policy condition not permit Contractor to enter into a pre-loss agreement to waive subrogation without an endorsement, then Contractor agrees to notify the insurer and request the policy be endorsed with a Waiver of Transfer of Rights of Recovery Against Others, or its equivalent. This Waiver of Subrogation requirement shall not apply to any policy, which includes a condition specifically prohibiting such an endorsement, or voids coverage should Contractor enter into such an agreement on a pre-loss basis.

Certificate(s) of Insurance. Contractor agrees to provide City a Certificate of Insurance evidencing that all coverages, limits and endorsements required herein are maintained and in full force and effect, and Certificates of Insurance shall provide a minimum thirty (30) day endeavor to notify, when a manuscript notice endorsement is available by Contractor's insurer. If the Contractor receives a non-renewal or cancellation notice from an insurance carrier affording coverage required herein, or receives notice that coverage no longer complies with the insurance requirements herein, Contractor agrees to notify the City by fax or email within five (5) business days with a copy of the non-renewal or cancellation notice, or written specifics as to which coverage is no longer in compliance. The Certificate Holder(s) address shall read:

Original to:
City of Sunrise
Attn: Procurement Manager
Purchasing Office
10770 West Oakland Park Blvd.
Sunrise, Florida 33351
purchasing@sunrisefl.gov
Fax (954) 752-2278

Copy to:
City of Sunrise
Attn: Risk Manager Office
Risk Management Division
10770 W. Oakland Park Blvd.
Sunrise, FL 33351
riskmanagement@sunrisefl.gov

Umbrella or Excess Liability. Contractor may satisfy the minimum liability limits required above for Commercial General Liability or Business Auto Liability under an Umbrella or Excess Liability policy. There is no minimum Per Occurrence limit of liability under the Umbrella or Excess Liability; however, the Annual Aggregate limit shall not be less than the highest "Each Occurrence" limit for either Commercial General Liability or Business Auto Liability. Contractor agrees to endorse City as an "Additional Insured" on the Umbrella or Excess Liability, unless the Certificate of Insurance states the Umbrella or Excess Liability provides coverage on a "Follow-Form" basis.

Right to Revise or Reject. City reserves the right, but not the obligation, to revise any insurance requirement, not limited to limits, coverages and endorsements, or to reject any insurance policies which fail to meet the criteria stated herein. Additionally, City reserves the right, but not the obligation, to review and reject any insurer providing coverage due to its poor financial condition or failure to operate legally.

4.3 PATENTS AND ROYALTIES

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

The Bidder, without exception, shall indemnify and save harmless the City of Sunrise and its employees from liability of any kind including cost and expenses for or on account of any copyrighted, patented or unpatented invention, process or article of manufacture lot any article used in the performance of the Contract, including its use by the Purchaser. If the Bidder uses any design, device or materials covered by letters, patent or copyright, it is mutually agreed. And understood without exception that the bid prices shall include all royalties or cost arising from the use of such design, device or materials in any way involved in the work.

4.4 INITIAL CONTRACT PERIOD AND CONTRACT RENEWAL

The initial contract period shall be for three (3) years, commencing on the date of award or September 24, 2022, whichever is later. In addition, the City reserves the right to renew the contract for two (2) additional one (1) year periods, providing all terms conditions and specifications remain the same, both parties agree to the extension, and such extension is approved by the City, contingent upon budget approval.

4.5 CONTRACT CONTINUITY / TRANSITIONAL PERIOD

In the event the services are scheduled to end either by Contract expiration or by termination by the City of Sunrise (at the City's discretion), the Bidder shall continue the services, if requested by the City, until new services can be completely operational. At no time shall this transitional period extend more than one hundred eighty (180) days beyond the expiration date of the existing Contract. The Bidder will be reimbursed for this service at the rate in effect when this transitional period clause is invoked by the City.

4.6 CONTRACTS OVERLAPPING FISCAL YEARS:

The City's fiscal year begins October 1 and ends September 30 of the following calendar year. When a Contract's terms extends beyond the fiscal year in which the Contract commences, the City will issue a new Purchase Order to cover its needs for the balance of the fiscal year and a new purchase order will be issued to correspond with the remaining months of the Contract that extends into the next fiscal year. Issuance of a new Purchase Order shall be subject to the availability of budgeted funds.

4.7 TERMINATION FOR GOVERNMENTAL NON-APPROPRIATIONS

City is a bona fide governmental entity of the State of Florida with City's fiscal year ending on September 30 of each calendar year. If City does not appropriate sufficient funds to purchase the quantities required under this Agreement for any of the City's fiscal years subsequent to the one in which the Agreement is executed and entered into, then this Agreement shall be terminated effective upon expiration of the fiscal year in which sufficient funds to continue satisfaction of City's obligation under this Agreement were last appropriated by City and City shall not, in this sole event be obligated to make any further purchases beyond said fiscal year.

4.8 TERMINATION FOR CAUSE

This Agreement may be terminated by either party upon three (3) calendar days written notice to the other party, should such other party fail substantially to perform in accordance with its material terms through no fault of the party initiating the termination. In the event the Contractor abandons this Agreement or causes it to be terminated by the CITY, the Contractor shall indemnify the CITY against any loss pertaining to this termination. In the

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

event that the Contractor is terminated by the CITY for cause and it is subsequently determined by a court of competent jurisdiction that such termination was without cause, such termination shall thereupon be deemed a termination for convenience under Section 4.9 and the provisions of Section 4.9 shall govern.

4.9 TERMINATION FOR CONVENIENCE

A Contract resulting from this Bid may be terminated by the City without cause upon thirty (30) days written notice to the Contractor. In the event of such a termination without cause, the Contractor shall be compensated for all services performed to the City's satisfaction, together with reimbursable expenses incurred. In such event, the Contractor shall promptly submit to the City its invoice for final payment and reimbursement under the terms of this Contract.

4.10 TERMS RELATING TO PRICE

Unless otherwise noted by the City, all prices shall be firm through the period of the Contract or purchase order and shall not be subject to increase. In the event of a manufacturer's or Contractor's price decrease during the Contract period, the City shall receive the full benefit of such price reduction on any undelivered goods or services on an existing purchase order and on any subsequent order placed during the Contract period. The Procurement Manager must be notified in writing of any price reduction within five (5) days of the effective date. Failure to report price reductions may result in cancellation of Contract for cause, pursuant to these Terms and Conditions.

The cost of all services as bid herein shall remain firm for the first year of the Contract. Costs for subsequent years and any extension term years shall be subject to an adjustment only if increases occur in the industry. However, unless very unusual and significant changes have occurred in the industry, such increases shall not exceed 5% per year or, the latest yearly percentage increase in the All Urban Consumers Price Index (CPI-U) (National) as published by the Bureau of Labor Statistics, U.S. Dept of Labor whichever is less. The yearly increase, or decrease in the CPI shall be that latest index published and available ninety (90) days prior to the end of the Contract year then in effect compared to the index for the same month one year prior. Any requested cost increase shall be fully documented and submitted to the City at least sixty (60) days prior to the Contract anniversary date. Any approved cost adjustments shall become effective upon the anniversary date of the Contract. In the event the CPI or industry costs decline, the City shall have the right to receive, from the Contractor, a reasonable reduction in costs that reflect such cost changes in the industry.

The City may, after examination, refuse to accept the adjusted costs if they are not properly documented, increases are considered to be excessive, or decreases are considered to be insufficient. In the event the City does not wish to accept the adjusted costs and the matter cannot be resolved to the satisfaction of the City, the Contract may be cancelled by the City upon giving thirty (30) days written notice to the Contractor.

4.11 SELLING, TRANSFERRING OR ASSIGNING RESPONSIBILITIES

The Contractor shall not sell, transfer or assign the performance required by this bid without the prior written consent of the City. Any Award issued pursuant to this bid and the monies

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which may become due hereunder are not assignable, unless the prior written approval of the City is obtained.

4.12 PAYMENT/BILLING INSTRUCTIONS

Payment will be made by the City after the items or services awarded have been, received, inspected, found to comply with award specifications, are free of damage or defect and are properly invoiced.

Invoices, unless otherwise indicated, must show Purchase Order Number and shall be submitted in duplicate to:

CITY OF SUNRISE,
Finance Department
10770 West Oakland Park Blvd.
Sunrise, FL 33351

Payment will be made within 30 days after delivery, authorized inspection and acceptance. The City is exempt from Federal and State Taxes for tangible personal property. The City will provide an exemption certificate to the Contractor upon request. The Contractor is not exempt from paying sales tax to the suppliers for materials to fulfill Contractual obligations with the City, nor is Contractor authorized to use the City's tax exemption Number in securing such materials.

4.13 PUBLIC ENTITY CRIMES

Please be informed that pursuant to Section 287.133(2)(a), Florida Statutes, "A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity; may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids, proposals, or replies on leases of real property to a public entity; may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity" in excess of the threshold amount provided in s. 287.017 for CATEGORY TWO for a period of 36 months following the date of being placed on the convicted vendor list." The submission of a bid shall constitute an affirmative representation of the Contractor to the City that the Contractor is aware of the Statute and in full compliance thereof.

4.14 COMPLIANCE WITH OCCUPATIONAL SAFETY AND HEALTH ACT

If applicable, Contractor certifies that all material, equipment, etc. contained in the bid meets all O.S.H.A. requirements. Bidder further certifies that if he/she is the successful Bidder, and the material, equipment, etc., delivered is subsequently found to be deficient in any O.S.H.A. requirement in effect on date of delivery, all costs necessary to bring the material, equipment, etc., into compliance with the aforementioned requirements shall be borne by Contractor.

4.15 SAFETY DATA SHEETS (SDS)

In compliance with federal standards and regulations listed under OSHA 29 CFR 1910.1200 Hazard Communication Standard with adopted Globally Harmonized System of

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Classification and Labeling of Chemicals when applicable, any item delivered from a Contract resulting from this bid must be accompanied by a Safety Data Sheet (SDS), if applicable. The SDS must contain the following information: 1. Product identifier used on the label and any other common names or synonyms by which the substance is known. 2. Hazard Identification and the appropriate warning information associated with those hazards. 3. Composition/Information on Ingredients in the product. 4. First-Aid Measures for initial care to individuals who have been exposed to the chemical. 5. Fire-Fighting Measures for fighting a fire caused by the chemical. 6. Accidental Release Measures with recommendations on appropriate spill, leak, or release response. 7. Handling and Storage for safe practice and conditions. 8. Exposure Controls/Personal Protection indicating exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure. 9. Physical and Chemical Properties of the substance or mixture. 10. Stability and Reactivity information of the chemical. 11. Toxicological Information identifying health effects and toxicology of the chemical.

4.16 STORAGE, REMOVAL AND DISPOSAL OF SOLID WASTE / CONSTRUCTION DEBRIS:

The Bidder must comply with Section 12-11 of the City Code, which reads as follows:

Sec. 12-11. - Construction sites.

All solid waste, including but not limited to construction and demolition waste, on construction sites shall be placed in a collection container on site while awaiting removal and disposal.

Mechanical containers for construction and demolition waste shall be obtained from the contractor and the name of the owner shall be clearly indicated on such containers. Only solid waste haulers that possess a franchise from the city may remove and dispose of solid waste from within the city.

4.17 NO DAMAGES FOR DELAY

The CONTRACTOR shall not be entitled to any claim for damages including, but not limited to, loss of profits, loss of use, home office overhead expenses, equipment rental and similar costs, on account of delays in the progress of the Project from any cause whatsoever including an act or neglect of the CITY, adverse weather conditions, and act of God, strike, war or national disaster or emergency, unusual delay in deliveries, unusual delay in procuring permits, differing site conditions, unavoidable casualties or other causes beyond the CONTRACTOR'S control, or by delay authorized by the CITY, or by other causes which the CONTRACTOR determines may justify delay. The CONTRACTOR'S sole recovery and sole remedy for any such delay shall be a reasonable extension of time and a revision to the Project Schedule as determined by the CITY. However, additional costs to the CONTRACTOR or delays in the CONTRACTOR'S performance caused by improperly timed activities shall not be the basis for granting a time extension. If the CONTRACTOR wishes to make a claim for an increase in time of performance, written notice of such claim shall be made to the CITY within ten (10) working days after the occurrence of the event, or the first appearance of the condition giving rise

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to such claim. The CITY'S representative shall determine whether or not the CONTRACTOR is entitled to a time extension for the delay. The failure of the CONTRACTOR to give such notice shall constitute a waiver of any claim under this section.

4.18 GOVERNING LAW AND VENUE

The Contract shall be governed by the laws of the State of Florida. Except as set forth in the indemnification section of the Contract should the Parties be involved in legal action arising under, or connected to this Contract, each party will be responsible for their own attorneys' fees and costs. The venue for any litigation will be Broward County, Florida. Both Parties hereby agree to waive a jury trial, and will proceed to a trial by judge if necessary.

4.19 DISCRIMINATORY VENDOR LIST

Pursuant to Section 287.134, Florida Statutes, an entity or affiliate who has been placed on the discriminatory vendor list may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity; may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids, proposals, or replies on leases of real property to a public entity; may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity. By execution of this Contract, Contractor represents that it has not been placed on the discriminatory vendor list as provided in Section 287.134, Florida Statutes.

4.20 SCRUTINIZED COMPANY

Pursuant to Section 287.135, Florida Statutes, Contractor certifies that it is not on the Scrutinized Companies that Boycott Israel List created pursuant to Section 215.4725, Florida Statutes and that it is not engaged in a boycott of Israel.

Pursuant to Section 287.135, in the event the Contract is for one million dollars or more, Contractor certifies that it is not on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List created pursuant to Section 215.473, Florida Statutes; and Contractor further certifies that it is not engaged in business operations in Cuba or Syria.

Pursuant to Section 287.135, Florida Statutes, City may, at the option of the City Commission, terminate this Contract if Contractor is found to have submitted a false certification as provided under subsection 287.135(5), Florida Statutes; has been placed on the Scrutinized Companies that Boycott Israel List, or is engaged in a boycott of Israel; has been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List; or has been engaged in business operations in Cuba or Syria.

4.21 PUBLIC RECORDS LAW

The CONTRACTOR shall comply with all applicable requirements contained in the Florida Public Records Law (Chapter 119, Florida Statutes), including but not limited to any applicable provisions in Section 119.0701, Florida Statutes. To the extent that the CONTRACTOR and this Contract are subject to the requirements in Section 119.0701,

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Florida Statutes, the CONTRACTOR shall: (a) keep and maintain public records required by the City to perform the services provided hereunder; (b) upon request from the City's custodian of public records, provide the City with a copy of the requested records or allow public records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes, or as otherwise provided by law; (c) ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed, except as authorized by law for the duration of the term of this Contract and following completion of this Contract if the CONTRACTOR does not transfer the records to the City; and (d) upon completion of the Contract, transfer, at no cost, to the City all public records in the possession of the CONTRACTOR or keep and maintain public records required by the City to perform the service. If the CONTRACTOR transfers all public records to the City upon completion of the Contract, the CONTRACTOR shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the CONTRACTOR keeps and maintains public records upon completion of the Contract, the CONTRACTOR shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City, upon request from the City's custodian of public records, in a format that is compatible with the information technology systems of the City. If the CONTRACTOR fails to comply with the requirements in this Section 4.19, the City may enforce these provisions in accordance with the terms of this Contract. If the CONTRACTOR fails to provide the public records to the City within a reasonable time, it may be subject to penalties under Section 119.10, Florida Statutes.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, THE CONTRACTOR SHOULD CONTACT THE CITY'S CUSTODIAN OF PUBLIC RECORDS: THE CITY CLERK, FELICIA M. BRAVO, BY TELEPHONE (954/746-3333), e-mail (CityClerk@[sunrisefl.gov](mailto:CityClerk@sunrisefl.gov)), or mail (City of Sunrise, Office of the City Clerk, 10770 West Oakland Park Boulevard, Sunrise, Florida 33351).

4.22 NONDISCRIMINATION

The Contractor warrants and represents that all of its employees are treated equally during employment without regard to race, color, national origin, sex, gender identity, sexual orientation, age, disability/handicap, religion, family or income status.

4.23 ELECTRONIC RECORD KEEPING

Bidder certifies their services and products meet all recordkeeping requirements of the State of Florida, including but not limited to those in Chapter 119, Florida Statutes and Rule 1B-26.003(6)(g), Florida Administrative Code.

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4.24 COMPLIANCE WITH LAWS

Bidder and the Services must comply with all applicable federal, state, and local laws, codes, ordinances, rules, and regulations including, without limitation, American with Disabilities Act, 42 U.S.C. § 12101, Section 504 of the Rehabilitation Act of 1973, and any related federal, state, or local laws, rules, and regulations.

4.25 E-VERIFY – EMPLOYMENT ELIGIBILITY

- 4.25.1 Contractor warrants and represents that it complies with Section 448.095, Florida Statutes, as may be amended. Contractor (1) has registered with and uses the E-Verify System (E-Verify.gov), to electronically verify the work authorization status of all newly hired employees; and (2) has verified that all of the Contractor's subcontractors performing the duties and obligations of this Contract are registered with and use the E-Verify System to electronically verify the employment eligibility of all newly hired workers.
- 4.25.2 Contractor shall obtain from each of its subcontractors an affidavit stating that the subcontractor does not employ, contract with, or subcontract with an Unauthorized Alien, as that term is defined in Section 448.095(1)(k), Florida Statutes, as may be amended. Contractor shall maintain a copy of any such affidavit from a subcontractor for, at a minimum, the duration of the subcontract and any extension thereof. This provision shall not supersede any provision of this Contract which requires a longer retention period.
- 4.25.3 City shall terminate this Contract if it has a good faith belief that Contractor has knowingly violated Section 448.09(1), Florida Statutes, as may be amended. If City has a good faith belief that Contractor's subcontractor has knowingly violated Section 448.09(1), Florida Statutes, as may be amended, City shall notify Contractor to terminate its contract with the subcontractor and Contractor shall immediately terminate its contract with the subcontractor.
- 4.25.4 If City terminates this Contract pursuant to the subsection 4.25.3 above, Contractor shall be barred from being awarded a future contract by City for a period of one (1) year from the date on which this Contract was terminated. In the event of such Contract termination, Contractor shall also be liable for any additional costs incurred by City as a result of the termination.

4.26 FOREIGN GIFTS AND CONTRACTS

Pursuant to Fla. Stat. §286.101(3), where the amount of the grant or contract is 100,000.00 or more, Contractor shall disclose any current or prior interest of, any contract with, or any grant or gift received from a country of foreign concern with a value of \$50,000 or more that was received or in force during the previous five (5) years. Definitions, disclosure requirements and exceptions are found in Fla. Stat. §268.101. Contractor represents and warrants it has complied with Fla. Stat. §286.101, it has properly disclosed such interests, contracts, grants or gifts to City

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before execution of this Contract, and it will remain in compliance with Fla. Stat. §286.101 for the duration of this Contract.

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SECTION 5 – SPECIAL TERMS AND CONDITIONS

5.1 CONTACT

The City's representative/liaison during the performance of this contract shall be Stanley Edwards, Director of Field Operations, telephone number (954) 888-6021 or designee.

The Contractor's representative/liaison during the performance of this contract shall be the authorized agent signing the Bid.

5.2 PAYMENTS

The Contractor will bill the City monthly partial payments based on percent (%) of the value of the items and/or partial services received, installed and accepted toward the completion of the work defined herein at the rates listed in Schedule A. Submit invoices to:

City of Sunrise
Attn: Accounts Payable Dept.
10770 W. Oakland Park Blvd.
Sunrise, FL 33351

Invoices received from the Contractor pursuant to this contract will be reviewed and approved by the City's representative, indicating that services have been rendered in conformity with the contract and then will be sent to the Finance Department for payment. Invoices will generally be paid within thirty (30) days following the City representative's approval.

Final Invoice: In order for both parties herein to close their books and records, the Contractor will clearly state "final invoice" on the Contractor's final/last billing to the City. This certifies that all services have been properly performed and all charges and costs have been invoiced to the City. Since this account will thereupon be closed, any and other further charges, if not properly included on this final invoice, or which are in excess of the not to exceed amount, are waived by the Contractor.

5.3 ACCESS AND AUDITS

The Contractor shall maintain adequate records related to all charges, expenses, and costs incurred in estimating and performing the work for at least three (3) years after completion of this Contract. The City shall have access to such books, records, and documents as required in this section for the purpose of inspection or audit during normal business hours, at the Contractor's place of business.

5.4 PERFORMANCE AND PAYMENT BOND

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The City may, at its sole discretion, require the successful Contractor to supply a Performance and Payment Bond equal to 100% of the project value, for projects over \$100,000. If the City determines that a Performance and Payment Bond is required, the original bond shall be submitted prior to commencement of work and/or the delivery of any materials. Not all projects will require a bond; however, failure to provide a Performance and Payment Bond for projects when required shall preclude the Contractor(s) from performing any work on that project regardless of any approved authorized task. The Contractor's failure to produce a Performance and Payment Bond on projects when required may be considered failure to perform under the contract.

Each bond shall set forth a penal sum in an amount not less than One Hundred percent (100%) of the work order amount. Each bond furnished by the successful Contractor shall incorporate by reference the terms of said work order as fully as though they were set forth verbatim in such bonds. In the event the awarded Bid amount is adjusted by a Change Order executed by the Contractor, the penal sum of the Performance and Payment Bond shall be deemed increased by like amount. The Performance and Payment Bond furnished by the Contractor shall be in a form acceptable by the City and shall be executed by a surety, or sureties, reasonably suitable to the City.

Performance and Payment Bond will only be returned upon the Contractor's written request after one (1) year from the date of final completion of the project and shall be addressed to the Office of the City Clerk, 4th Floor, 10770 W. Oakland Park Blvd, Sunrise, FL 33351

5.5 INDEPENDENT CONTRACTOR

The Contractor is an independent contractor under this Contract. Personal services provided by the Contractor shall be by employees of the Contractor who are subject to supervision by the Contractor, and who shall not be officers, employees, or agents of the City. Personnel policies, tax responsibilities, purchasing policies and other similar administrative procedures applicable to Services rendered under this Contract shall be those of the Contractor.

5.6. AUTHORITY TO PRACTICE

The Contractor hereby represents and warrants that it has and will continue to maintain all licenses and approvals required to conduct its business, and that it will at all times conduct its business activities in a reputable manner. Proof of such licenses and approvals shall be submitted to the City's representative upon request.

5.7. SEVERABILITY

If any term or provision of this Contract or the application thereof to any person or circumstances shall, to any extent, be held invalid or unenforceable, the remainder of this Contract, or the application of such terms or provision to persons or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected, and every

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other term and provision of this Contract shall be deemed valid and enforceable to the extent permitted by law.

5.8 SUCCESSORS AND ASSIGNS

The City and Contractor bind themselves, their successors, assigns and legal Representatives to the other party hereto and to successors, assigns and legal Representatives of such other party in respect to covenants, agreements and obligations contained in this Contract. The Contractor shall not assign this Contract without written consent of the City.

5.9 SUBCONTRACTING

The City reserves the right to accept the use of a subcontractor, or to reject the selection of a particular subcontractor and to inspect all facilities of any subcontractor in order to make a determination as to the capability of the subcontractor to perform properly under this Contract. If a subcontractor fails to perform or make progress, as required by this Contract, and it is necessary to replace the subcontractor to complete the work in a timely fashion, the Consultant shall promptly do so, subject to acceptance of the new subcontractor by the City.

5.10 CONFLICT OF INTEREST

The Contractor represents that it presently has no interest and shall acquire no interest, either direct or indirect, which would conflict in any manner with the performance or Services required hereunder, as provided for in Section 112.311, Florida Statutes. The Contractor further represents that no person having any interest shall be employed for said performance. Contractor shall ensure that it and its subcontractors comply with Chapter 10, Article II, of the City Code, which contains the City of Sunrise Code of Ethics.

5.11 CONTINGENT FEES

The Contractor warrants that it has not employed or retained any company or person, other than a bona fide employee working solely for the Contractor to solicit or secure this Contract and that it has not paid or agreed to pay any person, company, corporation, individual, or firm, other than a bona fide employee working solely for the Contractor, any fee, commission, percentage, gift, or any other consideration contingent upon or resulting from the award or making of this Contract.

5.12 MODIFICATIONS OF WORK

If the City requires miscellaneous additional work, Services or materials not delineated in the Contractor's Proposal but within the general Scope of Service, the Contractor shall submit a detailed written proposal to the authorized City representative. If the proposal is approved, the Contractor shall receive authorization to proceed by receipt of a purchase

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order incorporating the Contractor's proposal.

The City reserves the right to make changes in the Scope of Service, including alterations, reductions therein or additions thereto. Upon receipt by the Contractor of the City's notification of a contemplated change, the Contractor shall, in writing: (1) provide a detailed estimate for the increase or decrease in cost due to the contemplated change, (2) notify the City of any estimated change in the completion date, and (3) advise the City if the contemplated change shall affect the Contractor's ability to meet the completion dates or schedules of this Contract. The parties agree to negotiate in good faith changes in the Scope of Service that may occur.

If the City so instructs in writing, the Contractor shall suspend work on that portion of the Scope of Service affected by a contemplated change, pending the City's decision to proceed with the change. If the City elects to make the change, the City shall initiate a Contract Amendment and the Contractor shall not commence work on any such change until such written amendment is signed by the Contractor and approved and executed by the City's representative and Procurement Manager.

5.13 NOTICE

All written notices required in this Contract shall be sent by overnight mail or by certified mail, return receipt requested, to the following addresses:

To City:

Procurement Manager
City of Sunrise
10770 W. Oakland Park Blvd.
Sunrise, FL 33351

cc: City Attorneys' Office
City of Sunrise
10770 W. Oakland Park Blvd.
Sunrise, FL 33351

To Consultant:

Mailing Address on Certification Form

5.14 ENTIRETY OF CONTRACT

The City and the Contractor agree that this Contract sets forth the entire Contract between the parties, and that there are no promises or understandings other than those stated herein. None of the provisions, terms and conditions contained in this Contract may be added to, modified, superseded or otherwise altered, except by written instrument executed by the parties hereto with the same formality as this Contract. Any alteration of the terms

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and conditions of this Contract must be contained in the Deviation Page after approval by the City Attorney and executed by the Contractor and City to be binding.

5.15 SAFETY AND PROTECTION OF PROPERTY

The Contractor shall take all reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to, its employees on the Work and all other persons who may be affected thereby; the Work and materials and equipment to be incorporated therein; and all other property at the site or adjacent thereto including, but not limited to, trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction. The Contractor shall comply with all applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss, and shall give all notices required by same; this requirement includes, but is not limited to, the United States Occupational Safety and Health Act and the Florida Trench Safety Act, Fla. Stat. § 553.60.

5.16 BARRICADES

The Contractor shall provide all barricades and/or protective safety devices and shall take all necessary precautions to protect all personnel and property. The Contractor shall remove said barricades and/ or safety devices from City property at the completion of the project.

5.17 PERMITS AND FEES

The Contractor shall procure and pay for all permits and licenses, charges and fees and give all notices necessary and incidental to the due and lawful prosecution of the work. The cost of all permits, fees, etc. shall be paid under the Allowance Item.

5.18 EMERGENCIES

In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the City or the City's authorized representative, is obligated to immediately act to prevent threatened damage, injury, or loss. The Contractor shall give the City's authorized representative(s) written documentation within three (3) days from the inception of said emergency if the Contractor believes that any significant changes in the Work or variations from the contract documents have been caused thereby. If the City's authorized representative determines that a change in the contract documents is required because of action taken by the Contractor in response to such an emergency, a Change Order will be issued to document the consequences of such action.

5.19 SECURITY

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All personnel shall report to the Security Guard or Operator on duty at any each site for check-in upon arrival at any Utility location. Photo identification of person, their purpose of visit and contact person at Utilities who will accompany while on City property shall be required for entry. Upon leaving the premises, all personnel shall be required to check out with the Security Guard or Operator on duty. Contractor shall be responsible for complying with these procedures. The Contractor shall be required to complete and return a Vendor Pass Request, if applicable.

5.20 TIME AND LIQUIDATED DAMAGES

This section is to be used on applicable work orders, determined by the City. The City shall notify the Contractor in writing of the date on which the Work shall begin ("the Notice to Proceed Date"). The Contractor shall commence site activities on the Notice to Proceed Date, and the Work shall be carried on regularly and without interruption. The Contractor shall achieve Substantial Completion of the Work no later than ___ calendar days after the Notice to Proceed Date. The number of calendar days from the Notice to Proceed Date, through the date set forth for Substantial Completion, shall constitute the "Contract Time." The Contractor shall furthermore achieve Final Completion of the Work no later than one (1) calendar days after date of Substantial Completion.

The Contractor shall pay the City the sum of ___ Dollars (\$____.00) per day for each and every calendar day of unexcused delay in achieving Substantial Completion beyond the date set forth herein for Substantial Completion of the Work. Further, the Contractor shall pay the City sum of ___ Dollars (\$____.00) per day for each and every calendar day of unexcused delay in achieving Final Completion of the work beyond the number of days set forth in the work order.

Any sums due and payable hereunder by the Contractor shall be payable, not as a penalty, but as liquidated damages representing an estimate of delay damages likely to be sustained by the City, estimated at or before the time of executing this Contract. When the City reasonably believes that Substantial Completion will be inexcusably delayed, the City shall be entitled, but not required, to withhold from any amounts otherwise due the Contractor an amount then believed by the City to be adequate to recover liquidated damages applicable to such delays.

5.21 SUBSTANTIAL COMPLETION

"Substantial Completion" shall mean that stage in the progression of the Work when the Work is sufficiently complete in accordance with this Contract that the City can enjoy beneficial use or occupancy of the Work and can utilize the Work for its intended purpose. A condition precedent for the achievement of Substantial Completion is the receipt by the City of any and all Certificates of Occupancy or other authorizations required for occupancy by any governmental or regulatory authority.

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5.22 TIME IS OF THE ESSENCE

All limitations of time set forth in the Contract Documents are of the essence of this Contract.

5.23 LICENSES

All Contractors are to submit with their Invitation For Bid a copy of all licenses required to construct the Project along with such other information as the City may require to verify that the Contractor is responsible and capable of completing the work.

5.24 CONTRACTOR QUALIFICATIONS

The Contractor, including their subcontractors and material suppliers, performing or supplying this Work shall be reputable firms regularly engaged in this type of work with skilled workers and equipment capable of making a first-class installation in accordance with acceptable standards and practices.

A purchase order will only be issued to a Contractor qualified by experience and deemed acceptable to the City.

A list of all projects similar in size and scope completed during the last three years shall be submitted by the Contractor with this Invitation for Bid. The list shall include location of project, dates of contracts, names and addresses of owners, contact person and telephone number.

All Contractors, firms, subcontractors, etc. performing work under this contract must meet the criteria on section 1 of bid document. Certified copies of such licenses, registrations and/or certifications shall be filed with the City prior to the Commencement of the Work.

5.25 ADDITIONAL PRICING

The items on the Bid Form are common items needed and are being used as a means to determine the two (2) lowest responsive and responsible bidders. When those items are required, the Unit Prices shall govern.

When testing or repairs services require pricing not specified in the Items of Bid, each Contractor shall submit a detailed written proposal with a total cost, broken down for labor and material. The authorized City Representative will evaluate the proposals, determine if the pricing is fair and reasonable and will issue a Purchase Order to the successful Contractor.

5.26 COMMENCEMENT DATE AND TIME OF COMPLETION

On or after the award of the Contract, the City shall notify the Contractor of the date on

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which the Work shall commence "the Commencement Date". For non-emergencies, the Contractor shall receive no less than two (2) working days' notice of the Commencement Date. In cases of emergency, the City will notify the Contractor prior to submission of proposals, and the Contractor shall respond in the time requested. The Contractor shall commence work on the Commencement Date, and the Work shall be carried on regularly and without interruption, and the Contractor shall achieve Completion of the Work no later than the number of calendar days specified in the Contractor's proposal that has been accepted and approved by the City.

5.27 MATERIALS, INSTALLATION AND PERFORMANCE

The Contractor shall be responsible for the provision, installation and performance of all equipment, materials, services, etc. offered in their Bid. The Contractor is in no way relieved of the responsibility for the performance of all equipment furnished or of assuring the timely delivery of materials, equipment, etc. even though it is not of their own manufacture. Unless otherwise specified, material storage shall be on site and within the defined area of the Work and within the Contractor's area of responsibility.

5.28 AUTHORIZED MANUFACTURER'S INSTALLATIONS

Installation of any manufacturer's proprietary systems, products or equipment, specified or approved for this project, shall be performed by duly authorized and approved manufacturer's representatives, dealers, applicators or installers if same is a condition of special, standard or implied manufacturer's warranty. Certification of said authorization shall be submitted to the City upon request.

5.29 SUBCONTRACTING

Each Contractor shall submit, on the form provided herein, a list of subcontractors to be used on the Project with their bid. Within Thirty (30) days after receipt of such list the City shall state in writing any objections it may have to any proposed subcontractor.

The Prime Contractor shall not subcontract the Work or portions of the Work in excess of 75% of the Contract amount. Reciprocally, at least 25% of the Work shall be performed by the Prime Contractor's own on-payroll forces.

The successful Contractor shall not enter into a subcontract with any proposed subcontractor with reference to whom the City has made timely objection. After submittal of the list of subcontractors, no variance in subcontractors will be allowed without prior written acceptance and authorization by the City.

The Contractor shall have a competent superintendent, supervisor, or foreman on the job when any work is being performed. Subcontractors shall NOT be used in these capacities. No subcontract or sub-trade work shall be done without a project superintendent, supervisor or foreman AND a competent trades supervisor on the job.

BID TITLE: Lift Station Rehabilitation and Repair Services

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No subcontractors, suppliers or superintendents shall be used after reasonable objection.

5.30 CHANGES IN THE WORK

Changes in the work consist of additions, revisions, deletions or any combination thereof without invalidating this Contract, by written Change Order to the Purchase Order. The awarded Bid price and/or specified completion time may only be changed by a properly executed written Change Order.

If the Contractor encounters unforeseen conditions, the Contractor shall inform the City and its authorized City representative(s) of the situation within Seventy-Two (72) consecutive hours and suggest solutions to resolve the situation. Further, the Contractor must give the City and its authorized representative(s) an opportunity to observe said unforeseen conditions prior to commencement of any changes. The Contractor shall quantify their response by informing the City and its authorized representative(s) of any additional costs and/or additional time required for the added or changed Work.

5.31 AS SPECIFIED

A purchase order will be issued to the successful Contractor with the understanding that all items delivered and installed must meet the specifications herein. Items delivered and/or installed not as specified will be returned at no expense to the City, and the Contractor will be required to deliver and install the items per the specifications.

5.32 CITY'S RIGHT TO STOP WORK

If the Contractor persistently fails or refuses to perform the Work in accordance with the contract documents, the City shall have the right, but not an obligation, to order the Contractor to stop the Work, or any described portion thereof, until the cause for stoppage has been corrected, no longer exists, or the City orders that the Work be resumed. In such event, the Contractor shall immediately obey such order. A stop work directive provided under this paragraph shall not entitle the Contractor to an extension of the completion date.

5.33 CITY'S RIGHT TO PERFORM WORK

If the Contractor's Work is stopped by the City, or if the Contractor persistently fails or refuses to perform the Work in accordance with the contract documents, and the Contractor fails within Three (3) working days of such stoppage, failure, or refusal, to provide adequate assurance to the City that the cause of such stoppage, failure, or refusal will be eliminated or corrected, then the City may, without prejudice to any other rights or remedies the City may have against the Contractor, proceed to carry out the subject Work. In such a situation, an appropriate Change Order shall be issued deducting from the contract price the cost of correcting the subject deficiencies, plus compensation for the City's Consultant's additional services and expenses necessitated thereby, if any. If the unpaid portion of the contract

BID TITLE: Lift Station Rehabilitation and Repair Services

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price is insufficient to cover the amount due the City, the Contractor shall pay the difference to the City.

5.34 FINAL PAYMENT

The "Final Payment" will not be processed until the entire project has been accepted by the CITY and all of the requirements in Article 1.3 "Final Submittals", section 01700 of the Technical Specifications, have been satisfied.

5.35 INVESTIGATIONS OF CONDITIONS AFFECTING OPERATIONS

Before submitting a Bid, each Bidder shall make all investigations and examinations necessary to ascertain conditions and requirements of the Bid. Failure to make investigations and examinations shall not relieve the successful Bidder from the obligation to comply in every detail with all provisions and requirements of the Bid nor shall it be a basis for any claim whatsoever for alteration in any term of or payment required by the Purchase Order or any subsequent Contract.

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SECTION 6 – BID SUBMISSION PACKAGE
BID SUBMISSION CHECK LIST

COMPANY NAME: (Please Print): _____
Phone: _____ Fax: _____

BEFORE SUBMITTING YOUR BID, MAKE SURE YOU...

- _____ 1. Carefully read the SPECIFICATIONS.
- _____ 2. Properly fill out the BID SHEET and CERTIFICATION PAGE and (Schedule "A"). Upload Bid Form in Excel Format to www.demandstar.com
- _____ 3. Fill out and sign the NON-COLLUSION AFFIDAVIT (Schedule "B") and have it properly notarized.
- _____ 4. Sign the VENDOR DRUG FREE STATEMENT (Schedule "C").
- _____ 5. Fill out the VENDOR QUALIFICATION STATEMENT (Schedule "D"), if required.
- _____ 6. Include WARRANTY INFORMATION FORM AND EXHIBITS (Schedule "E"), if required.
- _____ 7. CHECK THE INSURANCE and LICENSE requirements to be sure you comply, and submit PROOF of INSURANCES or LICENSES, if required, with your Bid (Schedule "F").
- _____ 8. Complete STATEMENT OF NO BID (Schedule "G"), if applicable.
- _____ 9. Submit Electronically.
- n/a 10. Include a Bid Bond, if applicable.
- _____ 11. Make sure your BID is submitted prior to the deadline. Late Bids will not be accepted.

FAILURE TO PROVIDE THE REQUESTED SCHEDULES MAY RESULT IN YOUR BID BEING DEEMED NON-RESPONSIVE.
THIS PAGE AND THE FOLLOWING PAGES ARE TO BE RETURNED WITH YOUR BID.

THIS SHOULD BE THE FIRST PAGE OF YOUR BID.

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS ^{Exhibit "A"}

SECTION 6 – BID SUBMISSION PACKAGE

SCHEDULE "A"
CITY OF SUNRISE
BID SHEET & CERTIFICATION

Please go to www.Demandstar.com to download Schedule "A" – Bid Sheet & Certification form, fill out and upload as part of your bid response along with rest of schedules provided below.

1-Upload filled out Schedule A in Excel format to Demanstar.com.

2-Print filled out Schedule A, sign and upload to Demandstar.com.

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS **Exhibit "A"**

SCHEDULE "B"
CITY OF SUNRISE
NON-COLLUSION AFFIDAVIT

This affidavit is to be filled in, executed and notarized by the Bidder. If the bid is made by a Corporation, then it should be executed by its Chief Officer. This document MUST be submitted with the bid.

STATE OF _____)
) SS
 COUNTY OF _____)

_____, being first duly sworn, deposes and says
 that
(Type or print name of person who is signing below)

1. He/she is the _____ (*Owner, Partner, Officer, Representative or Agent*)
 of the Bidder that has submitted the attached Bid.
2. He/she is fully informed with respect to the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid.
3. Said Bid is made without any connection or common interest in the profits with any other persons making a Bid for the said commodities/services. Said Bid is on our part in all respects fair and without collusion or fraud. No head of any department, any employee or any officer of the City of Sunrise is directly or indirectly interested therein. If any relatives are employed by the City, indicate name and relationship below.

Name: _____ Relationship: _____
 Name: _____ Relationship: _____

Company Name: _____

Bidder's Authorized Signature: _____

STATE OF FLORIDA
 COUNTY OF BROWARD

Sworn to (or affirmed) and subscribed before me by means of ☐ physical presence or ☐ online notarization, this
 ____ day of _____, 20____, by _____, as _____ (title) of
 _____ (Company).

(SEAL)

 Signature of Notary Public – State of Florida

 Print, type or stamp commissioned name of Notary Public

Personally Known OR Produced Identification

Type of Identification Produced _____

SCHEDULE "C"
CITY OF SUNRISE**BIDDER'S DRUG - FREE WORKPLACE CERTIFICATION**

Preference may be given to Vendors submitting a certification with their bid/Bid certifying they have a drug-free workplace in accordance with Section 287.087, Florida Statutes. This requirement affects all public entities of the State and becomes effective January 1, 1991. The special condition is as follows: IDENTICAL SUBMISSIONS - Preference may be given to businesses with drug-free workplace programs. Whenever two or more bids, Bids or replies which are equal with respect to price, quality, and service are received by the State or by any political subdivision for the procurement of commodities or Contractual services, a bid received from a business that certifies that it has implemented a drug-free workplace program shall be given preference in the award process. Established procedures for processing tie bids will be followed if none of the tied Vendors have a drug-free workplace program. In order to have a drug-free workplace program, a business shall:

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or Contractual services that are under bid a copy of the statement specified in subsection (1).
4. In the statement specified in subsection (1), notify the employees that, as a condition of working on the commodities or Contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.
5. Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.
6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section. As the person authorized to sign the statement, I certify that this Vendor complies fully with the above requirements.

I hereby certify that the company submitting this Bid has established a Drug Free work place program in accordance with State Statute 287.087

VENDOR'S SIGNATURE

COMPANY'S NAME
SCHEDULE "D"
CITY OF SUNRISE

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS ^{Exhibit "A"}**BIDDER'S QUALIFICATION STATEMENT**

The undersigned certifies under oath the truth and correctness of all statements and all answers to questions made hereinafter:

Company

Name: _____

Address: _____

_____	Street	_____	City	_____	State	_____	Zip Code

Telephone:(____) _____ Fax:(____) _____ E-

Mail: _____

Web Site: _____

How many years has your organization been in business under its present name? _____ Yes

If Bidder is operating under Fictitious Name, submit evidence of compliance with Florida Fictitious Name Statute:

Under what former names has your business operated? :

At what address was that business located?

Are You Certified? Yes _____ No _____ If Yes, ATTACH COPY OF LICENSE

Are You Licensed? Yes _____ No _____ If Yes, ATTACH COPY OF LICENSE

Has your company or its senior officers ever declared bankruptcy?

Yes _____ No _____ If yes, explain:

Are you a sales representative, _____ distributor, _____ broker, _____ manufacturer _____ of the commodities/services bid upon?

Have you ever received a Contract or a Purchase Order from the City of Sunrise or other government entity? Yes _____ No _____ If Yes, explain (date, service/project, bid title, etc.) _____

Have you ever received a complaint on a Contract or bid awarded to you by any government entity?

Yes _____ No _____ if yes, explain:

Have you ever been debarred or suspended from doing business with any government entity?

Yes _____ No _____ If Yes,

explain _____

BID TITLE: Lift Station Rehabilitation and Repair Services

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Please identify each incident within the last five (5) years where a civil, criminal, administrative, other similar proceeding was filed or is pending; if such proceeding arises from or is a dispute concerning the Consultant's rights, remedies or duties under a Contract for the same or similar type services to be provided under this Bid:

(Attach additional sheets as necessary)

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS **Exhibit "A"**

SCHEDULE "D"
(Continued)
REFERENCES:

List all pertinent government agencies and private firm(s) with whom you have done business within the past three (3) years:

Agency/Firm Name: _____	Agency/Firm Name: _____
Address: _____	Address: _____
City/State/Zip Code: _____	City/State/Zip Code: _____
Phone: _____	Phone: _____
Fax: _____	Fax: _____
Contact: _____	Contact: _____
E-Mail: _____	E-Mail: _____

Agency/Firm Name: _____	Agency/Firm Name: _____
Address: _____	Address: _____
City/State/Zip Code: _____	City/State/Zip Code: _____
Phone: _____	Phone: _____
Fax: _____	Fax: _____
Contact: _____	Contact: _____
E-Mail: _____	E-Mail: _____

Agency/Firm Name: _____	Agency/Firm Name: _____
Address: _____	Address: _____
City/State/Zip Code: _____	City/State/Zip Code: _____
Phone: _____	Phone: _____
Fax: _____	Fax: _____
Contact: _____	Contact: _____
E-Mail: _____	E-Mail: _____

YOUR COMPANY NAME _____

ADDRESS _____

PHONE: _____ **FAX:** _____

EMAIL: _____

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS Exhibit "A"

SCHEDULE "E"
CITY OF SUNRISE

WARRANTY INFORMATION FORM

ALL BLANKS SHOULD BE FILLED IN AND SUBMITTED WITH BID
MINIMUM WARRANTY SHALL BE AS SPECIFIED HEREIN

MAKE AND MODEL OF ITEM PROPOSED:

DOES WARRANTY APPLY TO ENTIRE PACKAGE OR ONLY TO SPECIFIC PARTS? (State Explicitly)

DOES WARRANTY INCLUDE LABOR FOR REPLACEMENT OF DEFECTIVE PARTS?

_____ YES _____ NO

WARRANTY PERIOD FOR PARTS REPLACEMENT _____

WHO WILL PROVIDE LABOR, AND WHERE, IN THE EVENT OF FAILURE WITHIN WARRANTY PERIOD? _____

TELEPHONE: _____ FAX: _____
EMAIL: _____

NEAREST SOURCE TO THE CITY OF SUNRISE FOR PARTS AND SERVICE AFTER WARRANTY PERIOD:

TELEPHONE: _____ FAX: _____
EMAIL: _____

A COPY OF COMPLETE WARRANTY STATEMENT IS SUBMITTED HERewith:

_____ YES _____ NO

NAME OF BIDDER: _____

SIGNATURE AND TITLE: _____

TELEPHONE: _____ FAX: _____

DATE: _____

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS ^{Exhibit "A"}

SCHEDULE "F"
CITY OF SUNRISE

PROOF OF INSURANCE, REQUIRED LICENSES AND CERTIFICATIONS

ATTENTION BIDDER:

ATTACH TO SCHEDULE "F":

1. PROOF OF INSURANCE AS SPECIFIED HEREIN
2. COPIES OF LICENSES, IF APPLICABLE
3. IRS FORM W-9
4. Proof firm is registered with the E-Verify system.

NOTE: Only the successful Bidder shall be required to provide a Certificate of Insurance naming the City of Sunrise as additional insured.

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS **Exhibit "A"**

**SCHEDULE “G”
CITY OF SUNRISE**

STATEMENT OF NO BID

NOTE: If you do not intend to bid on this solicitation, please return this form immediately. Failure to return this form may result in your name being removed from the list of qualified Bidders for the City of Sunrise. Please indicate bid name and number on the outside of the envelope. Thank you.

MAIL TO: CITY OF SUNRISE
10770 W. OAKLAND PARK BLVD.
SUNRISE, FL 33351
ATTN: CITY CLERK'S OFFICE

We, the undersigned have declined to bid for the following reason:

- _____ Specification too "tight," i.e., geared toward one brand or manufacturer only (explain below).
- _____ Insufficient time to respond to the Invitation for Bid.
- _____ We do not offer this product or an equivalent.
- _____ Our product schedule would not permit us to perform.
- _____ Unable to meet specifications.
- _____ Unable to meet Bond requirements.
- _____ Specification unclear (explain below).
- _____ Other (specify below).

REMARKS:

COMPANY NAME: _____

SIGNATURE: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

TELEPHONE NUMBER: _____

FAX NUMBER: _____

E MAIL: _____

SCHEDULE “H”
CITY OF SUNRISE
VENDOR PASS REQUEST

Vendor Name _____

Vendor Address _____

Vendor Contact Name _____

Vendor Contact Phone Number _____

Vendor Contact Email Address _____

List of Contractor Employees Requiring Entry to City of Sunrise Utility Facilities
Attach copy of Picture Identification (State/Federal/Passport) for all persons listed

List beginning month required _____
List project ending date (month & year)_____

Name (First Last)	Work to be Performed

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS ^{Exhibit "A"}

SCHEDULE "I"
CITY OF SUNRISE
LIST OF SUPERVISORY PERSONNEL TO BE DIRECTLY INVOLVED WITH
THE PROJECT AND SPECIALTY TECHNICIANS

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS ^{Exhibit "A"}

**SCHEDULE “J”
CITY OF SUNRISE
TRENCH SAFETY FORM**

THIS FORM MUST BE COMPLETED AND SIGNED BY THE CONTRACTOR.
FAILURE TO COMPLETE THIS FORM MAY RESULT IN THE BID BEING
DECLARED NON-RESPONSIVE.

Contractor acknowledges that the Florida Trench Safety Act, Florida State Statutes Section 553.60 to 553.64 et. seq., which became effective October 1, 1990, shall be in effect during the period of construction of the project. The Contractor, by signing and submitting the bid, assures that the Contractor will perform trench excavations in accordance with applicable trench safety standards. The Contractor further identifies the following separate item of cost of compliance with the applicable trench safety standards as well as the method of compliance:

Method of Compliance

Amount: Total \$ _____

Contractor acknowledges that this amount is included in the applicable items of the Proposal and in the Grand Total Bid Price.

The Contractor is, and the Owner and Engineer are not, responsible to review and assess all safety precautions, programs and costs, and the means, methods, techniques or technique adequacy, reasonableness of cost, sequences and procedures of any safety precaution, including, but not limited to, compliance with any and all requirements of Florida Statutes Section 553.60 to 553.64 et. seq. cited as the “Trench Safety Act”. Contractor is, responsible to determine any safety or safety related standards that apply to the project.

Authorized Contractor Signature

Printed Name

Title

Date

END OF DOCUMENT

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

Exhibit "A"

**SCHEDULE “K”
CITY OF SUNRISE
LIST OF SUBCONTRACTORS**

For any major trades, all Contractors must provide the following information: the individual's or company's name, address and phone number and submit the information on this page with their Invitation for Bid. Failure to do so may result in your Bid being deemed non-responsive. (Attach additional pages, if required).

1. TRADE:(%)__

Company Name/Phone Number

Address

2. TRADE: (%)__

Company Name/Phone Number

Address

3. TRADE: (%)__

Company Name/Phone Number

Address

4. TRADE:

Company Name/Phone Number

Address

5. TRADE:

Company Name/Phone Number

Address

CONTRACTOR'S COMPANY NAME: _____

AUTHORIZED SIGNATURE: _____

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

SCHEDULE "L"
CITY OF SUNRISE
CERTIFICATION OF OPPORTUNITY TO SUBCONTRACTORS

TO THE CITY OF SUNRISE:

I _____, (Contractor), hereby certifies that as Contractor for a Project identified as _____, it has provided the opportunity to all potential Sub-Contractors and potential suppliers of goods and/or services to review the entire bid package which includes terms, conditions, plans, specifications, addenda and any other documents contained in the bid package.

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

SCHEDULE "M"
CITY OF SUNRISE
PUBLIC CONSTRUCTION BOND

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

PUBLIC CONSTRUCTION BOND

(100% of Contract Price)

City of Sunrise Contract Number: _____ Surety Bond Number: _____

BY THIS BOND, We [Name, Address and Telephone Number of Contractor], as Principal

, and [Name, Address and Telephone Number of Surety] __________,
a corporation, as Surety, are bound to CITY OF SUNRISE, FLORIDA, a Municipal Corporation of
the State of Florida, 10770 West Oakland Park, Sunrise, Florida, 33351 (954) 572-2274), herein
called Owner, in the sum of _____ Dollars
(\$_____), for payment for which we bind ourselves, our heirs, personal
representatives, successors, and assigns, jointly and severally.

THE CONDITION OF THIS BOND is that if Principal:

1. Performs the Contract dated _____, between Principal and
Owner for construction of _____, the
Contract being made a part of this bond by reference, at the times and manner prescribed in the
contract; and
2. Promptly makes payments to all claimants, as defined in Section 255.05(1), Florida
Statutes, supplying Principal with labor, materials, or supplies, used directly or indirectly by Principal
in the prosecution of the work provided for in the Contract; and
3. Pays Owner all losses, damages, expenses, costs, and attorneys' fees, including
appellate proceedings, that Owner sustains because of a default by Principal under the Contract;
and
4. Performs the guarantee of all work and materials furnished under the Contract for the
time specified in the Contract, then this bond is void; otherwise it remains in full force.

Any action instituted by a claimant under this bond for payment must be in accordance with
the notice and time limitation provisions in Section 255.05(2), Florida Statutes.Any changes in or under the Contract documents and compliance or noncompliance with
any formalities connected with the Contract or the changes does not affect Surety's obligation
under this bond.

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

IN WITNESS WHEREOF, the PRINCIPAL and the SURETY have hereunto affixed their corporate seals and caused this obligation to be signed by their duly authorized officers or attorneys-in-fact, this _____ day of _____, 20_____.

Signed and Sealed in
the Presence of:

[Name of PRINCIPAL]

By: _____(SEAL)

[Corporate Title]

(Principal Place of
Business Address)

Signed and Sealed in
the Presence of:

[Name of SURETY]

By: _____

Attorney-in-Fact for SURETY

(Principal Place of
Business Address)

NOTE: Power of attorney and certification of authority for issuance and current status thereof for Attorney-in-Fact and for Surety Company must be attached.

Proof that Surety is licensed to transact business in the State of Florida must be submitted with this Bond

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

SCHEDULE "N"
CITY OF SUNRISE**FINAL RECEIPT AND RELEASE**

Project: _____

_____ ("the Project").

COMES NOW, _____, the Contractor on the above referenced Project, who herein acknowledges receipt of final payment for any and all work performed, and any and all labor, materials, equipment, or supplies furnished, under its contract with the City of Sunrise, Florida (the "City"), the same being dated the ____ day of _____, 20____. The undersigned does further acknowledge that said Final Payment includes payment for any and all change orders, claims, extras, damages, or liabilities, of every kind and nature, arising out of, or relating to, the performance by the undersigned of the aforesaid contract. The Contractor does herein release and forever discharge and acquit the City from any and all claims, damages, or liabilities, of every kind and nature, arising out of or relating to, the performance of the aforesaid contract. The Contractor expressly represents and warrants that it has paid in full all subcontractors, laborers, materialmen, suppliers, and others who furnished labor, materials, supplies, equipment, or work on the Project.

The undersigned acknowledges and represents that the City is, or has, made final payment to the undersigned in reliance upon the truth and accuracy of the statements, representations, and warranties contained herein.

CONTRACTOR

By: _____

Sworn to and subscribed before
me this ____ day of _____, 20____.

BID TITLE: Lift Station Rehabilitation and Repair Services

BID NUMBER: 22-17-03-MS

SECTION 7 – TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

DIVISION 1

GENERAL REQUIREMENTS

SECTION 01001
GENERAL REQUIREMENTS

PART 1 PROJECT DESCRIPTION

1.1 GENERAL

- A. A brief description of the work is stated in the Invitation to Bid. To determine the full scope of the Project or any particular part of the Project, coordinate the applicable information in these Contract Documents.
- B. The Work under this Contract shall be performed by the CONTRACTOR as required by the OWNER. Work will be authorized in the form of a Notice to Proceed issued to the CONTRACTOR. The CONTRACTOR shall complete all work in the Contract within the number of calendar days stipulated in the Contract unless an extension in the time of completion is granted by the OWNER. Upon completion of the work and compliance with applicable provisions in the Contract Documents, the CONTRACTOR will receive final payment for all work done.
- C. The following additional information, though not all-inclusive, is given to assist contractors in their evaluation of the work required to meet the project objectives.
- D. This Project will provide the OWNER with the rehabilitation of wastewater pumping stations with all associated appurtenances.
- E. The Work may be influenced by the tides (or rain events). The ground water level can have an effect on the timing and work schedule. No extra claims shall be made for the tides or for other natural causes.
- F. The CONTRACTOR shall become familiar with the existing operating conditions of the OWNER's sewage collection system and pumping stations and take such into consideration in planning and scheduling work. No extra claims shall be made for work required to achieve conditions beyond those obtainable under normal operation of the existing collection and pumping facilities necessary to accomplish the work.

1.2 DOT SPECIFICATIONS

- A. Portions of The Florida Department of Transportation Standard Specifications for Road and Bridge Construction and their Roadway and Traffic Design Standards, hereinafter referred to as the DOT Specifications, are referred to herein and amended, in part, and the same are hereby made a part of this Contract to the extent of such references and shall be as binding upon the Contract as though reproduced herein. Such reference shall mean the current edition, including all supplements. In case of a conflict in the requirements of

the DOT Specifications and the requirements stated herein, the requirements herein shall prevail.

PART 2 SEQUENCE OF OPERATIONS

2.1 SCHEDULING

A. General:

1. Submit estimated progress schedule and preliminary schedule of submittals in duplicate to OWNER. Updated progress schedules and submittal schedules shall be submitted with each partial pay request.
2. Revise and resubmit as specified, and identify all changes made from previous schedule submittal.
3. Many pump stations are located in sensitive areas. Work at each station shall be completed in a continuous manner that minimizes disruption to the neighborhood.
 - a. Construction activities at a specific section, exclusive of FP&L related electrical work, shall be completed within 45 days after mobilization of equipment to that site (unless a longer period is pre-approved by the OWNER). An intermediate certification of substantial completion will then be issued for each station. The intermediate construction periods are in addition to the specified time periods for substantial and final project completion.
 - b. All major components including, but not limited to, wet wells, valve vaults, manholes and piping components must be fabricated and available for installation prior to moving heavy equipment to a specific pump station site.
 - c. CONTRACTOR will be responsible for the functional and operational aspects of each station from the time mobilization occurs at any site until Substantial Completion is certified for that site. If the station should become nonoperational during this period for any reason, the CONTRACTOR shall facilitate repairs or institute bypass pumping operations as specified.

B. Construction Schedule:

1. Within 10 days following approval of the Shop Drawings and after establishment of equipment delivery dates the CONTRACTOR shall provide a bar chart analysis of the required construction work for the project. All activities should be shown along with the required time to do the work in a proper and continuous sequence of operation and without delays. This schedule shall not modify the baseline project schedules.
2. Show complete sequence of construction by activity, identifying work of separate stages, and other logically grouped activities. Indicate dates for early and late start, early and late finish, float, and duration.
3. No activity duration shall be more than 20 working days.
4. Any contingency within the schedule (i.e., a difference in time between the project's early completion and required Contract completion date)

and the float in the overall project schedule will belong to the project and not to the parties to the Contract. CONTRACTOR shall not sequester shared float through such strategies as extending duration estimates to consume available float time, extensive crew/resource sequencing, etc.

5. Provide a workable plan for monitoring the progress of all elements of the work, establish the critical elements of work, and forecast potential problems in maintaining the specified completion dates.

C. Schedule of Submittals:

1. Schedule of Submittals: Indicate submittals required by Specification section number with brief description, starting and completion dates for respective submittal preparation, and submittal review by OWNER.
2. Indicate product manufacture and delivery dates, including those products furnished by OWNER, as applicable.

- D. Plan the work and carry it out with minimum interference to the operation of the existing facilities. Prior to starting the work, confer with the OWNER's representative to develop an approved work schedule which will permit the facilities to function as normally as practical. It may be necessary to do certain parts of the construction work outside normal working hours in order to avoid undesirable conditions. The CONTRACTOR shall do this work at such times, and at no additional cost to the OWNER. Do not make connections between existing work and new work until necessary inspection and tests have been completed on the new work and it is found to conform in all respects to the requirements of the Contract Documents.

- E. No work shall be started until the CONTRACTOR has received approved shop drawings, established material/delivery dates for all equipment, and received approval of the construction schedule from the OWNER. The CONTRACTOR shall have sufficient manpower, equipment, and material to complete the Project. No work shall commence without express consent of the OWNER.

2.2 MOBILIZATION AND DEMOBILIZATION

- A. CONTRACTOR shall be responsible for mobilization and demobilization of labor, materials and equipment. Payment for mobilization and demobilization shall be included in the lump sum price indicated in the Proposal for each pump station.

2.3 COORDINATION

- A. CONTRACTOR shall cooperate in the coordination of separate activities in a manner that will provide the least interference with the OWNER's operations and other contractors and utility companies working in the area, and in the interfacing and connection of the separate elements of the overall Project work.

- B. If any difficulty or dispute should arise in the accomplishment of the above, the problem shall be brought immediately to the attention of the OWNER.

2.4 SHUTDOWN OF EXISTING OPERATIONS OR UTILITIES

- A. Continuous operation of the OWNER's existing wastewater transmission system is of critical importance. The CONTRACTOR's work shall not result in the interruption or spillage of sewage, water, or solid waste service to any customers.
- B. Minimizing conflicts with the existing pump stations are of critical importance. The CONTRACTOR's work shall not result in the interruption of any phase of operations at any facility.
- C. Connections to existing services or utilities, or other work that requires the temporary shutdown of any existing operations or utilities shall be planned in detail with appropriate scheduling of the work and coordinated with the OWNER. Advance notice shall be given in order that the OWNER may witness the shutdown, tie-in, and startup. The temporary shutdown must be approved by the OWNER. All tie-in and bypass operations shall be the responsibility of the CONTRACTOR and are considered incidental to the cost of construction and provided at no additional cost to the OWNER.
- D. All materials and equipment (including emergency equipment) necessary to expedite the tie-in shall be on hand prior to the shutdown of existing services or utilities.

2.5 OPERATION OF EXISTING SYSTEM PROHIBITED

- A. At no time undertake to close off any utility lines or open valves or take any other action which would affect the operation of existing systems. The OWNER's forces will operate all valves. Request approval in writing to OWNER 10 working days in advance of the time that interruption of existing systems is required.

2.6 BYPASS PUMPING

- A. Comply with requirements of Section 02734, FLOW BYPASS PUMPING SYSTEM.
- B. Wastewater flows shall be controlled through the pipeline sections and pumps stations where work is being performed. Under no circumstances, can portions of the system be removed from service for periods of time in excess of that approved by the OWNER. The CONTRACTOR shall be responsible to assess conditions and capacities of the existing sewer lines and pump stations in order to implement an acceptable bypass plan at no additional cost to the OWNER. Bypass pumping will be required for all sewer and pump station reconstruction. The CONTRACTOR shall supply the necessary pumps,

- B. conduits, and other equipment to not only divert flow around the pump station, manhole or pipe section in which work is to be performed, but also to transmit the flow in downstream sewer lines and/or pump stations without surcharge. The bypass systems shall be of sufficient capacity to handle existing flows plus additional flows that may occur during periods of high tide or rainfall. Emergency backup pumping capability must be available in addition to the primary bypass system. The CONTRACTOR will be responsible for furnishing the necessary labor, power, and supervision to set up and operate the pumping and bypass systems. When pumping is in operation, all engines shall be equipped in a manner to keep the pump noise to a minimum and comply with the City noise ordinances. Electrical bypass pumping is mandatory in residential or low noise areas.
- C. The CONTRACTOR shall be responsible for any damage to properties or buildings connected to the sewer system, and to the pipeline, which result from the flow control activities. The CONTRACTOR shall be responsible for cleaning, removing, and disinfection of any spillage in compliance with state and local regulation.
- D. The CONTRACTOR shall submit a bypass pumping plan for all lift stations to be reconstructed.

PART 3 SITE CONDITIONS

3.1 SITE INVESTIGATION AND REPRESENTATION

- A. The CONTRACTOR acknowledges satisfaction as to the general nature and location of the work, the general and local conditions, particularly those bearing upon availability of transportation, availability of labor, water, electric power, roads, and uncertainties of weather, river stages, or similar physical conditions, the character of equipment and facilities needed preliminary to and during the prosecution of the work, and all other matters which can in any way affect the work or the cost thereof under this Contract.
- B. Failure by the CONTRACTOR to become acquainted with the physical conditions and all the available information will not relieve the CONTRACTOR from responsibility for properly estimating the difficulty or cost of successfully performing the work.
- C. The CONTRACTOR warrants that as a result of examination and investigation of all the aforesaid data, the CONTRACTOR can perform the work in a good and workmanlike manner and to the satisfaction of the OWNER. The OWNER assumes no responsibility for any representations made by any of its officers or agents during or prior to the execution of this Contract, unless (1) such representations are expressly stated in the Contract, and (2) the Contract expressly provides that the responsibility therefore is assumed by the OWNER.

3.2 INFORMATION ON SITE CONDITIONS

- A. General: Any information obtained by the OWNER regarding site conditions, subsurface information, groundwater elevations, existing construction of site facilities as applicable, and similar data will be available for inspection at the office of the OWNER upon request. Such information is offered as supplementary information only. The OWNER assumes no responsibility for the completeness or interpretation of such supplementary information.

3.3 SUBSURFACE INVESTIGATION

- A. The CONTRACTOR shall examine the worksite and make arrangements with the OWNER to conduct his own subsurface investigation.

3.4 UTILITIES

- A. The CONTRACTOR shall be responsible for determining, at his cost, the locations of all utilities within the project area, and shall be responsible for contacting each utility for location and notification for verification prior to commencing work.

3.5 CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

- A. Where the CONTRACTOR's operations could cause damage or inconvenience to utilities, telephone, television, power, water, or sewer systems, the operations shall be suspended until all arrangements necessary for the protection of these utilities and services have been made by the CONTRACTOR with the owner of the utility affected.
- B. Notify all utility offices which are affected by the construction operation at least 48 hours in advance. Under no circumstances expose any utility without first obtaining permission from the appropriate agency. Once permission has been granted, locate, expose, and provide temporary support for all existing underground utilities.
- C. The CONTRACTOR shall be solely and directly responsible to the OWNER and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which may result from the construction operations under this Contract.
- D. Neither the OWNER nor its officers or agents shall be responsible to the CONTRACTOR for damages as a result of the CONTRACTOR's failure to protect utilities encountered in the work.

- E. In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, promptly notify the proper authority. Cooperate with said authority in restoration of service as promptly as possible and bear all costs of repair. In no case shall interruption of any water or utility service be allowed to exist outside working hours unless prior approval is granted.
- F. In the event the CONTRACTOR encounters water service lines that interfere with trenching, he may, by obtaining prior approval of the property owner, and the OWNER, cut the service, dig through, and restore the service with similar and equal materials at the CONTRACTOR's expense.
- G. The CONTRACTOR shall replace, at his own expense, all existing utilities or structures removed or damaged during construction, unless otherwise provided for in these Contract documents or ordered by the OWNER.

3.6 INTERFERING STRUCTURES

- A. Take necessary precautions to prevent damage to existing structures whether on the surface, aboveground, or underground.
- B. Protect underground and aboveground existing structures from damage, whether or not they lie within the limits of the easements obtained by the OWNER. Where such existing fences, gates, sheds, buildings, or any other structure must be removed in order to properly carry out the construction, or are damaged during construction, restore to their original condition to the satisfaction of the property owner involved at the CONTRACTOR's own expense. Notify the OWNER of any damaged underground structure, and make repairs or replacements before backfilling.
- C. Without additional compensation, the CONTRACTOR may remove and shall replace in a condition as good as or better than original, such small miscellaneous structures as fences, mailboxes, and signposts that interfere with the CONTRACTOR's operations.

3.7 FIELD RELOCATION

- A. During the progress of construction, it is expected that minor relocations of the work will be necessary. Such relocations shall be made only by direction of the OWNER. If existing structures are encountered which prevent the construction, and which are not properly shown on any Contract Drawings, notify the OWNER before continuing with the construction in order that the OWNER may make such field revisions as necessary to avoid conflict with the existing structures. If the CONTRACTOR shall fail to so notify the OWNER when an existing structure is encountered, and shall proceed with the construction despite this interference, he shall do so at his own risk.

3.8 EASEMENTS

- A. Where portions of the work are located on public or private property, easements and permits will be obtained by the OWNER, except as otherwise noted in these Specifications. Easements will provide for the use of property for construction purposes to the extent indicated on the easements. Copies of these easements and permits are available upon request to the OWNER. It shall be the CONTRACTOR's responsibility to determine the adequacy of the easement obtained in every case and to abide by all requirements and provisions of the easement. The CONTRACTOR shall confine his construction operations to within the easement limits or street right-of-way limits or make special arrangements with the property owners or appropriate public agency for the additional area required. Any damage to property, either inside or outside the limits of the easements provided by the OWNER or street rights-of-way, shall be the responsibility of the CONTRACTOR as specified herein. The CONTRACTOR shall remove, protect, and replace all fences or other items encountered on public or private property. Before final payment will be authorized by the OWNER, the CONTRACTOR will be required to furnish the OWNER with written releases from property owners or public agencies where side agreements or special easements have been made by the CONTRACTOR or where the CONTRACTOR's operations, for any reason, have not been kept within the construction right-of-way obtained by the OWNER or the street right-of-way.
- B. The CONTRACTOR shall delineate the limits of construction easements using T-rail posts painted a florescent orange, extending a minimum 4 feet aboveground and spaced at 200-foot intervals. This delineation shall be maintained until the construction work within a given area has been conditionally accepted by the OWNER. In some areas, the CONTRACTOR may also be required to delineate the road right-of-way in order that he confines his operations to within the right-of-way.
- C. It is anticipated that the required easements and permits will be obtained before construction is started. However, should the procurement of any easement or permit be delayed, the CONTRACTOR shall schedule and perform the work around these areas until such a time as the easement or permit has been secured.

PART 4 SAFETY AND CONVENIENCE

4.1 SAFETY EQUIPMENT

- A. The CONTRACTOR shall do all work necessary to protect the general public from hazards, including, but not limited to, surface irregularities or unramped grade changes in pedestrian sidewalk or walkway, and trenches or excavations in roadway. Barricades, lanterns, and proper signs shall be furnished in sufficient amount to safeguard the public and the work. All barricades and signs shall be clean and serviceable, in the opinion of the OWNER.

- B. During construction, the CONTRACTOR shall construct and at all times maintain satisfactory and substantial temporary chain link fencing, solid fencing, railing, barricades or steel plates, as applicable, at all openings, obstructions, or other hazards in streets, sidewalks, floors, roofs, and walkways. All such barriers shall have adequate warning lights as necessary, or required, for safety. All lights shall be regularly maintained, and in a fully operational state at all times.

4.2 ACCIDENT REPORTS

- A. In addition, the CONTRACTOR must promptly report in writing to the OWNER all accidents whatsoever arising out of, or in connection with, the performance of the work whether on, or adjacent to, the site, giving full details and statements of witnesses. If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the OWNER.
- B. If a claim is made by anyone against the contractor or any subcontractor on account of any accident, the CONTRACTOR shall promptly report the facts in writing to the OWNER, giving full details of the claim.

4.3 SAFE ACCESS BY FEDERAL, STATE, AND LOCAL GOVERNMENT OFFICIALS

- A. Authorized representatives of the state, federal, or local governmental agencies, shall at all times have safe access to the work, and the CONTRACTOR shall provide proper facilities for such access and inspection.

4.4 PROTECTION OF PROPERTY

- A. Protect stored materials located adjacent to the proposed work. Notify property owners affected by the construction at least 48 hours in advance of the time construction begins. During construction operations, construct and maintain such facilities as may be required to provide access by all property owners to their property. No person shall be cut off from access to his residence or place of business for a period exceeding 8 hours, unless the CONTRACTOR has made special arrangements with the affected persons.
- B. The CONTRACTOR shall identify and isolate his work zone in such a manner as to exclude all personnel not employed by him, the OWNER, and the OWNER.

4.5 FIRE PREVENTION AND PROTECTION

- A. The CONTRACTOR shall perform all work in a fire-safe manner. He shall supply and maintain on the site adequate fire-fighting equipment capable of extinguishing incipient fires. The CONTRACTOR shall comply with applicable federal, state, and local fire-prevention regulations. Where these regulations do not apply, applicable parts of the National Fire Prevention

Standard for Safeguarding Building Construction Operations (NFPA No. 241) shall be followed.

4.6 ACCESS FOR POLICE, FIRE, AND POSTAL SERVICE

- A. Notify the fire department and police department before closing any street or portion thereof. No closing shall be made without the OWNER's approval of MOT plan. Notify said departments when the streets are again passable for emergency vehicles. Do not block off emergency vehicle access to consecutive arterial crossings or dead-end streets, in excess of 300 linear feet, without special written permission from the fire department. Conduct operations with the least interference to fire equipment access, and at no time prevent such access.
- B. The CONTRACTOR shall leave a night emergency telephone number or numbers with the police department the OWNER, so that contact may be made easily at all times in case of barricade and flare trouble or other emergencies.
- C. Maintain postal service facilities in accordance with the requirements of the U.S. Postal Service. Move mailboxes to temporary locations designated by the U.S. Postal Service, and at the completion of the work in each area, replace them in their original location and in a condition satisfactory to the U.S. Postal Service.

PART 5 PRESERVATION, RESTORATION, AND CLEANUP

5.1 SITE RESTORATION AND CLEANUP

- A. At all times during the work, keep the premises clean and orderly, and upon completion of the work, repair all damage caused by equipment and leave the project free of rubbish or excess materials of any kind.
- B. Stockpile excavated materials in a manner that will cause the least damage to adjacent lawns, grassed areas, gardens, shrubbery, or fences, regardless of whether these are on private property, or on state, county, or city rights-of-way. Remove all excavated materials from grassed and planted areas, and leave these surfaces in a condition equivalent to their original condition. Replace topsoiled areas as specified in Section 02220, FILL AND BACKFILL, raked and graded to conform to their original contours.
- C. All existing drainage ditches and culverts shall be reopened and graded and natural drainage restored. Restore culverts broken or damaged to their original condition and location.
- D. Upon completion of pipe laying and backfilling operations, hand-rake and drag all former grassed and planted areas, leaving all disturbed areas free from rocks, gravel, clay, or any other foreign material. The finished surface shall conform to the original surface, and shall be free-draining and free from holes, ruts, rough spots, or other surface features detrimental to a seeded area.

5.2 FINISHING OF SITE, BORROW, AND STORAGE AREAS

- A. Upon completion of the Project, all areas used by the CONTRACTOR shall be properly cleared of all temporary structures, rubbish, and waste materials and properly graded to drain and blend in with the abutting property. Areas used for the deposit of waste materials shall be finished to properly drain and blend with the surrounding terrain.

PART 6 PRE AND POST-CONSTRUCTION VIDEO RECORDINGS

6.1 GENERAL

- A. The CONTRACTOR shall provide color videos showing the preconstruction site, and the post-construction site. All videos shall be taken by a professional commercial video photographer. The video photographer shall be an established enterprise that routinely provides these services. The videos shall be in DVD format, the video shall indicate on the beginning and front of each disk the date, job title, and brief description of the video and location where the video was taken. Two copies of the video DVD (including the original) shall be delivered to the OWNER as follows:
 - 1. A video shall be taken of the preconstruction site, as well as all storage and staging areas, and the property adjacent to the perimeter of the construction site. Particular emphasis should be directed to structures both inside and outside the site or as directed by the OWNER.
 - 2. A video shall be taken of the post-construction site and the property adjacent to the perimeter of the site. Particular emphasis should be directed to structures both inside and outside the site boundaries or as directed by the OWNER.
- B. The Following shall be Included with the Video Documentation:
 - 1. Coverage is required within and adjacent to the right-of-way, and easements, and storage, and staging areas where the work is being constructed.
 - 2. Documentation of the conditions of the adjacent properties or any affected structures as a result of the impending construction.
 - 3. Certification as to date work done and by whom.
 - 4. All videos shall be keyed to the construction drawings.
- C. Preconstruction and Post-Construction on Videos shall be Submitted as Follows:
 - 1. Preconstruction videos shall be presented to the OWNER at the preconstruction conference.
 - 2. Post-construction videos shall be submitted prior to final project closeout. This submittal is contingent to final payment.

6.2 CONSTRUCTION PHOTOGRAPHS

- A. The CONTRACTOR shall provide five color photographs, suitable to portray project progress, of each pump station site at the end of each pay period.
- B. Photographs shall be submitted with each month's pay request.

END OF SECTION

SECTION 01025 MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Payments to the CONTRACTOR shall be made on the basis of the Proposal bid items as full and complete payment for furnishing all materials, labor, tools and equipment, and for performing all operations necessary to complete the work included in the Contract Documents. Such compensation shall also include payments for any loss or damages arising directly or indirectly from the work, or from any discrepancies between the actual quantities of work and those shown in the Contract Documents, or from any unforeseen difficulties which may be encountered during the prosecution of the work until the final acceptance by the CITY.
- B. The prices stated in the proposal include all costs and expenses for taxes, labor, equipment, materials, commissions, transportation charges and expenses, patent fees and royalties, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the work as shown on the plans and specified herein. The Basis of Payment for an item at the price shown in the Proposal shall be in accordance with its description of the item in this Section and as related to the work specified and as shown on the Drawings. Unit prices where used will be applied to the actual quantities furnished and installed in conformance with the Contract Documents.
- C. The CONTRACTOR's attention is called to the fact that the quotations for the various items of work are intended to establish a total price for completing the work in its entirety. No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the prices named in Bid Schedule for various appurtenant items of work.

1.02 MEASUREMENT

- A. The quantities for payment under this Contract shall be determined by actual measurement of the completed items, in place, ready for service and accepted by the CITY.

1.03 PAYMENT ITEMS

GENERAL CONDITIONS

ITEM NO. 1 – SITE MOBILIZATION/DEMOBILIZATION:

Payment for mobilization/demobilization, bonds and insurance, permit fees, scheduling and temporary facilities and utilities will be made at the contract unit price (EA) bid for the item, which price shall be full compensation for all materials, labor, equipment, tools, excavation, reinforced concrete, masonry and all other incidentals necessary to complete this item including the provision of an on-site Superintendent during the performance of Work at the site throughout the project.

This also includes coordination between the Contractor and FPL in regards to any power poles that may need to be temporarily secured during construction. The City shall pay FPL for services on a case by case basis. If, however, due to the Contractor's failure to complete the work within the agreed upon time, any additional costs for FPL's extended time for their service, including any stand-by time or remobilization shall be paid for by the Contractor.

ITEM NO.2 – MAINTENANCE OF TRAFFIC (minor):

Payment for this item will be made at the Contract Unit (EA) price bid for the item. The contract unit price shall include compensation for required labor, materials, and equipment necessary to keep roadways and property accesses in service during construction activities in accordance with the Contract Documents.

A detailed MOT plan will need to be provided by the Contractor and be approved by the City's Community Development Division (CDD).

This item includes maintenance of traffic plan, traffic control, flagman, detour signs, barricades, advance warning arrow panels, temporary signage, **construction and removal of temporary access driveways to residential homes, commercial material for driveway maintenance**, etc. in order to provide safety and traffic access in accordance with local and state requirements.

ITEM NO.3 – MAINTENANCE OF TRAFFIC (major):

Payment for this item will be made at the Contract Unit (EA) price bid for the item. The contract unit price shall include compensation for required labor, materials, and equipment necessary to keep roadways and property accesses in service during construction activities in accordance with the Contract Documents.

A detailed MOT plan will need to be provided by the Contractor and be approved by the City's Community Development Division (CDD).

This item includes maintenance of traffic plan, traffic control, flagman, detour signs, barricades, advance warning arrow panels, temporary signage, **construction and removal of temporary access driveways to residential homes, commercial material for driveway maintenance**, etc. in order to provide safety and traffic access in accordance with local and state requirements.

ROADWAYS

ITEM NO. 4 – REMOVE & DISPOSE OF EXISTING ASPHALT SECTION (VARYING THICKNESS):

Payment for this item will be made on a Square Yard (SY) basis. The Contractor's unit price shall include full compensation for labor, materials and equipment required for removal of all existing roadway pavement section (asphalt pavement and base material - varying thickness). Includes sawcuts and joints at connections to existing pavement. The existing pavement section shall be completely removed and shall be properly disposed of off-site at no additional cost to the Owner. Also included in this item is all restoration work (sod, driveways, etc.) that is required due to removing the pavement section.

ITEM NO. 5 – REMOVE & DISPOSE OF EXISTING SUBGRADE (VARYING THICKNESS):

Payment for this item will be made on a Square Yard (SY) basis. The Contractor's unit price shall include full compensation for labor, materials and equipment required for removal of all existing subgrade section (varying thickness).

ITEM NO. 6 – 1-1/2" TYPE S-3 ASPHALT (2 – 3/4" lifts):

Payment for installing new 1 1/2" Type S-3 asphalt shall be made at the Contractor's unit price per Square Yard (SY) for Type S-3 asphalt and shall include all labor, material, and equipment required to construct 1 1/2" Type S-3 asphaltic concrete surface course (two 3/4" lifts). The unit price shall include compensation for labor, materials, and equipment required to construct the new asphaltic concrete surface course.

This unit price shall also include all necessary labor, materials, and equipment to adjust the valve boxes, manholes, rims, inlets, or other fixtures to final grade,

transitions to existing pavement, milling, tack coating, compaction, rolling, brooming, and any other work required to complete the work.

This item also includes installing an asphalt taper around all structures in roadway, if both $\frac{3}{4}$ " lifts are not installed within 24 hours.

ITEM NO. 7 – 2" TYPE S-3 ASPHALT (2 – 1" lifts):

Payment for installing new 2" Type S-3 asphalt shall be made at the Contractor's unit price per Square Yard (SY) for Type S-3 asphalt and shall include all labor, material, and equipment required to construct 2" Type S-3 asphaltic concrete surface course (two 1" lifts). The unit price shall include compensation for labor, materials, and equipment required to construct the new asphaltic concrete surface course.

This unit price shall also include all necessary labor, materials, and equipment to adjust the valve boxes, manholes, rims, inlets, or other fixtures to final grade, transitions to existing pavement, milling, tack coating, compaction, rolling, brooming, and any other work required to complete the work.

This item also includes installing an asphalt taper around all structures in roadway, if both 1" lifts are not installed within 24 hours.

ITEM NO. 8 – MILL & RESURFACE ASPHALT ROADWAY (1"):

Payment for milling 1" of existing pavement and installing new 1" Type S-3 asphalt overlay shall be made at the Contractor's unit price per Square Yard (SY) and shall include all labor, material, and equipment required to mill 1" of existing pavement and construct 1" of Type S-3 asphaltic concrete overlay. The unit price shall include compensation for multiple mobilizations, labor, materials and equipment, as necessary. The contract unit price shall also include other miscellaneous work required to complete the work in accordance with FDOT Standard Specifications for Road and Bridge Construction, latest edition, and the City of Sunrise Standards.

This item also includes all necessary labor, materials and equipment to adjust the valve boxes, manhole rims, inlets, or other fixtures to final grade; transitions to existing pavement, milling, removal of existing pavement, disposal of existing pavement, tack coat, compaction, rolling, brooming, and any other work required to complete the overlay work.

ITEM NO. 9 – 8" LIMEROCK BASE:

Payment for installing new 8-inch limerock base (LBR 100) including primer and tack coats shall be made at the Contractor's unit price per Square Yard (SY) for limerock base installed and accepted.

The Contract Unit Price shall include compensation for labor, materials, and equipment required to construct the new limerock base, including primer and tack coats.

ITEM NO. 10 – 12” COMPACTED SUBGRADE

The unit price bid per Square Yard (SY) for the stabilized, compacted subgrade (12" thick, LBR 40) shall include all labor, material, and equipment required to construct the subgrade. The unit price shall include all excavation, line cutting of existing pavement, preparation of subgrade, fine grading, placement of subgrade material, compaction, rolling, and other miscellaneous work required to complete the work in accordance with FDOT Standard Specifications for Road and Bridge Construction, latest edition, and the City of Sunrise Standards.

ITEM NO. 11 & 12 – CONCRETE SIDEWALK (4”/6” THICK)

Payment for furnishing and installing concrete sidewalk (width varies), 4 or 6 inches thick, shall be made at the contract unit price per Square Yard (SY) of concrete sidewalk installed and accepted. The contract unit price shall include full compensation for all labor, materials, and equipment necessary to install the concrete sidewalk in accordance with FDOT Standard Specifications for Road and Bridge Construction, latest edition, and the City of Sunrise Standards.

Also included in this item is all restoration work (sod, driveways, etc.) that is required due to the removal/installation of new sidewalk.

ITEM NO. 13 & 14 – REMOVE EXISTING CONCRETE (NON-SIDEWALK) (4”/6” THICK)

This item shall be paid on a Square Yard (SY) basis. The Contractor's unit price shall include full compensation for labor, materials and equipment required for removal of existing non-sidewalk concrete (varying widths and thickness). This item includes all saw-cutting and joints at connections to existing sidewalks / walkways / pavement / driveways. The existing concrete shall be completely removed and shall be properly disposed of off-site at no additional cost to the Owner.

ITEM NO. 15, 16, 17 & 18 – REMOVE EXISTING ASPHALT (NON-ROADWAY)

This item shall be paid on a Square Yard (SY) basis. The Contractor's unit price shall include full compensation for labor, materials and equipment required for removal of existing non-roadway asphalt (varying widths and thickness of 1”, 1.5”, 2” and greater than 2”). This item includes all saw-cutting and joints at connections to existing sidewalks / walkways / pavement / driveways. The existing asphalt shall be completely removed and shall be properly disposed of off-site at no additional cost to the Owner.

ITEM NO. 19 – FLOWABLE FILL

Payment for this item shall be made at the contract unit price per Cubic Yard (CY) of 100 psi FDOT diggable, flowable fill installed and accepted and shall include compensation for all labor, materials, and equipment required to complete the work.

WATER**ITEM NO. 20 & 21 – RELOCATE ¾" and 1" PE WATER SERVICE**

Payment for the relocation of existing ¾" and 1" water services (up to 30') will be made at the Contractor's unit price for each water service relocated and accepted. The Contract Unit Price will include compensation for all labor, material and equipment required to relocate the existing above grade water service components including valving, backflow prevention device(s), hose bib, etc.

Payment will also include full compensation for providing all excavation, backfilling, poly tubing, fittings, plugs, reducers, adapters, nipples, casing pipe, valving and other below grade appurtenances necessary to relocate the existing water service as required to have a complete and fully functional water service at an alternate location. This includes all restoration.

ITEM NO. 22 – 1" PE WATER SERVICE

Payment for furnishing and installing the water service (up to 30') at the new lift station will be made at the Contractor's unit price for each 1" single water service including 1" curb stop, tap and valve box installed and accepted. The Contract Unit Price will include compensation for labor, material and equipment, required to install the new water service and connection from the water main to the new curb stop, including back flow preventer.

Payment will also include full compensation for providing all excavation, backfilling, poly tubing, fittings, plugs, valves, reducers, adapters, nipples, double strapped saddle, corporation stop, curb stop, 1" RPZ assembly & hose bib, casing pipe, and other appurtenances necessary to have a complete and fully functional water service. This includes all restoration.

SEWER**ITEM NO. 23, 24, 25 & 26 – BY-PASS PUMPING**

Payment for this item shall be made on a Daily (DAY) basis. The Contractor's unit price shall include full compensation for providing labor, materials and equipment for the bypass pumping (4", 6", 8" or 10" pump) operation with high level float and alarm with auto dialer unit.

ITEM NO.27 – REMOVE WETWELL TOP SLAB (6’ SQUARE)

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes removal of wetwell top slab (6’ square).

ITEM NO. 28 – REMOVE AND SALVAGE EXISTING PUMP AND DELIVER TO THE CITY

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes removal and salvage of existing pumps and delivery to the City at the Operations and Maintenance Building, located at 14150 NW 8th Street, Sunrise, FL 33325.

ITEM NO.29, 30, 31, 32 & 33 – DIAMETER CONCRETE RISER RING

Payment for this item will be made on a Linear Foot (LF) basis. This item includes furnishing and installing (4’-12’) diameter concrete riser ring.

ITEM NO.34 – 6’ SQUARE CONCRETE RISER

Payment for this item will be made on a Linear Foot (LF) basis. This item includes furnishing and installing a 6’ square concrete riser.

ITEM NO.35 – 30”X36” ACCESS DOOR

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing a 30”x36” watertight (flood tight/gas tight), angle frame, single cover, access door with H20 wheel loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.).

ITEM NO.36 – 30”X48” ACCESS DOOR

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing a 30”x48” watertight (flood tight/gas tight), angle frame, single cover, access door with H20 wheel loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.).

ITEM NO.37 – 36”X36” ACCESS DOOR

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing a 36”x36” watertight (flood tight/gas tight), angle frame, single cover, access door with H20 wheel loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.).

ITEM NO.38 – 36”X48” ACCESS DOOR

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing a 36”x48” watertight (flood tight/gas tight), angle frame, single cover, access door with H20 wheel loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.).

ITEM NO.39 – 36”X60” ACCESS DOOR

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing a 36”x60” watertight (flood tight/

gas tight), angle frame, single cover, access door with H20 wheel loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.).

ITEM NO.40 – 48”X54” ACCESS DOOR

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing a 48”x54” watertight (flood tight/gas tight), angle frame, single cover, access door with H20 wheel loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.).

ITEM NO.41 – 48”X72” ACCESS DOOR

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing a 48”x72” watertight (flood tight/gas tight), angle frame, single cover, access door with H20 wheel loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.).

ITEM NO.42 – 60”X60” ACCESS DOOR

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing a 60”x60” watertight (flood tight/gas tight), angle frame, single cover, access door with H20 wheel loading (Model W-AHS as manufactured by U.S.F. Fabrication, Inc.).

ITEM NO. 43 – GROUTING

Payment for this item will be made on a Gallon (GAL) basis, and will include the labor, materials and equipment required to perform concrete repairs to concrete structures and fillets as specified in Section 02726, Article 2.05.

ITEM NO. 44 – HIGH PRESSURE INJECTION GROUTING

Payment for this item will be made on a Gallon (GAL) basis, and will include the labor, materials and equipment required to perform high pressure injection grouting of concrete structures for the purposes of waterproofing.

ITEM NO. 45 – CONCRETE TOP SLAB FOR VALVE VAULT AND/OR WETWELL (6” THICK) W/REBAR AT 6” O.C.E.W.

Payment for this item will be made on a Cubic Yard (CY) basis, and will include all rebar required where top slab must be poured-in place.

ITEM NO. 46 – CONCRETE TOP SLAB FOR VALVE VAULT AND/OR WETWELL (8” THICK) W/REBAR AT 6” O.C.E.W.

Payment for this item will be made on a Cubic Yard (CY) basis, and will include all rebar required where top slab must be poured-in place.

ITEM NO. 47 – CONCRETE TOP SLAB IN HIGH TRAFFIC AREA FOR VALVE VAULT AND/OR WETWELL (12" THICK) W/ DOUBLE MAT REBAR AT 6" O.C.E.W.

Payment for this item will be made on a Cubic Yard (CY) basis and will include all rebar required where top slab must be poured-in place.

ITEM NO. 48 – FURNISH AND INSTALL 4" EZ VENT™ BIOVENT PACKAGE WITH 12" BIOVENT CARTRIDGE (4" BVC412F)

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing 4" EZ Vent Biovent Package with 12" Biovent Cartridge (Model No. 4"BVC412F).

ITEM NO. 49 – FURNISH AND INSTALL 6" EZ VENT™ BIOVENT PACKAGE WITH 12" BIOVENT CARTRIDGE (6" BVC612F)

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing 6" EZ Vent Biovent Package with 12" Biovent Cartridge (Model No. 6"BVC612F).

ITEM NO. 50, 51, 52, 53 & 54 – REMOVE EXISTING CONCRETE FILLET IN (4' – 12') DIAMETER WETWELL

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes removing existing concrete fillet in a wet well (4'-12' diameter).

ITEM NO. 55, 56, 57, 58 & 59 – CONSTRUCT NEW CONCRETE FILLET IN (4' – 12') DIAMETER WETWELL

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes constructing new concrete fillet in a wetwell (4'-12' diameter).

ITEM NO. 60, 61, 62, 63, & 64 – UNDERGROUND DEZURIK PLUG VALVE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing underground Dezurik plug valve (4'-12").

ITEM NO. 65, 66, 67 & 68 – FLANGED DEZURIK PLUG VALVE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing above ground flanged Dezurik plug valve (4'-10").

ITEM NO. 69, 70, 71 & 72 – KENNEDY CHECK VALVES

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing (4'-10") Kennedy check valves (lever & weight).

ITEM NO. 73 – DIP FITTINGS (EPOXY LINED)

The per ton unit price bid for this item shall be full compensation for furnishing, installing and testing fittings, restraining devices, including restraint glands, bolts, nuts, gaskets, and all other appurtenances for fittings. Only fittings actually installed will be measured for payment by the weight ton, based on certified shipping weight slips supplied by the CONTRACTOR. The fittings shall be epoxy lined and must be domestic cast fittings.

ITEM NO. 74, 75, 76 & 77 – EPOXY COATED DUCTILE IRON FLANGED PIPE (INSIDE WETWELL)

Payment for this item will be made on a Linear Foot (LF) basis. This item includes furnishing and installing epoxy coated (4”–10”) ductile iron flanged piping and fittings inside the wetwell. This also includes removal and disposal of existing piping in the wetwell.

ITEM NO. 78, 79, 80 & 81 – HDPE PIPE (INSIDE WETWELL)

Payment for these items shall be made on a per linear foot (LF) basis. This item includes furnishing and installing 4”-10” HDPE (high density polyethylene) pipe as the riser pipe inside the wetwell, including ductile iron pipe fittings (epoxy coated) as needed. This item includes removal and disposal of existing piping in the wetwell. It also includes horizontal bracing for the HDPE from wall to wall. Heights up to fifteen foot a single brace at midpoint of the riser will be required. Heights greater than fifteen foot, two horizontal bracings will be required.

ITEM NO. 82, 83, 84, 85, 86 & 87 – EPOXY COATED DUCTILE IRON PIPE FOR MINOR FM CONNECTIONS/REPAIRS

Payment for this item will be made on a Linear Foot (LF) basis. This item includes furnishing and installing epoxy coated (12”-24”) ductile iron restrained joint piping for minor force main connection or repairs, including fittings. This also includes removal of existing piping when necessary. The ductile iron force main pipe shall be Class 350 with an exterior asphaltic coating (shall conform to ANSI A21.51) and epoxy interior coating (Protecto 401) or approved equal.

ITEM NO. 88 – CORE DRILL INTO EXISTING WETWELL FOR 4” TO 6” DUCTILE IRON PIPE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes coring into existing wetwell for 4”- 6” ductile iron FM connection.

ITEM NO. 89 – CORE DRILL INTO EXISTING WETWELL FOR 8” TO 10” DUCTILE IRON PIPE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes coring into existing wetwell for 8”-10” ductile iron FM connection.

ITEM NO. 90, 91, 92 & 93 – INSTALL CITY FURNISHED PUMPS & BASE ELBOWS FOR 4”-10” SEWAGE PUMPS

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes installing City furnished pumps and base elbows for 4”-10” sewage pumps, including any miscellaneous items.

ITEM NO. 94, 95, 96 & 97 – SURFACE PREP AND COAT THE INTERIOR WELL FOR 6’-12’ DIAMETER WETWELL

Payment for this item will be made on a Linear Foot (LF) basis. This item includes surface prep (cleaning) inside of 6’-12’ diameter wetwell and for furnishing and coating inside of 6’-12’ wetwell (with Mainstay coating or Sewpercoat). The surface prep shall include all items required for surface prep, including sandblasting and scouring.

Vactor truck services are provided under Bid Item 225.

ITEM NO. 98, 99, 100 & 101 – SURFACE PREP AND COAT THE INTERIOR WELL FOR 6’-12’ DIAMETER WETWELL

Payment for this item will be made on a Linear Foot (LF) basis. This item includes surface prep (cleaning) inside of 6’-12’ diameter wetwell and for furnishing and coating inside of 6’-12’ wetwell with Green Monster Lining (GML) System. The surface prep shall include all items required for surface prep, including sandblasting and scouring.

Vactor truck services are provided under Bid Item 225.

ITEM NO. 102 – REMOVE EXISTING WETWELL COATING

Payment for this item will be made at the Contact Unit (EA) price bid for this item. This item includes removal and disposal of existing wetwell (diameter varies) coating. Vactor truck services are provided under Bid Item 225.

ITEM NO. 103 – REMOVE & DISPOSE EXISTING VALVES, PIPING, SUMP PUMP, AND MISCELLANEOUS EQUIPMENT FROM VALVE VAULT

Payment for this item will be made at the Contract Lump Sum (LS) price bid for this item. This item includes removing and disposing of existing valves, piping, sump pumps and miscellaneous equipment from valve vault (unless notified otherwise by City).

ITEM NO. 104 – REMOVE & DISPOSE EXISTING VALVES, PIPING, SUMP PUMP, AND MISCELLANEOUS EQUIPMENT FROM WET-WELL

Payment for this item will be made at the Contract Lump Sum (LS) price bid for this item. This item includes removing and disposing of existing valves, piping, sump pumps and miscellaneous equipment from wet-well (unless notified otherwise by City).

ITEM NO. 105 – 2” PVC DRAIN LINE FROM VALVE VAULT TO WETWELL AND 2” TIDFLEX CHECK VALVE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing 2” PVC drainage line from valve vault to wetwell with a 2” tideflex check valve, including core drill of existing wetwell (per City details).

ITEM NO. 106, 107, 108 & 109 – FURNISH AND INSTALL PRE-FABRICATED CONCRETE VALVE VAULT WITH BOTTOM SLAB

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing pre-fabricated concrete valve vault with bottom slab. Installation to include excavation, shoring, dewatering, demo of the old valve vault, stone foundation, and boots for pipe penetrations, as required to install per City details. The sizes include: 48”x 48”; 58”x 60”; 60” x 84”; 72”x 72”.

ITEM NO. 110, 111, 112 & 113 – FURNISH AND INSTALL CAST-IN-PLACE CONCRETE VALVE VAULT WITH BOTTOM SLAB

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing cast-in-place concrete valve vault with bottom slab. Installation to include excavation, shoring, dewatering, demo of the old vault, stone foundation, and boots for pipe penetrations, as required to install in per City details. The sizes include: 48”x 48”; 58”x 60”; 60” x 84”; 72”x 72”.

ITEM NO. 114 & 115 – 4”-6” DIP PIPING AND FITTINGS, PRESSURE GAUGES (OIL FILLED), AND CAMLOK FITTING W/ DUST COVER INSIDE VALVE VAULT OR ABOVE GROUND MANIFOLD PIPING

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes 4”-6” DIP piping and fittings, pressure gauges (oil filled), and camlock fitting with dust cover inside valve vault or above ground manifold piping, per City details for duplex pump stations.

ITEM NO. 116 & 117 – 8”-10” DIP PIPING AND FITTINGS, PRESSURE GAUGES (OIL FILLED), AND BAUER FITTING W/ DUST COVER INSIDE VALVE VAULT OR ABOVE GROUND MANIFOLD PIPING

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes 8”-10” DIP piping and fittings, pressure gauges (oil filled), and bauer fitting with dust cover inside valve vault or above ground manifold piping, per City details for duplex pump stations.

ITEM NO. 118 – 6” DIP PIPING AND FITTINGS, PRESSURE GAUGES (OIL FILLED), AND CAMLOK FITTING W/ DUST COVER INSIDE VALVE VAULT OR ABOVE GROUND MANIFOLD PIPING

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes 6” DIP piping and fittings, pressure gauges (oil filled), and camlock fitting with dust cover inside valve vault or above ground manifold piping, per City details for triplex pump stations.

ITEM NO. 119 – 8” DIP PIPING AND FITTINGS, PRESSURE GAUGES (OIL FILLED), AND BAUER FITTING W/ DUST COVER INSIDE VALVE VAULT OR ABOVE GROUND MANIFOLD PIPING

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes 8” DIP piping and fittings, pressure gauges (oil filled), and bauer fitting with dust cover inside valve vault or above ground manifold piping, per City details for triplex pump stations.

ITEM NO. 120 – DEMOLISH EXISTING CAN 4’ BELOW GRADE AND CUT A HOLE IN THE FLOOR

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes demolishing existing can station 4’ below grade and cutting a hole in the floor.

ITEM NO. 121 – INSTALL CITY-PROVIDED GUIDE RAILS SYSTEMS AND UPPER GUIDE BRACKETS (PER PUMP) & REMOVE EXISTING SYSTEMS

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes installing the guide rail system and upper guide brackets (per pump supplied by City) and removal of existing systems, if required.

ITEM NO. 122 – FURNISH AND INSTALL SS FLOAT AND CABLE RACKS PER PUMP

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing SS float and cable racks per pump.

ITEM NO. 123 – FURNISH AND INSTALL PUMP BASE ANCHOR PLATE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing pump base anchor plate, including all anchorage and connection hardware per City details (size varies). All hardware shall be Type 316 stainless steel.

ITEM NO. 124 – FURNISH AND INSTALL SS ANCHOR PLATE AND FOOTER STEP FOR PUMP BASES

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing SS anchor plate and footer step for pump bases.

ITEM NO. 125 – FURNISH AND INSTALL NEW WETWELL FLOOR (6” Height) AND INCLUDE BENCH WALL

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes installing new wetwell floor (6” height), including bench wall.

ITEM NO. 126 – FURNISH AND INSTALL NEW WETWELL FLOOR (8” Height)
AND INCLUDE BENCH WALL

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing new wetwell floor (8” height), including bench wall.

ITEM NO. 127 – PROVIDE START-UP SERVICES FOR LIFT STATION

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes providing start-up services for each lift station as described in technical specifications (Section 01650).

ELECTRICAL/ INSTRUMENTATION

ITEM NO. 128 - COORDINATE WITH FPL AS REQUIRED TO COMPLETE
ELECTRICAL WORK – POLE MOUNTED SERVICE

Payment for this item will be made on an Hourly (HR) basis. Contractor shall coordinate with FPL for pole mounted service including but not limited to, demolition of existing and/or disconnect of existing, installation of FPL furnished handhole at base of utility pole, riser on the utility pole and final terminations by FPL.

ITEM NO. 129 – COORDINATE WITH FPL AS REQUIRED TO COMPLETE
ELECTRICAL WORK – PAD MOUNTED SERVICE

Payment for this item will be made on an Hourly (HR) basis. Contractor shall coordinate with FPL for pad mounted service including but not limited to, demolition of existing and/or disconnect of existing, installation of FPL transformer pad, FPL installation of FPL transformer and final terminations by FPL.

ITEM NO. 130 – DEMO EXISTING EQUIPMENT RACK

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to demolish and remove & dispose existing electrical equipment rack, and disconnect all associated exposed conduit and wire.

ITEM NO. 131 – DEMO METER CAN

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Contractor to demolish and remove & dispose existing utility meter can and disconnect all associated exposed conduit and wire.

ITEM NO. 132 – DEMO MAIN DISCONNECT AND ASSOCIATED PHASE
MONITOR

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Contractor to demolish and remove & dispose existing main disconnect phase monitor, and disconnect all associated exposed conduit and wire.

ITEM NO. 133 – DEMO LIFT STATION CONTROL PANEL

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Contractor to demolish and remove & dispose existing lift station control panel and disconnect all associated exposed conduit and wire.

ITEM NO. 134 – DEMO RTU

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Contractor to demolish and remove & dispose existing RTU panel and disconnect all associated exposed conduit and wire.

ITEM NO. 135 – DEMO TERMINATION BOX AND FITTINGS

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Contractor to demolish and remove & dispose existing termination box and fittings and disconnect all associated exposed conduit and wire.

ITEM NO. 136 – DEMO ANTENNA AND CABLE

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Contractor to demolish and remove & dispose existing antenna and associated antenna cable with appurtenances.

ITEM NO. 137 – DEMO ANTENNA MAST AND FOOTER

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Contractor to demolish and remove & dispose existing antenna mast including footer and all exposed conduit and wire.

ITEM NO. 138 – FURNISH AND INSTALL COMPLETE ELECTRICAL EQUIPMENT RACK

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Contractor to furnish and install complete electrical equipment rack, including posts, footers, unistrut and all necessary hardware.

ITEM NO. 139 – FURNISH AND INSTALL METER CAN

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Contractor to furnish and install utility meter can and re-connect all associated exposed conduit and wire. Contractor to coordinate with FPL for meter installation.

ITEM NO. 140 – FURNISH AND INSTALL MAIN PHASE MONITOR ASSEMBLY

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Contractor to furnish and install (per City detail) and reconnect all exposed conduit and wire. Contractor to coordinate with FPL for termination at the meter can.

ITEM NO. 141 – INSTALL OWNER FURNISHED DUPLEX CONTROL PANEL

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Contractor to install Owner furnished lift station duplex control panel and reconnect all exposed conduit and wire.

ITEM NO. 142 – INSTALL OWNER FURNISHED TRIPLEX CONTROL PANEL

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to install Owner furnished lift station triplex control panel and reconnect all exposed conduit and wire.

ITEM NO. 143 – FURNISH AND INSTALL RTU

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to furnish and install RTU panel and re-connect all associated exposed conduit and wire.

ITEM NO. 144 – INSTALL OWNER FURNISHED RTU

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to install Owner furnished RTU panel and re-connect all associated exposed conduit and wire.

ITEM NO. 145 – FURNISH AND INSTALL 8”X8”X6” EXPLOSION PROOF
TERMINAL BOXES AND FITTINGS

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to furnish and install 8” x 8” x 6” explosion proof terminal box with terminal strips fittings and re-connect all associated exposed conduit and wire. This termination box is intended for one (1) pump only.

ITEM NO. 146, 147 & 148 – FURNISH AND INSTALL 1”-3” PVC COATED EYSR
FITTINGS WITH DUCT SEAL OR CITY APPROVED EQUAL

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to furnish and install 1”, 2” or 3” PVC Coated EYSR Fitting with Duct Seal or City-approved equal.

ITEM NO. 149, 150 & 151 – FURNISH AND INSTALL 1” – 3” PVC COATED EYS
FITTINGS WITH CHICO CEMENT

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to furnish and install 1”, 2” or 3” PVC Coated EYSR Fitting with Chico Cement.

ITEM NO. 152, 153, 154, 155, 156, 157, 158, 159, 160, 161 & 162 – FURNISH AND
INSTALL ELECTRICAL WIRE

Payment for this item will be made on a Linear Foot (LF) basis. Contractor to furnish and install electrical wire.

ITEM NO.163 – RAISE EXISTING CONTROL PANEL

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor shall raise existing control panel, modify unistrut hardware and the conduits entering and leaving the enclosure and re-terminate all wiring.

ITEM NO.164 – FURNISH AND INSTALL NEW OVERLOADS – SIZE 2 STARTER

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to furnish and install new Overloads in the Starters Rated for the New Pump Motors Name Plate Full Load Amperage; for Size 2 starters.

ITEM NO.165 – FURNISH AND INSTALL NEW OVERLOADS – SIZE 3 STARTER

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to furnish and install new Overloads in the Starters Rated for the New Pump Motors Name Plate Full Load Amperage; for Size 3 starters.

ITEM NO.166 – FURNISH AND INSTALL 4" ALUMINUM POSTS AND SS UNISTRUT FOR EXISTING CONTROL PANEL

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to furnish and install 4" Aluminum posts with stainless steel unistrut for existing control panel equipment racks.

ITEM NO.167 – INSTALL GROUND RODS, TEST WELL AND GRID

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to furnish and install ground rods, ground test well and grid per City detail. Installation to include three (3) ground rods, one (1) test well and bare copper wire and associated cadwelded connections.

ITEM NO.168 – REMOVE EXISTING CONDUIT

Payment for this item will be made on a Linear Foot (LF) basis. The contract unit price shall include all labor, equipment, materials, open cut removal of conduit, backfill and all appurtenances necessary to remove conduit.

ITEM NO.169 – FURNISH AND INSTALL 1" PVC COATED CONDUIT

Payment for this item will be made on a Linear Foot (LF) basis. The contract unit price shall include furnishing and installing 1" PVC coated conduit including all fittings, adapters, couplings, hubs, etc.

ITEM NO.170 – FURNISH AND INSTALL 1" PVC SCHEDULE 80 CONDUIT

Payment for this item will be made on a Linear Foot (LF) basis. The contract unit price shall include furnishing and installing 1" PVC Schedule 80 conduit including all fittings, adapters, couplings, hubs, etc.

ITEM NO.171 – FURNISH AND INSTALL 2” PVC COATED CONDUIT

Payment for this item will be made on a Linear Foot (LF) basis. The contract unit price shall include furnishing and installing 2” PVC coated conduit including all fittings, adapters, couplings, hubs, etc.

ITEM NO.172 – FURNISH AND INSTALL 2” PVC SCHEDULE 80 CONDUIT

Payment for this item will be made on a Linear Foot (LF) basis. The contract unit price shall include furnishing and installing 2” PVC Schedule 80 conduit including all fittings, adapters, couplings, hubs, etc.

ITEM NO.173 – FURNISH AND INSTALL 3” PVC COATED CONDUIT

Payment for this item will be made on a Linear Foot (LF) basis. The contract unit price shall include furnishing and installing 3” PVC coated conduit including all fittings, adapters, couplings, hubs, etc.

ITEM NO.174 – FURNISH AND INSTALL 3” PVC SCHEDULE 80 CONDUIT

Payment for this item will be made on a Linear Foot (LF) basis. The contract unit price shall include furnishing and installing 3” PVC Schedule 80 conduit including all fittings, adapters, couplings, hubs, etc.

ITEM NO.175 – CORE DRILL EXISTING WETWELL FOR CONDUIT

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Core drill existing wetwell for electrical conduit – 1 core per wetwell for all conduits.

ITEM NO.176 – FURNISH AND INSTALL HIGH LEVEL FLOAT

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Furnish and install High Level Float (Root Float - normally open) with SS Sleeve.

ITEM NO.177 – FURNISH AND INSTALL LOW LEVEL FLOAT

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Furnish and install Low Level Float (Root Float - normally open) with SS Sleeve.

ITEM NO.178 – FURNISH AND INSTALL ULTRASONIC LEVEL TRANSDUCER AND TRANSMITTER

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Furnish and install Ultrasonic Level transducer and transmitter.

ITEM NO.179 – INSTALL OWNER FURNISHED ULTRASONIC LEVEL TRANSDUCER AND TRANSMITTER

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Install Owner furnished Ultrasonic Level transducer and transmitter.

ITEM NO. 180 – FURNISH AND INSTALL PRESSURE LEVEL TRANSDUCER AND TRANSMITTER

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Furnish and install Pressure Level transducer and transmitter.

ITEM NO. 181 – INSTALL OWNER FURNISHED PRESSURE LEVEL TRANSDUCER AND TRANSMITTER

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Install Owner furnished Pressure Level transducer and transmitter

MISCELLANEOUS**ITEM NO. 182 – DENSITY TESTS**

Payment for this item will be made on a Contract Unit (EA) price bid for this item. Payment will only be made on the number of completed density tests by an approved Testing Laboratory for passing tests. Contractor will not be compensated for failed tests.

ITEM NO. 183 – BAHIA SOD

Payment for this item will be made on a Square Foot (SF) basis. The Contractor's unit price shall constitute full compensation for all labor, equipment and materials required for furnishing, hauling and placing of the sod and for watering until established and through the maintenance period.

ITEM NO. 184 – FLORATAM (ST. AUGUSTINE) SOD

Payment for this item will be made on a Square Foot (SF) basis. The Contractor's unit price shall constitute full compensation for all labor, equipment and materials required for furnishing, hauling and placing of the sod and for watering until established and through the maintenance period.

ALLOWANCE AND T&M ITEMS FOR WORK NOT COVERED BY OTHER PAY ITEMS**ITEM NO. 185 – TREE REMOVAL AND DISPOSAL**

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes removal and disposal of any and all types of trees. Note: a tree removal permit may be required by the City.

ITEM NO. 186 – WELLPOINT EQUIPMENT

Payment for this item will be made on a Daily (DAY) basis. Contractor to supply and operate a wellpoint (50 points) system for groundwater dewatering operation. This item shall include full compensation for labor, material, equipment, and cleanup necessary for providing dewatering and disposal operation for the construction of the proposed improvements. This item includes, well points,

stilling basin, piping, Silent Knight pumps, pump noise mitigation and all other required dewatering appurtenances. Dewatering pumps shall have mitigation measures to reduce the noise level to 55 dBA measured at the base of residential structures.

ITEM NO. 187 – SETUP WELL POINT EQUIPMENT AND REMOVE AFTER DEWATERING OPERATION IS FINISHED

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to set up wellpoint (50 points) equipment and remove after dewatering operation is complete.

ITEM NO. 188 – SUPERVISOR

Payment for this item will be made on an Hourly (HR) basis. A qualified supervisor shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 189 – FOREMAN

Payment for this item will be made on an Hourly (HR) basis. A qualified foreman shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 190 – PIPE LAYER

Payment for this item will be made on an Hourly (HR) basis. A qualified pipe layer shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 191 – LABORER

Payment for this item will be made on an Hourly (HR) basis. A qualified laborer shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 192 – ELECTRICIAN – ENTRY LEVEL

Payment for this item will be made on an Hourly (HR) basis. A qualified entry-level electrician shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 193 – ELECTRICIAN – JOURNEYMAN

Payment for this item will be made on an Hourly (HR) basis. A qualified journeyman electrician shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 194 – ELECTRICIAN – ENTRY LEVEL

Payment for this item will be made on an Hourly (HR) basis. A qualified entry-level electrician shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 195 – ELECTRICIAN – JOURNEYMAN

Payment for this item will be made on an Hourly (HR) basis. A qualified journeyman electrician shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 196 – ELECTRICIAN – MASTER ELECTRICIAN

Payment for this item will be made on an Hourly (HR) basis. A qualified master electrician shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 197 – INTEGRATOR

Payment for this item will be made on an Hourly (HR) basis. A qualified integrator shall only be used. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 198 – SINGLE AXLE DUMP TRUCK, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 199 – DOUBLE AXLE DUMP TRUCK, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 200 – CRANE TRUCK WITH LIFTING CAPACITY UP TO 30 TONS, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO.201 – CREW TRUCK

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 200 – FLATBED TRUCK, UNDER 25,000 POUNDS (GVW), WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 201 – 3/8-YARD COMBINATION BACKHOE, FRONT END LOADER, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 202 – FRONT END LOADER, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO.203 – EXCAVATOR, WITH OPERATOR

Payment for this item will be made on an Hourly (HR) basis. The Owner's Representative shall be notified in advance of the work. Standby time shall not be measured for payment. The time intervals shall be measured in increments of 15 minutes.

ITEM NO. 204, 205, 206 & 207 – PROVIDE AND INSTALL 230 VOLT, 100, 200, ETC... AMP FUSED DISCONNECT

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Furnish and install 230 Volt, 100, 200, 300 or 400 Amp fused disconnect switch. This item also includes the supply and install of all wiring, conduit and fittings from a source within 30' of the proposed disconnect location as well as mounting of the disconnect to an existing panel rack.

ITEM NO. 208, 209, 210 & 211 – PROVIDE AND INSTALL 460 VOLT, 100, 200, ETC...
AMP FUSED DISCONNECT

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Furnish and install 460 Volt 100, 200, 300 or 400 Amp fused disconnect switch. This item also includes the supply and install of all wiring, conduit and fittings from a source within 30' of the proposed disconnect location as well as mounting of the disconnect to an existing panel rack.

ITEM NO. 212 – POWER DISTRIBUTION BLOCK

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Furnish and install solid copper power distribution blocks sized to support one conductor port per pole that accepts 350 kcmil - #6 Cu conductor and the load-side characteristics six (6) conductor ports per pole that each accepts #4 - #14 Cu conductors.

ITEM NO. 213, 214, 215 & 216 – FURNISH & INSTALL 8", 12", 16" & 18" DROP
BOWL WITH PIPE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing 8"-18" drop bowl with pipe.

ITEM NO. 217 – REMOVE EXISTING DROP PIPING OR BAFFLING

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor shall remove existing drop piping or baffling.

ITEM NO. 218 – FENCING

Payment for this item will be made on a Linear Foot (LF) basis. This item includes furnishing and installing fencing per City details, including all concrete and hardware to install fencing.

ITEM NO. 219 – AIR RELEASE VALVE AND PIPING BACK TO WET WELL

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes installing an above ground Combination Air-Vac Valve for Wastewater – Short Version, Manufacturer H-TEC Model #980-00, stainless steel body, and painted PVC, rigidly supported piping back to wetwell.

ITEM NO. 220 – RELOCATE EXISTING ELECTRICAL PANEL, INCLUDE WIRING
AS NEEDED AND DISTANCES

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes relocating existing electrical panel, including wiring, conduit & fittings as needed.

ITEM NO. 221 & 222 – FURNISH AND INSTALL SUCTION PIPE AND FITTINGS FOR EMERGENCY PUMP OUT

Payment for this item will be made on a Linear Foot (LF) basis. This item includes furnishing and installing suction piping and fittings for emergency pump out to the wetwell including 6" and 8" pump out connections with 10" x 6" or- 8" reducing 90-degree bend with the Bauer quick connect female flange. Pipe is to be ductile iron coated (described in Section 09900) (up to 25 feet) and positioned no closer than 1 ft. off floor or bench and as close to wetwell wall as possible.

ITEM NO. 223 – CORE HOLES ALL SIZES UP TO 24"

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes core holes in concrete structures all sizes up to 24" (that are not already included in other bid items).

ITEM NO. 224 – EPOXY PAINT ALL PIPING, INCLUDE MANIFOLD

Payment for this item will be made on a Square Foot (SF) basis. This item includes epoxy painting (Mainstay DS-5, minimum 50 mils DFT) of all pipe exterior, including manifold.

ITEM NO. 225 – PROVIDE VACTOR SERVICES

Payment for this item will be made on an Hourly (HR) basis. This item includes providing vactor truck services as required by the City for tie-ins and wet-well cleaning. Vactor truck utilized shall have minimum 8" top loading suction boom.

ITEM NO. 226, 227, 228, 229 & 230 – FURNISH AND INSTALL LINE STOP

Payment under this item shall be made at the Contractor's unit price for each (EA) size line stop (4" – 12") and shall include full compensation for all labor, material and equipment required to provide and remove the line stop.

ITEM NO. 231 – FURNISH AND INSTALL PRESSURE GAUGE ON DISCHARGE SIDE OF VALVES

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing pressure gauges on discharge side of valves. This item shall include all valving, fittings, nipples, Type 316 SS diaphragm, etc. required to install the pressure gauge assembly in accordance with City standard details.

ITEM NO. 232 – REPLACE DIP (EPOXY LINED) 4" PIPING BETWEEN WET WELL AND VAULT

Payment for this item will be made at the Contract Unit (LF) price bid for this item. This item includes replacing the 4" DIP (epoxy lined) piping between the wet well and vault, including 316 SS pipe clamps and restraining the wall pipe. Refer to Typical Lift Station Details (Sheet 1 of 5)

ITEM NO. 233 – REPLACE DIP (EPOXY LINED) 6” PIPING BETWEEN WET WELL AND VAULT

Payment for this item will be made at the Contract Unit (LF) price bid for this item. This item includes replacing the 6” DIP (epoxy lined) piping between the wet well and vault, including 316 SS pipe clamps and restraining the wall pipe. Refer to Typical Lift Station Details (Sheet 1 of 3).

ITEM NO. 234 – REPLACE DIP (EPOXY LINED) 8” PIPING BETWEEN WET WELL AND VAULT

Payment for this item will be made at the Contract Unit (LF) price bid for this item. This item includes replacing the 8” DIP (epoxy lined) piping between the wet well and vault, including 316 SS pipe clamps and restraining the wall pipe. Refer to Typical Lift Station Details (Sheet 1 of 3).

ITEM NO. 235 – REPLACE DIP (EPOXY LINED) 10” PIPING BETWEEN WET WELL AND VAULT

Payment for this item will be made at the Contract Unit (LF) price bid for this item. This item includes replacing the 10” DIP (epoxy lined) piping between the wet well and vault, including 316 SS pipe clamps and restraining the wall pipe. Refer to Typical Lift Station Details (Sheet 1 of 3).

ITEM NO. 236 – REPLACE DIP (EPOXY LINED) 12” PIPING BETWEEN WET WELL AND VAULT

Payment for this item will be made at the Contract Unit (LF) price bid for this item. This item includes replacing the 12” DIP (epoxy lined) piping between the wet well and vault, including 316 SS pipe clamps and restraining the wall pipe. Refer to Typical Lift Station Details (Sheet 1 of 3).

ITEM NO. 237 – FURNISH AND INSTALL CONTROL PANEL – DUPLEX (< 7.5 HP) 240V/3 PHASE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing control panel for Duplex (≤ 7.5 HP) 240V/3 Phase. This item includes the supply and install of all required terminal boxes, interconnecting wiring, conductors and fittings as well as all required connections.

ITEM NO. 238 – FURNISH AND INSTALL CONTROL PANEL – DUPLEX (> 7.5 HP $\leq$ 15 HP) 240V/3 PHASE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing control panel for Duplex (> 7.5 HP and ≤ 15 HP) 240V/3 Phase. This item includes the supply and install of all required terminal boxes, interconnecting wiring, conductors and fittings as well as all required connections.

ITEM NO. 239 – FURNISH AND INSTALL CONTROL PANEL – DUPLEX (> 15 HP < 30 HP) 240V/3 PHASE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing control panel for Duplex (> 15 HP and $\leq$ 30 HP) 240V/3 Phase. This item includes the supply and install of all required terminal boxes, interconnecting wiring, conductors and fittings as well as all required connections.

ITEM NO. 240 – FURNISH AND INSTALL CONTROL PANEL – DUPLEX (> 30 HP < 50 HP) 240V/3 PHASE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing control panel for Duplex (> 30 HP $\leq$ 50 HP) 240V/3 Phase. This item includes the supply and install of all required terminal boxes, interconnecting wiring, conductors and fittings as well as all required connections.

ITEM NO. 241 – FURNISH AND INSTALL CONTROL PANEL – DUPLEX (> 50 HP < 75 HP) 240V/3 PHASE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing control panel for Duplex (> 50 HP $\leq$ 75 HP) 240V/3 Phase. This item includes the supply and install of all required terminal boxes, interconnecting wiring, conductors and fittings as well as all required connections.

ITEM NO. 242 – FURNISH AND INSTALL CONTROL PANEL – DUPLEX (< 7.5 HP) 480V/3 PHASE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing control panel for Duplex ($\leq$ 7.5 HP) 480V/3 Phase. This item includes the supply and install of all required terminal boxes, interconnecting wiring, conductors and fittings as well as all required connections.

ITEM NO. 243 – FURNISH AND INSTALL CONTROL PANEL – DUPLEX (> 7.5 HP $\leq$ 15 HP) 480V/3 PHASE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing control panel for Duplex (> 7.5 HP and $\leq$ 15 HP) 480V/3 Phase. This item includes the supply and install of all required terminal boxes, interconnecting wiring, conductors and fittings as well as all required connections.

ITEM NO. 244 – FURNISH AND INSTALL CONTROL PANEL – DUPLEX (> 15 HP $\leq$ 30 HP) 480V/3 PHASE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing control panel for Duplex (> 15 HP and $\leq$ 30 HP) 480V/3 Phase. This item includes the supply and install of all

required terminal boxes, interconnecting wiring, conductors and fittings as well as all required connections.

ITEM NO. 245 – FURNISH AND INSTALL CONTROL PANEL – DUPLEX (> 30 HP ≤ 50 HP) 480V/3 PHASE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing control panel for Duplex (> 30 HP ≤ 50 HP) 480V/3 Phase. This item includes the supply and install of all required terminal boxes, interconnecting wiring, conductors and fittings as well as all required connections.

ITEM NO. 246 – FURNISH AND INSTALL CONTROL PANEL – DUPLEX (> 50 HP ≤ 75 HP) 480V/3 PHASE

Payment for this item will be made at the Contract Unit (EA) price bid for this item. This item includes furnishing and installing control panel for Duplex (> 50 HP ≤ 75 HP) 480V/3 Phase. This item includes the supply and install of all required terminal boxes, interconnecting wiring, conductors and fittings as well as all required connections.

ITEM NO. 247 – TRANSFORMER

Payment for this item will be made at the Contract Unit (EA) price bid for this item. Contractor to furnish and install new Control Transformer in standalone NEMA 4X Type 316 SS enclosure including all required fuses and appurtenances.

ITEM NO. 248 – ALLOWANCE

The Allowance shall be used to pay for unforeseen utility conflict resolutions, utility repair work, or other material and work not within the other bid items, but necessary and related to the itemized line items only at the direction and within the authorization of the City. FPL costs will be paid by the City as a pass through with no markups as detailed in Section 16010.

ITEM NO. 249 – PERMIT FEE ALLOWANCE

Payment for Contractor required Permit Fee Allowance will be made as a direct reimbursable allowance. No markup by Contractor will be allowed.

PRODUCTS (NOT USED)

PART 2 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01027

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Administrative and procedural requirements governing the CONTRACTOR's Applications for Payment.

1.02 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of the CONTRACTOR's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - a. CONTRACTOR's Construction Schedule.
 - b. Application for Payment forms, including Continuation Sheets.
 - c. Final list of subcontractors.
 - d. Schedule of allowances.
 - e. Schedule of alternates.
 - f. List of products.
 - g. List of principal suppliers and fabricators.
 - h. Schedule of submittals.
 - 2. Submit the Schedule of Values to the OWNER at the earliest possible date but no later than 7 days before the date scheduled for submittal of the initial Applications for Payment.
 - 3. Sub-schedules: Where Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one-line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of the OWNER.
 - c. Project number.
 - d. CONTRACTOR's name and address.
 - e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of both labor and materials.
3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items.
4. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.
6. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Unit-Cost Allowances: Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents.
8. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.03 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the OWNER and paid for by the CITY. The initial Application for Payment and the final Application for Payment involve additional requirements.
- B. Payment-Application Times: Each progress-payment date is indicated in the Agreement. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment-Application Times: The date for each progress payment is the 15th day of each month. The period covered by each Application for Payment starts on the day following the end of the preceding period and ends 15 days prior to the date for each progress payment.

- D. Payment-Application Forms: Use AIA Document G702 and Continuation Sheets G703 as the form for Applications for Payment. Percent of work complete indicated on the Application for Payment shall be consistent with the work indicated on the Record Documents as complete as of the date of the application. AIA Forms are included at the end of this Section.
- E. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the CONTRACTOR. The OWNER will return incomplete applications without action.
1. Entries shall match data on the Schedule of Values and the CONTRACTOR's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
- F. Transmittal: Submit 4 signed and notarized original copies of each Application for Payment to the OWNER by a method ensuring receipt within 24 hours. One copy shall be complete, including waivers of lien and similar attachments, when required.
- G. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics liens from subcontractors, sub-subcontractors and suppliers for the construction period covered by the previous application.
1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers for such items.
 3. Waiver Forms: Submit executed waivers of lien on forms in conformance with Florida Statute FS 713.20.
 4. Waiver Forms: Submit waivers of lien on forms which comply with State statutes, and executed in a manner, acceptable to the CITY.
- H. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment, include the following:
1. Final list of subcontractors.
 2. List of principal suppliers and fabricators.
 3. Schedule of Values.
 4. CONTRACTOR's Construction Schedule (preliminary if not final).
 5. Schedule of principal products.
 6. Schedule of unit prices.
 7. Submittal Schedule (preliminary if not final).
 8. List of CONTRACTOR's staff assignments.
 9. List of CONTRACTOR's principal consultants.

10. Copies of building permits.
 11. Copies of authorizations and licenses from governing authorities for performance of the Work.
 12. Initial progress report.
 13. Report of preconstruction meeting.
 14. Certificates of insurance and insurance policies.
 15. Public Construction Bond
 16. Record Documents.
 17. Data needed to acquire the CITY's insurance.
 18. Initial settlement survey and damage report, if required.
- I. Final Payment Application for each Work Order: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:
1. Completion of Project closeout requirements.
 2. Completion of items specified for completion after Final Project Inspection.
 3. Ensure that unsettled claims will be settled.
 4. Ensure that incomplete Work is not accepted and will be completed without undue delay.
 5. Transmittal of required Project construction records to the CITY.
 6. Proof that taxes, fees, and similar obligations were paid.
 7. Removal of temporary facilities and services.
 8. Removal of surplus materials, rubbish, and similar elements.
 9. Record Documents - Drawings and Specifications with CONTRACTOR's Endorsement.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01092 ABBREVIATIONS

PART 1 GENERAL

1.1 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES

- A. Reference to standards and specifications of technical societies and reporting and resolving discrepancies associated therewith shall be as provided in the General Conditions, and as may otherwise be required herein and in the individual Specification sections.
- B. Work specified by reference to the published standard or specification of a government agency, technical association, trade association, professional society or institute, testing agency, or other organization shall meet the requirements or surpass the minimum standards of quality for materials and workmanship established by the designated standard or Specification.
- C. Where so specified, products or workmanship shall also meet or exceed the additional prescriptive or performance requirements included within the Contract Documents to establish a higher or more stringent standard of quality than that required by the referenced standard.
- D. Where two or more standards are specified to establish quality, the product and workmanship shall meet or exceed the requirements of the most stringent.
- E. Where both a standard and a brand name are specified for a product in the Contract Documents, the proprietary product named shall meet or exceed the requirements of the specified reference standard.
- F. Copies of Standards and Specifications of Technical Societies:
 - 1. Copies of applicable referenced standards have not been bound in these Contract Documents.
 - 2. Where copies of standards are needed by the CONTRACTOR, obtain a copy or copies directly from the publication source and maintain in an orderly manner at the site as Work site records, available to the CONTRACTOR's personnel, Subcontractors and OWNER.

1.2 ABBREVIATIONS

- A. Abbreviations for trade organizations and government agencies: Following is a list of construction industry organizations and government agencies to which references may be made in the Contract Documents, with abbreviations used.
 - 1. AA Aluminum Association
 - 2. AABC Associated Air Balance Council

3.	AAMA	American Architectural Manufacturers Association
4.	AASHTO	American Association of State Highway and Transportation Officials
5.	ACI	American Concrete Institute
6.	AFBMA	Anti-Friction Bearing Manufacturers Association
7.	AGA	American Gas Association
8.	AGMA	American Gear Manufacturers' Association
9.	AI	Asphalt Institute
10.	AISC	American Institute of Steel Construction
11.	AISI	American Iron and Steel Institute
12.	AITC	American Institute of Timber Construction
13.	ALS	American Lumber Standards
14.	AMA	Acoustical Materials Association
15.	AMCA	Air Movement and Control Association
16.	ANSI	American National Standards Institute
17.	APA	American Plywood Association
18.	API	American Petroleum Institute
19.	APWA	American Public Works Association
20.	AREA	American Railway Engineering Association
21.	ARI	Air Conditioning and Refrigeration Institute
22.	ASA	American Standards Association
23.	ASAE	American Society of Agricultural Engineers
24.	ASCE	American Society of Civil Engineers
25.	ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
26.	ASNT	American Society for Nondestructive Testing
27.	ASME	American Society of Mechanical Engineers
28.	ASTM	American Society for Testing and Materials
29.	AWI	Architectural Wood Work Institute
30.	AWPA	American Wood Preservers' Association
31.	AWPB	American Wood Preservers Bureau
32.	AWPI	American Wood Preservers' Institute
33.	AWS	American Welding Society
34.	AWWA	American Water Works Association
35.	BHMA	Builders Hardware Manufacturers' Association
36.	CBMA	Certified Ballast Manufacturers' Association
37.	CDA	Copper Development Association
38.	CGA	Compressed Gas Association
39.	CIPRI	Cast Iron Pipe Research Institute
40.	CISPI	Cast Iron Soil Pipe Institute
41.	CMAA	Crane Manufacturers' Association of America
42.	CRSI	Concrete Reinforcing Steel Institute
43.	CS	Commercial Standard
44.	CSA	Canadian Standards Association
45.	CSI	Construction Specifications Institute

46.	CTSS	Caltrans Standard Specification
47.	EJCDC	Engineers Joint Contract Documents' Committee
48.	ETL	Engineering Test Laboratories
49.	FCC	Federal Communications Commission
50.	FEMA	Federal Emergency Management Agency
51.	FGMA	Flat Glass Marketing Association
52.	FM	Factory Mutual
53.	Fed. Spec.	Federal Specifications
54.	FS	Federal Specification
55.	GA	Gypsum Association
56.	HI	Hydraulic Institute
57.	HMI	Hoist Manufacturers' Institute
58.	ICBO	International Conference of Building Officials
59.	ICEA	Insulated Cable Engineers' Association
60.	IEEE	Institute of Electrical and Electronics Engineers, Inc.
61.	IES	Illuminating Engineering Society
62.	IFI	Industrial Fasteners Institute
63.	ISA	Instrument Society of America
64.	ISO	Insurance Service Office
65.	JIC	Joint Industry Conferences of Hydraulic Manufacturers
66.	MIA	Marble Institute of America
67.	Mil. Sp.	Military Specification or MIL
68.	MS	Military Specifications
69.	MMA	Monorail Manufacturers' Association
70.	NAAMM	National Association of Architectural Metal Manufacturers
71.	NACE	National Association of Corrosion Engineers
72.	NBHA	National Builders' Hardware Association
73.	NEC	National Electrical Code
74.	NECA	National Electrical Contractor's Association
75.	NEMA	National Electrical Manufacturers' Association
76.	NESC	National Electric Safety Code
77.	NFPA	National Fire Protection Association
78.	NHLA	National Hardwood Lumber Association
79.	NHPMA	Northern Hardwood and Pine Manufacturer's Association
80.	NLMA	National Lumber Manufacturers' Association
81.	NRCA	National Roofing Contractors Association
82.	NSF	National Sanitation Foundation Testing Laboratory
83.	NSPE	National Society of Professional Engineers
84.	NTMA	National Terrazzo and Mosaic Association
85.	NWWDA	National Wood Window and Door Association

86.	OECI	Overhead Electrical Crane Institute
87.	OSHA	Occupational Safety and Health Act (both Federal and State)
88.	PCI	Prestressed Concrete Institute
89.	PEI	Porcelain Enamel Institute
90.	PPI	Plastic Pipe Institute
91.	PS	Product Standards Section-U.S. Department of Commerce
92.	RMA	Rubber Manufacturers' Association
93.	SAE	Society of Automotive Engineers
94.	SCPRF	Structural Clay Products Research Foundation
95.	SDI	Steel Deck Institute
96.	SDI	Steel Door Institute
97.	SIGMA	Sealed Insulating Glass Manufacturing Association
98.	SJI	Steel Joist Institute
99.	SMACNA	Sheet Metal and Air Conditioning Contractors National Association
100.	SPI	Society of the Plastics Industry
101.	SSPC	Steel Structures Painting Council
102.	SWI	Steel Window Institute
103.	TEMA	Tubular Exchanger Manufacturers' Association
104.	TCA	Tile Council of America
105.	UBC	Uniform Building Code
106.	UFC	Uniform Fire Code
107.	UL	Underwriters Laboratories Inc.
108.	UMC	Uniform Mechanical Code
109.	US	U.S. Bureau of Standards
110.	USBR	Bureau of Reclamation
111.	WCLIB	West Coast Lumber Inspection Bureau
112.	WWPA	Western Wood Products Association

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION (NOT USED)****END OF SECTION**

SECTION 01300 SUBMITTALS

PART 1 GENERAL

1.1 GENERAL

- A. Inquiries: Direct to OWNER regarding procedure, purpose, or extent of Submittal.
- B. Timeliness: Schedule and make submissions in accordance with requirements of individual Specification sections and in such sequence as to cause no delay in Work or in work of other contractors.
- C. Identification of Submittals:
 - 1. Complete, sign, and transmit with each Submittal package, one Transmittal of CONTRACTOR's Submittal Form attached at the end of this Section.
 - 2. Identify each Submittal with the following numbering and tracking system:
 - a. Sequentially number each Submittal.
 - b. Resubmission of a Submittal will have original number with sequential alphabetic suffix.
 - 3. Format: Orderly, indexed with labeled tab dividers.
 - 4. Show date of submission.
 - 5. Show Project title and OWNER's contract identification and contract number.
 - 6. Show names of CONTRACTOR, Subcontractor or Supplier, and manufacturer as appropriate.
 - 7. Identify, as applicable, Contract Document section and paragraph to which Submittal applies.
 - 8. Identify Submittal type; submit only one type in each Submittal package.
 - 9. Identify and indicate each deviation or variation from Contract Documents.
- D. Resubmissions: Clearly identify each correction or change made.
- E. Incomplete Submittal Submissions:
 - 1. OWNER will return the entire Submittal for CONTRACTOR's revision/correction and resubmission.
 - 2. Submittals which do not clearly bear CONTRACTOR's specific written indication of CONTRACTOR review and approval of Submittal or which are transmitted with an unsigned or uncertified submission form

or as may otherwise be required will be returned to CONTRACTOR unreviewed.

- F. Non-specified Submissions: Submissions not required under these Contract Documents and not shown on submissions will not be reviewed and will be returned to CONTRACTOR.
- G. OWNER's Review: OWNER will act upon CONTRACTOR's Submittal and transmit response to CONTRACTOR not later than 15 days after receipt, unless otherwise specified. Resubmittals will be subject to the same review time.
- H. Schedule Delays:
 - 1. No adjustment of Contract Times or Price will be allowed due to OWNER's review of Submittals, unless all of the following criteria are met:
 - a. CONTRACTOR has notified OWNER in writing that timely review of Submittal in question is critical to progress of Work, and has received OWNER's written acceptance to reflect such on current accepted submissions and progress schedule. Written agreement by the OWNER to reduce Submittal review time will be made only for unusual and CONTRACTOR-justified reasons. Acceptance of a progress schedule containing Submittal review times less than specified or less than agreed to in writing by OWNER will not constitute OWNER's acceptance of the review times.
 - b. OWNER has failed to review and return first submission of a Submittal within agreed time indicated on current accepted schedule of submissions or, if no time is indicated thereon, within 15 days after receipt.
 - c. CONTRACTOR demonstrates that delay in progress of Work is directly attributable to OWNER's failure to return Submittal within time indicated and accepted by OWNER.
 - 2. No adjustment of Contract Times or Price will be allowed due to delays in progress of Work caused by rejection and subsequent resubmission of Submittals, including multiple resubmissions.

1.2 SHOP DRAWINGS AND SAMPLES

- A. Copies:
 - 1. Shop Drawings and Product Data: Four – unless only electronic copies are requested by the City
 - 2. Samples: Two, unless otherwise specified in individual Specification sections.

- B. General: Submit to City of Sunrise Utilities as required by individual Specification sections.
- C. Identify and Indicate:
 - 1. Pertinent Drawing sheet(s) and detail number(s), products, units and assemblies, and system or equipment identification or tag numbers.
 - 2. Critical field dimensions and relationships to other critical features of Work.
 - 3. Samples: Source, location, date taken, and by whom.
 - 4. Each deviation or variation from Contract Documents.
- D. Design Data: When specified, provide Project-specific information as required and as necessary to clearly show calculations, dimensions, logic and assumptions, and referenced standards and codes upon which design is based.
- E. Foreign Manufacturers: When proposed, include following additional information:
 - 1. Names and addresses of at least two companies closest to Project that maintain technical service representatives.
 - 2. Complete inventory of spare parts and accessories for each piece of equipment.
- F. Preparation:
 - 1. Format: Whenever possible, schedule for and combine Shop Drawings and Samples required for submission in each Specification section or division into a single Submittal package. Also combine product data for like items into a single Submittal package.
 - 2. Present in a clear and thorough manner and of sufficient detail to show kind, size, arrangement, and function of components, materials, and devices and compliance with Contract Documents. Identify details by reference to sheet and detail, and schedule or room numbers shown on Drawings.
 - 3. Reproducible Copy:
 - a. Preferred Minimum Sheet Size: 8-1/2 by 11-inch and 11- by 17-inch pages, suitable for photocopying.
 - b. Larger than 11- by 17-Inch Sheets: 22-inch by 34-inch preferred.
 - 4. Piping Systems: Drawn to scale.
 - 5. Product Data: Clearly mark each copy to identify pertinent products or models and show performance characteristics and capacities, dimensions and clearances required, wiring or piping diagrams and controls, and external connections, anchorages, and supports required.
 - 6. Equipment and Component Titles: Identical to title, tag number, or valve number shown on Drawings.
 - 7. Manufacturer's Standard Schematic Drawings and Diagrams as Follows:
 - a. Modify to delete information that is not applicable to Work.

- b. Supplement standard information to provide information specifically applicable to Work.
- G. Shop Drawing Disposition: OWNER will review, mark, and stamp as appropriate and distribute marked-up copies as noted:
 - 1. Approved as Submitted (for Incorporation in Work):
 - a. One copy furnished OWNER.
 - b. One copy furnished Resident Project Representative.
 - c. Remaining copies returned to CONTRACTOR appropriately annotated.
 - d. CONTRACTOR may begin to implement activities to incorporate specific product(s) or Work covered by Submittal.
 - 2. Approved as Noted (for Incorporation in Work):
 - a. One copy furnished OWNER.
 - b. One copy furnished Resident Project Representative.
 - c. Remaining copies returned to CONTRACTOR appropriately annotated.
 - d. CONTRACTOR may begin to implement activities to incorporate product(s) or Work covered by Submittal, in accordance with OWNER's notations.
 - 3. Disapproved:
 - a. One copy furnished Resident Project Representative.
 - b. One copy retained in OWNER's file.
 - c. Remaining copies returned to CONTRACTOR appropriately annotated.
 - d. CONTRACTOR shall make corrections or develop replacement and resubmit (in same manner and quantity as specified for original submission).
 - e. Submittal is not approved.
 - 4. Incomplete:
 - a. One copy furnished Resident Project Representative.
 - b. One copy retained in OWNER's file.
 - c. Remaining copies returned to CONTRACTOR appropriately annotated.
 - d. CONTRACTOR shall complete and resubmit or submit missing portions.
 - e. Submittal is not approved.
- H. Sample Disposition: Same as Shop Drawing disposition; samples will not be returned.

1.3 ADMINISTRATIVE SUBMITTALS

- A. Copies: Submit five- unless only electronic copies are requested by the City
- B. Description: Submittals that are not Shop Drawings or Samples, or that do not reflect quality of product or method of construction. May include, but not limited to those Submittals identified below.
- C. Applications for Payment (and Cash Allowance Data and Values): Meet requirements of Section 01025, MEASUREMENT AND PAYMENT.
- D. Construction Videos: In accordance with Section 01001, GENERAL REQUIREMENTS.
- E. Schedules:
 - 1. Progress Schedule(s): Meet the requirements of Section 01001, GENERAL REQUIREMENTS.
 - 2. Schedule of Values: Meet requirements of Section 01025, MEASUREMENT AND PAYMENT.
 - 3. Schedule of Submittal Submissions:
 - a. Prepare and submit, preliminary list of submissions grouped by Contract Document article/paragraph number or Specification section number, with identification, numbering and tracking system as specified under Paragraph Identification of Submittals and as approved by OWNER.
 - b. Include Only the Following Required Submissions:
 - 1) Shop Drawings and Samples.
 - 2) Test procedures.
 - 3) Operation and maintenance manuals.
 - 4) Record documents.
 - 5) Specifically required certificates, warranties, and service agreements.
 - c. Coordinate with progress schedule and prepare submissions to show for each Submittal, at a minimum, the following:
 - 1) Estimated submission date to OWNER.
 - 2) Specifically requested and clearly identified OWNER review time if shorter than that set forth herein, with justification for such request and critical dates Submittals will be needed from OWNER.
 - 3) For first 6-month period from the date the Contract Times commence or following any update or adjustment of the submissions, the estimated submission date shall be week, month, and year; for submissions beyond 6-month time period, show closest month and year.

- d. Submit to OWNER monthly (i) updated list if changes have occurred, otherwise submit a written communication confirming existing list, and (ii) adjusted submissions reflecting submission activity planned for forthcoming 6-month time period and beyond. Coordinate with progress schedule updates.
- F. Training Materials: Meet the requirements of Section 01640, MANUFACTURERS' SERVICES.
- G. Submittals Required by Laws, Regulations, and Governing Agencies:
1. Submit promptly notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
 2. Transmit to OWNER one copy of correspondence and transmittals (to include enclosures and attachments) between CONTRACTOR and governing agency.
- H. Disposition: OWNER will review, stamp, and indicate requirements for resubmission or acceptance on Submittal as follows:
1. Accepted:
 - a. Schedules: Acceptance will indicate that schedules provide for the orderly progression of the Work to completion within any specified milestones and the Contract Times, but such acceptance will neither impose on OWNER responsibility for the sequencing, scheduling, or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor.
 - b. Acceptance of other Administrative Submittals will indicate that Submittal conforms to intent of Contract Documents as to form and substance.
 - c. CONTRACTOR may proceed to perform Submittal related Work.
 - d. Two copies furnished OWNER.
 - e. One copy furnished Resident Project Representative.
 - f. Remaining copies returned to CONTRACTOR appropriately annotated.
 2. Rejected as Noted:
 - a. One copy retained in OWNER's file.
 - b. Remaining copies returned to CONTRACTOR appropriately annotated.
 - c. CONTRACTOR shall revise/correct or develop replacement and resubmit.

1.4 QUALITY CONTROL SUBMITTALS

A. Certificates:

1. Manufacturer's Certificate of Compliance:
 - a. When specified in individual Specification sections or where products are specified to a recognized standard or code, submit prior to shipment of product or material to the site.
 - b. OWNER may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.
 - c. Signed by product manufacturer certifying that materials, manufacture, and product specified conforms to or exceeds specified requirements and intent for which product will be used. Submit supporting reference data, affidavits, and certifications as appropriate.
 - d. May reflect recent or previous test results on material or product, but must be acceptable to OWNER.
2. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in the individual Specification sections.
3. Manufacturer's Certificate of Proper Installation: As required in Section 01640, MANUFACTURERS' SERVICES. Coordinate with Section 01650, FACILITY STARTUP.

B. Operation and Maintenance Manual: As required in Section 01430, OPERATION AND MAINTENANCE DATA.

C. Field Samples: Provide as required by individual Specifications and as may be required by OWNER during progress of Work.

D. Written Test Reports of Each Test and Inspection: As a minimum, include the following:

1. Date of test and date issued, Project title and number, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.
2. Date and time of sampling or inspection and record of temperature and weather conditions.
3. Identification of product and Specification section, location of Sample, test or inspection in the Project, type of inspection or test with referenced standard or code, certified results of test.
4. Compliance with Contract Documents, and identifying corrective action necessary to bring materials and equipment into compliance.
5. Provide an interpretation of test results, when requested by OWNER.

E. Disposition: OWNER will review, stamp, and indicate requirements for resubmission or acceptance on Submittal as follows:

1. Accepted:
 - a. Acceptance will indicate that Submittal conforms to intent of Contract Documents as to form and substance.
 - b. CONTRACTOR may proceed to perform Submittal related Work.
 - c. Two copies furnished OWNER.
 - d. One copy furnished Resident Project Representative.
 - e. Remaining copies returned to CONTRACTOR appropriately annotated.
2. Rejected as Noted:
 - a. One copy retained in OWNER's file.
 - b. Remaining copies returned to CONTRACTOR appropriately annotated.
 - c. CONTRACTOR shall revise/correct or develop replacement and resubmit.

1.5 CONTRACT CLOSEOUT SUBMITTALS

- A. General: In accordance with Section 01700, CONTRACT CLOSEOUT.
- B. Disposition: OWNER will review, stamp, and indicate requirements for resubmission or acceptance on Submittal as follows:
 1. Accepted:
 - a. Acceptance will indicate that Submittal conforms to intent of Contract Documents as to form and substance.
 - b. CONTRACTOR may proceed to perform Submittal related Work.
 - c. Two copies furnished OWNER.
 - d. One copy furnished Resident Project Representative.
 - e. Remaining copies returned to CONTRACTOR appropriately annotated.
 2. Rejected as Noted:
 - a. One copy retained in OWNER's file.
 - b. Remaining copies returned to CONTRACTOR appropriately annotated.
 - c. CONTRACTOR shall revise/correct or develop replacement and resubmit.

1.6 SUPPLEMENTS

- A. The supplement listed below, following "END OF SECTION," are part of this Specification.
 1. Form: Transmittal of Contractor's Submittal.

PART 2 PRODUCTS (NOT USED)
PART 3 EXECUTION (NOT USED)
END OF SECTION

TRANSMITTAL OF CONTRACTOR'S SUBMITTAL
(ATTACH TO EACH SUBMITTAL)

DATE: _____

TO: _____

Submittal No.: _____
☐ New Submittal ☐ Resubmittal
Previous Submittal No.: _____
Project: _____
Project No.: _____
Specification Section No.: _____

FROM: _____
Contractor

(Cover only one section with each transmittal)
Schedule Date of Submittal: _____

SUBMITTAL TYPE: ☐ Shop Drawing ☐ Administrative ☐ Sample
 ☐ Quality Control ☐ Contract Closeout ☐ "Or-Equal"/Substitute

The following items are hereby submitted:

Number of Copies	Description of Item Submitted (Type, Size, Model Number, Etc.)	Spec. Para. No.	Drawing or Brochure Number	Contains Variation to Contract	
				No	Yes

CONTRACTOR hereby certifies that (i) CONTRACTOR has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By: _____
CONTRACTOR (Authorized Signature)

SECTION 01430
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 DEFINITIONS

- A. Maintenance Operation: As used in the Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.
- B. System and Subsystem: Refer to Section 01650, FACILITY STARTUP.

1.2 QUALITY ASSURANCE

- A. Manuals for equipment and systems shall be prepared by equipment manufacturer or system Supplier.

1.3 SEQUENCING AND SCHEDULING

- A. Manuals for Equipment and Systems:
 - 1. Preliminary Manuals: Submit prior to shipment date for equipment, system, subsystem, or component. Include copy of warranties, Bonds, and service agreements if specified.
 - 2. Final Manuals: Submit not less than 30 days prior to equipment or system field testing or startup.

1.4 GENERAL

- A. Furnish for each item of equipment or system as specified in the individual Specification sections. Individual manuals shall be prepared and submitted by the CONTRACTOR for each lift station.
- B. Prepare data for use by OWNER's personnel in the form of an instructional manual.
- C. Manual Format:
 - 1. Size: 8-1/2 inches by 11 inches.
 - 2. Paper: 20-pound minimum, white for typed pages.
 - 3. Text: Manufacturer's printed data, or neatly typewritten.
 - 4. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.

5. Provide fly-leaf for each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment and provide with heavy section dividers with numbered plastic index tabs.
6. Provide each manual with title page, and typed table of contents with consecutive page numbers. Place contents of entire set, identified by volume number, in each binder.
7. Cover: Identify each volume with typed or printed title "OPERATION AND MAINTENANCE MANUAL, VOLUME NO. OF __," if applicable, and list:
 - a. Project title.
 - b. Identity of individual lift station.
 - c. Identity of general subject matter covered in manual. Identity of equipment number and Specification section.
8. Assemble and bind material in same order as specified, as much as possible.
9. Material shall be suitable for reproduction, with quality equal to original. Photocopying of material will be acceptable, except for material containing photographs.
10. Binders:
 - a. Preliminary Manuals: Heavy paper covers.
 - b. Final Manuals: Commercial quality, substantial, permanent, three-ring binders with durable, cleanable, plastic binders.
11. Table of Contents Neatly Typewritten, Arranged in a Systematic Order:
 - a. CONTRACTOR, name of responsible principal, address, and telephone number.
 - b. List of each product required to be included, indexed to content of each volume.
 - c. List with Each Product: Name, address, and telephone number of Subcontractor, Supplier, installer, and maintenance contractor, as appropriate.
 - 1) Identify area of responsibility of each.
 - 2) Provide local source of supply for parts and replacement.
 - d. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
12. Product Data:
 - a. Include only those sheets that are pertinent to specific product.
 - b. Clearly Annotate Each Sheet to:
 - 1) Identify specific product or part installed.
 - 2) Identify data applicable to installation.
 - 3) Delete references to inapplicable information.
13. Drawings: Supplement product data with Drawings as necessary to clearly illustrate:
 - a. Relations of component parts of equipment and systems.
 - b. Control and flow diagrams.

- c. Coordinate drawings with Project record documents to assure correct illustration of completed installation.
 - d. Do not use Project record documents as maintenance manual drawings.
 - e. Provide reinforced punched binder tab, bind in with text.
 - f. Reduced to 8-1/2 inches by 11 inches, or 11 inches by 17 inches folded to 8-1/2 inches by 11 inches.
 - g. Where reduction is impractical, fold and place in 8-1/2 inch by 11-inch envelopes bound in text.
 - h. Identify Specification section and product on Drawings and envelopes.
14. Instructions and Procedures: Within text, as required to supplement product data.
- a. Handling, storage, maintenance during storage, assembly, erection, installation, adjusting, testing, operating, shutdown in emergency, troubleshooting, maintenance, interface, and as may otherwise be required.
 - b. Organize in a consistent format under separate heading for each different procedure.
 - c. Provide a logical sequence of instructions for each procedure.
 - d. Provide Information Sheet for OWNER's Personnel, Including:
 - 1) Proper procedures in the event of failure.
 - 2) Instances that might affect the validity of warranties or Bonds.
15. Warranties, Bonds, and Service Agreements: In accordance with Section 01700, CONTRACT CLOSEOUT.

1.5 SUBMITTAL PROCEDURE

A. Preliminary Manuals:

- 1. Submit two copies and pdf copy for OWNER's review.
- 2. Disposition: In accordance with Section 01300, SUBMITTALS.
- 3. If Accepted:
 - a. Two copies will be returned to CONTRACTOR.
 - b. Two copies will be retained in OWNER's file.
- 4. If Rejected:
 - a. Two copies will be returned to CONTRACTOR with OWNER's comments for revision.
 - b. Two copies will be retained in OWNER's file.
 - c. Resubmit four copies revised Preliminary copies for OWNER's review.

B. Final Manuals:

1. Submit six copies of Final Manual.
2. If Final Manuals are acceptable, CONTRACTOR will be so notified.
3. If rejected, and at OWNER's Option:
 - a. All copies will be returned to CONTRACTOR for revision.
 - b. All copies will be retained by OWNER and the necessary revision data will be requested from CONTRACTOR.

1.6 MANUALS FOR EQUIPMENT AND SYSTEMS

A. Content for Each Unit (or Common Units) and System:

1. Description of unit and component parts, including controls, accessories, and appurtenances:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, operating data, nameplate data, and tests. Provide performance curve for actual tested installation at each station.
 - c. Complete nomenclature and commercial number of replaceable parts.
2. Operating Procedures:
 - a. Startup, break-in, routine, and normal operating instructions.
 - b. Test procedures and results of factory tests where required.
 - c. Regulation, control, stopping, and emergency instructions.
 - d. Description of operation sequence by control manufacturer.
 - e. Shutdown instructions for both short and extended durations.
 - f. Summer and winter operating instructions, as applicable.
 - g. Safety precautions.
 - h. Special operating instructions.
 - i. Installation instructions.
3. Maintenance and Overhaul Procedures:
 - a. Routine operations.
 - b. Guide to troubleshooting.
 - c. Disassembly, removal, repair, reinstallation, and reassembly.
4. Installation Instructions: Including alignment, adjusting, calibrating, and checking.
5. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list, and diagrams required for maintenance.
6. Spare parts ordering instructions.
7. Where applicable, identify installed spares and other provisions for future work (e.g., reserved panel space, unused components, wiring, terminals).
8. Manufacturer's printed operating and maintenance instructions.
9. As-installed, color-coded piping diagrams.

10. Charts of valve tag numbers, with the location and function of each valve.
- B. Maintenance Summary:
1. Compile an individual Maintenance Summary for each applicable equipment item, respective unit or system, and for components or subunits.
 2. Format:
 - a. Use Maintenance Summary Form bound with this Section, or an electronic facsimile of such.
 - b. Each Maintenance Summary may take as many pages as required.
 - c. Use only 8-1/2 inch by 11-inch size paper.
 - d. Complete using typewriter or electronic printing.
 3. Include detailed lubrication instructions and diagrams showing points to be greased or oiled; recommend type, grade, and temperature range of lubricants and frequency of lubrication.
 4. Recommended Spare Parts:
 - a. Data to be consistent with manufacturer's Bill of Materials/Parts List furnished in O&M manuals.
 - b. "Unit" is the unit of measure for ordering the part.
 - c. "Quantity" is the number of units recommended.
 - d. "Unit Cost" is the current purchase price.
- C. Content for Each Electric or Electronic Item or System:
1. Description of Unit and Component Parts:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, operating data, nameplate data, and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 - d. Interconnection wiring diagrams, including all control and lighting systems.
 2. Circuit Directories of Panelboards:
 - a. Electrical service.
 - b. Controls.
 - c. Communications.
 3. List of electrical relay settings, and control and alarm contact settings.
 4. Electrical interconnection wiring diagram, including control and lighting systems.
 5. As-installed control diagrams by control manufacturer.
 6. Operating Procedures:
 - a. Routine and normal operating instructions.
 - b. Sequences required.
 - c. Safety precautions.
 - d. Special operating instructions.

7. Maintenance Procedures:
 - a. Routine operations.
 - b. Guide to troubleshooting.
 - c. Adjustment and checking.
 - d. List of relay settings, control and alarm contact settings.
8. Manufacturer's printed operating and maintenance instructions.
9. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

1.7 SUPPLEMENTS

- A. The supplement listed below, following "END OF SECTION," are part of this Specification.

1. Maintenance Summary Form.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

MAINTENANCE SUMMARY FORM

PROJECT: _____ CONTRACT NO.: _____

1. EQUIPMENT ITEM _____

2. MANUFACTURER _____

3. EQUIPMENT/TAG NUMBER(S) _____

4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) _____

5. NAMEPLATE DATA (hp, voltage, speed, etc.) _____

6. MANUFACTURER'S LOCAL REPRESENTATIVE _____

a. Name _____ Telephone No. _____

b. Address _____

7. MAINTENANCE REQUIREMENTS

Maintenance Operation Comments	Frequency	Lubricant (If Applicable)
List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable.)	List required frequency of each maintenance operation.	Refer by symbol to lubricant required.

8. LUBRICANT LIST

Reference Symbol	Shell	Standard Oil	Gulf	Arco	Or Equal
List symbols used in No. 7. above.	List equivalent lubricants, as distributed by each manufacturer for the specific use recommended.				

9. RECOMMENDED SPARE PARTS FOR OWNER'S INVENTORY.

Part No.	Description	Unit	Quantity	Unit Cost
Note: Identify parts provided by this Contract with two asterisks.				

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SUBMITTALS

- A. Administrative Submittals: Copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.
- B. Shop Drawings:
 - 1. Temporary Utility Submittals:
 - a. Bypass pumping plans.
 - b. Drainage plans.
 - c. Dewatering well locations.
 - 2. Temporary Construction Submittals:
 - a. Access Roads: Routes, cross-sections, and drainage facilities.
 - b. Parking area plans.
 - c. Storage yard and storage building plans, including gravel surfaced area.
 - d. Fencing and protective barrier locations and details.
 - e. OWNER's field office plans.
 - f. Staging area location plan.
 - g. Traffic Routing Plans: As specified herein, and proposed revisions thereto.
 - h. Plan for maintenance of existing facility operations, including flow bypass pumping system.
 - 3. Temporary Control Submittals: Noise control plan.
 - 4. Erosion control plan.

1.2 MOBILIZATION

- A. Mobilization shall include, but not be limited to, these principal items:
 - 1. Obtaining required permits.
 - 2. Moving CONTRACTOR's plant and equipment required for first month operations onto site.
 - 3. Installing temporary construction power, wiring, and lighting facilities.
 - 4. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
 - 5. Arranging for and/or erection of CONTRACTOR's work and storage yard.

6. Posting OSHA required notices and establishing safety programs and procedures.
 7. Having the CONTRACTOR's superintendent on-site during all times during the performance of Work at the site throughout the project.
- B. No area is available at the site on OWNER's property for CONTRACTOR's temporary facilities, provide lands and access thereto that will be required for such use by CONTRACTOR.

1.3 CONTRACTOR'S USE OF PREMISES

- A. Lands furnished by OWNER upon which CONTRACTOR shall perform the Work are shown on the Drawings.
1. Rights-of-way and easements for access to such lands furnished by OWNER are shown on the Drawings.

1.4 PERMITS

- A. Permits, Licenses, or Approvals: Obtain in accordance with the General Conditions and retain onsite.

1.5 PROTECTION OF WORK AND PROPERTY

- A. Comply with OWNER's safety rules while on OWNER's property or easements
- B. Keep OWNER informed of serious accidents on the site and related claims.
- C. During the performance of the Work, CONTRACTOR is responsible for adapting its means, methods, techniques, sequences and procedures of construction to allow OWNER to maintain operation of the lift stations at the existing level of facility production and consistent with applicable permit requirements, and Laws and Regulations. In performing such Work and in cooperating with the OWNER to maintain operations, it may be necessary for the CONTRACTOR to plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items which will be included within the Contract Price.
- D. Bypass Pumping: See Section 01001, GENERAL REQUIREMENTS, Paragraph BYPASS PUMPING and Section 02734, FLOW BYPASS PUMPING SYSTEM.
- E. Provide detailed hurricane plan for protection and securing of equipment prior to a hurricane watch or warning.

1.6 VEHICULAR TRAFFIC

- A. Traffic Routing Plan: Show sequences of construction affecting the use of roadways, time required for each phase of the Work, provisions for decking over excavations and phasing of operations to provide necessary access, and plans for signing, barricading, and striping to provide passages for pedestrians and vehicles.
- B. CONTRACTOR shall prepare and submit a Maintenance of Traffic (MOT) plan for each pump station meeting the requirements of FDOT Standard Specifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TEMPORARY UTILITIES

- A. Power:
 - 1. Electric power will be available at or near the site. Determine the type and amount available and make arrangements for obtaining temporary electric power service, metering equipment, and pay all costs for the electric power used during the contract period, except for portions of the Work designated in writing by the OWNER as substantially complete.
 - 2. Cost of electric power used in performance and acceptance testing will be borne by CONTRACTOR.
- B. Lighting: Provide temporary lighting at least to meet all applicable safety requirements to allow erection, application or installation of materials and equipment, and observation or inspection of the Work.
- C. Water:
 - 1. Hydrant Water:
 - a. Is available from nearby hydrants. Secure written permission for connection and use from the water department and meet requirements for use. Obtain hydrant meter from OWNER; fee will be waived. CONTRACTOR shall pay the City for water used based upon assessment and charges from the City.
 - b. Use only special hydrant-operating wrenches to open hydrants. Make certain that hydrant valve is open full, since cracking the valve causes damage to the hydrant. Repair damaged hydrants and notify the appropriate agency as quickly as possible. Hydrants shall be completely accessible to the fire department at all times.
 - c. Include costs to connect and transport water to construction areas in the Contract Price.

- D. Sanitary and Personnel Facilities: Provide and maintain facilities for CONTRACTOR's employees, Subcontractors, and all other onsite employer's employees. Service, clean, and maintain facilities and enclosures.
- E. Fire Protection: Furnish and maintain on the site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of the National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No. 241).

3.2 PROTECTION OF WORK AND PROPERTY

A. General:

- 1. Perform Work within rights-of-way and easements in a systematic manner that minimizes inconvenience to property owners and the public.
- 2. No residence or business shall be cut off from vehicular traffic for a period exceeding 4 hours unless special arrangements have been made.
- 3. Maintain in continuous service all existing oil and gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and all other utilities encountered along the line of work, unless other arrangements satisfactory to owners of said utilities have been made.
- 4. Where completion of Work requires temporary or permanent removal and/or relocation of an existing utility, coordinate all activities with owner of said utility and perform all work to their satisfaction.
- 5. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
- 6. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
- 7. In areas where the CONTRACTOR's operations are adjacent to or near a utility such as gas, telephone, television, electric power, water, sewer, or irrigation system and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection thereof have been made by the CONTRACTOR.
- 8. Notify property owners and utility offices which may be affected by the construction operation at least 2 days in advance.
 - a. Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to the CONTRACTOR's operation, notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear costs incurred.
- 9. Do not impair operation of existing sewer systems. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, or other sewer structures. Maintain original site drainage wherever possible.

- B. Site Security: Provide and maintain additional temporary security fences as necessary to protect the Work and CONTRACTOR-furnished products not yet installed. Provide 24-hour security personnel as required by specific site conditions and public safety needs at no additional cost.
- C. Barricades and Lights:
1. Provide as necessary to prevent unauthorized entry to construction areas and affected roads, streets, and alleyways, inside and outside of fenced area, and as required to ensure public safety and the safety of CONTRACTOR's employees, other employer's employees, and others who may be affected by the Work.
 2. Provide to protect existing facilities and adjacent properties from potential damage.
 3. Locate to enable access by facility operators and property owners.
 4. Protect streets, roads, highways, and other public thoroughfares that are closed to traffic by effective barricades with acceptable warning signs.
 5. Locate barricades at the nearest intersecting public thoroughfare on each side of the blocked section.
- D. Tree and Plantings:
1. Protect from damage and preserve trees, shrubs, and other plants outside the limits of the Work and within the limits of the Work which are designated on the Drawings to remain undisturbed.
 - a. Where practical, tunnel beneath trees when on or near the line of trench.
 - b. Employ hand excavation as necessary to prevent tree injury.
 - c. Do not stockpile materials or permit traffic within drip lines of trees.
 - d. Provide and maintain temporary barricades around trees.
 - e. Water vegetation as necessary to maintain health.
 - f. Cover temporarily exposed roots with wet burlap, and keep the burlap moist until soil is replaced around the roots.
 - g. No trees, except those specifically shown on Drawings to be removed, shall be removed without written approval of the OWNER.
 - h. Dispose of removed trees in a legal manner off the site.
 2. The balling and burlapping of trees indicated for replacement shall conform to the recommended specifications set forth in the American Standards for Nursery Stock, published by American Association of Nurserymen. All balls shall be firm and intact and made-balls will not be accepted. Handle ball and burlap trees by the ball and not by the top.
 3. In the event of damage to bark, trunks, limbs, or roots of plants that are not designated for removal, treat damage by corrective pruning, bark tracing, application of a heavy coating of tree paint, and other accepted horticultural and tree surgery practices.

4. Replace each plant that dies as a result of construction activities.
- E. Existing Structures: Where CONTRACTOR contemplates removal of small structures such as mailboxes, signposts, and culverts that interfere with CONTRACTOR's operations, obtain approval of property owner and OWNER. Replace those removed in a condition equal to or better than original.
- F. Waterways: Keep swales, culverts, and natural drainages continuously free of construction materials and debris.
- G. Dewatering: Construct, maintain, and operate cofferdams, channels, flume drains, sumps, pumps, or other temporary diversion and protection works. Furnish materials required, install, maintain, and operate necessary pumping and other equipment for the environmentally safe removal and disposal of water from the various parts of the Work. Maintain the foundations and parts of the Work free from water.

3.3 TEMPORARY CONTROLS

- A. Air Pollution Control:
 1. Minimize air pollution from construction operations.
 2. Burning:
 - a. Of waste materials, rubbish, or other debris will not be permitted on or adjacent to the site.
 3. Conduct operations of dumping rock and of carrying rock away in trucks to cause a minimum of dust. Give unpaved streets, roads, detours, or haul roads used in the construction area a dust-preventive treatment or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention.
- B. Noise Control: Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels.
- C. Water Pollution Control:
 1. Divert sanitary sewage and non-storm waste flow interfering with construction and requiring diversion to sanitary sewers. Do not cause or permit action to occur which would cause an overflow to an existing waterway.
 2. Prior to commencing excavation and construction, obtain OWNER's agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and stormwater flow, including dewatering pump discharges.

Control Planning” and “Implementation, Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity,” and “Erosion and Sediment Control-Surface Mining in Eastern United States.”

4. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.
- D. Erosion, Sediment, and Flood Control: Provide, maintain, and operate temporary facilities to control erosion and sediment releases, and to protect Work and existing facilities from flooding during construction period.

3.4 STORAGE YARDS AND BUILDINGS

- A. Coordinate requirements with Section 01600, MATERIAL AND EQUIPMENT.
- B. Temporary Storage Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions.
- C. Temporary Storage Buildings:
 1. Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored.
 2. Arrange or partition to provide security of contents and ready access for inspection and inventory.
 3. Store combustible materials (paints, solvents, fuels, etc.) in a well-ventilated and remote building meeting safety standards.

3.5 ACCESS ROADS AND DETOURS

- A. Construct access roads as shown and within easements, rights-of-way, or Project limits. Utilize existing roads where shown.
- B. Maintain drainage ways. Install and maintain culverts to allow water to flow beneath access roads. Provide corrosion-resistant culvert pipe of adequate strength to resist construction loads.
- C. Provide gravel, crushed rock, or other stabilization material to permit access by all motor vehicles at all times.
- D. Maintain road grade and crown to eliminate potholes, rutting, and other irregularities that restrict access.
- E. Coordinate with OWNER detours and other operations affecting traffic and access. Provide at least 72 hours' notice to OWNER of operations that will alter access to the site.

- F. Upon completion of construction, restore ground surface disturbed by access road construction to original grade. Leave access roads in condition suitable for future use by OWNER. Replace damaged or broken culverts with new culvert pipe of same diameter and material.

3.6 PARKING AREAS

- A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, OWNER's operations, or construction operations.

3.7 VEHICULAR TRAFFIC

- A. Comply with Laws and Regulations regarding closing or restricting the use of public streets or highways. No public or private road shall be closed, except by written permission of the proper authority. Assure the least possible obstruction to traffic and normal commercial pursuits.
- B. Conduct Work to interfere as little as possible with public travel, whether vehicular or pedestrian.
- C. Whenever it is necessary to cross, close, or obstruct roads, driveways, and walks, whether public or private, provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.
- D. Provide maintenance of traffic where directed by OWNER.
- E. Road Closures: Maintain satisfactory means of exit for persons residing or having occasion to transact business along the route of the Work. If it is necessary to close off roadway or alley providing sole vehicular access to property for periods greater than 2 hours, provide written notice to each owner so affected 3 days prior to such closure. In such cases, closings of up to 4 hours may be allowed. Closures of up to 10 hours may be allowed if a week's written notice is given and undue hardship does not result.
- F. In making street crossings, do not block more than one-half the street at a time. Whenever possible, widen the shoulder on the opposite side to facilitate traffic flow. Provide temporary surfacing on shoulders as necessary.
- G. Maintain top of backfilled trenches before they are paved, to allow normal vehicular traffic to pass over. Provide temporary access driveways where required. Cleanup operations shall follow immediately behind backfilling.
- H. When flaggers and guards are required by regulation or when deemed necessary for safety, furnish them with approved orange wearing apparel and other regulation traffic control devices.

- I. Notify the fire department and police department before closing street or portion thereof. Notify said departments when streets are again passable for emergency vehicles. Do not block off emergency vehicle access to consecutive arterial crossings or dead-end streets, in excess of 300 linear feet, without written permission from the fire department. Conduct operations with the least interference to fire equipment access, and at no time prevent such access. Furnish CONTRACTOR's night emergency telephone numbers to the police department.
- J. Move mailboxes to temporary locations accessible to postal service, and on completion of Work in each area replace them in their original location and in a condition equal to or better than original.
- K. Temporary Bridges:
 - 1. Construct temporary bridges at all points where maintenance of traffic across pipeline construction is necessary.
 - 2. Make bridges over public streets, roads, and highways acceptable to the authority having jurisdiction thereover.
 - 3. Bridges erected over private roads and driveways shall be adequate for the service to which they will be subjected.
 - 4. Provide substantial guardrails and suitably protected approaches.
 - 5. Provide foot bridges not less than 4 feet wide with handrails and uprights of dressed lumber.
 - 6. Maintain bridges in place as long as the conditions of the Work require their use for safety of the public, except that when necessary for the proper prosecution of the Work in the immediate vicinity of a bridge, the bridge may be relocated or temporarily removed for such period as the OWNER may permit.
 - 7. Detours: Where the authority having jurisdiction requires that traffic be maintained over construction work in a public street, road, or highway, and traffic cannot be maintained on the original roadbed or pavement, construct and maintain a detour around the Work.
- L. Detours: Where the authority having jurisdiction requires that traffic be maintained over construction work in a public street, road, or highway, and traffic cannot be maintained on the original roadbed or pavement, construct and maintain a detour around the Work.
- M. Coordination: Coordinate traffic routing with that of others working in the same or adjacent areas.

3.8 CLEANING DURING CONSTRUCTION

- A. In accordance with the General Conditions, as may be specified in Specification sections, and as required herein.

- B. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris. At least weekly, sweep all floors (basins, tunnels, platforms, walkways, roof surfaces), and pick up all debris and dispose.
- C. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least at weekly intervals, dispose of such waste materials, debris, and rubbish offsite.
- D. At least weekly, brush sweep the entry drive and roadways, and all other streets and walkways affected by Work and where adjacent to Work.

END OF SECTION

SECTION 01525 PROTECTION OF EXISTING FACILITIES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. The CONTRACTOR shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the Contract Documents.
- B. The CONTRACTOR shall verify the exact locations and depths of all utilities shown, and the CONTRACTOR shall make exploratory excavations of all utilities that may interfere with the Work.
- C. All such exploratory excavations shall be performed as soon as practicable after award of the Contract and, in any event, a sufficient time in advance of construction to avoid possible delays to the CONTRACTOR's work.
- D. When such exploratory excavations show the utility location as shown to be in error, the CONTRACTOR shall so notify the OWNER.
- E. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility.

1.02 RIGHTS-OF-WAY

- A. The CONTRACTOR shall not do any Work that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, or electric transmission line; any fence; or any other structure, nor shall the CONTRACTOR enter upon the rights-of-way involved until notified by the OWNER that the CITY has secured authority therefor from the proper party.
- B. After authority has been obtained, the CONTRACTOR shall give said party due notice of its intention to begin work, if required by said party, and shall remove, shore, support, or otherwise protect such pipeline, transmission line, ditch, fence, or structure, or replace the same.
- C. When two or more contracts are being executed at one time on the same or adjacent land in such manner that work on one Contract may interfere with that on another, the CITY shall determine the sequence and order of the Work.

- D. When the limits of one Contract are the necessary or convenient means of access for the execution of another Contract, such privilege of access or any other reasonable privilege may be granted by the CITY to the CONTRACTOR so desiring, to the extent, amount, in the manner, and at the times permitted.
- E. No such decision as to the method or time of conducting the Work or the use of territory shall be made the basis of any claim for delay or damage, except as provided for temporary suspension of the Work.

1.03 PROTECTION OF STREET OR ROADWAY MARKERS

- A. The CONTRACTOR shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization.
- B. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced.
- C. All survey markers or points disturbed by the CONTRACTOR shall be accurately replaced after all street or roadway re-surfacing has been completed.

1.04 RESTORATION OF PAVEMENT

- A. General:
 - 1. All paved areas including asphaltic concrete cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas, except where specific re-surfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit.
 - 2. All temporary and permanent pavement shall conform to the requirements of the affected pavement owner.
 - 3. All pavements subject to partial removal shall be neatly saw-cut in straight lines.
- B. Temporary Re-surfacing:
 - 1. Wherever required by the public authorities having jurisdiction, the CONTRACTOR shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with final restoration.

C. Permanent Re-surfacing:

1. To obtain a satisfactory junction with adjacent surfaces, the CONTRACTOR shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement.
2. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines.
3. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

D. Restoration of Sidewalks or Private Driveways:

1. Wherever sidewalks or private roads have been removed for purposes of construction, the CONTRACTOR shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions before proceeding with the final restoration or, if no such period of time is so fixed, the CONTRACTOR shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.

1.05 EXISTING UTILITIES AND IMPROVEMENTS

A. General:

1. The CONTRACTOR shall protect all underground utilities and other improvements that may be impaired during construction operations.
2. It shall be the CONTRACTOR's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations.
3. The CONTRACTOR shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be deemed necessary.

B. Utilities to be Moved:

1. In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the CONTRACTOR, be notified by the CITY to move such property within a specified reasonable time.

2. When utility lines that are to be removed are encountered within the area of operations, the CONTRACTOR shall notify the OWNER a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.
- C. Temporary Removal and/or Relocation:
1. Where the proper completion of the Work requires the temporary removal and/or relocation of an existing utility or other improvement which is indicated, the CONTRACTOR shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the OWNER and the owner of the facility.
 2. In all cases of such temporary removal or relocation, restoration to the former location shall be accomplished by the CONTRACTOR in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.
- D. The right is reserved to the CITY and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work of this Contract.
- E. Existing utility lines that are indicated or the locations of which are made known to the CONTRACTOR prior to excavation and that are to be retained, and all utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the CONTRACTOR.
- F. Underground Utilities Not Indicated:
1. In the event that the CONTRACTOR damages any existing utility lines that are not indicated or the locations of which are not made known to the CONTRACTOR prior to excavation, a written report thereof shall be made immediately to the OWNER.
 2. If directed by the OWNER, repairs shall be made by the CONTRACTOR under the provisions for changes and extra work contained in the General Conditions.
- G. All costs of locating, repairing damage not due to failure of the CONTRACTOR to exercise reasonable care, and removing or relocating such utility facilities not shown in the Contract Documents with reasonable accuracy, and for equipment on the project which was actually working on that portion of the work interrupted or idled by removal or relocation of such utility facilities, and which was necessarily

idled during such work will be paid for as extra work in accordance with the provisions for changes and extra work contained in the General Conditions.

- H. All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility or improvement owner before being concealed by backfill.
- I. Maintaining Service:
 - 1. All oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas mains, water mains, irrigation lines, sewer lines, storm drainage, poles, and overhead power and communication wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the OWNER are made with the owner(s) of said pipelines, ducts, main, irrigation lines, sewers, storm drains, poles, wires or cables.
 - 2. The CONTRACTOR shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.
 - 3. CONTRACTOR shall replace all damaged irrigation piping, heads and control lines in kind. Zones to be capped off at construction line. If this results in discontinuance of service on private property, the contractor shall provide for irrigation service to this area(s).

1.06 TREES WITHIN ROAD RIGHTS-OF-WAY AND PROJECT LIMITS

- A. General:
 - 1. The CONTRACTOR shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs, including those lying within street rights-of-way and project limits, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional agency or CITY.
 - 2. All existing trees and shrubs which are damaged during construction shall be trimmed or replaced by the CONTRACTOR or a certified tree company under permit from the jurisdictional agency and/or the CITY.
- B. Trimming:
 - 1. Symmetry of the tree shall be preserved; no stubs or splits or torn branches left; clean cuts shall be made close to the trunk or large branch.
 - 2. Spikes shall not be used for climbing live trees.

3. All cuts over 1-1/2" in diameter shall be coated with an asphaltic emulsion material.
- C. Replacement:
1. The CONTRACTOR shall immediately notify the jurisdictional agency and/or the CITY if any tree is damaged by the CONTRACTOR's operations.
 2. If, in the opinion of said agency or the CITY, the damage is such that replacement is necessary, the CONTRACTOR shall replace the tree at its own expense.
 3. The tree shall be of a like size and variety as the tree damaged, or, if of a smaller size, the CONTRACTOR shall pay to the owner of said tree a compensatory payment acceptable to the tree owner, subject to the approval of the jurisdictional agency or CITY.
 4. The size of the trees shall be not less than 1-inch diameter, nor less than six feet high.

1.07 NOTIFICATION BY THE CONTRACTOR

- A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way the CONTRACTOR shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than three days nor more than seven days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01530
TREE AND PLANT PROTECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1, GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 WORK INCLUDED

- A. Protection of existing trees and plants from damage as a result of the CONTRACTOR's operations including, but not limited to:
1. Protection of existing natural habitat areas.
 2. Marking of clearing limits.
 3. Protection of all endangered plant species as identified by the Environmental Impact Assessment or the City of Sunrise, whether inside marked Habitat Protection Areas or outside of such areas,
 4. Limits of Disturbance Fencing or Boxing of tree trunks.

1.3 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
1. Section 02115, REMOVAL OF EXOTIC AND INVASIVE PLANTS.

1.4 REFERENCED STANDARDS

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. American National Standards Institute (ANSI): Z133.1, Safety Requirements for Pruning, Trimming, Repairing, Maintaining and Removing Trees, and for Cutting Brush.
 2. City of Sunrise Codes and Ordinances.

1.5 SUBMITTALS

- A. Proposed methods, and schedule for effecting tree and plant protection shall be submitted for approval.

1.6 MARKING OF CLEARING LIMITS

- A. The CONTRACTOR's attention is called to the fact that certain areas on the site exist as Natural Habitat Areas and are to remain as such. Therefore, all construction operations must be performed in a manner which will cause minimal disturbance to these existing environments.

1.7 HABITAT PROTECTION

- A. Protective fencing shall be installed around the Limits of Disturbance after the OWNER has approved the layout and marking of those areas.

PART 2 PRODUCTS

2.1 BOXING

- A. Boxing shall be 4-inch by 4-inch posts spaced 8 feet. OC, with 2-inch by 4-inch rails between posts approximately 24 by 24 feet, centered on the tree trunk, to a height of approximately 5 feet.

2.2 LIMITS OF DISTURBANCE FENCING

- A. Limits of disturbance fencing shall be surveyors flagging at least 1-inch wide, in a highly visible color, or approved equal product.
- B. Stakes shall be 2-inch by 2-inch pressure treated pine stakes, 8 feet long, 10 feet on center and 4-inch by 4-inch pressure treated pine posts, 8 feet long, 50 feet on center. Set level and plumb in the ground.

PART 3 EXECUTION

3.1 GENERAL

- A. Limits of disturbance fencing shall be installed prior to any other construction activity. All native plant material shall be protected unless otherwise noted on the Drawings. Damaged material shall be replaced in kind by the CONTRACTOR. The CONTRACTOR will be assessed additional penalties and fines within the limits of City Code. The CONTRACTOR will be held responsible for these fines and assessments and no additional payments will be made by the OWNER due to the CONTRACTOR's negligence.
- B. Limits of disturbance fencing will be used in lieu of boxing at the discretion of the City Landscape Architect. The City reserves the right to require boxing of trees as specified at no additional cost to the OWNER.

3.2 INSTALLATION OF LIMITS OF DISTURBANCE FENCING

- A. Limits of disturbance fencing shall be installed in two continuous bands, one 24 inches above the ground and the second 48 inches above the ground. The

habitat protection marking shall **not** be looped around existing tree trunk or in any manner injurious to the plant material.

- B. The CONTRACTOR shall maintain the habitat protection during the course of the work. Repair or replace habitat protection as necessary to maintain effective protection.

3.3 BOXING

- A. Boxing of trees shall be done only after the exotic plant material have been staked and identified for removal and approved by the OWNER and prior to beginning of any construction activities. Boxing shall be placed around entire perimeter of tree.

3.4 REMOVAL OF PROTECTION

- A. Except as otherwise indicated or requested by the OWNER , temporary protection devices and facilities installed during course of the work shall be removed only after all work which may injure or damage trees and plants is completed. The City may require protective fencing to remain in-place at the end of the project at no additional cost or credit to the City.

END OF SECTION

SECTION 01550
INSTALLATION OF OWNER-FURNISHED PRODUCTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Work necessary to transport from OWNER's storage location to job site, store and protect, assemble and install, conduct and coordinate testing, complete and ready for operation, the OWNER-furnished products.

1.2 DEFINITIONS

- A. Manufacturer: Where "manufacturer" is referred to in this Section, it refers to the parties under separate Contract with the OWNER for furnishing the material or equipment products purchased by the OWNER. Such party may be referred to as "CONTRACTOR for OWNER-furnished products," or "OWNER-furnished equipment CONTRACTOR," in other sections.
- B. Transfer: "Transfer" of OWNER-furnished products to the CONTRACTOR refers to the time when manufacturers' instructions for unloading, handling, storage, and protection have been received; products have been jointly inspected at the OWNER's storage location; any damage or loss has been reported in writing to the OWNER and the OWNER has accepted such products as ready for transporting, storage, and protection by the CONTRACTOR.

1.3 PRODUCTS FURNISHED BY OWNER

- A. The following general list summarizes the major equipment items to be furnished by the OWNER for installation by the CONTRACTOR:
 - 1. Lift Station Pumps & Control Panels
 - 2. Pump Accessories Including:
 - a. Pump base (quantity 2)
 - b. Guiderails and intermediate supports (quantity 2)
 - c. Lift bale and safety cable (quantity 2)
 - d. Float hanger (quantity 1)

1.4 CONTRACTOR'S RESPONSIBILITY FOR COMPLETE SYSTEM

- A. CONTRACTOR shall have complete responsibility for necessary transporting, storing, handling, installing, adjusting, maintaining, testing, and operation startup of OWNER-furnished products. CONTRACTOR shall provide and coordinate the construction of interconnecting structures, equipment, piping, electrical and instrumentation work, and appurtenances to achieve installation and operation of the OWNER-furnished products as

shown and specified, and as required to provide a complete and functional system.

1.5 MANUFACTURER'S RESPONSIBILITY FOR PRODUCTS

A. The Manufacturer will be Responsible for Providing the Following:

1. Manufacturer support during installation, testing, and startup.
2. Factory testing and certification of test results, if specified.
3. Instruction manual, including installation and storage instructions.
4. Certification of Proper Installation.

1.6 EQUIPMENT DELIVERY SCHEDULE

A. CONTRACTOR shall be responsible for transporting OWNER-furnished products from OWNER's storage location to the job site. CONTRACTOR shall coordinate with OWNER for access to the storage location.

1.7 INFORMATION FURNISHED BY OWNER

- A. Vendor/manufacturer Shop Drawings of the OWNER-furnished products will be made available after Contract Award for CONTRACTOR's use in performing the Work under this Section.
- B. Manufacturer's installation, operation, and maintenance instructions for the OWNER-furnished products will be made available for CONTRACTOR's use.
- C. The CONTRACTOR shall review these submittals as they relate to the installation of this material and other integrated work.

1.8 SUBMITTALS

- A. Submittal shall be in accordance with Division 1, GENERAL REQUIREMENTS. In addition, the following specific information shall be provided:
1. CONTRACTOR shall furnish as part of the work under this Section, detailed Shop Drawings to indicate the layout, location, and identification of materials provided by CONTRACTOR.
 - a. CONTRACTOR shall include pipe, fittings, valves, specialties, hangers, supports, equipment, and required specialties.
 2. CONTRACTOR shall submit complete list of materials to be furnished, and include data necessary to allow the OWNER to determine their fitness for the work.
 3. CONTRACTOR shall submit plans repair or replace products that become damaged or lost after transfer to CONTRACTOR for storage and protection.

4. CONTRACTOR shall submit functional test logs and performance test reports as specified in Division 1, GENERAL REQUIREMENTS.

1.9 SEQUENCING AND SCHEDULING

- A. CONTRACTOR shall verify availability of OWNER-furnished products by contacting the OWNER before making final arrangements for, or committing resources to the unloading, handling, storage, protection, or installation of such products. No additional time or compensation will be considered, unless CONTRACTOR has made every effort to monitor delivery schedules of OWNER-furnished products.

PART 2 PRODUCTS

2.1 GENERAL

- A. CONTRACTOR shall provide products required to complete the work under this Section, except where specifically specified as "OWNER-furnished." Such products may include, but are not limited to, inserts, anchor bolts, connecting piping and valves, flexible couplings, flanged coupling adapters, retainer glands, flange insulating kits, temporary plugs, hangers and supports, motor starters and wiring, piping accessories, specialties, finish painting, and expendable materials, all as necessary to provide a complete and properly functioning system.

2.2 MISCELLANEOUS PRODUCTS

- A. General: CONTRACTOR shall furnish incidental products, such as gaskets, supports, bolts, and lubricants, as shown and as required for proper operation of equipment installed under this Section. Products shall conform to applicable sections of these Specifications for the intended service.

PART 3 EXECUTION

3.1 GENERAL

- A. Installation work shall conform with manufacturer's recommended procedures, instructions, and Shop Drawings, as accepted by the OWNER.
- B. CONTRACTOR shall receive, unload, transport to its place of installation, inspect, store, handle, and protect OWNER-furnished products as specified in Division 1, GENERAL REQUIREMENTS.
- C. CONTRACTOR shall maintain complete inventory on all OWNER-furnished products after their transfer to CONTRACTOR.
- D. CONTRACTOR shall install piping, valves, and miscellaneous fittings attached to OWNER-furnished equipment in accordance with manufacturer's

instructions, Section 02660, PRESSURE PIPING, the Detail Piping Specification, and Section 15100, VALVES AND OPERATORS.

- E. CONTRACTOR shall install and connect electrical equipment in accordance with Division 16, ELECTRICAL, and with equipment manufacturer's instructions. Install and connect control panels and local instruments in accordance with Section 11305, SUBMERSIBLE PUMPS.

3.2 INSPECTION PRIOR TO UNLOADING

- A. Prior to transfer of OWNER-furnished products to the CONTRACTOR, CONTRACTOR and the OWNER shall jointly inspect the condition of each product.
 - 1. CONTRACTOR shall record in writing the products transferred to the CONTRACTOR's care.
 - 2. Damage to or loss of equipment and materials shall be immediately reported to the OWNER.
 - 3. After completion of inspection, unload products in accordance with manufacturer's instructions for unloading, or as specified. Do not unload damaged or incomplete products to be returned to manufacturer for replacement, except as necessary to expedite return shipment.
 - 4. Do not unload products to be returned to manufacturer for repair or replacement, unless necessary to expedite return shipping.

3.3 STORAGE AND PROTECTION

- A. Following transfer of OWNER-furnished products and until final acceptance of the completed work, CONTRACTOR shall protect and maintain products to prevent damage in accordance with manufacturer's instructions and as specified below:
 - 1. Store products such as pipe and reinforcing steel off the ground in approved storage yards.
 - 2. Store items subject to damage by the elements, vandalism, or theft in secure buildings.
 - 3. Provide environmentally controlled storage facilities for items requiring environmental control for protection.
 - 4. Storage yards and storage building shall conform to requirements of Division 1, GENERAL REQUIREMENTS.
- B. Damage to or loss of products after the date of their transfer to CONTRACTOR shall be repaired to original condition or replaced with new identical products as reviewed and accepted by the OWNER.
- C. Damage to or loss of products unloaded to expedite return shipment for repair or replacement shall be repaired to original condition, or replaced with new identical products as reviewed and accepted by the OWNER.

3.4 GENERAL INSTALLATION

- A. CONTRACTOR shall provide supervision, labor, tools, construction equipment, incidental materials, and necessary services required to install and test the OWNER-furnished products.
- B. Excavation, concrete, mechanical, and electrical work shall conform to applicable standards, final stamped and reviewed Shop Drawings, Specifications, and Drawings included in these Contract Documents, including manufacturer's installation instructions.
- C. Installation of equipment shall not begin prior to satisfactory completion of the supporting structures. Support structure columns, beams, walls, or slabs shall not be used to move the equipment into position.
- D. Refer to Division 1, GENERAL REQUIREMENTS, for procedures prior to equipment startup.

3.5 PAINTING

- A. OWNER-furnished products will be delivered with final finish coating applied unless otherwise specified hereinbefore.
 - 1. CONTRACTOR shall protect these finishes during unloading, storage, and installation.
 - 2. CONTRACTOR shall touchup or repair damage to coatings resulting from unloading, storage, installation, testing, and startup.
 - 3. Touchup, repair, or complete repainting shall match color of original paint, and shall be fully compatible with primes and finish applied by equipment manufacturer.

3.6 MAINTENANCE

- A. Immediately after installation, CONTRACTOR shall lubricate components in accordance with manufacturer's instructions.
- B. CONTRACTOR shall follow manufacturer's instructions for maintenance during storage, after installation but prior to testing and startup, and after startup but prior to OWNER's acceptance.
- C. Notify the OWNER immediately in event that manufacturer's spare parts and maintenance materials are not available.
- D. CONTRACTOR shall furnish incidental maintenance, labor, and supplies including lubricants, cleaning fluids, nuts and bolts, and similar products not furnished by manufacturer, as needed for maintaining the OWNER-furnished products.

3.7 FIELD TESTING

A. General:

1. CONTRACTOR shall perform field testing and startup as specified in Division 1, GENERAL REQUIREMENTS, and as specified below.
2. Unless otherwise specified below for specific equipment tests, CONTRACTOR shall prepare all test logs and reports for submission.

B. Preparation: CONTRACTOR shall prepare OWNER-furnished equipment for startup including cleanup, lubrication, motor phasing, motor test running, and equipment tolerance adjusting, CONTRACTOR shall furnish incidental materials required for this preparation, as well as the following:

1. Check and adjust settings of components prior to startup.
2. Verify that equipment has been serviced with proper lubricants and that applicable safety equipment has been installed.
3. Verify that proper mechanical and electrical connections have been made.
4. Correct misalignment, vibration, excessive noise, or other evidence of improper setting obtained from short startup tests of drives.
5. Correct defects in installation as required by manufacturer's instructions and recommendations.

C. Functional Tests:

1. Following startup preparation, CONTRACTOR shall conduct a functional (or run) test on each OWNER-furnished equipment unit in the presence of the OWNER.
2. CONTRACTOR shall make adjustments to installed equipment as recommended by manufacturer prior to proceeding to performance testing, in addition to procedures specified in Division 1, GENERAL REQUIREMENTS.

END OF SECTION

SECTION 01570 TRAFFIC CONTROL

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide, operate and maintain equipment, services and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow around the construction area.
- B. Remove temporary equipment and facilities when no longer required, restore grounds to original, or to specified conditions.

1.02 REFERENCES

- A. Traffic regulation shall be in accordance with FDOT Roadway and Traffic Design Standards Series 600, latest Edition and supplements thereto, Manual on Uniform Traffic Control Devices, latest Edition and supplements thereto, and FDOT Standard Specifications for Road and Bridge Construction, latest Edition and supplements thereto.

1.03 TRAFFIC CONTROL PLAN

- A. The CONTRACTOR is to prepare a traffic control plan and/or policy statement for each phase of construction. This plan is to be presented to the CITY at or before the pre-construction meeting.
- B. All proposed traffic control plans and policy statements shall be complete and in compliance with Section 1.02.

1.04 TRAFFIC SIGNALS AND SIGNS

- A. Provide and operate traffic control and directional signals required to direct and maintain an orderly flow of traffic in all areas under CONTRACTOR's control, or affected by CONTRACTOR's operations.
- B. Provide traffic control and direction signs, post mounted, at all areas required by Section 1.02.
- C. Traffic Signals - Construction requiring traffic signal modification shall be reported to the CITY at least 72 hours prior to the commencement of such activities. All

excavation work within 30 feet of any traffic signal shall be reported to the CITY at least 72 hours prior to its commencement.

- D. All existing traffic signs shall remain visible throughout construction activities unless superseded by required construction signing.

1.05 FLAGMEN

Provide qualified and suitably equipped flagmen when construction operations encroach on traffic lanes, as required for regulation of traffic (See Section 1.02).

1.06 FLARES AND LIGHTS

- A. Provide lights as required by Section 1.02.
1. To clearly delineate traffic lanes and to guide traffic as required in Section 1.02
 2. For use by flagmen in directing traffic.
- B. Provide illumination of critical traffic and parking areas as required in Section 1.02.

1.07 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, CITY's operations, or construction operations.
- B. Monitor parking of construction personnel's private vehicles.
1. Maintain free vehicular access to and through parking areas and driveways.
 2. Prohibit parking on or adjacent to access roads, or in non-designated areas.

1.08 CONSTRUCTION VEHICLES

- A. All slow-moving construction vehicles shall have a slow-moving sign visible from the rear of the vehicle.
- B. All vehicles used for construction activities shall have audible back-up warning devices.

1.09 ROAD CLOSINGS AND TRAFFIC CONTROL

- A. CONTRACTOR shall be responsible for preparation of FDOT traffic control plans. A minimum of one copy (electronic preferred) of all traffic plans shall be submitted to OWNER. All traffic plans shall contain the following information:
1. All applicable street names.

2. All detour routes.
 3. All required construction and detour signage, including Variable Message Boards and Specialty Signage.
 4. All flag man locations.
 5. Locations of all street and lane closings.
 6. As applicable, time and date, street or lane will be closed and time and date, street or lane will be reopened to traffic.
 7. The following statement shall be included on all traffic plans: "This plan meets all applicable requirements of the Manual of Uniform Traffic Control Devices".
- B. Traffic plans must also be approved by City of Sunrise two (2) weeks prior to beginning work in affected areas, where applicable.
- C. All businesses and homeowners affected by road closures shall be notified a minimum of one (1) week in advance of closing. CONTRACTOR to submit notification flyers for approval of format.
- D. Provisions must always be maintained for local residential and business traffic. Specifically, but not limited to:
1. **Access shall be provided to each residence at the end of the day. In areas of construction within deep trench, a temporary compacted rock driveway access can be provided to groupings of residences in order to provide access at the end of the day.**
- E. Approved maintenance of traffic plans shall be submitted to Local, Police, Fire Department and Emergency Medical Services (EMS) by CITY.

PART 2 - PRODUCTS

- A. All traffic control devices shall meet or exceed FDOT certification standards and the Manual of Uniform Traffic Control Devices.
- B. All traffic signs shall have high intensity face material.

PART 3 - EXECUTION

- A. Upon notification by the CITY either verbally or in writing, the contractor shall correct any noted deficiencies within one hour.

- B. Inspection of all traffic control items shall be accomplished at least twice per day. One of these inspections shall be at the end of the work day or at night.

END OF SECTION

SECTION 01600 MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.1 DEFINITIONS

A. Products:

1. New items for incorporation in the Work, whether purchased by CONTRACTOR or OWNER for the Project, or taken from previously purchased stock and may also include existing materials or components required for reuse.
2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change the meaning of such other terms used in the Contract Documents as those terms are self-explanatory and have well recognized meanings in the construction industry.
3. Items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.

1.2 DESIGN REQUIREMENTS

- ##### **A. Provide systems, equipment, and components, including supports and anchorages, in accordance with the provisions of the latest edition of Uniform Building Code (UBC).**

1.3 SUBMITTALS

A. Administrative Submittals:

1. List of all proposed substitute or "or-equal" items/methods.
2. Schedule of factory tests required by Contract Documents. Identify tests for which OWNER's presence has been specified.

B. Quality Control Submittals:

1. Factory Tests: As specified in the individual Specifications.
 - a. Procedures: Preliminary outlines.
 - 1) Final Accepted Procedures: Prior to start of factory testing.
 - b. Test Documentation: Results of successful testing, including certification of procedures and results.

1.4 PREPARATION FOR SHIPMENT

- A. When practical, factory assemble products. Matchmark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with a strippable protective coating.
- B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and CONTRACTOR, equipment number, and approximate weight. Include complete packing lists and bills of materials with each shipment.
- C. Spare Parts, Special Tools, Test Equipment, Expendables, and Maintenance Materials:
 - 1. Furnish as required by the Specifications prior to (i) starting functional testing as set forth in Section 01650, FACILITY STARTUP, or (ii) operation of the equipment by the OWNER, or (iii) 75 percent Project completion, whichever occurs first.
 - 2. Properly package to avoid damage, in original cartons insofar as possible. Replace parts damaged or otherwise inoperable.
 - 3. Firmly fix to, and prominently display on, each package.
 - a. Minimum 3-inch by 6-inch manila shipping tag with the following information printed clearly:
 - 1) Manufacturer's part description and number.
 - 2) Applicable equipment description.
 - 3) Quantity of parts in package.
 - 4) Equipment manufacturer.
 - 5) Applicable Specification section.
 - 6) Name of CONTRACTOR.
 - 7) Project name.
- D. Protect equipment from exposure to the elements and keep thoroughly dry and dust free at all times. Protect painted surfaces against impact, abrasion, discoloration, or other damage. Grease or oil all bearings and similar items.
- E. Factory Test Results: Reviewed and accepted by OWNER before product shipment as required in individual Specification sections.

1.5 DELIVERY AND INSPECTION

- A. Deliver products in accordance with the accepted current progress schedule and coordinate to avoid conflict with Work and conditions at the site. Deliver

anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.

- B. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label date of manufacture and shelf life, where applicable. Include UL labels on products so specified.
- C. Unload products in accordance with manufacturer's instructions for unloading, or as specified. Record the receipt of products at the site. Inspect for completeness and evidence of damage during shipment.
- D. Remove damaged products from the site and expedite delivery of identical new undamaged products and remedy incomplete or lost products to provide that specified, so as not to delay the progress of the Work.

1.6 HANDLING, STORAGE, AND PROTECTION

- A. Handle products in accordance with the manufacturer's written instructions, and in a manner to prevent damage. Store products, upon delivery, in accordance with manufacturer's instructions, with labels intact and legible, in approved storage yards or sheds provided in accordance with Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by OWNER.
- B. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered but not installed in the Work.
- C. Store electrical, instrumentation, and control products, and equipment with bearings in weathertight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulation against moisture, water, and dust damage. Connect and operate continuously all space heaters furnished in electrical equipment.
- D. Store fabricated products aboveground, on blocking or skids, and prevent soiling or staining. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

- E. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity.
- F. Hazardous Materials: Prevent contamination of personnel, the storage building, and the site. Meet the requirements of the product specifications, codes, and manufacturer's instructions.

1.7 SUBSTITUTE AND "OR-EQUAL" PRODUCTS

- A. Meet the requirements of the General Conditions, the Specification sections, and as set forth herein.
- B. Listing of proposed substitutes or "or-equal" items or methods.
 - 1. With consideration of the additional evaluation time necessary for OWNER's review of such items, indicate for each item the review status (either substitute or "or-equal") and estimated submission date.
 - 2. CONTRACTOR, in indicating the review status of the proposed item, acknowledges that the time shown for OWNER's review on the current accepted schedule is sufficient only to allow OWNER to accomplish review for the status indicated and not sufficient to perform both a review for "or-equal" status and a subsequent review for substitute status on the same product.
 - 3. OWNER may return unreviewed those submissions (i) not shown on the current accepted schedule, (ii) for which the review status differs from that indicated on the accepted list, (iii) which are incomplete, or (iv) which are uncertified, in which case CONTRACTOR shall provide the specified product.
- C. Submit seven copies of proposed substitute or "or-equal" item/method, to include all supporting data to allow OWNER's review. Complete, sign, and transmit with each proposed substitute or "or-equal" item/method submission. Submit one copy separately to OWNER.
- D. Disposition of "Or-Equal" Item: In accordance with Article SHOP DRAWINGS in Section 01300, SUBMITTALS, or in accordance with following paragraph.
- E. Disposition of Substitute Item/Method:
 - 1. Accepted: OWNER will evidence such acceptance by recommendation of a Change Order for CONTRACTOR and OWNER execution. Such Change Order will accompany OWNER's evaluation and acceptance of CONTRACTOR's proposed substitute.
 - 2. Rejected:

- a. One copy retained by OWNER.
- b. One copy returned to CONTRACTOR with a commentary by OWNER.
- c. Remaining copies will be destroyed.
- d. CONTRACTOR shall provide item specified in Contract Documents.

PART 2 PRODUCTS

2.1 GENERAL

- A. Provide manufacturer's standard materials suitable for service conditions unless otherwise specified in the individual Specifications.
- B. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.
- C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, and manufacturer's services and implement same or similar process instrumentation and control functions in same or similar manner.
- D. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- E. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
- F. Equipment, Components, Systems, Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable OSHA, state, and local health and safety regulations.
- G. Provide materials and equipment listed by UL wherever standards have been established by that agency.
- H. Special Tools and Accessories: Furnish to OWNER, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to, adequate oil and grease (as required for first lubrication of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts as required for maintenance.

- I. Lubricant: Provide initial lubricant recommended by equipment manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, startup, and operation until final acceptance by OWNER.

2.2 FABRICATION AND MANUFACTURE

A. General:

1. Manufacture parts to U.S.A. standard sizes and gauges.
2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
3. Design structural members for anticipated shock and vibratory loads.
4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
5. Modify standard products as necessary to meet performance Specifications.

B. Lubrication System:

1. Require no more than weekly attention during continuous operation.
2. Convenient and accessible. Oil drains with bronze or stainless steel valves and fill plugs easily accessible from the normal operating area or platform. Locate drains to allow convenient collection of oil during oil changes without removing equipment from its installed position.
3. Provide constant-level oilers or oil level indicators for oil lubrication systems.
4. For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.

2.3 SOURCE QUALITY CONTROL

- A. Calibration Instruments: Bear the seal of a reputable laboratory certifying that instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- B. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

PART 3 EXECUTION

3.1 INSPECTION

- A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing such effects. Remove damaged material or equipment from the site and

expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage which necessitates procurement of new products will be considered delays within CONTRACTOR's control.

3.2 INSTALLATION

- A. Equipment Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. No shimming between machined surfaces is allowed.
- C. Install Work in accordance with NECA Standard of Installation, unless otherwise specified.
- D. Repaint painted surfaces that are damaged prior to equipment acceptance.
- E. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions and as may be specified. Retain a copy of manufacturers' instruction at site, available for review at all times.
- F. For material and equipment specifically indicated or specified to be reused in the Work:
 - 1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
 - 2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such Work in the Contract Price.

3.3 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

3.4 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by OWNER.

END OF SECTION

SECTION 01640
MANUFACTURERS' SERVICES

PART 1 GENERAL

1.1 DEFINITIONS

- A. Reference Section 01650, FACILITY STARTUP.

1.2 SUBMITTALS

- A. Training Materials:

1. Submit written outlines of proposed training sessions not less than 21 days prior to scheduled training.
2. Furnish complete training materials, to include operation and maintenance data as required in this section to be retained by each trainee.

- B. Quality Control Submittals: When specified in the individual Specifications, submit:

1. Qualifications of Manufacturer's Representative performing specified services.
2. Manufacturer's Certificate of Proper Installation: On form appended to this Section.

1.3 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

- A. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system. Additional qualifications may be specified elsewhere.
- B. Representative subject to acceptance by OWNER. No substitute representatives will be allowed unless prior written approval by OWNER has been given.

1.4 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

- A. Where manufacturers' services are specified, furnish manufacturer's qualified representative. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, additional time required to perform the specified services shall be considered incidental work.

- B. Schedule manufacturer's services to avoid conflicting with other onsite testing or other manufacturer's onsite services.
 - 1. Determine that all conditions necessary to allow successful testing have been met before scheduling services.
- C. Only those days of service approved by OWNER will be credited to fulfill the specified minimum services.
- D. Manufacturer's Onsite Services shall Include as a Minimum:
 - 1. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish written approval of installation.
 - 2. Revisiting the site as required to correct problems and until installation and operation are acceptable to OWNER.
 - 3. Resolution of assembly or installation problems attributable to, or associated with, respective manufacturer's products and systems.
 - 4. Assistance during functional and performance testing and startup demonstration, and until product acceptance by the OWNER.
 - 5. Training of OWNER's personnel in the operation and maintenance of respective product as required.
 - 6. Completion of Manufacturer's Certificate of Proper Installation (form enclosed at end of this section) with applicable certificates for proper installation and initial, interim, and final test or service.
 - 7. Additional requirements may be specified elsewhere.

1.5 TRAINING SCHEDULE

- A. Adjust training schedule to ensure training of appropriate personnel as deemed necessary by OWNER, and to allow full participation by manufacturers' representatives. Adjust schedule for interruptions in operability of equipment.
- B. Coordinate with Section 01650, FACILITY STARTUP.

1.6 TRAINING OWNER'S PERSONNEL

- A. Furnish trained, articulate personnel to coordinate and expedite training and be familiar with operation and maintenance manual information specified in Section 01430, OPERATION AND MAINTENANCE DATA.
- B. Furnish manufacturers' representatives for detailed hands-on training to OWNER's personnel on operation and maintenance of specified product (system, subsystem, component) and as may be required in applicable Specifications.
 - 1. Manufacturer's Representative: Familiar with facility operation and maintenance requirements as well as with specified equipment.

C. Pre-startup Training:

1. Coordinate training sessions with OWNER's operating personnel and manufacturers' representatives, and with submission of operation and maintenance manuals in accordance with Section 01430, OPERATION AND MAINTENANCE DATA.
2. Complete at least 14 days prior to actual startup.

1.7 SUPPLEMENTS

A. The supplement listed below, following "END OF SECTION," are part of this Specification.

1. Form: Manufacturer's Certificate of Proper Installation.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION (NOT USED)****END OF SECTION**

MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

OWNER _____ EQPT SERIAL NO: _____

EQPT TAG NO: _____ EQPT/SYSTEM: _____

PROJECT NO: _____ SPEC. SECTION: _____

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

- ☐ Installed in accordance with Manufacturer's recommendations.
- ☐ Inspected, checked, and adjusted.
- ☐ Serviced with proper initial lubricants.
- ☐ Electrical and mechanical connections meet quality and safety standards.
- ☐ All applicable safety equipment has been properly installed.
- ☐ System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Comments: _____

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate his equipment and (iii) authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: _____, 20

Manufacturer: _____

By Manufacturer's Authorized Representative: _____
(Authorized Signature)

SECTION 01650 FACILITY STARTUP

PART 1 GENERAL

1.1 DEFINITIONS

- A. Facility Startup: Includes putting Project in operating order, cleaning, adjusting and balancing equipment, initial operation (startup) of equipment item, operating equipment, starting systems, operation of systems, testing of equipment and systems, and demonstration and verification of the completed facility as a unit.
- B. Functional Test: A test or tests in the presence of the OWNER to demonstrate that the installed equipment or system meets manufacturer's installation and adjustment requirements and other requirements specified including, but not limited to, noise, vibration, alignment, speed, proper electrical and mechanical connections, thrust restraint, proper rotation, and initial servicing.
- C. Operation Period: The operation period begins when the facility has been successfully started up as defined under Paragraph Startup Test Period and has met all Substantial Completion requirements.
- D. Performance Test: A test performed in the presence of the OWNER and after any required functional test specified, to demonstrate and confirm that the equipment and/or system meets the specified performance requirements.
- E. Significant Interruption: May include any of the following events:
 - 1. Failure of CONTRACTOR to maintain qualified onsite startup personnel as scheduled.
 - 2. Failure to meet specified performance for more than 2 consecutive hours.
 - 3. Failure of any critical equipment unit, system, or subsystem that is not satisfactorily corrected within 5 hours after failure.
 - 4. Failure of noncritical unit, system, or subsystem that is not satisfactorily corrected within 8 hours after failure.
 - 5. As may be determined by OWNER.
- F. Startup Test Period:
 - 1. Startup of the entire facility or any portion thereof includes coordinated operation of the facilities by the CONTRACTOR, Subcontractors, OWNER operating personnel, and manufacturer's representatives for equipment items and systems after all required functional tests have been completed and those performance tests deemed necessary for the safe operation of the entire facility have been completed.

2. Startup of each pump station or any portion thereof shall be considered complete when, in the opinion of the OWNER, each pump station or designated portion has operated in the manner intended for 5 continuous days without significant interruption. This period is in addition to any training, functional, or performance test periods specified elsewhere. A significant interruption will require the startup then in progress to be stopped and restarted after corrections are made.
- G. System: The overall process, or a portion thereof, that performs a specific function. A system may consist of two or more subsystems as well as two or more types of equipment. Examples of systems on this Project are as follows:
1. Pumps, motors, and controls.

1.2 SUBMITTALS

A. Administrative Submittals:

1. Functional and performance test schedules and plan for equipment, units, and systems at least 14 days prior to start of related testing. Include test plan, procedures, and log format.
2. Schedule and plan of facility startup activities at least 14 days prior to commencement.

B. Quality Control Submittals:

1. Manufacturer's Certificate of Proper Installation as required.
2. Test Reports: Functional and performance testing, in format acceptable to OWNER and certification of functional and performance test for each piece of equipment or system specified.
3. Certifications of Calibration: Testing equipment.

1.3 CONTRACTOR FACILITY STARTUP RESPONSIBILITIES

A. General:

1. Perform Work for tests specified.
2. Demonstrate proper installation, adjustment, function, performance, and operation of equipment, systems, control devices, and required interfaces individually and in conjunction with process instrumentation and control system.

1.4 OWNER FACILITY STARTUP RESPONSIBILITIES

A. General:

1. Review CONTRACTOR's test plan and schedule.
2. Witness each functional or performance test.

3. Coordinate other plant operations, if necessary, to facilitate CONTRACTOR's tests.
4. Provide water, power, chemicals, and other items as required for testing, unless otherwise indicated.

B. Startup Test Period:

1. Operate process units and devices, with support of CONTRACTOR.
2. Provide sampling, labor, and materials as required and provide laboratory analyses.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TESTING PREPARATION

A. General:

1. Complete Work associated with the unit and related processes before testing, including related manufacturer's representative services.
2. Furnish qualified manufacturer's representatives when required to assist in testing.
3. Utilize the Manufacturer's Certificate of Proper Installation Form from Section 01640, MANUFACTURERS' SERVICES, supplemented as necessary, to document functional and performance procedures, results, problems, and conclusions.
4. Schedule and attend pretest (functional and performance) meetings related to test schedule, plan of test, materials, chemicals, and liquids required, facilities' operations interface, OWNER involvement.
5. Designate and furnish one or more persons to be responsible for coordinating and expediting CONTRACTOR's facility startup duties. The person or persons shall be present during facility startup meetings and shall be available at all times during the facility startup period.
6. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required to conduct testing.

B. Cleaning and Checking: Prior to starting functional testing:

1. Calibrate testing equipment for accurate results.
2. Inspect and clean equipment, devices, connected piping, and structures so they are free of foreign material.
3. Lubricate equipment in accordance with manufacturer's instructions.
4. Turn rotating equipment by hand and check motor-driven equipment for correct rotation.
5. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
6. Check power supply to electric-powered equipment for correct voltage.

7. Adjust clearances and torques.
 8. Test piping for leaks.
 9. Obtain completion of applicable portions of Manufacturer's Certificate of Proper Installation in accordance with Section 01640, MANUFACTURERS' SERVICES.
- C. Ready-to-test determination will be by OWNER based at least on the following:
1. Notification by CONTRACTOR of equipment and system readiness for testing.
 2. Acceptable testing plan.
 3. Acceptable Operation and Maintenance Manuals.
 4. Receipt of Manufacturer's Certificate of Proper Installation, if specified.
 5. Adequate completion of Work adjacent to, or interfacing with, equipment to be tested.
 6. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment, and satisfactory fulfillment of other specified manufacturers' responsibilities.
 7. Equipment and electrical tagging complete.
 8. All spare parts and special tools delivered to OWNER.

3.2 FUNCTIONAL TESTING

A. General:

1. Begin testing at a time mutually agreed upon by the OWNER, manufacturer's representative(s), and CONTRACTOR.
2. Notify in writing OWNER and manufacturer's representative at least 14 days prior to scheduled date of functional tests.
3. Separate items of equipment demonstrated to function properly during subsystem testing may require no further functional test if documentation of subsystem testing is acceptable to OWNER.
4. Conduct functional test until each individual component item or system has achieved 2 continuous hours of satisfactory operation. Demonstrate all operational features and controls function during this period while in automatic modes.
5. If, in OWNER's opinion, each system meets the functional requirements specified, such system will be accepted as conforming for purposes of advancing to performance testing phase, if required. If, in OWNER's opinion, functional test results do not meet requirements specified, the systems will be considered as nonconforming.
6. Performance testing shall not commence until the equipment or system meets functional tests specified.

3.3 PERFORMANCE TESTING

A. General:

1. Begin testing at time mutually agreed upon by the OWNER, manufacturers' representative(s), and CONTRACTOR, as appropriate.
 - a. OWNER will be present during test.
 - b. Notify OWNER at least 14 days prior to scheduled date of test.
2. Follow approved testing plan and detailed procedures specified.
3. Unless otherwise indicated, furnish all labor, materials, and supplies for conducting the test and taking all samples and performance measurements.
4. Prepare performance test report summarizing test method. Include test logs, pertinent calculations, and certification of performance.

3.4 STARTUP TEST PERIOD

- A. Test Reports: As applicable to the equipment furnished, certify in writing that:
 1. Necessary hydraulic structures, piping systems, and valves have been successfully tested.
 2. Equipment systems and subsystems have been checked for proper installation, started, and successfully tested to indicate that they are operational.
 3. Systems and subsystems are capable of performing their intended functions.
 4. Facilities are ready for intended operation.
- B. Attend planning meetings and arrange for attendance by key major equipment manufacturer representatives as required by the Contract Documents.
- C. Designate and furnish one or more persons to be responsible for coordinating and expediting CONTRACTOR's facility startup duties.
- D. When facility startup has commenced, schedule remaining Work so as not to interfere with or delay the completion of facility startup. Support the facility startup activities with adequate staff to prevent delays and process upsets. This staff shall include, but not be limited to, major equipment and system manufacturers' representatives, Subcontractors, electricians, instrumentation personnel, millwrights, pipefitters and plumbers.
- E. Supply and coordinate specified manufacturer's facility startup services.
- F. Make adjustments, repairs, and corrections necessary to complete facility startup.
- G. After the facility is operating, complete the testing of those items of equipment, systems, and subsystems which could not be or were not adequately or successfully tested prior to startup test period.

3.5 PARTIAL UTILIZATION

- A. After successful performance testing of a particular equipment type or system, OWNER may elect to start up a portion of the equipment or system for continuous operation.

3.6 CONTINUOUS OPERATIONS

- A. OWNER will accept equipment and systems as substantially complete and ready for continuous operation only after successful facility startup is completed and documented, and reports submitted, and manufacturers' services completed for training of OWNER's personnel.

END OF SECTION

SECTION 01700 CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SUBMITTALS

- A. Quality Control Submittals: Written procedures for maintaining and markup of record documents.
- B. Contract Closeout Submittals: Submit prior to application for final payment for each WORK ORDER.
 - 1. Record Documents: As required in the General Conditions.
 - 2. Special Bonds, Special Warranties, and Service Agreements.
 - 3. Consent of Surety to Final Payment: As required in the General Conditions.
 - 4. Releases or Waivers of Liens and Claims: As required in the General Conditions.
 - 5. Releases from Agreements.
 - 6. Final Application for Payment: Submit in accordance with procedures and requirements stated in Section 01025, MEASUREMENT AND PAYMENT.
 - 7. Spare Parts and Special Tools: As required by individual Specification sections.

1.2 RECORD DOCUMENTS

- A. Quality Assurance:
 - 1. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.
 - 2. Accuracy of Records:
 - a. Coordinate changes within record documents, making legible and accurate entries on each page of Specifications and each sheet of Drawings and other documents where such entry is required to show change.
 - b. Purpose of Project record documents is to document factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement, investigation, and examination.
 - 3. Make entries within 24 hours after receipt of information that a change in Work has occurred.
 - 4. Prior to submitting each request for progress payment, request OWNER's review and approval of current status of record documents.

Failure to properly maintain, update, and submit record documents may result in OWNER withholding, in whole or in part, the CONTRACTOR's Application for Payment.

1.3 RELEASES FROM AGREEMENTS

- A. Furnish OWNER written releases from property owners or public agencies where side agreements or special easements have been made, or where CONTRACTOR's operations have not been kept within the OWNER's construction right-of-way.
- B. In the event CONTRACTOR is unable to secure written releases, inform the OWNER of the reasons:
 - 1. OWNER or its representatives will examine the site, and OWNER will direct CONTRACTOR to complete Work that may be necessary to satisfy terms of the easement.
 - 2. Should CONTRACTOR refuse to perform this Work, OWNER reserves the right to have it done by separate contract and deduct the cost of same from the Contract Price, or require the CONTRACTOR to furnish a satisfactory Bond in a sum to cover legal claims for damages.
 - 3. When OWNER is satisfied that Work has been completed in agreement with the Contract Documents and terms of easements, the right is reserved to waive the requirement for written release if:
 - a. CONTRACTOR's failure to obtain such statement is due to the grantor's refusal to sign, and this refusal is not based upon any legitimate claims that CONTRACTOR has failed to fulfill the terms of the easement.
 - b. CONTRACTOR is unable to contact or has had undue hardship in contacting the grantor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 MAINTENANCE OF RECORD DOCUMENTS

- A. General:
 - 1. Promptly following commencement of Contract Period, secure from OWNER at no cost to CONTRACTOR, one complete set of Contract Documents.
 - 2. Delete OWNER title block and seal from all documents.
 - 3. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.

4. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.
- B. Preservation:
1. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
 2. Make documents and Samples available at all times for observation by OWNER.
- C. Making Entries on Drawings:
1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
 - a. Color Coding:
 - 1) Green when showing information deleted from Drawings.
 - 2) Red when showing information added to Drawings.
 - 3) Blue and circled in blue to show notes.
 2. Date entries.
 3. Call attention to entry by "cloud" drawn around area or areas affected.
 4. Legibly mark to record actual changes made during construction, including, but not limited to:
 - a. Depths of various elements of foundation in relation to finished top of slab data if not shown or where depth differs from that shown.
 - b. Horizontal and vertical locations of existing and new Underground Facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.
 - c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
 - d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
 - e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and OWNER's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
 5. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
 - a. Clearly identify the item by accurate note such as "cast iron drain," "galv. water," and the like.

- b. Show, by symbol or note, vertical location of item ("under slab," "in ceiling plenum," "exposed," and the like).
 - c. Make identification so descriptive that it may be related reliably to Specifications.
6. Specifications: Legibly mark and record for each product the description of actual product installed if differs from that specified, including:
- a. Manufacturer, trade name, and catalog model number of each product and item of equipment actually installed.

3.2 FINAL CLEANING

- A. At completion of Work or of a part thereof and immediately prior to CONTRACTOR's request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to CONTRACTOR's notice of completion, clean entire site or parts thereof, as applicable.
- 1. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to OWNER.
 - 2. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.
 - 3. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.
 - 4. Broom clean exterior paved driveways and parking areas.
 - 5. Hose clean sidewalks, loading areas, and others contiguous with principal structures.
 - 6. Rake clean all other surfaces.
 - 7. Leave water courses, gutters, and ditches open and clean.
- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

END OF SECTION

SECTION 01740 WARRANTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on products and special warranties. Refer to the General Conditions for terms of the CONTRACTOR's period for correction of the Work.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the CONTRACTOR of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the CONTRACTOR.

1.02 DEFINITIONS

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

1.03 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, CONTRACTOR shall reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The CONTRACTOR is responsible for the cost of replacing or rebuilding defective Work regardless of whether the CITY

has benefited from use of the Work through a portion of its anticipated useful service life.

- D. CITY's Recourse: Expressed warranties made to the CITY are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the CITY can enforce such other duties, obligations, rights, or remedies.
- E. Rejection of Warranties: The CITY reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
- F. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the CITY reserves the right to refuse to accept the Work, until the CONTRACTOR presents evidence that entities required to countersign such commitments are willing to do so.

1.04 SUBMITTALS

- A. Submit written warranties to the CITY prior to the date certified for Final Completion. The CITY's Certificate of Final Completion designates a commencement date for warranties for the Work. Submit written warranties upon request of the CITY.
- B. When the Contract Documents require the CONTRACTOR, or the CONTRACTOR and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties.
- C. Form of Submittal: At Final Completion compile 2 copies of each required warranty properly executed by the CONTRACTOR, or by the CONTRACTOR, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence.
- D. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 ½ x 11-inch paper.
- E. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
- F. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the CONTRACTOR.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

DIVISION 2

SITE WORK

SECTION 02012

PROTECTING EXISTING UNDERGROUND UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section includes materials and procedures for protecting existing underground utilities.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02225: Trench Backfill

PART 2 - MATERIALS

2.01 REPLACEMENT IN KIND

- A. Except as indicated below or as specifically authorized by the CITY's Representative, reconstruct utilities with new material of the same size, type, and quality as that removed.

PART 3 - EXECUTION

3.01 GENERAL

- A. Replace in kind street improvements, such as curbs and gutters, barricades, traffic islands, signalization, fences, signs, etc., that are cut, removed, damaged, or otherwise disturbed by the construction.
- B. Where utilities are parallel to or cross the construction but do not conflict with the permanent work to be constructed, follow the procedures given below and as indicated in the drawings. Notify the utility owner 48 hours in advance of the crossing construction and coordinate the construction schedule with the utility owner's requirements. For utility crossings not shown in the drawings, refer to the General Conditions and the instructions of the CITY's Representative for guidance.
- C. Determine the true location and depth of utilities and service connections which may be affected by or affect the work. Determine the type, material, and condition of these utilities. In order to provide sufficient lead-time to resolve unforeseen conflicts, order materials and take appropriate measures to ensure that there is no delay in work.

D. **Expose utilities 200 feet in advance of the pipeline construction.**

3.02 PROCEDURES

- A. Protect in Place: Protect utilities in place, unless abandoned, and maintain the utility in service, unless otherwise specified in the drawings or in the specifications.
- B. Cut and Plug Ends: Cut abandoned utility lines and plug the ends. Plug storm drains and sewers with an 8-inch wall of brick and mortar. Cap waterlines with a cast-iron cap or install a 3-foot-long concrete plug. Dispose of the cut pipe as unsuitable material.
- C. Remove and Reconstruct: Where so indicated in the drawings or as required by the CITY's Representative, remove the utility and, after passage, reconstruct it with new materials. Provide temporary service for the disconnected utility.
- D. In the event an existing CITY utility is damaged by the CONTRACTOR which was accurately marking in the field, shown on the drawings, or previously identified through potholing procedures, the CONTRACTOR shall be responsible to make the repair if directed by CITY or pay CITY's current repair rate if CITY is required to make the repair.

3.03 COMPACTION

- A. Utilities Protected in Place: Backfill and compact under and around the utility so that no voids are left.
- B. Utilities Reconstructed: Prior to replacement of the utility, backfill the trench and compact to an elevation 1 foot above the top of the ends of the utility. Excavate a cross trench of the proper width for the utility and lay, backfill, and compact.

END OF SECTION

SECTION 02050 DEMOLITION

PART 1 GENERAL

1.1 SUBMITTALS

A. Quality Control Submittals:

1. Schedule of demolition.
2. Methods of demolition and equipment proposed to demolish each structure.
3. Copies of any authorizations and permits required to perform Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PREPARATION

A. Utilities:

1. Notify OWNER or appropriate utilities to turn off affected services before starting demolition.
2. Remove utility lines exposed by demolition excavation.
3. Plug sewer lines at locations shown or at limits of excavation if not shown with concrete length of plug, 3 feet minimum to prevent groundwater infiltrating sewer systems.

B. Removal and Storage of Equipment for Reuse:

1. Do not remove equipment and materials without approval of OWNER.
2. Properly store and maintain equipment and materials in same condition as when removed.
3. OWNER will determine condition of equipment and materials prior to removal.

3.2 SEQUENCE OF REMOVAL

- ##### **A.**
- Prior to removal or demolition of any structures, facilities must be in place to ensure the uninterrupted pumping and transmission of wastewater. For stations to be rehabilitated, complete bypass pumping equipment must be operational. For new stations, the new station must be fully operational and accepted for use by the OWNER prior to demolition of the existing facility.

3.3 DEMOLITION

- ##### **A.**
- Drawings define minimum portion of structures to be removed. Unless otherwise shown, rough cuts or breaks may be made exceeding limits of demolition shown.

- B. Core drill floor slabs, catch basins, and other concrete improvements to remain in place below ground, or break holes at structure's lowest point to allow water to freely migrate through.
- C. Remove piping from areas to be backfilled. Pipe, valves, and fittings adjacent to those to be removed may also be removed as salvage.
- D. Remove all materials associated with existing equipment that is to be removed or relocated.

3.4 DISPOSAL

- A. Dispose of debris and other non-salvaged materials offsite in licensed landfills.

3.5 BACKFILLING

- A. Demolished Areas: Backfill to existing ground level or foundation level of new construction.
- B. Backfill Material and Compaction:
 - 1. Conform to Section 02220, FILL AND BACKFILL.
 - 2. Do not use demolition debris as backfill material.

3.6 SALVAGE

- A. Equipment and materials, including piping within the limits of demolition, unless otherwise specified, will become the property of the CONTRACTOR.
- B. RTU Antennas and Panels:
 - 1. Salvage for reuse in the Project.
 - 2. Store and protect until installation.
- C. Motor Control Panels:
 - 1. Salvage for future use by OWNER.
 - 2. Remove and deliver to OWNER-designated storage area.
- D. Pumps and Motors:
 - 1. Salvage for future use by OWNER.
 - 2. Remove and deliver at OWNER-designed storage area.

END OF SECTION

SECTION 02100 SITE PREPARATION

PART 1 GENERAL

1.1 DEFINITIONS

- A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.
- B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.
- C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots greater than 2 inches caliper to a depth of 6 inches below subgrade.
- D. Scalping: Removal of sod without removing more than upper 3 inches of topsoil.
- E. Stripping: Removal of topsoil remaining after applicable scalping is completed.
- F. Project Limits: Areas, as shown or specified, within which Work is to be performed.

1.2 SCHEDULING AND SEQUENCING

- A. Prepare site only after adequate erosion and sediment controls are in place.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

- A. Clear, grub, and strip areas actually needed for waste disposal, borrow, or site improvements within limits shown or specified.
- B. Do not injure or deface vegetation that is not designated for removal.

3.2 LIMITS

- A. As follows, but not to extend beyond Project limits.
 - 1. Excavation Excluding Trenches: 5 feet beyond top of cut slopes.
 - 2. Trench Excavation: 4 feet from trench centerline, regardless of actual trench width.
 - 3. Fill:
 - a. Clearing and Grubbing: 5 feet beyond toe of permanent fill.
 - b. Stripping and Scalping: 2 feet beyond toe of permanent fill.
 - 4. Structures: 15 feet outside of new structures.
 - 5. Other Areas: As shown.
- B. Remove rubbish, trash, and junk from entire area within Project limits.

3.3 TEMPORARY REMOVAL OF INTERFERING PLANTINGS

- A. Remove and store shrubs and trees that are not designated for removal but do interfere with construction or could be damaged by construction activities.
- B. Photograph and document location, orientation, and condition of each plant prior to its removal. Record sufficient information to uniquely identify each plant removed and to assure accurate replacement.

3.4 CLEARING

- A. Clear areas within limits shown or specified.
- B. Fell trees so that they fall away from facilities and vegetation not designated for removal.
- C. Cut stumps not designated for grubbing flush with ground surface.
- D. Cut off shrubs, brush, weeds, and grasses to within 2 inches of ground surface.

3.5 GRUBBING

- A. Grub areas within limits shown or specified.

3.6 SCALPING

- A. Do not remove sod until after clearing and grubbing is completed and resulting debris is removed.
- B. Scalp areas within limits shown or specified.

3.7 STRIPPING

- A. Do not remove topsoil until after scalping is completed.
- B. Strip areas within limits to minimum depths shown or specified. Do not remove subsoil with topsoil.

3.8 TREE REMOVAL OUTSIDE CLEARING LIMITS

- A. Remove within Project Limits: Dead, dying, leaning, or otherwise unsound trees that may strike and damage Project facilities in falling.
- B. All stumps shall be removed to their full depth; remove debris, and if disturbed, restore surrounding area to its original condition.

3.9 DISPOSAL

- A. Clearing and Grubbing Debris:
 - 1. Dispose of debris offsite.
 - 2. Woody debris may be chipped. Chips may be sold to CONTRACTOR's benefit or used for landscaping onsite as mulch or uniformly mixed with topsoil, provided that resulting mix will be fertile and not support combustion. Maximum dimensions of chipped material used onsite shall be 1/4 inch by 2 inches. Dispose of chips that are unsaleable or unsuitable for landscaping or other uses with unchipped debris.
 - 3. Limit offsite disposal of clearing and grubbing debris to locations that are approved by federal, state, and local authorities, and that will not be visible from Project.
- B. Scalpings: As specified for clearing and grubbing debris.
- C. Strippings:
 - 1. Dispose of strippings that are unsuitable for topsoil or that exceed quantity required for topsoil offsite.
 - 2. Stockpile topsoil in sufficient quantity to meet Project needs. Dispose of excess strippings as specified for clearing and grubbing.

END OF SECTION

SECTION 02115
REMOVAL OF EXOTIC AND INVASIVE PLANTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, AND CONDITIONS OF THE CONTRACT and applicable parts of Section 01001, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

1.2 WORK INCLUDED

- A. Do all work necessary to remove exotic and invasive plants as indicated on the Drawings and as specified herein.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this section. Other Specification sections that directly relate to work of this Section include, but are not limited to:

1. Section 01530, TREE AND PLANT PROTECTION.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. American National Standards Institute (ANSI): Z133.1 Safety Requirements for Pruning, Trimming, Repairing, Maintaining and Removing Trees, and for Cutting Brush.
2. City of Sunrise Codes and Ordinances.

1.5 EXOTIC AND INVASIVE PLANTS

- A. Exotic and Invasive Plants are Defined as the Following:

Botanical Name	Common Name
Acacia auriculiformis	Earleaf Acacia
Brassia actinophylla	Schefflera
Cupaniopsis anacardiopsis	Carrotwood

Botanical Name	Common Name
Leucaena leucocephala	Lead Tree
Melaleuca quinquenervia	Melaleuca
Schinus terebinthifolius	Brazilian Pepper
Ricinus communis	Castor Bean
Parthenocissus cinquefolia	Virginia Creeper
Cestrum	Day Blooming Jasmine
Sanseveria spp.	Sanseveria
Crinum asiaticum	Crinum Lilly Balsam Apple Leatherleaf
Echites umbellata	Devil's Potato
Vitis spp.	Grape Vine
Nerium spp.	Oleander
Scaevola sericea	Hawaiian Scaevola

1.6 SUBMITTALS

- A. The CONTRACTOR shall submit to the OWNER for review, proposed methods and materials for clearing of exotic and invasive plant material, including a schedule indicating specific dates for implementing specific work items in each major work area.
- B. The CONTRACTOR shall provide data and technical data and safety sheet for herbicides used.

1.7 QUALITY ASSURANCE

- A. In the event that the removal of exotic and invasive plant materials would damage any native trees larger than 3-inch caliper, the CONTRACTOR shall notify the OWNER and the City Environmental Officer before proceeding further.
- B. Selective clearing methods shall conform to the applicable requirements of ANSI Z1 33.

PART 2 PRODUCTS**2.1 HERBICIDE**

- A. Herbicide for stump removal shall be Garion 4 Woody Plant Control Herbicide manufactured by Dow Chemical Company, Midland, MI 48874, or approved equal.

2.2 TOPSOIL

- A. All topsoil used for work under this section shall be clean of stones, sticks, plants, and other foreign materials before used to prepare planting soil.
- B. Topsoil shall be natural, fertile, friable soil without admixture of subsoil and shall be clean and reasonably free of clay lumps, stones, stumps, roots, or similar substances one or more inches in diameter, debris, or other objects which might be a hindrance to planting operation.
- C. Topsoil shall be subject to approval of the OWNER.
- D. Soil shall be a pH value between 5.5 and 6.5 after the admixtures have been added.

2.3 MULCH

- A. Mulch Produced as a By-Product of Exotic and Invasive Removal: Roots, trunks, and branches of removed exotics and invasive material without green leaves and/or fruit shall be chipped and used as mulch. Mulch must be uniform in size and no greater than 1 inch by 10 inch by 1/2 inch in size. Spray new mulch with pre-emergent herbicide to thoroughly cover all surfaces. Mulch which is determined to be intermixed with leaves or fruit bodies will be rejected as a lot and must be removed from the site as refuse by the CONTRACTOR. Mulch produced as a by-product of the exotic removal is the property of the City and the preparation and application of this mulch is part of the work under this Section.

PART 3 EXECUTION**3.1 TREES TO REMAIN**

- A. As an exception to the following provisions, where so directed by the City Landscape Architect, desirable trees and vegetation shall be trimmed, protected and left standing. Damaged vegetation will be replaced by the CONTRACTOR at no additional expense to the OWNER on a 1 to 1 ratio or as directed by the City Environmental Planning Officer.

3.2 PROTECTION OF PROPERTY

- A. Property obstructions which are to remain in-place, such as sewers, drains, water or gas pipes, conduits, poles, walls, posts, bridges, monitoring wells, boardwalks, pavement, shower facilities, benches, utilities etc., are to be carefully protected from injury and are not to be displaced.
- B. All site improvements damaged during construction shall be repaired or replaced as directed by the City Landscape Architect by the CONTRACTOR to as new conditions at no additional expense to the OWNER.

3.3 SITE PREPARATION

- A. Install boxing and limits of disturbance fencing as shown on the Drawings and details.
- B. Stake out centerline and limits of disturbance for proposed haul route and staging areas' construction of proposed haul route for approval by City Landscape Architect.
- C. Stabilize haul route and staging areas as required.

3.4 EXOTIC AND INVASIVE PLANT REMOVAL

- A. Remove all exotic and invasive plant materials from within the limit of exotic and invasive plant removal, as indicated on the Drawings.
 - 1. Treat exotic and invasive stumps with herbicide mixture to facilitate removal or grub by hand. Herbicide may be used where necessary to protect plants from damage by mechanical equipment.
 - 2. Acceptable herbicides include Tordon, Round-Up, Diquat, Gramoxond, or approved equal. Herbicides shall be applied in strict compliance with manufacturer's published application instructions and manufacturer's published instructions for safe use and safety.
- B. Dispose of all branches with leaves, pine needles, and fruit off-site. Removed plant material shall be legally disposed offsite.
- C. Spray cleared areas of invasive and exotic tree canopy cover with a pre-emergent herbicide within 72 hours of clearing and grubbing. Contact City Landscape Architect to schedule inspection prior to continuing work in this area.
- D. Exotic and invasive material by-product mulch shall be produced and stockpiled onsite. Locations for mulch piles require approval by the City Landscape Architect. Locate mulch piles away from stumps and protected vegetation. Spray and thoroughly saturate mulch pile with pre-emergent herbicide. Cover and secure mulch piles completely with 4-mil thick plastic

sheeting. Thoroughly secure edges of sheeting. Maintain integrity of sheeting and mulch pile until distribution. Byproduct mulch shall be applied in various locations within Spanish River Park to be determined by the City Landscape Architect and Recreation Services District One Maintenance supervisors.

- E. After approval of work by City Landscape Architect, apply pine straw mulch to all disturbed areas after inspection to a depth of 3 to 4 inches within the disturbed areas.

3.5 STUMP REMOVAL

- A. All stumps shall be removed to their full depth. Roots 3 inches and larger shall be removed to a depth of 2 feet below grade. In environmentally sensitive areas and in areas inaccessible to heavy machinery, roots, and other debris will be removed to a depth of at least one foot below the ground surface. All areas shall be plowed to a depth of at least 6 inches and all roots thereby exposed shall be removed to a depth of one foot. Stumps shall be legally disposed offsite.
- B. Remove stumps without damage to the surrounding understory. If mechanical removal is not possible without damage to native plants, notify OWNER and recommend alternate methods for ensuring that there is no vegetative regeneration of the undesirable species. Proceed with alternative methods only with the OWNER's approval.
- C. After stump removal, all holes produced from the stump and root removal shall be filled to the prior grade with topsoil to equal grade prior to stump removal. The disturbed area shall be lightly graded to produce a smooth surface.

END OF SECTION

SECTION 02140 DEWATERING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The work covered by this Section consists of furnishing all permits, labor, equipment, appliances and materials, and performing all operations required for dewatering excavations as required to ensure that all work is performed in the dry.
- B. The CONTRACTOR shall not discharge water from dewatering operations in any manner that will:
 - 1. Adversely affect the water quality of adjoining water bodies.
 - 2. Violate federal, state or local laws and regulations.
 - 3. Allow discharge to flow onto private property.
 - 4. Hamper the movement of traffic.
 - 5. Damage portions of the work previously constructed.

1.02 STATUTORY REQUIREMENTS

- A. **All State and local permits associated with the dewatering are the responsibility of the CONTRACTOR. Obtain and pay for all permits required for temporary dewatering systems.**
- B. Compliance with the Florida Department of Environmental Protection's Generic Permit for the discharge of Produced Ground Water from a Non-Contaminated Site Activity (FDEP Document No. 62-621.300 (2)) shall be required for any dewatering operations.
- C. Original permits shall be prominently displayed on the site prior to constructing dewatering systems.

1.03 RELATED WORK

- A. Division 1: General Requirements
- B. Division 2: Site Work

1.04 SUBMITTALS

- A. Administrative Submittals: Discharge permits.
- B. Shop Drawings:
 - 1. Water Control Plan, including dewatering pumps, stilling basin, and means of sound attenuation.

1.05 WATER CONTROL PLAN

- A. As a minimum, include descriptions of proposed groundwater and surface water control facilities including, but not limited to, equipment, methods, standby equipment and power supply, pollution control facilities, and discharge locations to be utilized as required by this Section.

PART 2 - PRODUCTS

2.01 PUMP DRIVERS

- A. Sound attenuated pumps as manufactured by Thompson Pumps with "Silent Knight" canopy, or approved equal shall be used for all dewatering activities that require a pumping system. CONTRACTOR shall demonstrate, measure and record the dB levels at the time of initial set-up. The CONTRACTOR shall record the dB levels weekly.

PART 3 - EXECUTION

- A. The CONTRACTOR's proposed method for dewatering pipe trenches and manhole excavations shall be reviewed by the OWNER prior to instituting any such operations. Methods may include well-points, sump pumps, bedding rock or other methods approved by the OWNER. The CONTRACTOR is responsible for means and methods of construction dewatering activities.
- B. **In areas of deep trench where dewatering and maintenance of vehicular traffic is required, the CONTRACTOR shall bench down the sides of the trench in order to cover the dewatering well point heads with temporary steel plating.**
- C. The CONTRACTOR shall provide all labor, materials, tools and equipment necessary to properly control the quality of the discharge from dewatering operations. The CONTRACTOR shall comply with all applicable laws, rules and regulations governing the discharge of water from dewatering operations.

- D. The impact of anticipated subsurface soil/water conditions shall be considered when selecting methods of excavation and temporary dewatering and drainage systems. Where groundwater levels are above the proposed bottoms of excavations, a pumped dewatering system is expected for pre-drainage of the soils prior to excavation to final grade and for maintenance of the lowered groundwater level until construction has been completed to such an extent that the foundation, structure, pipe, conduit, or fill will not be floated or otherwise damaged. Type of dewatering system, spacing of dewatering units and other details of the work are expected to vary with soil/water conditions at a particular location.
- E. The CONTRACTOR is responsible for controlling the bacteriological quality of well point discharges into existing bodies of water. The maximum allowable level for fecal coliform in the well-point discharge is a mean MPN of 14 per 100 ML with not more than ten percent (10%) of the samples exceeding an MPN of 43 per 100 ML.
- F. Protection of Property - CONTRACTOR shall make an assessment for dewatering induced settlement and shall provide devices or systems, including but not limited to re-injection wells, infiltration trenches and cutoff walls, necessary to prevent damage to existing facilities, completed Work and adjacent facilities.
- G. Control surface water and groundwater such that excavation to final grade is made in the dry, and bearing soils are maintained undisturbed. Prevent softening, or instability of, or disturbance to, the sub-grade due to water seepage.
- H. Provide protection against flotation for all work.
- I. Well-points shall not be set in such a way that undermines or jeopardizes paved areas; if the setting of well-points undermines or impacts paved areas, the impacted areas shall be removed and restored equal to or better than their original condition at the expense of the CONTRACTOR.
- J. Pipe and conduit shall not be installed in water or allowed to be submerged prior to backfilling. Pipe and conduit which becomes submerged shall be removed and the excavation dewatered and restored to proper conditions prior to reinstalling the pipe and conduit.
- K. Collect and properly dispose of all discharge water from dewatering and drainage systems in accordance with State and local requirements and permits. As a minimum, no discharge or run-off of groundwater or surface water that is contaminated with any petroleum products (gasoline, diesel fuel, oil, grease, hydraulic fluid, etc.) and/or sanitary waste shall be made to surface water systems such as lakes, rivers, streams, the Intracoastal Waterway or "on-site" retention ponds that secondarily discharge to these surface water systems.
- L. Dewatering systems shall be designed to allow for localized variations in the depths of the excavations.

- M. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of sub-grades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- N. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.
- O. As the well-points are withdrawn, the locations of the voided areas shall back-filled by jetting approved backfill material into the voids until they are completely filled. These restored well-point voids are subject to random density verification testing.
- P. **Provide adequate noise attenuation enclosure around all engine generator pumping equipment and comply with CITY's Noise Ordinance. Dewatering pumps shall have mitigation measures to meet the CITY's Noise Ordinance: During such periods of normal construction hours of 7:00 am to 6:00 pm on Monday through Friday, the noise levels generated by construction activities shall not exceed 60 dBA. The CONTRACTOR will be required to construct additional sound attenuation means to achieve compliance with the CITY's Noise Ordinance.**

END OF SECTION

SECTION 02205 EXCAVATION

PART 1 GENERAL

1.1 QUALITY ASSURANCE

- A. Provide adequate survey control to avoid unauthorized over excavation.

1.2 SEQUENCING AND SCHEDULING

- A. Demolition: Complete applicable Work specified in Section 02050, DEMOLITION, prior to excavating.
- B. Clearing, Grubbing, and Stripping: Complete applicable Work specified in Section 02100, SITE PREPARATION, prior to excavating.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

- A. Excavate to lines, grades, and dimensions shown and as necessary to accomplish Work. Excavate to within tolerance of plus or minus 0.1 foot except where dimensions or grades are shown or specified as maximum or minimum. Allow for forms, working space, granular base, topsoil, and similar items, wherever applicable. Trim to neat lines where concrete is to be deposited against earth.
- B. Do not over excavate without written authorization of OWNER.
- C. Remove or protect obstructions as shown and as specified in Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS, Article PROTECTION OF WORK AND PROPERTY.

3.2 UNCLASSIFIED EXCAVATION

- A. Excavation is unclassified. Complete all excavation regardless of the type, nature, or condition of the materials encountered.

3.3 TRENCH WIDTH

- A. Minimum Width of Trenches:
 - 1. Single Pipes, Conduits, Direct-Buried Cables, and Duct Banks:

- a. Less than 4-Inch Outside Diameter or Width: 18 inches.
 - b. Greater than 4-Inch Outside Diameter or Width: 18 inches greater than outside diameter or width of pipe, conduit, direct-buried cable, or duct bank.
 2. Multiple Pipes, Conduits, Cables, or Duct Banks in Single Trench: 18 inches greater than aggregate width of pipes, conduits, cables, duct banks, plus space between.
 3. Increase trench widths by thicknesses of sheeting.
- B. Maximum Trench Width: Unlimited, unless otherwise shown or specified, or unless excess width will cause damage to existing facilities, adjacent property, or completed Work.

3.4 EMBANKMENT AND CUT SLOPES

- A. Shape, trim, and finish cut slopes to conform with lines, grades, and cross-sections shown, with proper allowance for topsoil or slope protection, where shown.
- B. Remove stones and rock that exceed 3 inch in diameter and that are loose and may roll down slope. Remove exposed roots from cut slopes.
- C. Round tops of cut slopes in soil to not less than a 6-foot radius, provided such rounding does not extend offsite or outside easements and right-of-way, or adversely impacts existing facilities, adjacent property, or completed Work.

3.5 STOCKPILING EXCAVATED MATERIAL

- A. Stockpile excavated material that is suitable for use as fill or backfill until material is needed.
- B. Post signs indicating proposed use of material stockpiled. Post signs that are readable from all directions of approach to each stockpile. Signs should be clearly worded and readable by equipment operators from their normal seated position.
- C. Confine stockpiles to within easements, rights-of-way, and approved work areas. Do not obstruct roads or streets.
- D. Do not stockpile excavated material adjacent to trenches and other excavations unless excavation side-slopes and excavation support systems are designed, constructed, and maintained for stockpile loads.
- E. Do not stockpile excavated materials near or over existing facilities, adjacent property, or completed Work, if weight of stockpiled material could induce excessive settlement.

3.6 DISPOSAL OF SPOIL

- A. Dispose of excavated materials, which are unsuitable or exceed quantity needed for fill or backfill, offsite.
- B. Dispose of debris resulting from removal of underground facilities as specified in Section 02050, DEMOLITION, for demolition debris.
- C. Dispose of debris resulting from removal of organic matter, trash, refuse, and junk as specified in Section 02100, SITE PREPARATION, for clearing and grubbing debris.

3.7 REMOVAL OF WATER

- A. Provide and operate equipment adequate to keep the excavation for the pump station, structures, and trenches free of water. Remove water during periods when pipe is being laid, during the placing of backfill, and at all other times as required for safe and efficient construction. Place tremie concrete if necessary to reduce the dewatering volume. After the concrete plug has been poured in the caisson, do not remove water from inside caisson until the plug has obtained its 28-day strength. Avoid settlement or damage to adjacent property. Dispose of the water in a manner that will not damage adjacent property or cause siltation in the adjacent waterways and wetland areas. Do not dispose of dewatering effluent in planted or sodded areas.

END OF SECTION

SECTION 02220 FILL AND BACKFILL

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American Society for Testing and Materials (ASTM):
 - a. C117, Standard Test Method for Materials Finer Than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - b. C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - c. D75, Standard Practice for Sampling Aggregates.
 - d. D698, Standard Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 5.5-pound (2.49 kg) Rammer and 12-inch (305 mm) Drop.
 - e. D1556, Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - f. D1557, Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-pound (4.54 kg) Rammer and 18-inch (457 mm) Drop.
 - g. D2922, Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods.
 - h. D4253, Standard Test Methods for Maximum Index Density of Soils Using a Vibratory Table.
 - i. D4254, Standard Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.

1.2 DEFINITIONS

A. Relative Compaction:

1. Ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D1557.
2. Apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by OWNER.

B. Optimum Moisture Content:

1. Determined in accordance with ASTM Standard specified to determine maximum dry density for relative compaction.
2. Determine field moisture content on basis of fraction passing 3/4-inch sieve.

- C. Relative Density: Calculated in accordance with ASTM D4254 based on maximum index density determined in accordance with ASTM D4253 and minimum index density determined in accordance with ASTM D4254.
- D. Prepared Ground Surface: Ground surface after completion of required demolition, clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and subgrade preparation.
- E. Completed Course: A course or layer that is ready for next layer or next phase of Work.
- F. Lift: Loose (uncompacted) layer of material.
- G. Geosynthetics: Geotextiles, geogrids, or geomembranes.
- H. Well Graded:
 - 1. A mixture of particle sizes with no specific concentration or lack thereof of one or more sizes.
 - 2. Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
 - 3. Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.
- I. Influence Area: Area within planes sloped downward and outward at 60-degree angle from horizontal measured from:
 - 1. 1 foot outside outermost edge at base of foundations or slabs.
 - 2. 1 foot outside outermost edge at surface of roadways or shoulder.
 - 3. 0.5 foot outside exterior at spring line of pipes or culverts.
- J. Borrow Material: Material from required excavations or from designated borrow areas on or near site.
- K. Selected Backfill Material: Materials available onsite that OWNER determines to be suitable for specific use.
- L. Imported Material: Materials obtained from sources offsite, suitable for specified use.
- M. Structural Fill: Fill materials as required under structures, pavements, and other facilities.
- N. Embankment Material: Fill materials required to raise existing grade in areas other than under structures.

1.3 SUBMITTALS

- A. Quality Control Submittals: Certified test results from independent testing agency.

1.4 QUALITY ASSURANCE

- A. Notify OWNER when:
 - 1. Structure or tank is ready for backfilling, and whenever backfilling operations are resumed after a period of inactivity.
 - 2. Soft or loose subgrade materials are encountered wherever embankment or site fill is to be placed.
 - 3. Fill material appears to be deviating from Specifications.

1.5 SEQUENCING AND SCHEDULING

- A. Complete applicable Work specified in Sections 02050, DEMOLITION; 02100, SITE PREPARATION and 02205, EXCAVATION, prior to placing fill or backfill.
- B. Backfill against concrete structures only after concrete has attained compressive strength, specified in Section 03300, CONCRETE. Obtain OWNER's acceptance of concrete work and attained strength prior to placing backfill.

PART 2 PRODUCTS

2.1 SOURCE QUALITY CONTROL

- A. Gradation Tests:
 - 1. As necessary to locate acceptable sources of imported material.
 - 2. During production of imported material, for each station test as follows:
 - a. Granular Fill: One test.
 - b. Base Course Rock: One test.
 - c. Foundation Stabilization Rock: One test.

2.2 EARTHFILL

- A. Excavated material from required excavations free from rocks larger than 3 inches, from roots and other organic matter, ashes, cinders, trash, debris, and other deleterious materials.
- B. Provide imported material of equivalent quality, if required to accomplish Work.

2.3 GRANULAR FILL

- A. One inch minus crushed gravel or crushed rock.

- B. Free from dirt, clay balls, and organic material.
- C. Well graded from coarse to fine and containing sufficient fines to bind material when compacted, but with maximum 8 percent by weight passing No. 200 sieve.

2.4 WATER FOR MOISTURE CONDITIONING

- A. Free of hazardous or toxic contaminants, or contaminants deleterious to proper compaction.

2.5 BASE COURSE ROCK

- A. No. 57 stone as specified in FDOT Standard Specifications.

2.6 FOUNDATION STABILIZATION ROCK

- A. Crushed rock or pit run rock.
- B. Uniformly graded from coarse to fine.
- C. Free from excessive dirt and other organic material.
- D. Maximum 2-1/2 inches particle size.

PART 3 EXECUTION

3.1 GENERAL

- A. Keep placement surfaces free of water, debris, and foreign material during placement and compaction of fill and backfill materials.
- B. Place and spread fill and backfill materials in horizontal lifts of uniform thickness, in a manner that avoids segregation, and compact each lift to specified densities prior to placing succeeding lifts. Slope lifts only where necessary to conform to final grades or as necessary to keep placement surfaces drained of water.
- C. During filling and backfilling, keep level of fill and backfill around each structure even.
- D. If pipe, conduit, duct bank, or cable is to be laid within fill or backfill:
 - 1. Fill or backfill to an elevation 2 feet above top of item to be laid.
 - 2. Excavate trench for installation of item.
 - 3. Install bedding, if applicable, as specified in Section 02225, TRENCH BACKFILL.
 - 4. Install item.

5. Backfill envelope zone and remaining trench, as specified in Section 02225, TRENCH BACKFILL, before resuming filling or backfilling specified in this Section.

E. Tolerances:

1. Final Lines and Grades: Within a tolerance of 0.1 foot unless dimensions or grades are shown or specified otherwise.
2. Grade to establish and maintain slopes and drainage as shown. Reverse slopes are not permitted.

- F. Settlement: Correct and repair any subsequent damage to structures, pavements, curbs, slabs, piping, and other facilities, caused by settlement of fill or backfill material.

3.2 BACKFILL UNDER AND AROUND STRUCTURES

- A. Under Facilities: Within influence area beneath structures, slabs, pavements, curbs, piping, conduits, duct banks, and other facilities, backfill with granular fill, unless otherwise shown. Place granular fill in lifts of 6-inch maximum thickness and compact each lift to minimum of 98 percent relative compaction as determined in accordance with ASTM D1557.
- B. Subsurface Drainage: Backfill with granular drain material, where shown. Place granular drain material in lifts of 6-inch maximum thickness and compact each lift to minimum of 90 percent relative density.
- C. Other Areas: Backfill with earthfill to lines and grades shown, with proper allowance for topsoil thickness where shown. Place in lifts of 6-inch maximum thickness and compact each lift to minimum 98 percent relative compaction as determined in accordance with ASTM D1557.

3.3 FILL

- A. Outside Influence Areas Beneath Structures, Tanks, Pavements, Curbs, Slabs, Piping, and Other Facilities: Unless otherwise shown, place earthfill as follows:
1. Allow for 6-inch thickness of topsoil where required.
 2. Maximum 8-inch thick lifts.
 3. Place and compact fill across full width of embankment.
 4. Compact to 98 percent relative compaction as determined in accordance with ASTM D1557 based on average of most recent four tests on like material. If any two of the four most recent tests falls below 96 percent or any one of the four preceding tests falls below 94 percent, additional compactive effort will be required.
 5. Dress completed embankment with allowance for topsoil, crest surfacing, and slope protection, where applicable.

3.4 SITE TESTING

A. Gradation:

1. One sample from each 1,500 tons of finished product or more often as determined by OWNER, if variation in gradation is occurring, or if material appears to depart from Specifications.
2. If test results indicate material does not meet Specification requirements, terminate material placement until corrective measures are taken.
3. Remove material placed in Work that does not meet Specification requirements.

3.5 GRANULAR BASE, SUBBASE, AND SURFACING

A. Place and Compact as specified in FDOT Standard Specifications.

3.6 REPLACING OVEREXCAVATED MATERIAL

A. Replace excavation carried below grade lines shown or established by OWNER as follows:

1. Beneath Footings: Granular fill.
2. Beneath Fill or Backfill: Same material as specified for overlying fill or backfill.
3. Beneath Slabs-On-Grade: Granular fill.
4. Trenches:
 - a. Unauthorized Over excavation: Either trench stabilization material or granular pipe base material, as specified in Section 02225, TRENCH BACKFILL.
 - b. Authorized Over excavation: Trench stabilization material, as specified in Section 02225, TRENCH BACKFILL.
5. Permanent Cut Slopes (Where Overlying Area is Not to Receive Fill or Backfill):
 - a. Flat to Moderate Steep Slopes (3 to 1, Horizontal Run: Vertical Rise or Flatter): Earthfill.
 - b. Steep Slopes (Steeper than 3 to 1):
 - 1) Correct over excavation by transitioning between overcut areas and designed slope adjoining areas, provided such cutting does not extend offsite or outside easements and right-of-way, or adversely impacts existing facilities, adjacent property, or completed Work.
 - 2) Backfilling over excavated areas is prohibited unless, in OWNER's opinion, backfill will remain stable, and over excavated material is replaced as compacted earth fill.

3.7 ACCESS ROAD SURFACING

- A. Place and compact as specified in FDOT Standard Specifications and Section 02575, SURFACE RESTORATION.

END OF SECTION

SECTION 02225 TRENCH BACKFILL

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American National Standards Institute (ANSI): Z53.1, Safety Color Code.
2. American Public Works Association (APWA): Uniform Color Code for Temporary Marking of Underground Utility Locations.
3. American Society for Testing and Materials (ASTM):
 - a. C330, Standard Specification for Concrete Aggregates.
 - b. C94, Specification for Ready-Mixed Concrete.
 - c. C117, Standard Test Method for Materials Finer than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing.
 - d. C136, Sieve Analysis of Fine and Coarse Aggregates.
 - e. C150, Portland Cement.
 - f. C618, Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
 - g. D422, Rev 90, Method for Particle-Size Analysis of Soils.
 - h. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil using Standard Effort (12,400 ft-lbf/cubic ft).
 - i. D1140, Rev. 90, Amount of Material in Soils Finer than the No. 200 Sieve.
 - j. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/cubic ft).
 - k. D3776 (Rev 90), Mass per Unit Area (Weight) of Woven Fabric.
 - l. D3786, Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method.
 - m. D4253, Standard Test Methods for Maximum Index Density of Soils Using a Vibratory Table.
 - n. D4254, Standard Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.
 - o. D4318, Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - p. D4533, Trapezoid Tearing Strength of Geotextiles.

- q. D4832, Preparation and Testing of Soil-Cement Slurry Test Cylinders.
- r. D4991, Leakage Testing of Empty Containers by Vacuum Method.
- s. D5034, Breaking Force and Elongation of Textile Fabrics (Grab Test).

1.2 DEFINITIONS

- A. Base Rock: Granular material upon which manhole bases and other structures are placed.
- B. Bedding Material: Granular material upon which pipes, conduits, cables, or duct banks are placed.
- C. Imported Material: Material obtained by the CONTRACTOR from source(s) offsite.
- D. Lift: Loose (uncompacted) layer of material.
- E. Pipe Zone: Backfill zone that includes full trench width and extends from prepared trench bottom to an upper limit above top outside surface of pipe, conduit, cable or duct bank.
- F. Prepared Trench Bottom: Graded trench bottom after stabilization and installation of bedding material.
- G. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D1557. Corrections for oversize material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the OWNER.
- H. Relative Density: As defined by ASTM D4253 and ASTM D4254.
- I. Selected Backfill Material: Material available onsite that the OWNER determines to be suitable for a specific use.
- J. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes producing a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids. Well-Graded does not define any numerical value that must be placed on the coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.

1.3 SUBMITTALS

- A. Shop Drawings: Manufacturer's descriptive literature for marking tapes.
- B. Samples:
 - 1. Trench stabilization material.
 - 2. Bedding and pipe zone material.
 - 3. Granular drain.
 - 4. Granular backfill.
 - 5. Earth back-fill.
 - 6. Sand(s).
 - 7. Geotextile.
- C. Quality Control Submittals: Catalog and manufacturer's data sheets for compaction equipment.
 - 1. Certified Gradation Analysis: Submit not less than 30 days prior to delivery for imported materials or anticipated use for excavated materials, except for trench stabilization material that will be submitted prior to material delivery to site.
 - 2. Controlled Low Strength Material: Certified mix design and test results. Include material types and weight per cubic yard for each component of mix.

PART 2 PRODUCTS

2.1 MARKING TAPE

- A. Plastic:
 - 1. Inert polyethylene, impervious to known alkalis, acids, chemical reagents, and solvents likely to be encountered in soil.
 - 2. Thickness: Minimum 4 mils.
 - 3. Width: 12 inches.
 - 4. Identifying Lettering: Minimum 1-inch high, permanent black lettering imprinted continuously over entire length.
 - 5. Manufacturers and Products:
 - a. Reef Industries; Terra Tape.
 - b. Allen; Markline.
- B. Metallic:
 - 1. Solid aluminum foil, visible on unprinted side, encased in a protective high visibility, inert polyethylene plastic jacket.
 - 2. Foil Thickness: Minimum 5.5 mils.
 - 3. Width: 12 inches.

4. Identifying Lettering: Minimum 1-inch high, permanent black lettering imprinted continuously over entire length.
 5. Joining Clips: Tin or nickel-coated, furnished by tape manufacturer.
 6. Manufacturers and Products:
 - a. Reef Industries; Terra "D."
 - b. Allen; Detectatape.
- C. Color: In accordance with APWA Uniform Color Code for Temporary Marking of Underground Facilities.

Color ^a	Facility
Red	Electric power lines, cables, and conduit.
Orange	Communicating alarm or signal lines, cables, or conduit.
Green	Sewers, drain, and force main lines.
Blue	Water and irrigation lines.
^a As specified in ANSI Z53.1, Safety Color Code.	

2.2 TRENCH STABILIZATION MATERIAL

A. Base Rock:

1. Clean, hard, durable 3-inch minus crushed rock or gravel, or pit run, free from clay balls, other organic materials, or debris.
2. Uniformly graded from coarse to fine, less than 8 percent by weight passing the 1/4-inch sieve.

B. Granular Backfill:

1. Clean gravel or crushed rock, reasonably well-graded from coarse to fine.
2. Maximum Particle Size: 3/4 inch.
3. Dry sand, accepted by OWNER, may be provided for trenches above maximum groundwater level.

2.3 BEDDING MATERIAL AND PIPE ZONE MATERIAL

A. Unfrozen, friable, and no clay balls, roots, or other organic material.

B. FDOT No. 57 stone.

2.4 EARTH BACKFILL

- A. Soil, loam, or other excavated material suitable for use as backfill.
- B. Free from roots or organic matter, refuse, boulders and material larger than 1/2 cubic foot, or other deleterious materials.

2.5 SOURCE QUALITY CONTROL

- A. Perform Gradation Analysis in Accordance with ASTM C136 for:
 - 1. Earth backfill, including specified class(es).
 - 2. Trench stabilization material.
 - 3. Bedding and pipe zone material.

PART 3 EXECUTION

3.1 TRENCH PREPARATION

- A. Water Control:
 - 1. Promptly remove and dispose of water entering trench as necessary to grade trench bottom and to compact backfill and install manholes, pipe, conduit, direct-buried cable, or duct bank. Do not place concrete, lay pipe, conduit, direct-buried cable, or duct bank in water.
 - 2. Remove water in a manner that minimizes soil erosion from trench sides and bottom.
 - 3. Provide continuous water control until trench backfill is complete.
- B. Remove foreign material and backfill contaminated with foreign material that falls into trench.

3.2 TRENCH BOTTOM

- A. Firm Subgrade: Grade with hand tools, remove loose and disturbed material, and trim off high areas and ridges left by excavating bucket teeth. Allow space for bedding material if shown or specified.
- B. Soft Subgrade: If subgrade is encountered that may require removal to prevent pipe settlement, notify OWNER. OWNER will determine the depth of over excavation, if any, required.

3.3 TRENCH STABILIZATION MATERIAL INSTALLATION

- A. Rebuild trench bottom with trench stabilization material.
- B. Place material over full width of trench in 6-inch lifts to required grade, providing allowance for bedding thickness.
- C. Compact each lift so as to provide a firm, unyielding support for the bedding material prior to placing succeeding lifts.

3.4 BEDDING

- A. Furnish imported bedding material where, in the opinion of the OWNER, excavated material is unsuitable for bedding or insufficient in quantity.
- B. Place over the full width of the prepared trench bottom in two equal lifts when the required depth exceeds 8 inches.
- C. Hand grade and compact each lift to provide a firm, unyielding surface.
- D. Minimum Thickness: As follows:
 - 1. Pipe, 15 Inches and Smaller: 4 inches.
 - 2. Pipe, 18 Inches to 36 Inches: 6 inches.
 - 3. Conduit: 3 inches.
 - 4. Direct-Buried Cable: 3 inches.
- E. Check grade and correct irregularities in bedding material. Loosen top 1 to 2 inches of compacted bedding material with a rake or by other means to provide a cushion before laying each section of pipe, conduit, direct-buried cable, or duct bank.
- F. Install to form continuous and uniform support except at bell holes, if applicable, or minor disturbances resulting from removal of lifting tackle.
- G. Bell or Coupling Holes: Excavate in bedding at each joint to permit proper assembly and inspection of joint and to provide uniform bearing along barrel of pipe or conduit.

3.5 BACKFILL PIPE ZONE

- A. Upper Limit of Pipe Zone shall Not be Less than Following:
 - 1. Pipe: 12 inches, unless shown otherwise.
 - 2. Conduit: 3 inches, unless shown otherwise.
 - 3. Direct-Buried Cable: 3 inches, unless shown otherwise.
- B. Restrain pipe, conduit, cables, and duct banks as necessary to prevent their movement during backfill operations.

- C. Place material simultaneously in lifts on both sides of pipe and, if applicable, between pipes, conduit, cables, and duct banks installed in same trench.
 - 1. Pipes 10 Inches and Smaller Diameter: First lift less than or equal to 1/2 pipe-diameter.
 - 2. Pipes Over 10 Inches Diameter: Maximum 6-inch lifts.
- D. Thoroughly tamp each lift, including area under haunches, with handheld tamping bars supplemented by "walking in" and slicing material under haunches with a shovel to ensure that voids are completely filled before placing each succeeding lift.
- E. After the full depth of the pipe zone material has been placed as specified, compact the material by a minimum of three passes with a vibratory plate compactor only over the area between the sides of the pipe and the trench walls.
- F. Do not use power-driven impact compactors to compact pipe zone material.

3.6 MARKING TAPE INSTALLATION

- A. Continuously install marking tape along centerline of all buried piping, at depth of 2 feet. Coordinate with piping installation drawings.
 - 1. Metallic Marking Tape: Install with nonmetallic piping and waterlines.
 - 2. Plastic Marking Tape: Install with metallic piping.

3.7 BACKFILL ABOVE PIPE ZONE

- A. General:
 - 1. Process excavated material to meet specified gradation requirements.
 - 2. Adjust moisture content as necessary to obtain specified compaction.
 - 3. Do not allow backfill to free fall into the trench or allow heavy, sharp pieces of material to be placed as backfill until after at least 2 feet of backfill has been provided over the top of pipe.
 - 4. Do not use power driven impact type compactors for compaction until at least 4 feet of backfill is placed over top of pipe.
 - 5. Backfill to grade with proper allowances for topsoil, crushed rock surfacing, and pavement thicknesses, wherever applicable.
 - 6. Backfill around structures with same class backfill as specified for adjacent trench unless otherwise shown or specified.
- B. Backfill:
 - 1. Place in lifts not exceeding 9-inch thickness.
 - 2. Mechanically compact each lift to a minimum of 95 percent relative compaction prior to placing succeeding lifts.

C. Class A Backfill:

1. Place in lifts of suitable thickness.
2. Mechanically compact each lift prior to placing succeeding lifts.
3. Determine proper lift thickness, type of compaction equipment, method to use, and amount of compaction necessary to prevent settlement.

3.8 REPLACEMENT OF TOPSOIL

- A. Replace topsoil in top 12 inches of backfilled trench.
- B. Maintain the finished grade of topsoil even with adjacent area and grade as necessary to restore drainage.

3.9 MAINTENANCE OF TRENCH BACKFILL

- A. After each section of trench is backfilled, maintain the surface of the backfilled trench even with the adjacent ground surface until final surface restoration is completed.
- B. Gravel Surfacing Rock: Add gravel surfacing rock where applicable and as necessary to keep the surface of the backfilled trench even with the adjacent ground surface, and grade and compact as necessary to keep the surface of backfilled trenches smooth, free from ruts and potholes, and suitable for normal traffic flow.
- C. Topsoil: Add topsoil where applicable and as necessary to maintain the surface of the backfilled trench level with the adjacent ground surface.
- D. Concrete Pavement: Replace settled slabs as specified in Section 02575, SURFACE RESTORATION.
- E. Asphaltic Pavement: Replace settled areas or fill with asphalt as specified in Section 02575, SURFACE RESTORATION.
- F. Other Areas: Add excavated material where applicable and keep the surface of the backfilled trench level with the adjacent ground surface.

3.10 SETTLEMENT OF BACKFILL

- A. Settlement of trench backfill, or of fill or facilities constructed over trench backfill will be considered a result of defective compaction of trench backfill.

END OF SECTION

SECTION 02367 SHEET PILES

PART 1 GENERAL

1.1 WORK INCLUDED

- A. This Section covers the work necessary for the temporary sheet piles and cells, complete.
- B. The cost of sheet piles will be incidental to wetwell installation.
- C. The installation of wetwells may be accomplished as caissons or as sheet-piled cells.

1.2 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
 - 1. American Society for Testing and Materials (ASTM):
 - a. A36, Structural Steel.
 - b. A183, Carbon Steel Track Bolts and Nuts.
 - c. A123, Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.
 - d. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware (R 1987).
 - e. A307, Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - f. A328, Steel Sheet Piling.
 - g. A572, High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.

1.3 DEFINITIONS

- A. Elevations: Referenced to NAVD 1988.
- B. Obstruction: Sudden and significant increase of penetration resistance and deviation of pile out of tolerance resulting from encountering a subsurface or physical condition.
- C. Practical Refusal: Penetration resistance of at least 120 blows per foot for 3 continuous feet, 200 blows per foot for 1 foot, or 50 blows per inch for 2 consecutive inches, whichever comes first, and to continue driving pile would be impractical. These criteria apply only for hammer sizes and operation as specified.

D. Rated Hammer Energy:

1. Diesel Hammers: Product of rated stroke times ram weight.
2. Air Hammers: Rated energy from manufacturer's literature.

E. Refusal: Zero rate of penetration for 10 seconds during pile driving.

F. Set: Pile penetration in inches per blow.

G. Sweep: Deviation from straightness measured along two perpendicular faces of pile while not subject to bending forces.

H. Termination Penetration Resistance: Penetration resistance exceeding 60 blows per foot at which driving may be terminated.

1.4 SUBMITTALS

A. Administrative Submittals: Pile driving schedule.

B. Shop Drawings: Indicate tie rods and accessories, number of piles required, fabricated corners, and detail dimensions.

C. Quality Control Submittals:

1. Manufacturer's product data prior to ordering piles.
2. Written sequence of setting and driving operation
3. Drilling: Manufacturer's literature on equipment and operation procedures.
4. Hammers: Manufacturer's specifications and catalog information. Show data necessary for computing bearing value of piles driven.
5. Installer qualifications.

D. If installed as sheet-piled cells, submit revised wet well sections including anti-flotation calculations proposed by a Florida Professional OWNER.

1.5 QUALIFICATIONS

A. Piling Installer: Minimum of 5 years of past successful experience on 10 projects of sheet pile installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Sheet Piles: Lift and handle so that maximum bending stresses shall not exceed 22,500 pounds per square inch.

1.7 SPECIAL TOOLS

A. Tool checking interlock dimensions.

PART 2 PRODUCTS**2.1 SHEET PILES**

- A. Minimum size and wall thickness shown manufactured to ASTM A572, Grade 50.
- B. Sections: Continuously interlocking type, structural characteristics as follows:

Section Designation	Nominal Web Thickness/In.	Weight Per SF-Pounds	Sect. Modulus Per LF/Cu.In.
PZ38	3/8 by 1/2	38.0	46.8
PZ32	3/8 by 1/2	32.0	38.3
PZ27	3/8	27.0	30.2
PDA27	3/8	27.0	10.7
PMA22	3/8	22.0	5.4
PSA23	3/8	23.0	2.4
PSA28	1/2	28.0	2.5
PS28	3/8	28.0	1.9
PS32	1/2	32.0	1.9
PSX32	29/64	32.0	2.4

- C. Section Modulus: Base on individual whole piece, not dependent on the interlock friction between pile sections to secure the required section modulus.
- D. Pulling (Handling) Holes: Manufacturer's standard, additional will not be allowed.
- E. Tolerances: Weight per square foot may not vary by more than 2-1/2 percent over or under that specified.

2.2 ACCESSORIES

- A. Tie Rod Assembly: Adjust spacing, size, plate dimensions, and length of tie rods if piling sections are of different proportions.
1. Tie Rods:
 - a. Fabricated Steel: ASTM A36, upset ends, threaded American Standard Free Fit, Class 2.
 - b. Coat with grease and wrap for protection from rust and physical damage while in transit.

2. Turnbuckles:
 - a. Forged steel with American Standard Class 2 fit threads, take up, and other dimensions as shown in American Institute of Steel Construction, Manual of Steel Construction.
 - b. Finished, with parts properly shaped and free from fins, cracks, flaws, seams, and other injurious defects.
 - c. Screw Threads: True to form, clean cut, and free from injurious defects.
 - d. Nuts: Standard hexagon, American Standard Class 2 fit threads.
- B. Steel Shapes, Plates, Bars, and Washers:
 1. General: ASTM A36, provide cut washers for each bolt head and nut.
 2. Bolts: ASTM A307, of length to finish $\frac{1}{4}$ -inch outside the nut and have additional thread to retighten.
 3. Hardware: Hot-dip galvanize, ASTM A123.

PART 3 EXECUTION

3.1 DRIVING EQUIPMENT

- A. Air or Steam Hammer: Minimum manufacturers' rated capacity of 24,000 foot-pounds of energy per blow.
 1. Pressure Gauge: Locate near hammer for measuring air or steam pressure.
- B. Diesel Hammers:
 1. Ram Weight: Not less than 3,600 pounds.
 2. Energy Developed: Exceed 13,000 foot-pounds per blow.
- C. Sonic Hammers: Use of adequate size and type. Demonstrate capability prior to approval for pile driving.
- D. Drop Hammer or Combination of Water Jets and Hammer:
 1. Drop Hammers:
 - a. Weight:
 - 1) Piles 50 Feet Long or Less: Minimum 3,000 pounds.
 - 2) Piles Over 50 Feet Long: Minimum 4,000 pounds.
 - b. Drop Height: Maximum 10 feet.
 - c. Hammer Head: Certified, weight stamped.

3.2 PILE LENGTHS

- A. Lengths shown are those required below cutoff as shown on the Shop Drawings. Furnish sheet piling with sufficient extra length to provide for fresh heading and to reach from the cutoff elevation up to position of driving equipment.

3.3 DRIVING GUIDES

- A. Position sheet piles using temporary guide wales support and anchor guide wales to form rigid structures during the sheet pile setting and driving operation.
- B. Guide Wales: Stationary (not moveable) with fluctuating water stage.

3.4 SETTING

- A. Clean pile, inspect for defects and proper interlock dimensions.
- B. Allow pile sufficient clearance in the interlocks to slide, under its own weight, in the interlock of the sheet pile previously placed until the top of existing ground is reached by the tip of the sliding pile. Do not use vibratory or drive hammer to force the interlocking of piles.

3.5 DRIVING

- A. Before driving is started, check sheet piles for position and alignment. Locate pile top within 2 inches of location shown.
- B. Drive sheet piles to the tip elevations shown. Drive down piles which are raised during the process of driving adjacent piles.
- C. If refusal is reached before driving to the specified tip elevation, an impact hammer or controlled jetting may be used. Perform jetting on both sides of sheet pile simultaneously with driving.
- D. Remove and replace sheet pile driven out of interlock.
- E. Driving Tolerances:
 - 1. Not more than 1/8 inch per foot from the vertical in all directions. Furnish plumb line or other device for checking vertical alignment.
 - 2. Not more than 1 percent from vertical or 2 percent from batter shown.

3.6 PILE CUTOFF

- A. Cut square at required elevation with tools that will not damage area below cut surface.
- B. Tolerance: Plus or minus 1/2 inch.

3.7 CUTTING AND SPLICING PILES

- A. Extend to required grade by welding on additional full-length piles driven below grade, and piles with damaged heads which have been cut off to permit further driving.
- B. Pile Splicing: Butt weld, making full penetration of the web. Piles adjoining spliced piles shall be full length piles.

3.8 WALES AND CAPS

- A. After driving sheet piling, install channel wales. Bolt splices in wales with field bolts. Set wales horizontal.
- B. Installation:
 - 1. Weld Splices using a single bevel butt joint, welded on one side on backing structure.
 - 2. Space wales within 1/4 inch for welded splices. Fabricate accessories by welding or as otherwise shown.

3.9 TIE ROD ASSEMBLIES

- A. Installation:
 - 1. Hand backfill tie rods to 6-inch depth above rods.
 - 2. Support tie rods in straight line from bulkhead to anchor wall.
 - 3. Maintain tie rod support until such time as rod is tensioned.
- B. Use sandfill or wood cribbing to maintain tie rod alignment.
- C. Tension tie rods with turnbuckles in OWNER's presence. Lubricate turnbuckles with graphite prior to tensioning.

3.10 TIE ROD HOLES

- A. Neatly cut through sheet piles by mechanical means. Flame cutting shall not be used.
- B. Spacing may vary up to 4 inches to avoid cutting sheet pile interlocks.
- C. Variations in Spacing: Prevent an accumulative variation of more than 4 inches.

3.11 SITE RESTORATION

- A. Sheet piling, if used, shall be removed at the completion of construction by the Contractor.

END OF SECTION

SECTION 02380 CAISSONS (WET WELLS)

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Submit procedure for installation of wet wells as a caisson.
- B. The installation of wet wells may be accomplished as caissons or sheet-piled cells.

PART 2 - PRODUCTS

2.01 BENTONITE

- A. Commercially processed powdered and expanding type.
- B. Manufacturers and Products:
 - 1. American Colloid Co.; Volclay.
 - 2. National Lead Co.; National Bentonite.

2.02 WATER FOR BENTONITE SLURRY

- A. Water shall be of drinking water quality.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Excavate within open wet well and remove excavated material without damaging wet well walls.
- B. Sink wet well to final depth by excavating material from within wet well under atmospheric pressure.
- C. Control rate and location of removed excavated materials to prevent undue stress or damage to open wet well as it settles.
- D. Align walls to within 1 percent from plumb.

- E. Either sink entire shell as a caisson, or excavate for initial section prior to sinking lower sections as a caisson. If excavation method is used for initial caisson section, provide sheeting and accomplish dewatering to permit placement of concrete.

3.02 REMOVAL OF WATER

- A. Provide and operate equipment adequate to keep the excavation for the pump station, structures, and trenches free of water. Remove water during periods when pipe is being laid, during the placing of backfill, and at all other times as required for safe and efficient construction. Place tremie concrete if necessary to reduce the dewatering volume. After the concrete plug has been poured in the caisson, do not remove water from inside caisson until the plug has obtained its 28-day strength. Avoid settlement or damage to adjacent property. Dispose of the water in a manner that will not damage adjacent property or cause siltation in the adjacent waterways and wetland areas. Do not dispose of dewatering effluent in planted or sodded areas.

END OF SECTION

SECTION 02521 FLOWABLE FILL

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies the requirements for flowable fill used for trenches, support for pipe structures, culverts, utility cuts and other works where cavities exist and where firm support is needed for pavements and structural elements. Flowable fill may also be used to fill water pipes that need to be abandoned in place and at other locations approved by the OWNER.

1.02 REFERENCE SPECIFICATIONS

- A. Section 01001 – General Requirements
- B. Section 01092 - Abbreviations
- C. Section 01300 - Submittals
- D. Section 02225 - Trench and Backfill

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The materials used shall conform with the requirements specified in Division III of the FDOT Standard Specifications for Road and Bridge Construction, latest edition and the supplements thereto. Specific reference are as follows:
- | | | |
|----|--|-------------|
| 1. | Portland Cement (Type I, II or III) | Section 921 |
| 2. | Fly Ash, Slag and other Pozzolanic materials | |
| | For Portland Cement Concrete | Section 929 |
| 3. | Fine Aggregate (Sand)* | Section 902 |
| 4. | Water | Section 923 |

*Any clean sand with 100% passing 3/8" sieve and not more than 10% passing with 200 mesh may be used.

2.02 MIX PROPORTIONS

- A. The CONTRACTOR shall be responsible for producing a flowable mixture using these guidelines and by adjusting his mixture design as called for by circumstances or as may be directed by the OWNER.
- B. Flowable fill material shall be proportioned to produce a 28-day compressive strength of a minimum of 100 psi.
- C. General mix quantities are as follows:

<u>Components</u>	<u>Pounds per Cubic Yard</u>
Cement	50-100*
Fly Ash or Granulated	
Blast Furnace Slag	0-600
Fine Sand	2,750
	(Adjust to yield one cubic yard of flowable fill)
Water	500 (Max.)

*The percentage of cement may be increased above these limits only when early strength is required and future removal is unlikely.

- D. Weights for fine aggregates and water shall be adjusted for removability, pumpability and flowability. If required, strength test data shall be provided prior to batching.
- E. If required by the OWNER, the flowability can be measured by afflux time determined in accordance with ASTM C 939 and shall be 30 seconds +/- 5 seconds as measured on mortar passing the No. 4 sieve. The equipment required to perform this test shall be provided by the CONTRACTOR.

PART 3 - EXECUTION

3.01 PRODUCTION AND PLACING

- A. Flowable fill shall be produced and delivered using ready mix concrete trucks and placed easily by chute in a flowable condition directly into the cavity to be filled or into a pump for final placement.
- B. The flowable fill shall be placed to the designated fill line without vibration or other means of compaction. Placement shall be avoided during inclement weather, e.g. rain. The CONTRACTOR shall take all necessary precautions to prevent any damages caused by hydraulic pressure of the fill during placement.

prior to hardening. Also, necessary means to confine the material within the designated space shall be provided by the CONTRACTOR.

3.02 ACCEPTANCE

- A. The flowable shall be proportioned and placed as specified herein. In general, the strength desired is the maximum hardness that can be excavated at a later date using conventional excavation equipment. No curing protection is required.
- B. The fill shall be left undisturbed until material obtains sufficient strength. Sufficient strength is 250 psi penetration resistance as measured using a hand-held penetrometer. The penetrometer shall be provided by the CONTRACTOR.
- C. All flowable fill areas subject to traffic loads must have a durable riding surface.
- D. An approved type of accelerator may be approved for the placement of "Flowable Fill" in traffic areas when submitted to the OWNER. Depending on the condition of the cavity, paving can begin from 8-24 hours after placement.

END OF SECTION

SECTION 02570

MILLING OF EXISTING ASPHALT PAVEMENT

PART 1 - GENERAL

1.10 SCOPE

- A. The work specified in this Section consists of removing existing asphaltic concrete pavement by milling to improve the rideability of the finished pavement, to lower the finished grade adjacent to existing curb prior to resurfacing, or to completely remove existing pavement.
- B. When milling to improve rideability, an average depth of cut will be specified in the plans.
- C. Unless otherwise specified, the milled material becomes the property of the CONTRACTOR.

1.02 REFERENCES

- A. FDOT Standard Specifications for Road and Bridge Construction (Latest Edition), and the supplements thereto.

PART 2 - EQUIPMENT

2.01 MILLING MACHINE

- A. The milling machine shall be capable of maintaining a depth of cut and cross slope that will achieve the results specified in the plans and specifications. The overall length of the machine (out to out measurement excluding the conveyor) shall be a minimum of 18 feet. The minimum cutting width shall be six feet.
- B. The milling machine shall be equipped with a built-in automatic grade control system that can control the transverse slope and the longitudinal profile to produce the specified results.
- C. Any commercially manufactured milling machine meeting the above requirements will be approved to start the project. If it becomes evident after milling has started that the milling machine cannot consistently produce the specified results, the milling machine will be rejected for further use.
- D. When milling to lower the grade adjacent to existing curb or other areas where it impractical to use the above described equipment, the use of a smaller milling machine will be permitted.

- E. The milling machine shall be equipped with means to effectively limit the amount of dust escaping the removal operation. For complete pavement removal, the use of alternate removal and crushing equipment, in lieu of the equipment specified above, may be approved by the OWNER.

PART 3 - EXECUTION

3.01 CONSTRUCTION

- A. When milling to improve rideability, the existing pavement shall be removed to the average depth specified in the plans, in a manner that will restore the pavement surface to a uniform cross section and longitudinal profile. The Project OWNER may require the use of a stringline to ensure maintaining the proper alignment.
- B. The contractor may elect to make multiple cuts to achieve the required pavement configuration or depth of cut.
- C. The milling machine shall be operated to effectively minimize the amount of dust being emitted from the machine. Prewetting of the pavement may be required.
- D. If traffic is to be maintained on the milled surface prior to the placement of the new asphaltic concrete, the pattern of striations shall be such as to produce an acceptable riding surface.
- E. Prior to opening an area which has been milled to traffic, the pavement shall be thoroughly swept with a power broom or other approved equipment to remove to the greatest extent practicable, fine material which will dust under traffic. This operation shall be conducted in a manner so as to minimize the potential for creation of a traffic hazard and to minimize air pollution.
- F. Sweeping of the milled surface with a power broom will be required prior to placing asphaltic concrete.
- G. In urban and other sensitive areas where dust would cause a serious problem, the CONTRACTOR shall use a street sweeper (using water) or other equipment capable of removing and controlling dust. Approval of the use of such equipment is contingent upon its demonstrated ability to do the work.
- H. To prevent, to the greatest extent practicable, the infiltration of milled material into the storm sewer system when the milling operation is within the limits of and adjacent to a municipal curb and gutter or a closed drainage system, the sweeping operation shall be performed immediately after the milling operations or as directly by the OWNER.

**SECTION 02575
SURFACE RESTORATION**

PART 1 GENERAL

1.1 WORK INCLUDED

- A. This Section covers the work necessary to replace all pavement, curbs, sidewalks, drainage facilities, and other features damaged either directly or indirectly by the operations incidental to the construction, complete.

PART 2 PRODUCTS

2.1 ROCK FOR SURFACING AND BASE

- A. Limerock quality and gradation shall conform to Section 911 of the FDOT Standard Specifications.
- B. Submit proof in the form of test results from a commercial testing laboratory or other evidence satisfactory to the OWNER to show that the materials meet the quality and gradation requirements.

2.2 ASPHALT CONCRETE

- A. Asphalt concrete mix conforming to the FDOT Standard Specifications, Type S-3.
- B. Crushed Glass Paving Mix as Follows:
 - 1. The amount of crushed glass in the asphalt mixture shall not exceed 15 percent (by weight of the total aggregates).
 - 2. The crushed glass shall be processed to have 100 percent passing the 3/8-inch sieve and no more than 8 percent passing the No. 200 sieve.
 - 3. Asphalt mixtures containing crushed glass shall contain an anti-stripping additive which can be demonstrated to satisfactorily improve the moisture damage resistance of the mixture.

2.3 ASPHALT PRIME

- A. Liquid asphalt for use as a prime coat under asphalt concrete shall be RC-70 or MC-70 liquid asphalt conforming to AASHTO M 81 or M 82.

2.4 CONCRETE

- A. Concrete for curbs, sidewalks, pavement, and miscellaneous construction shall conform to ASTM C94, Alternate 3; and shall have a design mix proportioned for 3,000 pounds per square inch compressive strength at 28 days. Concrete mix shall contain no less than 5-1/2 sacks of cement per cubic yard.
 - 1. Concrete Forms: All forms for curbs and sidewalks shall be either 2-inch dimensioned lumber, plywood, or metal forms. Forms on the face of the curb shall have no horizontal form joints within 7 inches of the top of the curb.
 - 2. Curing Compound: Commercial grade conforming to ASTM C309, Type I.
 - 3. Reinforcing Steel: Conform to ASTM A615, Grade 60.

2.5 PIPE FOR STORM SEWER AND CULVERT REPLACEMENT

- A. Pipe 15 inches and under shall be Class 2, conforming to ASTM C14. Pipe 18 inches and over shall conform to ASTM C76, Class III.

PART 3 EXECUTION

3.1 CONSTRUCTION PROCEDURE

- A. The OWNER reserves the right to vary the classes of backfill and the type of resurfacing as best serves the interest of the OWNER. Backfill shall be as specified in Section 02220, FILL AND BACKFILL.
- B. Replace all bituminous pavement damaged under this Contract with asphalt concrete regardless of original type.
- C. Replace concrete pavement with concrete pavement to match original.
- D. In addition to the requirements set forth herein, the work shall conform to the applicable workmanship requirements of the state highway or municipal specifications.

3.2 REMOVAL OF PAVEMENT, SIDEWALK, CURBS, AND GUTTERS

- A. Removal of all pavement, sidewalks, curbs, and gutters shall conform to Section 02205, EXCAVATION, and Section 02100, SITE PREPARATION, and payment for removal shall be included in that Section.

3.3 STREET MAINTENANCE

- A. Maintain all trenches as specified under Section 02660, PRESSURE PIPING.

3.4 ASPHALT CONCRETE PAVEMENT REPLACEMENT AND OVERLAY

A. Subgrade:

1. Bring the trench to a smooth, even grade at the correct distance below the top of the existing pavement surface so as to provide adequate space for the base and course and pavement. Sawcut existing pavement to a straight line to remove any pavement which has been damaged or which is broken and unsound to provide a smooth, sound edge for joining the new pavement.
2. Compact the subgrade with mechanical vibratory or impact tampers to 98 percent relative density. Determine the amount and method of compaction necessary to prevent subsequent settlement. Any subsequent settlement of the finished surfacing during the warranty period shall be promptly repaired by the CONTRACTOR, at the CONTRACTOR's sole expense.

B. Base Course:

1. Place sufficient base course on the subgrade to obtain the thickness shown on the Drawings after compaction. Place for the full width of the trench and process as required to provide a smooth surface without segregation.
2. Compact the base course to 98 percent of the maximum relative density with approved mechanical vibrating or impact tampers.
3. Determine the amount and method of compaction necessary to prevent subsequent settlement. Any subsequent settlement of the finished surfacing during the warranty period shall be promptly repaired by the CONTRACTOR, at this CONTRACTOR's sole expense.
4. Place base course under all pavement to be replaced and, in addition, under gravel surfaced shoulders and other graveled areas.

C. Leveling Course:

1. Place sufficient leveling course material to obtain the thickness shown on the Drawings after compaction, and for proper matching with the adjacent existing pavement. Place the leveling course for the full width of the trench where pavement was disturbed, including bituminous surfaced shoulders.
2. Compact the leveling course with mechanical vibratory or impact tampers. Determine the amount and method of compaction necessary to prevent subsequent settlement. Any subsequent settlement of the finished surfacing during the warranty period shall be promptly repaired by the CONTRACTOR, at the CONTRACTOR's sole expense.

- D. Prime Coat: After the leveling course has been compacted, apply an asphalt prime coat, specified above, at 0.25 to 0.45 gallon per square yard to the surface of the leveling course and to the edges of the existing pavement.
- E. Asphalt Concrete:
 - 1. Place the asphalt concrete on the prepared subgrade over the trench and on overlay areas to a depth of not less than 1-1/2 inches. Place asphalt concrete after the prime coat has set. If the thickness is greater than 6 inches, place the surfacing in two lifts. Spread and level the asphalt concrete with hand tools or by use of a mechanical spreader, depending upon the area to be paved. Bring the asphalt concrete to the proper grade and compact by rolling or the use of hand tampers where rolling is impossible or impractical.
 - 2. Roll with power rollers capable of providing compression of 200 to 300 pounds per linear inch. Begin the rolling from the outside edge of the replacement progressing toward the existing surfacing, lapping the existing surface at least 1/2 the width of the roller. If existing surfacing bounds both edges of the replacement, begin rolling at the edges of the replacement, lapping the existing surface at least 1/2 the width of the roller, and progress toward the center of the replacement area. Overlap each preceding track by at least 1/2 the width of the roller and make sufficient passes over the entire area to remove all roller marks and to produce the desired result, as determined by the OWNER.

3.5 WEATHER CONDITIONS

- A. Asphalt shall not be applied to wet material. Asphalt shall not be applied during rainfall or any imminent storms that might adversely affect the construction. The OWNER will determine when surfaces and material are dry enough to proceed with construction. Asphalt concrete shall not be placed (1) when the atmospheric temperature is lower than 40 degrees F, (2) during heavy rainfall, or (3) when the surface upon which it is to be placed is wet. Exceptions will be permitted only in special cases and only with prior written approval of the OWNER.

3.6 PROTECTION OF STRUCTURES

- A. Provide whatever protective coverings may be necessary to protect the exposed portions of bridges, culverts, curbs, gutters, posts, guard fences, road signs, and any other structures from splashing oil and asphalt from the paving operations. Remove any oil, asphalt, dirt, or any other undesirable matter that may come upon these structures by reason of the paving operations.

- B. Where water valve boxes, manholes, catch basins, or other underground utility appurtenances are within the area to be surfaced, the resurfacing shall be level with the top of the existing finished elevation of these facilities. If it is evident that these facilities are not in accordance with the proposed finished surface, notify the OWNER to have the proper authority contacted in order to have the facility altered before proceeding with the resurfacing around the obstruction. Consider any delays experienced from such obstructions as incidental to the paving operation. No additional payment will be made. Protect all covers during asphalt application.

3.7 EXCESS MATERIALS

- A. Legally dispose of all excess materials. Make arrangements for the disposal and bear all costs or retain any profit incidental to such disposal.

3.8 CONTRACTOR'S RESPONSIBILITY

- A. Settlement of replaced pavement over trenches within the warranty period shall be considered the result of improper or inadequate compaction of the subbase or base materials. The CONTRACTOR shall promptly repair all pavement deficiencies noted during the warranty period at the CONTRACTOR's sole expense.

3.9 CONCRETE PAVEMENT

- A. Pavement replaced shall be the same thickness as that removed, except that in no instance shall it be less than a minimum of 6 inches. Protect the newly placed concrete from traffic for a period of 7 days and cure by covering with burlap, sand, earth, or sawdust, which is kept continuously wet.
- B. Handle and place concrete pavement in accordance with the Standard Specifications.

3.10 SIDEWALKS AND CURBS

- A. Replace concrete sidewalks and curbs to the same section width, depth, line, and grade as that removed or damaged. Cut ends of existing curb to a vertical plane. Prior to replacing the sections, properly backfill and compact the trench to prevent subsequent settlement.
- B. Cut ends of existing curbs to a vertical plane. Construct forms to match existing. Place concrete and finish exposed surfaces similar to adjacent curb.

- C. Replace concrete sidewalks between scored joints and make replacement in a manner that will avoid a patched appearance. Provide a minimum 2-inch thick compacted leveling course of clean $\frac{3}{4}$ -inch minus crushed rock or gravel of quality hereinbefore specified. Finish concrete surface similar to the adjacent sidewalks. Score joints and finish edges with a steel edging tool.
- D. Tunneling under curbs and sidewalks is optional. However, should any subsequent cracking, subsidence, or any other indication of failure occur within the warranty period, the damaged section shall promptly be replaced at the CONTRACTOR's sole expense.

3.11 STORM SEWERS, CULVERTS, AND CATCH BASINS

- A. All storm sewers, catch basins, or culverts that are removed because of interference with the new construction shall be removed so as to do the least possible damage to the pipe or basin. Dispose of culvert pipe that is in too poor condition for replacement because of age, physical condition, or other reasons and install suitable pipe furnished by the OWNER.
- B. Replace all pipe to the lines and grades established by the OWNER. Pipe 15 inches and smaller shall be laid on a minimum 4-inch thick gravel base conforming to leveling or surfacing course under rock for surfacing and base, this section. Use a minimum 6-inch thick gravel base under pipe 18 inches and larger.
- C. Replace culvert headwalls of all types to a condition at least equivalent to their original shape or form.
- D. Reinstall catch basins in their original locations and reconnect to the drainage system in a manner equal to the original. If the existing catch basins are damaged beyond repair by the operations, construct new basins of similar size, cross section, and design as the original at the CONTRACTOR's sole expense.

END OF SECTION

SECTION 02580 PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The work included in this Section consists of applying pavement markings as required to restore disturbed pavement areas. CONTRACTOR is responsible for providing temporary painted striping during curing period of asphalt, and between asphalt lifts. CONTRACTOR shall provide permanent thermoplastic pavement markings.

1.02 RELATED REFERENCES

- A. All markings shall conform to the requirements of the Manual of Uniform Traffic Control Devices, and FDOT Roadway and Traffic Design Standards, latest editions and supplements thereto.
- B. Thermoplastic shall conform to the requirements of the FDOT Standard Specifications for Road and Bridge Construction (Section 711) latest edition and supplements thereto.

PART 2 - PRODUCTS

2.01 THERMOPLASTIC

- A. All final permanent markings to be Alkyd thermoplastic only.

2.02 TEMPORARY MARKINGS

- A. Temporary markings on final asphalt shall be only for backed construction tape. Lower asphalt lifts may be marked with paint or any other approved marking material.

2.03 REFLECTIVE PAVEMENT MARKERS (RPM'S)

- A. RPM'S shall meet FDOT Class B Specifications, and shall be installed per drawing details.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Thermoplastic shall not be installed on roadway until five (5) calendar days after final lift of asphalt has been completed, with the exception of friction course which shall be thirty (30) days.
- B. If existing marking material is not compatible with Alkyd thermosplastic, it shall be removed prior to installation of new markings.

END OF SECTION

SECTION 02660
PRESSURE PIPING

PART 1 GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this Section and any supplemental Data Sheets:
1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. Standard Specifications for Highway Bridges.
 2. American National Standards Institute (ANSI):
 - a. B1.20.1, Pipe Threads General Purpose.
 - b. B16.5, Pipe Flanges and Flanged Fittings.
 - c. B16.11, Forged Fittings, Socket-Welding and Threaded.
 - d. B16.25, Butt Welding Ends.
 3. American National Standards Institute/American Water Works Association (ANSI/AWWA): C111/A21.11, Rubber Gasket Joints for Cast Iron Pressure Pipe and Ductile Iron Pressure Pipe and Fittings.
 4. American Society for Testing and Materials (ASTM):
 - a. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware (R1987).
 - b. A182/A182M, Standard Specification for Forged or Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and for High-Temperature Service.
 - c. A194, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
 - d. A240, Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels.
 - e. A320/A320M, Standard Specifications for Alloy Steel Bolting Materials for Low-Temperature Service.
 - f. A497, Rev B, Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - g. A615/A615M Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - h. A778, Rev A, Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products.
 - i. C94, Standard Specification for Ready-Mixed Concrete.
 - j. C150, Standard Specification for Portland Cement.

5. American Water Works Association (AWWA):
 - a. C111/A21.11, Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
 - b. C205, Cement-Mortar Protective Lining and Coating for Steel Water Pipe-4-inch and Larger-Shop Applied.
 - c. C206, Field Welding of Steel Water Pipe.
 - d. C651, Disinfecting Water Mains.
6. MSS-SP43, Wrought Stainless Steel Butt-Welding Fittings Including Reference to Other Corrosion Resistant Materials.

1.2 DEFINITIONS

- A. Buried Piping: Underground in trenches and backfilled.
- B. Encased Piping: Encased in concrete underground and backfilled.
- C. Embedded Piping: Embedded in the walls or slabs of concrete structures.
- D. Exposed Piping:
 1. Aboveground.
 2. Inside structures including vaults, and wetwells.

1.3 SUBMITTALS

- A. Shop Drawings:
 1. Thrust Restraint for Restrained Joints: Details including materials, sizes, assembly ratings, and pipe attachment methods.
 2. Thrust Blocks: Concrete quantity, bearing area on pipe, and fitting joint locations.
 3. Dissimilar Buried Pipe Joints: Joint types and assembly drawings.
- B. Quality Control Submittals:
 1. Manufacturer's Certification of Compliance:
 - a. Pipe and fittings.
 - b. Factory applied linings and coatings.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. In accordance with Section 01600, MATERIAL AND EQUIPMENT, and:
 1. Flanges: Securely attach metal, hardboard, or wood protectors over entire gasket surface.
 2. Threaded or Socket Welding Ends: Fit with metal, wood, or plastic plugs or caps.

3. Cement Linings and Coatings: AWWA C205, Section 6. Pipe ends shall be tightly closed with a 10-mil polyethylene plastic wrap for protection of the cement-mortar lining during shipment. Keep plastic wrap on the pipe until the time of installation.
4. Interior Bracing: Leave in place until pipe zone material has been placed and completely compacted.
5. Handling: Use heavy canvas or nylon slings to lift pipe and fittings.
6. Rubber Gaskets:
 - a. Store in a cool, well-ventilated area.
 - b. Do not expose to the direct rays of the sun.
 - c. Do not allow contact with oils, fuels, or petroleum solvents.

PART 2 PRODUCTS

2.1 PIPING

- A. As shown on the Drawings.
- B. Diameters Shown:
 1. Standardized Products: Nominal size.
- C. Identification Marking: Mark with nontoxic paint on each end both inside and outside the pipe. The minimum size of the lettering shall be 4 inches. The number marking on each spool shall correspond to the Shop Drawings.

2.2 JOINTS

- A. Flanged Joints:
 1. Flat-faced ductile iron flanges when mating with flat-faced cast or ductile iron flanges.
 2. Higher pressure rated flanges as required to mate with equipment when equipment flange is of higher-pressure rating than required for piping.
- B. Thrust Tie Assemblies:
 1. Tie-rod attachments relying on clamp friction with pipe barrel to restrain thrust are unacceptable.
 2. Anchoring of retainer glands or thrust ties with set screws is unacceptable.
- C. Mechanical Joint Anchor Gland Follower:
 1. Ductile iron anchor type, wedge action, with breakoff tightening bolts.
 2. Manufacturer and Product: EBAA Iron Inc.; Megalug Series 1100.

2.3 COUPLINGS

A. Steel Middle Rings and Followers:

1. Fusion bonded epoxy-lined and coated in accordance with Section 09900, PAINTING AND PROTECTIVE COATINGS, System No. 19.
2. Pressure tested beyond yield point, for pressure piping.

B. Flexible Couplings:

1. Manufacturers and Products:
 - a. Ductile Iron Pipe:
 - 1) Dresser; Style 153.
 - 2) Smith-Blair; Style 411.

C. Transition Couplings:

1. Manufacturers and Products:
 - a. Dresser; Style 162.
 - b. Smith-Blair; Style 413.

D. Flanged Coupling Adapters:

1. Manufacturers and Products:
 - a. Ductile Iron Pipe:
 - 1) Smith-Blair; Series 912.
 - 2) Dresser Industries, Inc.; Style 127.

E. Bolting:

1. Concrete-Encased Installations: Zinc-plated nuts and bolts; however, high-strength, low-alloy steel, in accordance with AWWA C111/A21.11, may be substituted for use on cast iron and ductile iron couplings.
2. Exposed: Type 304 stainless steel as specified in Section 02660-01, DATA SHEET-LINED DUCTILE IRON PIPE AND FITTINGS.
3. Buried and Submerged Installations: Provide Type 316 stainless steel bolts and nuts.

2.4 SERVICE SADDLES

A. Double-Strap Iron (for Tapping Ferrous Metal Pipe):

1. Pressure Rating: Capable of withstanding 150 psi (minimum) internal pressure without leakage or over stressing.
2. Run Diameter: Compatible with the outside diameter of the pipe on which the saddle is installed.

3. Taps: Iron pipe threads.
4. Materials:
 - a. Body: Malleable or ductile iron.
 - b. Straps: Type 316 stainless steel.
 - c. Hex Nuts and Washers: Type 316 stainless steel.
 - d. Seal: Rubber.
5. Manufacturers and Products:
 - a. Smith-Blair; Series 313 or 366.
 - b. Dresser; Style 91.

B. Nylon-Coated Iron (for Tapping Nonmetallic and Stainless-Steel Pipe):

1. Pressure Rating: Capable of withstanding 150 psi (minimum) internal pressure without leakage or over stressing.
2. Run Diameter: Compatible with the outside diameter of the pipe on which the saddle is installed.
3. Materials:
 - a. Body: Nylon-coated iron.
 - b. Seal: Buna-N.
 - c. Clamps and Nuts: Type 316 stainless steel.
4. Manufacturer and Product:
 - a. Smith-Blair; Style 315 or 317.

2.5 TAPPING SLEEVES - TYPE A

- A. Use when tapping cast iron pipe.
- B. Gray or ductile iron body, high strength low alloy steel bolts and nuts per AWWA C111, rubber gaskets.
- C. Manufacturers:
 1. American-Darling/American Flow Control 1004 Series.
 2. M&H; Style 751-01.

2.6 TAPPING SLEEVES - TYPE B

- A. Use when tapping existing ferrous metal, nonmetallic and stainless-steel piping where a threaded outlet is required.
- B. Type 304 stainless steel body, bolts, and fasteners, threaded outlet, gasket suitable for intended service.

C. Manufacturers:

1. JCM Industries, Model 438.
2. Smith-Blair.
3. Dresser Industries.

2.7 TAPPING SLEEVES-TYPE C

- A. Use when tapping existing ferrous metal, nonmetallic, and stainless-steel piping where a flange outlet is required.
- B. Type 304 stainless steel body, bolts, and fasteners, flange drilled 150 psi ANSI standard, gasket suitable for intended service.
- C. Manufacturers:
1. JCM Industries, Model 432/452.
 2. Smith-Blair.
 3. Dresser Industries.

2.8 ANCILLARY MATERIALS

- A. Gasket Lubricant: As supplied by pipe manufacturer; no substitute or "or-equal" will be allowed.

2.9 CONCRETE FOR THRUST BLOCKS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 deformed bars.
- B. Welded Wire Fabric: ASTM A497 Rev B.
- C. Formwork: Plywood; earth cuts may be used.
- D. Mix: ASTM C94, Option A.
1. Cement: ASTM C150, Type II.
 2. Coarse Aggregate Size: 3/4 inch.
 3. Design for Minimum Compressive Strength at 28 Days: 3,000 psi.

2.10 VENT AND DRAIN VALVES

- A. Valve Type:
1. As shown and as specified in Section 15100, VALVES AND OPERATORS.
 2. Valve type shall be Type 300.

2.11 SLAB, FLOOR, WALL, AND ROOF PENETRATIONS

A. Ductile Iron Wall Pipe for Valve Vault Penetrations:

1. Diameter and Ends: Same as connecting ductile iron pipe.
2. Thickness: Equal to or greater than remainder of pipe in line.
3. Fittings: In accordance with the applicable Data Sheet.
4. Provide taps for stud bolts in flanges set flush with wall face.
5. Seep Ring:
 - a. Provide for wall pipes to prevent water seepage.
 - b. Material and Construction:
 - 1) Ductile iron cast integral with wall pipe wherever possible.
 - 2) Fabricate by welded attachment of ductile iron seep ring to pipe where casting impossible.
 - a) Perform in pipe manufacturer's shop by qualified welders as specified herein.
 - b) Welds: Electric arc welds of ductile iron with NI-55 or FC-55, nickel-iron-carbon weld rod.
 - c) Continuously weld on each side all around.
6. Manufacturer: American Cast Iron Pipe Co.

B. Stainless Steel Wall Pipe for Wetwell Penetrations:

Item	Size	Description
Pipe	3 inches through 6 inches 8 inches and larger	Schedule 10S: ASTM A778 Rev A "as-welded" grade, Type 304L. Schedule 5S: ASTM A778 Rev A "as-welded" grade, Type 304L.
Flanges	All	Grade WCA, drilled, ANSI B16.5 Class 150 Van Stone Type with stainless steel stub ends, ASTM A240 Type 316L "as-welded grade," conforming to MSS-SP43, wall thickness same as pipe.
Bolting	All	Type 316 stainless steel, ASTM A320/A320M Grade B8M hex head bolts and ASTM A194/A194M Grade 8M hex head nuts.

- C. Pipe Sleeves: Fabricate of 3/16-inch minimum thickness steel pipe.
1. Above grade in Non-submerged Areas: ASTM A153 hot-dip galvanized after fabrication.
 2. Below grade or in Submerged or Damp Environments: Interior lined and exterior coated after fabrication with System No. 19 and 2, respectively, as specified in Section 09900, PAINTING AND PROTECTIVE COATINGS.
 3. Seep Ring:
 - a. Provide 3/16-inch minimum thickness center flange for water stoppage on sleeves in exterior or water-bearing walls.
 - b. Continuously fillet weld on each side all around.
 4. Existing Walls: Holes drilled with a rotary drill may be provided in lieu of sleeves.
- D. Modular Mechanical Seal:
1. Type: Interconnected synthetic rubber links shaped and sized to continuously fill annular space between pipe and wall sleeve opening.
 2. Assemble interconnected rubber links with Type 316 stainless steel bolts, nuts, and pressure plates.
 3. Size modular mechanical seals according to manufacturer's instructions for the size of pipes shown to provide a watertight seal between pipe and wall sleeve opening.
 4. Manufacturer/Products: Thunderline "Link-Seal" Model S.

2.12 PIPE FABRICATION

- A. Flanged pipe shall be fabricated in the shop, not in the field, and delivered to the site with flanges in place and properly faced. Threaded flanges shall be individually fitted and machine tightened on matching threaded pipe by the manufacturer.
- B. Fabricate outlets and bends in appropriate lengths so that, when installed, they will be located as shown on laying drawings.
- C. Pressure taps and stubs required for hydrostatic testing shall be factory installed on the pipe.
- D. Mark Each Pipe Length on Outside:
1. Size or diameter and class.
 2. Manufacturer's identification and pipe serial number.
 3. Location number on laying drawing.
 4. Date of manufacture.
- E. Code markings according to approved Shop Drawings.

2.13 COUPLINGS FOR METALLIC PIPING

A. General:

1. Thrust Ties: Provide where shown and where required to restrain the force developed by 1-1/2 times the higher of the operating or test pressures specified.
 - a. Ductile Iron Pipe: Attach to adjacent flanges of pipe with fabricated lugs as shown on the Drawings.
2. Exposed, Buried, and Submerged Installations: Provide Type 316 stainless steel bolts and nuts.
3. Steel Middle Rings and Followers: Fusion bonded epoxy-lined and coated (System No. 29) in accordance with Section 09900, PAINTING AND PROTECTIVE COATINGS.

B. Flexible Couplings:

1. Provide thrust ties across flexible couplings as described above.
2. Manufacturers and Models for Ductile Iron Pipe: Dresser, Style 38 with Type 316 stainless steel middle rings and followers.

C. Flanged Coupling Adapters (FCA):

1. Provide thrust ties across FCA as described above.
2. Manufacturers and Models for Ductile Iron Pipe:
 - a. Rockwell International, Series 913.
 - b. Dresser Industries, Inc., Style 128.
3. Flange coupling adapters to be factory coated with Painting System No. 29 in accordance with Section 09900, PAINTING AND PROTECTIVE COATINGS.

2.14 BURIED DUCTILE IRON PIPE CORROSION PROTECTION

- A. Polyethylene Encasement (Bagging): Black polyethylene encasement tube, 8 mils minimum thickness, conforming to AWWA C105, Class C, free of gels, streaks, pinholes, foreign matter, undispersed raw materials, and visible defects such as tears, blisters, and thinning at folds.
- B. Securing Tape: Thermoplastic tape, 8 mils minimum thickness, 1-inch wide, pressure sensitive adhesive face capable of bonding to metal, bituminous coating, and polyethylene encasement tube.

2.15 QUICK CONNECT

- A. The quick connect with matching locking female dust cover, located where shown on the Drawings, shall be manufactured of Type 316 stainless steel with male NPT threading. Item shall be Model 633-A as manufactured by OPW, or equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify size, material, joint types, elevation, horizontal location, and pipe service of existing pipelines to be connected to new pipelines or new equipment.
- B. Inspect size and location of structure penetrations to verify adequacy of wall pipes, sleeves, and other openings.
- C. Welding Electrodes: Verify proper grade and type, and free of moisture and dampness, and coating is undamaged.

3.2 PREPARATION

- A. Notify OWNER at least 2 weeks prior to field fabrication of pipe or fittings.
- B. Damaged Coatings and Linings: Repair using original coating and lining materials in accordance with manufacturer's instructions.
- C. Furnish feeler gauges of the proper size, type, and shape for use during installation for each type of pipe furnished.

3.3 WELDING

- A. In accordance with AWWA C206.
- B. Weld Identification: Mark each weld with symbol identifying welder.
- C. Pipe End Preparation:
 - 1. Machine Shaping: Preferred.
 - 2. Oxygen or Arc Cutting: Smooth to touch, true, and slag removal by chipping or grinding.
 - 3. Beveled Ends for Butt Welding: ANSI B16.25.
- D. Surfaces:
 - 1. Clean and free of paint, oil, rust, scale, slag, or other material detrimental to welding.

2. Prior to deposition of each additional layer of weld metal, thoroughly clean each layer of deposited weld metal, including final pass, with a power-driven wire brush.
- E. Alignment and Spacing:
1. Align ends to be joined within existing commercial tolerances on diameters, wall thicknesses, and out-of-roundness.
 2. Root Opening of Joint: As stated in qualified welding procedure.
 3. Minimum Spacing of Circumferential Butt Welds: Minimum four times pipe wall thickness or 1 inch, whichever is greater.
- F. Climatic Conditions: Do not perform welding if there is impingement of any rain, snow, sleet, or high wind on the weld area, or if the ambient temperature is below 32 degrees F.
- G. Thermal Stress Control Joints:
1. Provide joints with a minimum lap of 3 inches approximately every 350 feet on piping.
 2. Install pipe zone material within 50 feet of the joint prior to welding.
 3. Leave unwelded until such time as the pipe temperature is the coldest (such as early in the morning).
- H. Tack Welds: Performed by qualified welder using same procedure as for completed weld, made with electrode similar or equivalent to electrode to be used for first weld pass, and not *defective*. Remove those not meeting requirements prior to commencing welding procedures.
- I. Surface Defects: Chip or grind out those affecting soundness of weld.
- J. Weld Passes:
1. Pipe 4 Inches and Under: Minimum of full root and second pass.
 2. Pipe Sizes 6 Inches and Larger: Minimum of three weld passes.
- K. Weld Quality: Free of cracks, incomplete penetration, weld undercutting, excessive weld reinforcement, porosity slag inclusions, and other defects in excess of limits shown in applicable piping code.

3.4 INSTALLATION-GENERAL

- A. Join pipe and fittings in accordance with manufacturer's instructions, unless otherwise shown or specified.
- B. Inspect pipe and fittings before installation, clean ends thoroughly, remove foreign matter and dirt from inside.
- C. Flanged Joints:
 - 1. Install perpendicular to pipe centerline.
 - 2. Bolt Holes: Straddle vertical centerline, aligned with connecting equipment flanges or as shown.
 - 3. Use torque-limiting wrenches to ensure uniform bearing and proper bolt tightness.
 - 4. Plastic Flanges: Install annular ring filler gasket at joints of raised-face flange.
 - a. Raised-Face Flanges: Use flat-face flange when joining with flat-faced ductile or cast-iron flange.
- D. Threaded and Coupled Joints:
 - 1. Conform with ANSI B1.20.1.
 - 2. Produce sufficient thread length to ensure full engagement when screwed home in fittings.
 - 3. Countersink pipe ends, ream and clean chips and burrs after threading.
 - 4. Make up connections full, with not more than three threads exposed.
 - 5. Lubricate male threads only with thread lubricant or tape as specified on Data Sheets.
- E. Couplings:
 - 1. Service Saddles:
 - a. Ferrous Metal Piping (Except Stainless Steel): Double-strap iron.
 - b. Plastic Piping: Nylon-coated iron.
 - 2. Installation:
 - a. Before coupling, clean pipe holdback area of oil, scale, rust, and dirt.
 - b. Do not remove pipe coating. If damaged, repair before joint is made.
 - c. Clean gaskets before installation.
 - d. If necessary, lubricate with gasket lubricant for installation on pipe ends.
 - e. Tighten coupling bolts progressively, drawing up bolts on opposite sides a little at a time until all bolts have uniform tightness.

F. Insulating Flanges, Couplings, and Unions:

1. Install between copper and ferrous metal piping connections and where shown.
2. Drill flanges oversize to accommodate insulating sleeves through the drilling using standard bolt sizes.

G. Penetrations:

1. Watertight Penetrations:
 - a. Provide wall pipes with thrust collars.
 - b. Provide taps for stud bolts in flanges to be set flush with wall face.
2. Nonwatertight Penetrations:
 - a. Pipe sleeves with seep ring.
 - b. Pipe sleeves with modular mechanical seal may be provided where fabrication of seep ring on pipe sleeve is impractical.
3. Existing Walls:
 - a. Pipe sleeve with modular mechanical seal.
 - b. Rotary drilled holes may be provided in lieu of sleeves in concrete walls.
4. New Concrete Walls:
 - a. Isolate embedded metallic piping from concrete reinforcement using coated pipe penetrations as specified in Section 09900, PAINTING AND PROTECTIVE COATINGS.
 - b. Support wall pipes securely by form work to prevent contact with reinforcing steel and tie wires.

H. Ductile Iron Piping:

1. Cutting Pipe: Cut pipe with milling type cutter, rolling pipe cutter, or abrasive saw cutter. Do not flame cut.
2. Dressing Cut Ends:
 - a. General: As required for the type of joint to be made.
 - b. Rubber Gasketed Joints: Remove sharp edges or projections.
 - c. Push-On Joints: Bevel, as recommended by pipe manufacturer.
 - d. Flexible Couplings, Flanged Coupling Adapters, and Grooved End Pipe Couplings: As recommended by the coupling or adapter manufacturer.

3.5 INSTALLATION-EXPOSED PIPING

- A. Unions or Flanges: Provide between each blocking valve and equipment to facilitate installation and removal.
- B. Install piping so that no load or movement in excess of that stipulated by equipment manufacturer will be imposed upon equipment connection; install to allow for contraction and expansion without stressing pipe, joints, or connected equipment.
- C. Piping Clearance, Unless Otherwise Shown:
 - 1. Between Equipment or Equipment Piping and Adjacent Piping: Minimum 3 feet 0 inches, measured from equipment extremity and extremity of piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 - 2. From Adjacent Work: Minimum 1 inch from nearest extremity of completed piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
- D. Valve Orientation:
 - 1. As shown where valve handwheels are shown.
 - 2. Where valve handwheels are not shown, orient to permit easy access to the valve operator, and to avoid interferences.

3.6 INSTALLATION-BURIED PIPE

- A. Joints:
 - 1. Dissimilar Buried Pipes: Provide flexible mechanical compression joints for pressure pipe.
 - 2. Concrete Encased or Embedded Pipe: Do not encase joints in concrete unless specifically shown.
 - 3. All buried pipe and fittings shall be restrained joint.
- B. Placement:
 - 1. Keep trench dry until pipe laying and joining are completed.
 - 2. Pipe Base and Pipe Zone: As specified in Section 02225, TRENCH BACKFILL.
 - 3. Exercise care when lowering pipe into trench to prevent twisting or damage to pipe.
 - 4. Measure for grade at pipe invert, not at top of pipe.
 - 5. Excavate trench bottom and sides of ample dimensions to permit proper joining, welding, visual inspection, and testing of entire joint.
 - 6. Prevent foreign material from entering pipe during placement.

7. Close and block open end of last laid pipe section when placement operations are not in progress and at close of day's work.
8. In general, lay pipe upgrade with bell ends pointing in direction of laying.
9. Deflect pipe at joints for pipelines laid on a curve using unsymmetrical closure of spigot into bell. If joint deflection of standard pipe lengths will not accommodate horizontal or vertical curves in alignment, provide:
 - a. Shorter pipe lengths.
 - b. Special mitered joints.
 - c. Standard or special fabricated bends.
10. Check gasket position with feeler gauge furnished by the pipe manufacturer, to assure proper seating.
11. After joint has been made, check pipe alignment and grade.
12. Place sufficient pipe zone material to secure pipe from movement before next joint is installed.
13. Prevent uplift and floating of pipe prior to backfilling.

C. Tolerances:

1. Deflection from Horizontal Line: Maximum 2 inches.
2. Deflection from Vertical Line: Maximum 1/2 inch.
3. Joint Deflection: Maximum of 75 percent of manufacturer's recommendation.
4. Horizontal position of pipe centerline on alignment around curves maximum variation of 1.75 feet from position shown.
5. Pipe Cover: Minimum 3 feet, unless otherwise shown.

3.7 THRUST RESTRAINT

- A. Location: At pipeline tees, plugs, caps, bends, and other locations where unbalanced forces exist.
- B. Type: Restrained joints unless otherwise shown.
- C. Mechanically restrained joints shall be as specified in the Data Sheets.
- D. Mechanical Joint Valve Restraint in Proprietary Restrained Joint Piping: Install pipe joint manufacturer's adapter gland follower and pipe end retainer, or thrust tie-rods and socket clamps. Joint restraint by use of Mega-Lug (EBAA Iron) or Grip Ring (Romac) is also acceptable.
- E. Mechanically restrained joints shall be as specified in the Data Sheets.

3.8 CORROSION PROTECTION

- A. Buried Pipe: Install polyethylene encasement of buried ductile iron pipe and fittings in accordance with AWWA C105 and manufacturer's instructions.
- B. Atmospherically Exposed Pipe: As specified in Section 09900, PAINTING AND PROTECTIVE COATINGS.

3.9 THREADED PIPE TAP CONNECTIONS

- A. Ductile Iron Piping: Connect only with service saddle or at a tapping boss of a fitting, valve body, or equipment casting.

3.10 VENTS AND DRAINS

- A. Vents and drains at high and low points in piping required for completed system may or may not be shown.
- B. Install vents on high points and drains on low points of pipelines only where shown.

3.11 CLEANING

- A. Following assembly and testing, and prior to final acceptance, flush pipelines with water at 2.5 fps minimum flushing velocity until foreign matter is removed.
- B. If impractical to flush large diameter pipe at 2.5 fps clean in-place from inside by brushing and sweeping, then flush or blow line at lower velocity.
- C. Remove accumulated debris through drains 2 inches and larger or by removing spools and valves from piping.

3.12 DISINFECTION

- A. General:
 - 1. Disinfect all new pipelines intended to carry potable water, before placing in service.
 - 2. Meet the requirements of AWWA C651, as hereinafter modified or expanded.
- B. Flushing: Perform as specified under Article CLEANING, before starting disinfection.

C. Application:

1. Inject chlorine mixture into pipeline to be treated at the beginning of the line through a corporation stop or suitable tap in the top of pipeline.
2. Control rate of chlorine solution flow in proportion to rate of water entering the pipe so that combined mixture contains not less than 50 ppm of free available chlorine.
3. Prevent backflow of chlorine solution into the line supplying the water by using check valves or other means.
4. Inject mixture into pipeline at a measured rate while fresh water is allowed to flow through the pipeline at a measured rate until the chlorine-water solutions at the specified strength.

D. Retention Period:

1. Retain treated water in pipeline for a minimum of 24 hours or long enough to destroy all non-spore-forming bacteria.
2. At the end of the retention period, the disinfecting mixture shall have a strength of at least 10 ppm of chlorine, or the pipeline shall be recleaned, disinfecting mixture reapplied, and specified procedure repeated.
3. After chlorination flush the water from the permanent source of supply through pipeline until water is equal chemically and bacteriologically to the permanent source of supply.

E. Disposal:

1. Dispose of flushing and disinfecting wastewater in accordance with applicable regulations, by means that will protect the public and receiving waters from harmful or toxic concentrations of chlorine or other chemicals.
2. Do not allow discharge into a waterway without adequate dilution or other satisfactory method of reducing contaminant concentrations to a safe level.
3. Provide hoses, temporary pipes, ditches, and other conduits as needed to dispose of wastewater without damage to adjacent properties.

3.13 FIELD QUALITY CONTROL

- A. Pressure Leakage Testing: As specified in Section 15992, PIPING LEAKAGE TESTING.

3.14 SUPPLEMENTS

A. Data Sheets.

<u>Number</u>	<u>Title</u>
-01	Lined Ductile Iron Pipe and Fittings
-10	Polyvinyl Chloride (PVC) Pipe and Fittings
-12	Detail Piping Specification Polyvinyl Chloride (PVC) Restrained Pipe and Fittings
-13	Copper and Copper Alloy Pipe, Tubing, and Fittings - General Service
-14	High Density Polyethylene (HDPE) Pipe

END OF SECTION

SECTION 02660-01 DATA SHEET LINED DUCTILE IRON PIPE AND FITTINGS	
Item	Description
Pipe	Buried Pipe Using Push-On Joints (except as shown otherwise): ANSI/AWWA C111/A21.11 and ANSI/AWWA C151/A21.51, Grade 60-42-10, pressure class conforming to Tables 51.1 and 51.3 for Type 4 trench, 350 psi minimum working pressure. Exposed Pipe Using Flange Joints: ANSI/AWWA C115/A21.15, and ANSI/AWWA C151/A21.51, thickness Pressure Class 350 minimum conforming to Table 51.7, 350 psi minimum working pressure. Flanged pipe shall be fabricated in the shop and delivered to site with flanges in place and properly faced. Threaded flanges shall be individually fitted and machine tightened on matching threaded pipe by manufacturer.
Interior Lining	System No. 19 as specified in Section 09900, PAINTING AND PROTECTIVE COATINGS.
Exterior Coating	Exposed: As specified in Section 09900, PAINTING AND PROTECTIVE COATINGS, System No. 5. Buried: Encase with polyethylene bagging as specified in Section 02660, PRESSURE PIPING. Submerged or Embedded: Coat as specified in Section 09900, PAINTING AND PROTECTIVE COATINGS, System No. 2.
Fittings	Lined and coated same as pipe. Push-On: ANSI/AWWA C110/A21.10 and C111/A21.11, gray or ductile iron, 250 psi minimum working pressure. American Cast Iron Pipe Co., Fastite Joint; U.S. Pipe and Foundry, Tyton Joint. Mechanical: ANSI/AWWA C110/A21.10, C111/A21.11, and C153/A21.53 gray or ductile iron, 250 psi minimum working pressure. Push-On Restrained: ANSI/AWWA C111/A21.11 and C153/A21.53, ductile iron, 250 psi minimum working pressure. Clow Corp., Super-Lock Joint; American Cast Iron Pipe Co., Flex-Ring or Lok-Ring Joint; U.S. Pipe, TR Flex. Flange: ANSI/AWWA C110/A21.10 and ANSI B16.1, ductile iron, faced and drilled, 125-pound flat face.

SECTION 02660-01 DATA SHEET LINED DUCTILE IRON PIPE AND FITTINGS	
Item	Description
Joints	Push-On: 250 psi minimum working pressure, ANSI/AWWA C110/A21.10 and C111/A21.11. American Cast Iron Pipe Co., Fastite Joint; U.S. Pipe and Foundry, Tyton Joint. Mechanical: 250 psi minimum working pressure. Push-On Restrained: 150 psi minimum working pressure. Clow Corp., Super-Lock; American Cast Iron Pipe Co., Flex-Ring or Lok-Ring; U.S. Pipe, TR Flex. Flange: 125-pound flat face, ductile iron, threaded conforming to ANSI/AWWA C115/A21.15.
Bolting	For Buried Service: High strength, low alloy steel (Cor-Ten) "T" bolts. Cor-Ten bolts, nuts, and accessories shall be manufactured by NSS Industries, EBAA Iron, Inc., or equal. For Atmospherically Exposed Service: 125-Pound Flat-Faced Flange: ASTM A307, Grade A carbon steel hex head bolts and ASTM A563, Grade A carbon steel hex head nuts. For Wetted or Submerged Service: 125-Pound Flat-Faced Flange: Type 304 stainless steel, ASTM A193, Grade B8M hex head bolts and ASTM A194, Grade 8M hex head nuts.
Gaskets	Push-On, Mechanical, and Proprietary Restrained Joints: Rubber conforming to ANSI/AWWA C111/A21.11. Flanged: 1/8-inch thick, cloth-inserted rubber conforming to ANSI B16.21 and AWWA C207, corrosive acid and alkali free for sewage service, full face for 125-pound flat-faced flanges. Gasket pressure rating to equal or exceed the system hydrostatic test pressure.
Joint Lubricant	Manufacturer's standard.

END OF SECTION

SECTION 02660-10 DATA SHEET POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS		
Item	Size	Description
Pipe	All	Schedule 80 PVC: Type I, Grade I or Class 12454-B conforming to ASTM D1784 and ASTM D1785. Threading of pipe is unacceptable.
Fittings	All	Schedule 80 PVC as Specified Under Pipe Above: ASTM D2466 and ASTM D2467 for socket-weld type and ASTM D2464 for threaded type.
Joints	All	Solvent socket-weld male and female adapters except where connection to valves and equipment items may require future disassembly. Provide NPT socket weld couplings at such locations for pipe 3 inches and smaller and flange connections for pipe 4 inches and larger.
Flanges	All	One-piece, molded hub type PVC flat face flange in accordance with Fittings above, 125-pound ANSIB16.1 drilling. At ENGINEER's discretion, CONTRACTOR may use Van Stone flanges for alignment at closure pieces.
Bolting	All	Flat-Faced Mating Flange: ASTM A193/A193M Rev A Type 316 stainless steel Grade B8M hex head bolts and silicon bronze hex head nuts.
Gaskets	All	Flat-Faced Mating Flange: Full-faced 1/8-inch thick ethylene propylene (EPR) rubber. Gaskets to be compatible with up to 7 mg/L chloramines.
Solvent Cement	All	As recommended by the pipe and fitting manufacturer conforming to ASTM D2564.
Thread Lubricant	All	Teflon tape.

END OF SECTION

SECTION 02660-12
DETAIL PIPING SPECIFICATION
POLYVINYL CHLORIDE (PVC) RESTRAINED PIPE AND FITTINGS

PART 1 GENERAL

1.1 WORK INCLUDED

- A. This Section covers the work necessary to furnish and install, complete, the polyvinyl chloride restrained pipe and fittings specified herein, and as specified further in Section 02660, PRESSURE PIPING.

1.2 GENERAL

- A. See Section 02660, PRESSURE PIPING for additional requirements. All piping system components shall be the products of one manufacturer.

PART 2 PRODUCTS

2.1 PIPE

- A. PVC, Type I, Grade 1, or Class 12454-B, conforming to ASTM D1784.
- B. Precision machined, factory cut grooves compatible with manufacturer's couplings.
- C. Pipe and Fitting SDR Rating: 18.

2.2 JOINTS

- A. Slip-on style couplings utilizing machined grooves and high-strength flexible spline providing a circumferential fully thrust restrained joint. Watertight sealing provided by twin flexible elastomeric O-ring gaskets. Joint rotation fixed by torque control type set screws cast in coupling body.

2.3 TRANSITION ADAPTERS

- A. Transition adapters and couplings to flanged ductile iron and stainless-steel pipe shall be fabricated by the pipe manufacturer from Type 316 stainless steel with a machined groove and ANSI B16.1 Class 125 flange end as necessary to couple the riser pipe segments to the pump base elbow and the wall pipe segment at the top of the wetwell riser.

2.4 MANUFACTURERS/PRODUCTS

- A. PVC pipe and fittings shall be the product of CertainTeed Corporation, "Certa-Lok," or equal.

PART 3 EXECUTION

3.1 GENERAL

- A. All PVC well drop pipe shall be cut, made up, and installed in accordance with the pipe manufacturer's recommendations
- B. Use transition adapters whenever necessary to connect to pump base elbow connections, fitting, or wall pipe segment.
- C. Only strap wrenches shall be used for handling the piping. Ends to be joined shall be shielded from direct sunlight prior to and during the installation operation.

END OF SECTION

SECTION 02660-13 DATA SHEET COPPER AND COPPER ALLOY PIPE, TUBING, AND FITTINGS – GENERAL SERVICE	
Item	Description
Pipe	Red brass, seamless, standard wall thickness, conforming to ASTM B43.
Tubing	Seamless, conforming to ASTM B88 Rev A as follows: No. 1 water (exposed).....Type L, hard drawn Compressed air service Type L, hard drawn Sample line service Type L, hard drawn
Fittings	Commercially pure wrought copper, socket joint, conforming to ASTM B75, dimensions conforming to ANSI B16.22.
Flanges	Commercially pure wrought copper, socket joint, conforming to ASTM B75, faced and drilled 150-pound ANSI B16.24 standard.
Bolting	ASTM A307, carbon steel, Grade A hex head bolts and ASTM A563 Grade A hex head nuts.
Gaskets	1/16-inch thick non-asbestos compression type, full face, Cranite, Johns-Manville.
Solder	95-5 wire solder (95 percent tin, 5 percent antimony), conforming to ASTM B32 Grade 95TA. Do not use cored solder.

END OF SECTION

SECTION 02660-14 DATA SHEET HIGH DENSITY POLYETHYLENE (HDPE) PIPE		
Item	Size	Description
General	All	Pipe lengths, fittings, and flanged connections to be joined by thermal butt-fusion shall be of the same type, grade, and class of polyethylene compound and supplied from the same raw material supplier.
Pipe		ASTM D3550, high density polyethylene, maximum allowable hoop stress 800 psi at 73.4 degrees F. Polyethylene resins shall conform to Type PE 3408 or better. Protection shall be provided against ultraviolet light degradation using carbon black, not less than 2 percent well dispersed in the resin. Pipe wall thickness shall reflect the required SDR* and diameter, as shown in Table 8, ASTM F714. Design Stress Rating: ASTM F714, 800 psi hydrostatic. <u>Pressure Rating* SDR**</u> 160 11 ** SDR: standard dimension ratio = OD/thickness
Fittings	6" & smaller 8" & larger	Molded fittings, butt fusion joined, conforming to ASTM D1248. Same as pipe, butt fusion joined, conforming to ASTM D3350. All fittings shall have same pressure rating as pipe, unless otherwise noted.
Flanges		ASTM A240 Type 304 stainless steel, 125-pound, ANSI B16.1 standard, Van Stone type with one-piece molded polyethylene stud ends, same rating as pipe. Backing flanges shall be Type 304 stainless steel.
Bolting		General Conditions: Carbon steel, ASTM A307 Grade B square head bolts and ASTM A563 Grade A heavy hex head nuts. Corrosive Conditions: Stainless steel, ASTM A193/A193M Rev A Grade B8M studs and ASTM A194/A194M Grade 8M hex head nuts. Washers shall be same material as bolts.
Gaskets		Flat ring, 1/8-inch ethylene propylene rubber (EPR).

END OF SECTION

SECTION 02700 SANITARY SEWER SYSTEM

PART 1 - DESCRIPTION

1.01 GENERAL

- A. The work specified in this Section consists of furnishing sanitary sewer pipe and fittings conforming to these specifications and of the particular types, sizes and dimensions shown in the plans. This work shall include the installation of the pipe and fittings at the location called for, in conformity with the lines and grades given and the furnishing and installation of standard precast manholes conforming to this section of the specification and in accordance with the details. These structures shall be of reinforced concrete and shall include the necessary connections to sewer pipes, metal frames and covers.

PART 2 - MATERIALS

2.01 GENERAL:

- A. All pipe and fittings shall be clearly marked with the name or trademark of the manufacturer, the batch number, the location of the plant and strength designation, as applicable. The Contractor shall furnish the OWNER with a certificate that all tests and inspections have been complied with as required by the specifications under which the pipe is manufactured.

2.02 POLYVINYL CHLORIDE PIPE (PVC):

- A. Pipe and fittings installed to a depth of up to 14 feet are to conform to ASTM D 3034-SDR 35. The maximum length of each section of pipe shall be 13 feet. All PVC pipe and fittings shall have a minimum pipe stiffness (PS) equal of 46 p.s.i. and a minimum modulus of elasticity (E) of 440,000 p.s.i.
- B. The pipe joint shall be the bell and spigot, rubber gasket type in which the bell portion is an integral portion of the pipe and shall meet the requirements of Specifications R4F477.
- C. Pipe and fittings deeper than 14 feet shall be C900 PVC or ASTM D3034-SDR 26.

2.03 DUCTILE IRON PIPE (DIP):

- A. All Ductile Iron pipe, fittings and their appurtenances used for gravity sewer main construction shall be pressure class 350 and receive an exterior asphaltic coating, and an epoxy inside coating, (Protecto 401 or approved equal) and be manufactured in accordance with the latest edition of the following ANSI/AWWA American National Standards:
- C105/A21.5 "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids"
 - C110/A21.10 "Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in. for Water and Other Liquids"
 - C111/A21.11 "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings"
 - C115/A21.15 "Flanged Ductile-Iron With Ductile Iron or Cast Iron Threaded Flanges"
 - C150/A21.50 "Thickness Design of Ductile-Iron Pipe"
 - C151/A21.51 "Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids"
 - C153/A21.53 "Ductile-Iron Compact Fittings, 3 in. through 24 in. and 54 in. Through 64 in. for Water Service"
- B. A sufficient quantity of non-toxic lubricant shall be supplied with the pipe, valves or fittings. The soap lubricant shall be suitable for installation of pipe under dry and/or sub aqueous trench conditions.
- C. Wall thickness and outside diameter of pipe shall conform to ANSI/AWWA C150/A21.50 and be pressure class 350, for 4-inch through 12-inch diameter pipe.
- D. Pipe shall be shipped in standard 18-foot or 20-foot lengths.
- E. All gaskets and joint materials shall be shipped in suitable protective containers.
- F. Pipe and fittings shall be as manufactured by the American Cast Iron Pipe Company, U.S. Pipe and Foundry Company or Clow Corporation.

2.04 SANITARY SEWER MANHOLES:

- A. General
1. Manholes are to be precast concrete, as shown in the Standard Detail. The minimum diameter of manholes will be 48 inches for

sewer sizes 21 inches in diameter or less. Special design must be submitted for larger diameter pipes, or when more than 2 pipes larger than 12 inches diameter are entering the manhole.

B. Certification

1. Each section shall be inspected, tested and certified by an accredited testing laboratory as to steel size/content area, placement and concrete compressive strength.
2. Each section shall be delivered unpainted and bear the stamp of the testing laboratory prior to installation. No section shall be installed or painted until approved for same by the OWNER.
3. Three copies of the above certification must be submitted to the OWNER for review prior to any partial payment requests.

C. Precast Reinforced Concrete Manholes.

1. All manhole sections shall be manufactured and conform with all sections of ASTM Designation C478, Standard Specifications for Precast Reinforced Concrete Manhole Sections except that no steps are to be installed and the inspector is to be employed by the precast manufacturer.
2. The minimum wall thickness for the barrel sections shall be 8 inches and shall have tongue and groove joints. Inside diameter is to be 48 inches.
3. Concrete shall conform to ASTM C-94, Type II cement, with a compressive strength of 4,000 psi at 28 days. Mortar shall be composed of one-part cement to two parts sand.
4. Base section is to be integrally poured with the first barrel section.
5. Reinforcement bars and steel shall be as a minimum what is shown of the drawings.
6. Pre-formed flexible plastic joint sealed conforming to Federal Specifications SS-S-00210 (GSA-FSS), "Ram-Nek", as manufactured by the K.T. Snyder Company, Houston, Texas, or an approved equal shall be installed at each section joint.
7. The interior and exterior surfaces of the structure are protected by the application of Ceilgard 663, Linergard 100 series and Protecto 401 or approved equal. Surface preparation and application are to comply with the manufacturer's recommendations.

D. Frames and Covers

1. Bricks used for frame and cover risers shall comply with A.S.T.M. Designation C 32, Grade MS (hard brick) and the mortar for the

masonry work shall be as specified in A.S.T.M. Designation C270, Type M.

2. Frames and covers for manholes shall be constructed of iron conforming to A.S.T.M. Designation A48, Class 30, and shall be manufactured by the U.S. Foundry and Manufacturing Corp., No. 410 or 420, or an approved equal. Each cover shall be cast with the legend "SANITARY SEWER" as shown on the details. Frame shall be suitable for future addition cast iron adjustment ring as may be necessary for an upward adjustment.

PART 3 - INSTALLATION OF PIPE, FITTINGS & MANHOLES

3.01 GENERAL:

- A. The installation of gravity sewer mains, manholes, fitting and service laterals shall be performed in accordance with section of the specifications, the details and to the lines and grades indicated on the plans and as directed by the OWNER. All materials shall be installed "in the dry".
- B. The type of sewer service lateral, single or double service and the exact horizontal location thereof shall be as determined in the field by the OWNER. The Contractor shall be required to provide all control staking.
- C. Piping is to be installed along straight line and grade between fittings, manholes, or other defined point, unless definite lines, alignment, deflection, or grade change have been established. Modification to approved alignment or grade during construction must receive prior approval from the OWNER. Gravity sewer mains are to be installed with a minimum cover of 3 feet.
- D. Materials are to be cleaned and maintained clean, with all coating protected from damage. The interior of the pipe must be free of dirt and debris and when work is not in progress, all open ends will be plugged.
- E. Pipes, fittings or other items are to be inspected prior to installation; any items showing a fracture or other defects will be rejected. Additionally, any pipe or fittings which has received a severe blow that may have caused an incipient fracture, even though not visible, must also be rejected. However, cast of ductile iron pipe showing an end crack, with no fracture indicated beyond that visible, may be salvaged by cutting off the damaged section 12 inches past, providing the remaining pipe is sound.
- F. Underground piping will not be driven to grade by striking it with an unyielding object. When the pipe has been properly bedded, enough

compacted backfill will be placed to hold the utility in correct alignment. If necessary, precautions will be taken to prevent flotation.

- G. Jointing will be by an approved method and shall not require undue force to accomplish full satisfactory seating and assembly. Connections at structures shall be cut accurately and worked into place without forcing and shall align with the connecting point. The installation is to be permanently watertight, with no visible leakage at joints, connections with structures, or other locations, under operational or testing condition. Materials that in jointing do not remain completely seated and/or watertight shall be rejected.

3.02 DUCTILE IRON PIPE (D.I.) PIPE:

- A. Installation shall be performed in accordance with the applicable provisions of ANSI/AWWA Standard C600. The opening cut in the pipe wall for installation of tapping saddles and sleeves must be made by a special tapping machine designed for this specific service. All pipe cutting is to be accomplished by power operated abrasive wheel or saw cutters, or other methods approved by the Pipe Manufacturer. Where required, Polyethylene Encasement must be installed as set forth under ANSI/AWWA C105/A21.5, "Polyethylene Encasement For Ductile-Iron Piping For Water And Other Liquids".

3.03 POLYVINYL CHLORIDE (PVC) PIPE:

- A. PVC pipe and fittings shall be installed to a depth not greater than 16 feet nor less than a depth of 3 feet and in accordance with A.S.T.M. D 2321-74 and the manufacturer's recommendations.
- B. Class II pipe bedding, consisting of dry coarse sand and gravel's shall be required and in sufficient quantities so that a tamper bar may be used to force the bedding material under the haunch of the pipe as necessary for proper support of the pipe. Compaction of all trench materials shall be in accordance with the Utility Excavation, Trenching and Backfilling section of the specifications.
- C. PVC pipe or fittings which show signs of ultraviolet degradation shall be considered substandard and shall be rejected accordingly.

3.04 MANHOLES:

- A. All precast reinforced concrete manholes are to be manufactured in strict accordance with ASTM Designation C478 latest revision, with the exception that manhole steps are not to be provided.

- B. Extreme care shall be used in the handling and stockpiling of all manhole sections. Prior to installation, the OWNER shall inspect all sections to assure there are no indications of damage. Any section or manhole determined by the OWNER to be unsatisfactory shall be removed from the job site and shall be replaced by the Contractor at no expense to the owner.
- C. Class II bedding shall be required for sanitary sewer manholes and shall be as specified for Class II bedding for PVC pipe in this section of the specifications.
- D. The base section shall be set on a thoroughly compacted gravel sub-base, all sections are to be set vertical and in true alignment with a 1/4 inch maximum tolerance to be allowed.
- E. The outside and inside joint shall be filled with mortar and finished flush with adjoining surfaces. Allow joints to set for 24 hours before painting.
- F. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides. If leaks appear in the structures, the inside joints shall be caulked to the satisfaction of the OWNER. The Contractor shall install the precast sections in a manner that will result in a watertight joint.
- G. Holes in the concrete pipe sections required for handling or other purposes shall be plugged with a non-shrinking grout or by grout in combination with concrete plugs.
- H. New pipe connections to new and existing manholes are to be caulked watertight with non-shrinking grout.

3.05 CONNECTIONS AT STRUCTURES:

- A. Where PVC pipe is to be connected to manholes and other structures, manhole couplings corresponding to the size of the sewer pipe must be cast directly into the structure; the PVC pipe is then inserted into the coupling. For other material, such as ductile iron and vitrified clay that bond more readily with concrete pipe joints are to be provided at the wall face.
- B. Where sanitary sewers connect to structures, pipe joints are to be provided at the wall face; and, where the connection is to wet walls or other installations where backfill exists below trench grade, one joint (18 to 20 feet) of cast or ductile iron pipe is to extend outward from the structure. When it is necessary to extend sewers through structures, such as conflicting elevation storm drain by-passing chambers, the pipe within must be ductile iron with no inside joints.

3.06 TRANSITION CONNECTIONS:

- A. Where pipes of alternate materials (PVC to D.I., etc.) are to be connected between manholes, suitable approved transition couplings shall be installed. Couplings are to be "Fernco Strongback" or an approved equal. Specially designed units may be submitted for approval; however, concrete collars are not acceptable.

3.07 SEWER SERVICE LATERALS:

- A. Installation of service laterals shall be in accordance with Standard Details, including the wye branches installed in the sewer main at the point of connection, and the service pipe and required fittings extended to the property line, perpendicular to said line, terminating with stoppered ends or fittings, as indicated.

PART 4 - UTILITY EXCAVATION, TRENCHING AND BACKFILLING

For Specifications See Division 2: Site Work.

PART 5 - TESTING OF GRAVITY SEWERS

5.01 GENERAL

- A. The Contractor shall perform testing of all sanitary gravity sewers, as specified below, and is to conduct his/her tests in the presence of the OWNER, with 24 hours advance notice provided by the Contractor.

5.02 LAMPED

- A. The installed sewers are to be "lamped" between manholes or other structures in order to ascertain that they are clear and to correct alignment. The concentricity of the lamp image received must be such that the diameter of image will have no vertical reductions from that of the pipe inside diameter and no horizontal reduction; that is, there must be a "full moon" or full oval image.
- B. Sanitary sewers to be tested shall be within sections as previously approved by the OWNER. Testing is not to proceed until all facilities are completely in place and the concrete cured. All piping is to be thoroughly cleaned of all foreign matter prior to testing. The water tightness of a sewer, which has a crown lying below ground water level, shall be tested by measuring the infiltration. The water tightness of sewers having a crown one inch or more above ground water level is to be tested by filling

the pipe with water to produce a hydrostatic head of three feet or more above the crown of the sewer at the upper end of the test section or the water table outside of the sewer, whichever is higher, and then measuring the exfiltration. In no case is the infiltration or exfiltration to exceed 0.20 gallons/inch of diameter/hour/100 feet of line/24 hours when field tested by actual infiltration conditions. If exfiltration testing is required, an allowance of an additional 10 percent of gallonage will be permitted for each additional 2-ft. head over a basic 3-ft. minimum internal head.

- C. Testing shall continue for a period of two (2) hours, with exfiltration or infiltration amounts measured by methods approved by the OWNER. Upon application of internal hydrostatic pressure for exfiltration testing, care should be taken to preclude unseating the joint gaskets for a specific type of pipe by exceeding the pressure capability thereof.
- D. Should the test fail, necessary repairs are to be made by the Contractor and the test repeated until the test results are satisfactory. The Contractor is to furnish the necessary labor, water and all other items required to conduct the required testing.

5.03 VIDEO INSPECTION

- A. All gravity sewers are to be video inspected by the City's Utility Services Department prior to any connections being made and prior to any acceptance of same unless approved otherwise by the Director of Utility Services.
- B. Any questionable portions of the system shall be videotaped and made available to the Contractor. Any portions of the system determined to be unacceptable by the OWNER shall be removed, reconstructed, or corrected by the Contractor at the Contractor's expense.

END OF SECTION

SECTION 02726
MANHOLE, WETWELL, AND VAULT CONSTRUCTION

PART 1 GENERAL

1.1 SUBMITTALS

A. Shop Drawings:

1. Precast Manholes, Wetwells, and Vaults: Details of construction.
2. Precast Base Sections: Details of construction.
3. Manholes Over Existing Sewers: Plans and schedule for diverting sewage flow.

B. Quality Control Submittals:

1. Concrete: Proposed curing method for cast-in-place concrete structures.
2. Precast Manhole Sections: Manufacturer's results of tests performed on representative sections to be furnished.
3. Manufacturer's Certification for Liner System.

PART 2 PRODUCTS

2.1 BASE ROCK

- A. FDOT No. 57 stone.**

2.2 CONCRETE

A. Ready-Mixed, Meeting ASTM C94, Alternate 2, and the Following:

1. Minimum Compressive Strength: 3,000 psi at 28 days.
2. Maximum Aggregate Size: 1-1/2 inches.
3. Slump: 2 to 4 inches.
4. Cement: ASTM C150, Type II.
5. Minimum Cement Content: 564 pounds per cubic yard.
6. Water Cement Ratio: Maximum of 0.49.

2.3 MORTAR

- A. Standard premixed meeting ASTM C387, or proportion 1-part Portland cement to 2 parts clean, well-graded sand which will pass a 1/8-inch screen.**

B. Admixtures: May be included but do not exceed the following percentages of weight of cement:

1. Hydrated Lime: 10 percent.
2. Diatomaceous Earth or Other Inert Material: 5 percent.

C. Consistency:

1. Tongue-and-Groove Type Joint: Such that mortar will readily adhere to pipe.
2. Confined Groove (Keylock) Joint: Such that excess mortar will be forced out of groove and support is not provided for section being placed.

2.4 BONDING AGENT

A. As Manufactured by:

1. Sika Corp., Sikastix 370.
2. Sika Corp., Sikador Hi-Mod.
3. Horn Co., Epoxitite Binder 2385.

2.5 FORMS

- A. Exposed Surfaces: Plywood or steel panels.
- B. Other Surfaces: Matched boards, plywood, or other approved material.
- C. Trench walls, large rock, or earth are not acceptable form material.

2.6 REINFORCING STEEL

A. Conform to ASTM A615, Grade 40, deformed bars.

2.7 CAST-IN-PLACE MANHOLES

A. Acceptable, subject to OWNER's approval.

2.8 PRECAST RISER SECTIONS

- A. Minimum 48 inches in diameter for manholes or as shown on the Drawings, for other structures, conforming to ASTM C478 and the following:
1. Eight-inch minimum wall thickness.
 2. Provide concentric cones for manholes. Cones shall have same wall thickness and reinforcement as riser section.
 3. Top and bottom of sections shall be parallel.
 4. Confined O-ring with rubber gaskets meeting ASTM C443.

5. Bitumastic exterior coating.

B. Source Tests:

1. Prior to delivery of any size precast manhole section to jobsite, conduct yard tests at point of manufacture.
2. Precast sections to be tested will be selected at random from stockpiled material to be supplied for the job.
3. All test specimens shall be mat tested and meet the permeability test requirements of ASTM C14.

2.9 PRECAST BASE SECTIONS AND BASES

- A. Preferred by OWNER. Separate slab and base sections with water proofing provision, only if approved.
- B. Base Sections: Base slab integral with sidewalls.
- C. Base Slab: Minimum 6 inches thick with No. 4 reinforcing bars, 8-inch centers, both directions in center of slab or as shown on the Drawings. Tie reinforcing steel to wall steel.
- D. Provide Type 316 stainless steel anchored "J" bolts for pump bases as shown on the Drawings. Coordinate with pump supplier. Drilled anchors not permitted.

2.10 MANHOLE EXTENSIONS

- A. Concrete Grade Rings for Extensions: Maximum 6 inches high with a minimum of one No. 2 reinforcing bar centered in the ring.
- B. In general, provide manhole extensions on manholes in streets or other locations where a subsequent change in existing grade may be likely. Limit extensions to maximum height of 12 inches.

2.11 PREFORMED PLASTIC GASKETS

- A. May be provided in lieu of mortar type joints.
- B. Conform to requirements of Federal Specification SS-S-00210.
- C. Manufacturers:
 1. Hamilton Kent Manufacturing Co., Box 178, Kent, OH 44240, Kent-Seal No. 2.
 2. K. T. Snyder Co., Inc., Central National Bank Bldg., Houston, TX 77002, Ram-Nek.

2.12 PIPE AND FITTINGS

- A. Tees and Ells for Drop Assemblies: Cement-mortar lined ductile iron conforming to AWWA C110.
 - 1. Tees of same material as the entering pipe.
 - 2. Type of joint optional.
 - 3. Extend ductile iron pipe upstream from the manhole excavation to minimum of 3 feet into trench section.
- B. Steel Strapping: 1/8-inch by 1-inch Type 316 stainless steel strap conforming to ASTM A36, for use with drop assemblies.
- C. Masonry Anchors:
 - 1. Snapoff or flush type for use with cadmium-plated bolts.
 - 2. Nondrilling Anchors: Flush type for use with a bolt or stud type with projecting threaded stud as manufactured by ITT Phillips Drill Division, Michigan City, IN; Hilti HDI Drop-in anchors, Hilti, Inc., Stamford, CT; or equal.

2.13 STANDARD MANHOLE FRAMES AND COVERS

- A. Ductile iron with 24-inch clear opening.
- B. Castings:
 - 1. Tough, close-grained gray iron, sound, smooth, clean, free from blisters, blowholes, shrinkage, cold shuts, and defects.
 - 2. Conform to ASTM A48, Class 30B, for cast iron and ASTM A536, Grade 60-40-12 for ductile iron.
 - 3. Plane or machine bearing surfaces to ensure flat, true surfaces, and low infiltration/leakage across mating surfaces.
- C. Covers: True and seat within ring at all points.

2.14 HINGED MANHOLE FRAMES AND COVERS FOR HIGH TRAFFIC AREAS

- A. Ductile Iron with 32-inch clear opening.
- B. PAMREX or similar approved manhole frame and cover.
- C. Covers shall be one-man operable using standard tools and shall be capable of withstanding an average load of 120,000 lbs.
- D. Covers to be hinged and incorporate a 90° blocking system to prevent accidental closure.

- E. Frames shall be circular and shall incorporate a seating gasket.
- F. Frames shall be complete with dual wiper infiltration resistant hinge plugs.
- G. The flange shall incorporate bedding slots and bolt holes.
- H. All components shall be black coated.

2.15 WATERTIGHT FRAME FASTENERS

- A. Fabricate as shown and galvanize after fabrication in conformance with ASTM A123.

2.16 FRAME TO STRUCTURE SEALS

- A. Extrude or mold from a high-grade rubber compound.
 - 1. Comply with materials test requirements of ASTM C923.
 - 2. Minimum Thickness: 3/16 inch.
 - 3. Minimum Unstretched Length: Sufficient to extend from the manhole frame, across a maximum of 12 inches of extension rings, to the manhole cone section.
- B. Fabricate bands used for compressing the sleeve against manhole from minimum 16 gauge if channeled sheet, or 5/16-inch diameter (if round) stainless steel conforming to ASTM A240, Type 316 for sheet, and ASTM A4769, Type 316 for rods.
- C. Screws, Bolts, or Nuts: Stainless steel conforming to ASTM F593 and 594, Type 316.
- D. The internal seal or its appurtenances shall not extend into the manhole opening to restrict entry into or exit from the manhole.
- E. The seal shall be made only of materials that have been proven to be resistant to the following exposures and conditions:
 - 1. Sanitary sewage.
 - 2. Corrosion or rotting under wet or dry conditions.
 - 3. Gaseous environment in sanitary sewers and at road surfaces including common levels of ozone, carbon monoxide, and other trace gases at the sites of installation.
 - 4. Biological environment in soils and sanitary sewers.
 - 5. Chemical attack by road oil and common street spillages or solvents used in street construction or maintenance.
 - 6. Temperature ranges, variations, and gradients in the area of construction.
 - 7. Variations in moisture conditions and humidity.

8. Vibrations due to traffic loadings.
 9. Fatigue failure due to repeated variations of tensile, compressive and shear stresses, and repeated elongation and compression.
 10. Any combination of the above.
- F. Materials used shall be compatible with each other and with the manhole materials and be capable of providing a service life of at least 20 years.
- G. Design Seal to Meet the Following Requirements:
1. Continuously prevent leakage of water from outside the manhole into the manhole at the joints between the manhole frame and the cone section.
 2. At the same time, seal shall remain flexible, allowing repeated vertical movements of the frame from 0 to 2 inches, or repeated horizontal movements of the frame with respect to the top of the extension or cone of from 0 to 1/2 inch due to pavement movements or other causes, or both types of movement occurring simultaneously at rates not exceeding 1/10 inch per minute.
- H. As approved by the OWNER.

2.17 CONCRETE PROTECTIVE LINER FOR PRECAST NEW STRUCTURES

- A. As Manufactured by:
1. AGRU "Sure-Grip" polypropylene liner as manufactured by U.S. Precast, Cape Coral, FL.
 2. Or approved equal.

2.18 CONCRETE PROTECTIVE LINER FOR EXISTING STRUCTURES

- A. System 19 (See Section 09900, PAINTING AND PROTECTIVE COATINGS), Mainstay ML-72 Microsilica Cement Mortar with Mainstay DS-5 Epoxy Coating, as manufactured by Madewell Products Corp., Roswell, GA.
- B. Sewpercoat PG as manufactured by Kerneos, Inc. of Chesapeake, Virginia.

2.19 MANHOLE REPAIR MATERIALS

- A. Non-shrink Grout: Grout shall be nonmetallic. The grout shall be nongas-liberating type, cement-base, premixed product requiring only the addition of water for the required consistency. All components shall be inorganic. The following listed grouts meet these requirements and are acceptable for use:
1. Horngrout, TAMMS Industries, Mentor, OH.
 2. UPCON Super Flow, The UPCO Company, Cleveland, OH.

3. Set Grout, The Master Builders Co., Cleveland, OH.
 4. Crystex, L&M Construction Chemicals, Inc., Omaha, NE.
- B. Patching Mortar: Shall be as approved by waterproofing/structural repair materials manufacturer as listed in Paragraph Waterproofing/Structural Repair Material.
- C. Waterproofing/Structural Repair Material: The following listed waterproofing/structural repair materials are acceptable for use:
1. EMACO 588-CA, Master Builders, Inc., Cleveland, OH.
 2. QUADDEX QM-1s RESTORE, QUADDEX Sewer Rehabilitation Products of Maumelle, AR.
 3. Mainstay ML-72, Parson Environmental Products, Inc., Reading, PA.
- D. Concrete: Conform to the requirements of Section 03300, CONCRETE.
- E. Mortar: Mortar shall be sand/Portland cement mix conforming to ASTM C270.
- F. Pipe Plugs: Pipe plugs shall be rubber gasketed test plugs, sized as necessary.
- G. Backfill: Conform to the requirements of Section 02225, TRENCH BACKFILL.

PART 3 EXECUTION

3.1 EXCAVATION AND BACKFILL

- A. As specified in Section 02205, EXCAVATION.
- B. Backfill Around Manholes: Use highest class of trench backfill immediately adjacent, as shown.
- C. As specified in Section 02380, CAISSONS (WETWELLS), and Section 02367, SHEET PILES. The wetwells are designed for installation as caissons. At the CONTRACTOR's option and at no additional cost, the wetwells may be installed using sheet piles and open excavation with dewatering as required. The CONTRACTOR shall submit an alternative design, including method and calculations for anti-flotation as a substitute for the tremie plug, prepared by a registered professional engineer in the State of Florida.

3.2 BASE ROCK

- A. Remove water from the excavation.

- B. Place minimum of 6 inches of rock base (FDOT No. 57 stone) and thoroughly compact with a mechanical vibrating or power tamper.

3.3 CONCRETE BASE

- A. Construct concrete base as shown.
- B. Vibrate to densify concrete and screed so first precast manhole section to be placed has a level, uniform bearing for full circumference.
- C. Deposit sufficient mortar on base to assure watertight seal between base and manhole wall, or place first precast section of manhole in concrete base before concrete has set. Properly locate and plumb first section.
- D. If material in bottom of trench is unsuitable for supporting manhole, excavate below the base as directed by OWNER, and backfill to required grade with rock, as specified in Section 02220, FILL AND BACKFILL, Article FOUNDATION STABILIZATION.

3.4 PLACING PRECAST SECTIONS

- A. Section Installation:
 - 1. Thoroughly clean ends of sections to be joined.
 - 2. Thoroughly wet joint with water prior to placing mortar.
 - 3. Place mortar on groove of lower section.
 - 4. Set next section in-place.
 - 5. Fill joint completely with mortar of proper consistency.
 - 6. Trowel interior and exterior surfaces smooth on standard tongue-and-groove joints.
 - 7. Prevent mortar from drying out and cure by applying an approved curing compound or comparable approved method.
 - 8. Do not use mortar mixed for longer than 30 minutes.
 - 9. Chip out and replace cracked or defective mortar.
 - 10. Completed Manholes: Rigid and watertight.
- B. Preformed Plastic Gaskets: If used in lieu of mortar joints, install in accordance with manufacturer's instructions and the following:
 - 1. Carefully inspect precast manhole sections to be joined.
 - 2. Do not use sections with chips or cracks in the tongue.
 - 3. Use only pipe primer furnished by gasket manufacturer.
 - 4. Install gasket material in accordance with manufacturer's instructions.
 - 5. Completed Manholes: Rigid and watertight.
- C. Rubber Gasketed Joints: Install in accordance with manufacturer's instructions.

3.5 MANHOLE INVERT

- A. Construct as shown with smooth transitions to ensure an unobstructed flow through manhole. Remove sharp edges or rough sections which tend to obstruct flow.
- B. Where full section of pipe is laid through manhole, break out top section as shown and cover exposed edge of pipe completely with mortar. Trowel mortar surfaces smooth.

3.6 DROP ASSEMBLIES

- A. Construct drop assemblies as shown, at locations shown.
- B. Extend ductile iron pipe from the drop to a minimum of 3 feet beyond the manhole excavation into the trench, and connect to sewer pipe with an approved adapter.
- C. Support lower drop elbow by concrete poured monolithically with manhole base.

3.7 FLEXIBLE JOINTS

- A. Provide joints in all pipe not more than 1-1/2 feet from manhole walls. Lay pipes entering manholes on compacted base rock extending to undisturbed earth.
- B. Where last joint of the line laid up to manhole is between 1-1/2 and 6 feet from manhole wall, provide a flexible joint in the manhole wall using:
 - 1. "Kor-N-Seal" flexible rubber boot with stainless steel accessories as manufactured by Kor-N-Seal Co. (NPC Systems, Inc.), Milford, New Hampshire 03055.
 - 2. "Z-Lok XP" or "A-LOK" flexible connectors as manufactured by A-Lok Products, Inc., Tullytown, Pennsylvania 19007.
- C. Shorten pipes laid out of manhole to ensure first joint is no more than 1-1/2 feet from manhole base.

3.8 PERMANENT PLUGS

- A. Clean interior contact surfaces of pipes to be cut off or abandoned as shown, and construct plug as follows:
 - 1. Pipe 18 Inches or Less in Diameter: Concrete plug in end, minimum 8 inches in length.

2. Pipe 21 Inches and Larger:
 - a. Construct plugs of common brick, concrete block, or concrete.
 - b. Plaster exposed face of block or brick plugs with mortar.
3. Plugs shall be watertight and capable of withstanding internal and external pressures without leakage.

3.9 MANHOLE EXTENSIONS

- A. Install extensions as shown, to height not exceeding 12 inches.
- B. Lay grade rings in mortar with sides plumb and tops level. Seal joints with mortar as specified for manhole sections, and make watertight.

3.10 MANHOLE FRAMES AND COVERS

- A. Install on top of manholes to positively prevent infiltration of surface or groundwater into manholes.
- B. Set frames in bed of mortar with mortar carried over flange as shown.
- C. Set tops of covers flush with surface of adjoining pavement or ground surface, unless otherwise shown or directed.

3.11 WATERTIGHT MANHOLES

- A. Prevent watertight manhole frames and covers from blowing off during sewer surcharging by installing watertight manhole frame fasteners as provided by the manufacturer.

3.12 CONNECTION TO EXISTING MANHOLES

- A. Connect sewers to existing manholes at locations shown.
 1. Break out existing manhole bases or grouting as necessary.
 2. Clean all surfaces and apply a bonding agent.
 3. RegROUT to provide smooth flow into and through existing manholes.
- B. Provide diversion facilities and perform work necessary to maintain sewage flow during connection to manholes.

3.13 SPECIAL MANHOLES

- A. Construct special manholes to meet these Specifications and as shown.

3.14 CONCRETE STRUCTURES

- A. Excavation and Formwork:

1. Remove and keep all water clear from the excavation.
2. Place 6-inch minimum layer of base rock to undisturbed earth.
3. Thoroughly compact base rock with a mechanical vibrating or power tamper.
4. Form all vertical surfaces with materials as specified.

- B. Reinforcing Steel:

1. Bar Splices: 24 diameters, but in no case less than 12 inches.
2. Wire tie splices and intersections.

- C. Placing Concrete:

1. Remove all water from forms prior to placing concrete.
2. Place concrete so there is no segregation of aggregate and vibrate all concrete placed.
3. Do not place concrete when ambient temperature is below 40 degrees F without special protection.
4. Cure concrete for 7 days in an approved manner.

- D. Finish:

1. After form removal, patch rock pockets, form tie holes, and irregularities with a stiff mixture of portland cement and sand mixed in same proportion as original mix.
2. Steel trowel slabs and tops of walls.
3. Finish exposed walls to produce a uniform, flat surface.

- E. Backfill:

1. Remove all form materials and debris from excavations before placing any backfill.
2. Backfill around structures only after concrete has attained 2/3 of specified compressive strength.
3. Obtain OWNER's approval of concrete work prior to backfilling.

3.15 LINING SYSTEMS

- A. The installation of polypropylene concrete protective liner (CPL) or fiberglass liners into precast wetwells and manholes shall be accomplished only by a

factory certified precast manhole manufacturer with a minimum of 5 years of precast manhole and lift station manufacturing experience and a minimum of 5 years' experience in the installation of corrosion resistant liners in concrete structures. Upon request, the liner installer shall provide written certification that the installation is in accordance with the liner manufacturer's specifications. (Alternates 1, 2, 3, and 4).

- B. Placement of the liner on forms shall conform to the liner manufacturer's written instructions. (Alternates 1, 2, 3, and 4).
- C. Lining shall cover all vertical walls and bottom of top slab.

3.16 MANHOLE/WETWELL REHABILITATION

- A. Specific manhole or wetwell repairs required are shown on the Drawings.
- B. Cleaning: All structures scheduled for rehabilitation shall be cleaned and scarified with a minimum 2,000 psi water jet at a minimum water temperature of 140 degrees F, or a 3,000 psi water jet at a minimum water temperature of 60 degrees F. The water jet shall hit the manhole wall surface at as near a perpendicular angle as possible. Cleaning the manhole walls from the surface without appropriate angled nozzles will not be accepted. All surface buildup and contamination and all loose mortar shall be removed during the cleaning process. If required, detergent and/or muriatic acid shall be used to remove grease, oil, and other matter that would prevent a good adhesive. Specific manufacturer's recommendations may require additional cleaning measures. Before cleaning, the CONTRACTOR shall install wire mesh screening over the inlet and outlet pipes to prevent materials from entering the sewer system. Remove all debris from the bottom of the manhole and bear all costs for proper disposal.
- C. Structurally Repair Entire Structure: Clean walls in accordance with Paragraph on Cleaning. Plug any leaks in accordance with the manufacturer's recommendation. If heavy leaks flow after Item C is complete, install bleedlines, as necessary at the bottom of the manhole to reduce the hydrostatic pressure. After pressure is reduced, plug remaining leaks with approved patching mortar as discussed in subparagraph Patching Mortar. Next, plug bleedlines with approved patching mortar and continue waterproofing process. Fill all cracks, holes, and joints that have voids with approved material as listed in Subparagraph Waterproofing/Structural Repair Material in accordance with the manufacturer's recommendations. Apply waterproofing/structural repair material per manufacturer's recommendations.
- D. Plug Abandoned Line: Plug abandoned sewer pipes with if not shown with concrete length of plug. Install in accordance with manufacturer's recommendations.

3.17 FIELD QUALITY CONTROL

A. Hydrostatic Testing:

1. When, in OWNER's opinion, the groundwater table is too low to permit visual detection of leaks, hydrostatically test all project manholes.
2. Procedure: Plug inlets and outlets and fill manhole with water to height determined by OWNER.
3. A manhole may be filled 24 hours prior to time of testing, if desired, to permit normal absorption into the pipe walls to take place.
4. Leakage in each manhole shall not exceed 0.1 gallon per hour per foot of head above the invert.
5. Repair manholes that do not meet the leakage test, or do not meet specified requirements from visual inspection.

END OF SECTION

SECTION 02734 FLOW BYPASS PUMPING SYSTEM

PART 1 - GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Society for Testing and Materials (ASTM): D3350-84, Polyethylene Plastics, Pipe and Fittings Materials.

1.02 SYSTEM DESCRIPTION

- A. Performance Requirements:
1. It is essential to the operation of the existing sewerage system that there be no interruption in the flow of sewage throughout the duration of the Project. Provide, maintain, and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and backup units as required), conduits, and all necessary power to intercept the sewage flow before it reaches the point where it would interfere with the Work, carry it past the Work, and return it to the existing sewer downstream of the Work.
 2. Design, install, and operate the temporary pumping system.
 3. Convey the sewage safely past this Work area. Do not stop or impede the main flows under any circumstances.
 4. Maintain sewer flow around the Work area in a manner that will not cause surcharging of sewers, damage to sewers, and that will protect public and private property from damage and flooding.
 5. Protect water resources, wetlands, and other natural resources.
 6. Provide an auto-dialer system which is capable of 24 hour/day, 7 days/week monitoring of the bypass pumping system with immediate notification to the CONTRACTOR of any pumping system problems, and field response by CONTRACTOR to correct issues within 30 minutes of notification of a problem. The CONTRACTOR shall submit for Owner approval, the contact information and call priority of the personnel to be on-call during the operation of the temporary pumping system.
- B. Design Requirements:
1. Provide all pipeline plugs, pumps of adequate size to handle peak flow and temporary discharge piping, to ensure that the total flow of the sewer and service connections can be safely diverted around the section to be

replaced. Bypass pumping system will be required to be operated 24 hours per day 7 days per week, including holidays during bypass pumping operation. The system operating pressure shall be as required to pump into the system.

2. **Install one bypass pump at each pump station or manhole to be bypassed. There shall be one back-up, in-line pump ready for immediate use in the event of an emergency or breakdown of any of the pumps.** Each pumping location shall have provisions for immediate installation of a redundant pump without shutting the system down.
3. Single discharge piping shall be provided for all bypass pumping operations. Each individual discharge pipeline shall be of adequate size to convey the required flow for the system's normal operating pumps.
4. Provide adequate enclosure around all bypass pumping equipment.
5. To minimize odors, install the discharge piping to within 2 feet of the manhole bottom and provide lockable security covers with an inspection door over all suction and discharge manholes. Covers can be made of ¾-inch plywood, securely fastened over the manholes.
6. Maintain onsite portable lights for emergency use only.
7. Discharge must have an isolation valve and a check valve.
8. Pump station cleanouts shall not be used for bypass pumping.

1.03 SUBMITTALS

- A. Shop Drawings: Detailed plans and descriptions outlining all provisions and precautions regarding the handling of existing wastewater flows. This plan must be specific and complete including such items as schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to ensure proper protection of the facilities, including protection of public and private property from damage and flooding by surcharging of sewers. The plan shall include, but not be limited to, details of the following:
 1. Staging areas for pumps.
 2. Sewer plugging method and types of plugs.
 3. Size, material, location and method of installation of suction piping.
 4. Size, material, method of installation and location of installation of discharge piping.
 5. Bypass pump sizes, capacity, and power requirements.
 6. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted).
 7. Standby power generator size, location.
 8. Downstream discharge plan.

9. Method of protecting discharge manholes or structures from surface water infiltration, erosion, and damage.
10. Thrust and restraint block sizes and locations.
11. Sections showing any suction and discharge pipe depth, embedment, select fill and special backfill where required.
12. Method of noise control for each pump and/or generator.
13. Any temporary pipe supports and anchoring required.
14. Plans for access to bypass pumping locations.
15. Calculations for selection of bypass pumping pipe size.
16. Schedule for installation of and maintenance of bypass pumping lines.
17. Plan indication selected location of bypass pumping line and air valve locations.
18. Inventory of disinfection materials in case of spillage.
19. Description of 24 hr/day, 7 days/week monitoring system and immediate notification to CONTRACTOR of any pumping system problems.
20. Description of procedures to be used for field response by CONTRACTOR to correct issues within 30 minutes of notification of a problem.

B. Quality Control Submittals:

1. Certification of vendor's compliance with qualifications included in Article QUALITY ASSURANCE.
2. Weekly maintenance and inspection logs.

1.04 QUALITY ASSURANCE

- A. System operators to be full-time employees or specialized vendor with minimum 1-year experience in operating and maintaining bypass systems.
 1. Provide five references from projects of similar size performed in the past 3 years.
- B. Be responsible for any spillage of raw sewage that results in civil or criminal charge from any local, state, or federal agency. Bear costs for these charges and any required restoration.

1.05 MAINTENANCE

- A. Maintenance Service: Ensure that the temporary pumping system is properly maintained and that a responsible operator is on call at all times when pumps are operating.

- B. Extra Materials: Spare parts for pumps and piping shall be kept onsite as necessary. Spare parts shall include, but not be limited to, the following: Extra pipe for each size and repair clamps for each bypass discharge line installed.
- C. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

PART 2 - PRODUCTS

2.01 BYPASS PIPING MATERIALS

- A. Header Piping: Header piping shall be used to connect the pumps to the discharge piping. The header shall be constructed of rigid pipe with positive, restrained joints, with a total maximum length of 50 feet. Under no circumstances will aluminum "irrigation" type piping or glued PVC pipe be allowed. Header piping will only be allowed in short sections and by specific permission from the OWNER.
- B. Discharge Piping: Discharge piping shall be used from the connection at the header piping to the discharge point. At the beginning of the Project, all discharge piping shall be new high-density polyethylene pressure piping conforming to ASTM D3350 with a minimum SDR of 21. Discharge piping may be reused for subsequent flow bypass pumping system placements, however, the OWNER at their sole discretion shall have the right to reject sections of discharge piping deemed by either of them to be unserviceable. Joints shall be butt fusion welded. Discharge piping shall be as manufactured by Phillips Driscopipe, Inc., or equal.

2.02 EQUIPMENT

- A. All pumps used shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system. The primary pumps must be electric with diesel powered backup. Pumps can be trailer mounted. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows.
- B. Provide the necessary stop/start controls and a visual alarm indicating a pump malfunction for each pump.
- C. The back-up pumps shall be online, isolated from the primary system by a valve.
- D. Incorporate noise prevention measures for any and all equipment being used to insure minimum noise impact on the surrounding areas.
 - 1. Include: hospital grade silencers or mufflers, equipment modifications, and special equipment or sound barrier walls as necessary to limit noise

levels below 55 decibels at a distance of 25 feet in the direction of any residential home for all diesel-powered back-up pumps.

2. In the event the CONTRACTOR fails to comply with maximum permissible noise level decibels in the operation of the flow bypass pumping system, the CITY or OWNER may order the CONTRACTOR to stop operation of the flow bypass pumping system until such time as specified noise levels are achieved. The termination of the flow bypass pumping system for such reason shall not be the basis for any extension of Contract time not for any claim for additional compensation.
- E. Repair clamps shall be full circle, stainless steel clamps, Style FS2 or FS3 as manufactured by the Ford Meter Box Company, Inc., or equal.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Precautions:
1. Locate any existing utilities in the area selected to locate the bypass pipelines. Locate bypass pipelines to minimize any disturbance to existing utilities and obtain approval of the pipeline locations from CITY, property owners, all utilities, and the OWNER prior to installation.
 2. Bypass pump all wastewater flows during all phases of the Work and coordinate all bypass pumping operations with the OWNER.

3.02 INSTALLATION

- A. Plugging or blocking of sewage flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance of Work, it is to be removed in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.
- B. When working inside manholes, exercise caution and comply with combustible or oxygen-deficient atmospheres, and confined spaces.
- C. The bypass pipeline must be located off streets, sidewalks, and shoulders of the roads. When the bypass pipeline crosses local streets and private driveways, place the bypass pipelines in trenches and cover with temporary pavement or other approved methods. Obtain approvals for placement of the temporary pipeline within public rights-of-ways.
- D. Protect the bypass discharge line from damage in the areas of backhoe operations. Protection shall be by either concrete jersey barriers or wood timbers.

- E. Confine the bypass discharge pipeline to the area within the temporary construction area and permanent easement, for in-place or during relocation of the pipeline. Concrete barriers or timber dead-man posts can be used to confine the movement of the discharge pipeline during relocation.

3.03 FIELD QUALITY CONTROL

- A. Test: Perform a hydrostatic pressure test for each section of discharge piping with a maximum pressure equal to 1.5 times the maximum operation pressure of the system (Test pressure = 75 psi). The OWNER shall witness the test to ensure that there are no leaks in the discharge piping prior to actual operation.
- B. The Operator shall inspect the bypass pumping system every hour, or on a schedule approved by the OWNER.
 - 1. An inspection log shall be kept at each pumping location. Each inspection log shall be marked with a time clock stamp to ensure the required maintenance and inspections are being performed.

3.04 CLEANING

- A. Sewage remaining in the bypass discharge pipeline and/or pumping equipment shall be flushed with CITY water and discharged to a working sewer before the bypass pumping system is broken down and moved to the next section. CITY water service must be protected by use of a backflow preventor.
- B. Disturbed Areas: Upon completion of the bypass pumping operation, the contractor shall clean up all areas disturbed by these operations, restoring same to a condition, including pavement restoration, at least equal to that which existed prior to the start of the Work.

END OF SECTION

SECTION 02830

CHAIN LINK FENCING AND GATES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work included: All polyvinyl chloride (PVC) coated galvanized steel chain link fencing complete with posts, fabric, rails and fittings, gates and all required accessories.

1.02 SUBMITTALS

- A. As Specified in Division 1 and General Conditions, CONTRACTOR shall submit complete drawings for the fabrication of all fence components including layout, bracing, gates, latch mechanisms, and connections to other portions of the work.

1.03 SPECIAL REQUIREMENTS

- A. Tolerance - Standard mill tolerances shall be used for all framework members and chain link style in strict accordance with the specifications.
- B. Height - The total height of fence shall be 8' above finished grade.
- C. Style - The fence shall be chain link style in strict accordance with specifications.
- D. Color - The gate and fencing shall be black P.V.C. coated material.

PART 2 - PRODUCTS

2.01 FENCING

- A. Fabric shall be hot-dipped galvanized after weaving to produce a zinc coating not less in weight than 0.3 oz. per square foot of bare wire surface. The polyvinyl chloride (PVC) coating shall be in accordance with the Chain Link Fence Manufacturers Institute Standard Specifications for PVC coated steel chain link fencing fabric and shall conform to ASTM F 668-88 Class 2B with fused and bonded vinyl coating (8 ga. Finish with a 9 ga. Galv. Core wire - electrostatic powder coated).
- B. Fabric Connections - The fabric shall be securely fastened to all terminal posts using 3/16" X 3/4" tension bars and beveled edge 11-gauge tension bands. The number of

bands shall be one (1) band less than the height of the fabric in feet for each tension bar. The fabric for the gate shall be fastened to all intermediate posts with 9-gauge vinyl coated tie wires, spacing not to exceed 14 inches apart. Fabric shall be tied to top rail, intermediate rail and bottom rail with 9-gauge wires, spacing not to exceed 24 inches. Connections shall be vinyl coated where vinyl coating fabric and posts are indicated on the plans.

2.02 FRAMEWORK AND ACCESSORIES

- A. All fence posts, rails, caps, sleeves and other accessories shall be hot dip zinc coated or as otherwise specified.
- B. Posts and Rails
 - 1. Chain-link fence posts, rails and braces shall be of the applicable class, size and grade as specified below:

CLASS 1 - STEEL PIPE

Grade A - Hot dip zinc coated after fabrication with 1.8 ounces of zinc per square foot of coated surface area.

Size - Outside diameter x minimum wall thickness in inches:

1.660 OD x 0.111	(1 5/8" O.D. nominal)
1.90 OD x 0.120	(2" O.D. nominal)
2.375 OD x 0.130	(2 1/2" O.D. nominal)
2.875 OD x 0.160	(3" O.D. nominal)
4.00 OD x 0.266	(4" O.D. nominal)
6.625 OD x 0.280	(6 5/8" O.D. nominal)
8.625 OD x 0.322	(8 5/8" O.D. nominal)

- 2. Pipe conforming to ASTM A120 (schedule 40 standard weight) shall meet or exceed the requirements for grade A. Steel pipe other than ASTM A120 (schedule 40 standard weight), shall meet the outside dimensions and minimum wall thickness required and shall have minimum yield strength of 50,000 psi. Grade A pipe shall be hot-dipped zinc coated inside and out with an average weight of not less than 1.8 ounces of zinc per square foot of coated surface area.
- C. Intermediate Posts
 - 1. All intermediate hot dipped galvanized posts shall be 2 1/2" O.D. nominal and shall be fitted with post tops as specified.

D. Terminal Posts

1. All end, corner and pull posts shall be 3" O.D. nominal. Posts shall have proper fitting malleable post tops.

E. Intermediate Posts Tops

1. Intermediate post tops shall be malleable loop tops.

F. Gate Posts

1. Posts for swing gates shall be pipe of the following nominal sizes for each gate leaf in conformance with Section 2.02.B.
2. Gate leaf up to 6' wide, inclusive: 3" O.D.
3. Gate posts shall be equipped with tops so designed to exclude moisture from the post.

G. Post Spacing

1. Post shall be evenly spaced in the line of fence no further apart than 10 feet on center for fences 6' height and below, and 8' on center for fences higher than 6'.

H. Top Rail, Middle Rail & Bottom Rail

1. The top rail shall be 1 5/8" O.D. nominal, provided with couplings approximately every 21 feet. Couplings are to be outside sleeve type at least 6 inches long. The top rail is to pass through the line post tops and form a continuous brace from end to end of each stretch of fence. The top rail is to be securely fastened to the terminal posts by 11-gauge pressed steel brace bands and malleable rail ends.
2. Middle and bottom rails shall be 1 5/8" O.D. nominal. Continuous middle rail required for all fencing over 6' height. Continuous bottom rail required for all fencing over 4' height. Bottom tension wire required for all 4' height fence.

I. Gates:

1. Swing Gates: Gate frames shall be fabricated using welded construction to form rigid and watertight connections. Gates shall be constructed of 2" O.D. pipe. Gates must be properly braced to eliminate any possible sagging condition. Hinges shall be malleable ball and socket of sufficient strength and design to permit easy and trouble-free operation.
2. Install gate with fabric to match fence. Install latch catches, torsion spring retainer, retainer and locking clamp, and hardware for padlock.

2.03 VINYL COATING

- A. Method of Application – P.V.C. coating shall be applied by bonded or electrostatic deposition method to a surface which has been cleaned and pre-treated.
- B. P.V.C. material shall be applied to a film thickness of 10 to 14 mils (.010 to .014”) on pipe and 20 mils on fabric.
- C. Finish product shall be smooth, clean, and free from visual bubbles or pits.

2.04 WIND SCREEN FABRIC

- A. Fencing shall include wind screen fabric on all sides, including access gate. Screen fabric shall be black, 90% Density (e.g. 90% visibility blockage) made of knitted, woven polypropylene.
- B. Wind screen fabric shall include grommets along top and bottom for attaching to the fence framework.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be made in a professional, workmanlike manner with skilled mechanics experienced in erection of this type of fence. The fence shall be erected on-line and to grade as specified.
- B. The fabric shall be stretched to proper tension between terminal posts and securely fastened to the framework members as covered in Part 2.
- C. Posts
 - 1. All posts shall be set plumb in full cylindrical concrete foundations in the ground to a minimum depth as shown on drawings with an additional 3 inches of concrete under the post. Diameter of the foundation shall be 5 times the outside diameter of the post unless otherwise indicated. The foundation shall be a 1-2-4 mixture of concrete, minimum 3,000 psi 28 days compressive strength. Foundations shall be set below grade or below curb as indicated. Refer to drawing for details, and coordinate with final grading as required.

3.02 CERTIFICATION

- A. Mill certification of material used such as grade of steel, galvanizing and coating thickness for vinyl-coated steel may be requested and shall be provided by the contractor at no additional cost to the CITY.

END OF SECTION

SECTION 02930 LAWNS AND GRASSES

PART 1 GENERAL

1.1 DEFINITIONS

- A. Maintenance Period: Begin maintenance immediately after each area is planted (seed, sod, or sprig) and continue for a period of 8 weeks after all planting under this section is completed.
- B. Satisfactory Stand: Grass or section of grass that has:
 - 1. No bare spots.
 - 2. Not more than 10 percent of total area with bare spots larger than 1 square foot.
 - 3. Not more than 15 percent of total area with bare spots larger than 6 square inches.

1.2 SUBMITTALS

- A. Shop Drawings: Product labels/data sheets.
- B. Quality Control Submittals: Certification of sod, include source and harvest date of sod, and sod seed mix.
- C. Contract Closeout Submittals: Description of required maintenance activities and activity frequency.

1.3 DELIVERY, STORAGE, AND PROTECTION

- A. Sod:
 - 1. Do not harvest if sod is excessively dry or wet to the extent survival may be adversely affected.
 - 2. Harvest and deliver sod only after laying bed is prepared for sodding.
 - 3. Roll or stack to prevent yellowing.
 - 4. Deliver and lay within 24 hours of harvesting.
 - 5. Keep moist and covered to protect from drying from time of harvesting until laid.

1.4 WEATHER RESTRICTIONS

- A. Perform Work under favorable weather and soil moisture conditions as determined by accepted local practice.

1.5 SEQUENCING AND SCHEDULING

- A. Complete Work under this section within 10 days following completion of soil preparation.
- B. Notify OWNER at Least 3 Days in Advance of:
 - 1. Each material delivery.
 - 2. Start of planting activity.

1.6 MAINTENANCE SERVICE

- A. CONTRACTOR: Perform maintenance operations during maintenance period to include:
 - 1. Watering: Keep surface moist.
 - 2. Washouts: Repair by filling with topsoil, liming, fertilizing, seeding, and mulching.
 - 3. Mulch: Replace wherever and whenever washed or blown away.
 - 4. Mowing: Mow to 2 inches after grass height reaches 3 inches, and mow to maintain grass height from exceeding 3-1/2 inches.

PART 2 PRODUCTS

2.1 FERTILIZER

- A. Commercial, uniform in composition, free-flowing, suitable for application with equipment designed for that purpose. Minimum percentage of plant food by weight.
- B. Application Rates: Determined by soil analysis results.
- C. Mix:
 - 1. Nitrogen: Ten.
 - 2. Phosphoric Acid: Ten.
 - 3. Potash: Ten.

2.2 SOD

- A. Certified, Containing Grass Mix:

<u>Species</u>	<u>Proportion By Weight</u>
Floratam-St. Augustine Sod	100 percent

- B. Strongly rooted pads, capable of supporting own weight and retaining size and shape when suspended vertically from a firm grasp on upper 10 percent of pad.
 - 1. Grass Height: Normal.
 - 2. Strip Size: Supplier's standard.
 - 3. Soil Thickness: Uniform; 1-inch plus or minus 1/4 inch at time of cutting.
 - 4. Age: Not less than 10 months or more than 30 months.
 - 5. Condition: Healthy, green, moist; free of diseases, nematodes and insects, and of undesirable grassy and broadleaf weeds. Yellow sod, or broken pads, or torn or uneven ends will not be accepted.

PART 3 EXECUTION

3.1 PREPARATION

- A. Grade areas to smooth, even surface with loose, uniformly fine texture.
 - 1. Roll and rake, remove ridges, fill depressions to meet finish grades.
 - 2. Limit such Work to areas to be planted within immediate future.
 - 3. Remove debris, and stones larger than 1-1/2 inches diameter, and other objects that may interfere with planting and maintenance operations.
- B. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface to dry off before seeding. Do not create muddy soil.
- C. Restore prepared areas to specified condition if eroded or otherwise disturbed after preparation and before planting.

3.2 FERTILIZER

- A. Apply evenly over area in accordance with manufacturer's instructions. Mix into top 2 inches of top soil.
- B. Application Rate: 23 pounds per 1,000 square feet (1,000 pounds per acre).

3.3 SODDING

- A. Lay sod to form solid mass with tightly fitted joints; butt ends and sides, do not overlap.
 - 1. Stagger strips to offset joints in adjacent courses.
 - 2. Work from boards to avoid damage to subgrade or sod.
 - 3. Tamp or roll lightly to ensure contact with subgrade; work sifted soil into minor cracks between pieces of sod, remove excess to avoid smothering adjacent grass.
 - 4. Complete sod surface true to finished grade, even, and firm.

- B. Fasten sod on slopes to prevent slippage with wooden pins 6 inches long driven through sod into subgrade, until flush with top of sod. Install at sufficiently close intervals to securely hold sod.
- C. Water sod with fine spray immediately after planting. During first week, water daily or more frequently to maintain moist soil to depth of 4 inches.
- D. Apply top dress fertilizer at rate of 1 pound per 1,000 square feet.

3.4 FIELD QUALITY CONTROL

- A. Eight weeks after sodding is complete and on written notice from CONTRACTOR, OWNER will, within 15 days of receipt, determine if a satisfactory stand has been established.
- B. If a satisfactory stand has not been established, OWNER will make another determination after written notice from CONTRACTOR following the replacement application.

3.5 PROTECTION

- A. Protect from pedestrian traffic by erecting temporary fence around each newly seeded area.

END OF SECTION

DIVISION 3

CONCRETE

SECTION 03051

LEAKAGE TESTING OF HYDRAULIC STRUCTURES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section describes the method of testing concrete hydraulic structures (manholes, wetwells, valve vaults, etc.) for leakage.

PART 2 - MATERIALS

2.01 GENERAL

- A. Provide water, piping, and equipment to test concrete structures for leakage.

PART 3 - EXECUTION

3.01 GENERAL

- A. Hydrostatically test reinforced concrete structures which will contain sewage to determine that they conform to Paragraph 3.02 herein and are free of detectable leaks.
- B. Prior to testing, clean exposed surfaces by thoroughly hosing and removing surface laitance and loose matter from walls and slabs.
- C. Conduct testing before backfill is placed against walls.

3.02 LEAKAGE TEST PROCEDURE

- A. Fill hydraulic structures to be subjected to leakage tests with water to the normal operating liquid level line. Filling shall not exceed 8 feet of water depth per 24-hour period. Filling shall be at a uniform rate over a 24-hour period with continuous monitoring. Repair any running leaks which appear during filling before continuing.
- B. After the structure has been kept full for 24 hours, it will be assumed for the purposes of the test that the absorption of moisture by the concrete in the structure is complete.
- C. During the test period, examine exposed portions of the structure, and mark visible leaks or damp spots. Repair visible leaks or damp spots after dewatering. If the drop in water surface in the 24-hour period exceeds 1/20 of 1% of the

normal volume of liquid contained in the structure, the leakage shall be considered excessive.

- D. The determination of surface moisture evaporation shall be aided with a 24-inch-deep, white-colored, watertight container with not less than 10 square feet of surface area exposure. Position container to experience environmental conditions similar to the structure being tested. Subtract the water loss due to evaporation from the measured water loss in the structure to determine the water loss due to leakage.
- E. If the leakage is excessive, drain the structure, repair leaks and damp spots, and refill the structure and again test for leakage. Continue this process until the drop in water surface in a 24-hour period meets the test requirements.
- F. Repair flowing leaks whether leakage exceeds the allowable leakage or not.
- G. Repairs and additional filling and testing (including the cost of water) shall be made by the Contractor at no additional cost to the Owner.

3.03 REPAIR METHODS

- A. Methods for repairing concrete not passing the leakage test shall be as described in Section 03732.

END OF SECTION

SECTION 03300 CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. This section covers all work necessary for providing, testing and placing ready mix concrete.
- B. See GENERAL CONDITIONS which contain information and requirements which apply to the Work specified herein and are mandatory for this project.
- C. The requirements in this section shall apply to the following types of concrete:
 - 1. Class A Concrete: Normal weight concrete used at all locations, unless otherwise noted.
 - 2. Class B Concrete: Normal weight concrete with pea-rock aggregate. Class B concrete shall be used only at locations indicated on the Drawings.
 - 3. Class C Concrete: Normal weight concrete used in electrical/instrumentation ductbanks, pipe encasements, sidewalks, and curbs.
 - 4. Flowable fill: Lean concrete proportioned without the use of coarse aggregate primarily for use as pipe backfill. Flowable fill shall be utilized only at locations indicated on the Drawings. Refer to Specification 02521 for requirements.
 - 5. Tremie concrete: Concrete indicated to be placed underwater.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02521 – Flowable Fill

1.03 REFERENCE STANDARDS, CODES AND SPECIFICATIONS

- A. ACI 214 "Recommended Practice for Evaluation of Compressive Test Results of Field Concrete".
- B. ACI 318 "Building Code Requirement for Reinforced Concrete".
- C. ASTM C31 "Standard Method for Making and Curing Concrete Compressive and Flexure Test Specimens in the Field".
- D. ASTM C33 "Standard Specification for Concrete Aggregates".
- E. ASTM C94 "Standard Specification for Ready-Mix Concrete".

1.04 SUBMITTALS

- A. Submittals shall be in accordance with the GENERAL CONDITIONS and shall include the following:
 - 1. Concrete mix designs and trial mix laboratory reports.
 - 2. Manufacturer's certification of admixtures.
 - 3. Contractor's schedule and sequence of placement.
 - 4. All Test Results.
 - 5. Drawings showing locations of construction joints.

1.05 QUALITY ASSURANCE

- A. Submit certificates of mill reports on all foreign cements for review by OWNER before batching concrete.
- B. Secure the services of a reputable manufacturer for counseling regarding the use of any specified admixture, as required.
- C. The OWNER shall have access to and have the right to inspect all batch plants, cement mills, and supply facilities of suppliers, manufacturers, subcontractors, and contractors providing products included in these Specifications. Batch plants shall have current certification that all weighing scales have been tested and are within the tolerances as set forth in the National Bureau of Standards Handbook No. 44.

1.06 CERTIFICATION

- A. Submit batch delivery tickets to the OWNER in compliance with and in accordance to ASTM C94.

1.07 TESTING

- A. Performed by an acceptable OWNER approved Laboratory. CONTRACTOR shall assist in the collection of samples. Any retests shall be within the Scope of the Contract.
- B. Criteria:
 - 1. Each test: not less than 5 cylinders; retain one after 28 days.
 - 2. One test for every 50 consecutive cubic yards of concrete cast.
 - 3. Furnish OWNER with 4 certified copies of tests made of 2 at 7 days, and 2 at 28 days.
 - 4. (1) Slump and temperature verification. Concrete temperature shall not exceed 100°F when placed.

- C. Questionable strength of in-place concrete:
1. Additional tests may be ordered by the OWNER.
 2. Execute the core tests in accordance with ASTM C42 procedure.
 3. Costs of additional tests showing strength of in-place concrete conforming to design criteria are the responsibility of the CITY.
 4. Costs of additional tests showing noncompliance with the design criteria are the responsibility of the CONTRACTOR.
 5. Additional items at CONTRACTOR's expense:
 - a. Provide load tests as directed by the OWNER.
 - b. Reinforce structure as directed or remove and replace all Under strength concrete structure in place.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cement
1. Portland cement Type I or Type II conforming to ASTM C 150. In addition, the tricalcium aluminate content of Type I cement shall not exceed 12 percent.
 2. Type I or Type II cement, at the Contractor's option, may be used for nonhydraulic structures, slabs on grade, sidewalks, thrust blocks and miscellaneous.
 3. Type II cement or Type I cement, in combination with pozzolan (fly ash) as hereinafter specified, shall be used for all precast sanitary structures.
- B. Water: potable, salt free.
- C. Fine Aggregate: salt free and clean, conforming to ASTM C33.
- D. Coarse Aggregate: salt free and clean, conforming to ASTM C33.
- E. All Aggregate: quarried/mined in fresh water only.

2.02 MIXES

- A. Concrete shall be composed of cement, admixtures, aggregates and water. These materials shall be of the qualities specified. The exact proportions in which these materials are to be used for different parts of the work will be determined by the Contractor. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. Mix designs with more than 41 percent of sand of the total weight of fine and coarse aggregate shall not be used for Class A Concrete. The

aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the Owner. All changes shall be subject to review by the OWNER.

- B. The proportions of cement, aggregates, admixtures and water used in the concrete shall be based on tests of grading and moisture content of materials, slump of concrete mixture, strength of concrete and the following factors:

1. Class A Concrete (All cast-in-place and precast concrete unless otherwise noted).

Minimum cementitious materials content, per cubic yard	without fly ash added: 611 lbs.
Maximum water-cementitious materials ratio, by weight	0.42
Slump range	3 inches to 4 inches with water reducing admixture 3-inch maximum before addition of high range water reducing admixture. 8-inch maximum after addition of high range water reducing admixture
Coarse Aggregate	#57 per ASTM C33
Compressive strength at 28 days - F'c	4,000 psi
Air Content	3% $\pm$ 1 %

2. Class B Concrete (At locations shown on the Drawings or specified herein).

Minimum cementitious materials content, per cubic yard	517 lbs.
Maximum water-cementitious materials ratio, by weight	0.50
Slump, maximum	5 inches
Compressive strength at 28 days - F'c	4,000 psi
Coarse Aggregate	Pearock
Air Content	3% ± 1%

3. Class C Concrete (Sidewalks, curb, driveway aprons, pipe encasements in the dry, thrust blocks and electrical duct banks)

Minimum cementitious materials content, per cubic yard	500 lbs.
Maximum water-cementitious materials ratio, by weight	0.60
Slump, maximum	5 inches
Compressive strength at 28 days - F'c	3,000 psi
Compressive strength at 28 days – F'c (Sidewalk only)	2,500 psi
Coarse Aggregate	#57 per ASTM C33
Air Content	2 ½ % ± 5 ½ %

4. Tremie Concrete (Concrete placed under water)

Minimum cementitious materials content, per cubic yard	700 lbs.
Maximum water-cementitious materials ratio, by weight	0.45
Slump, maximum	7 inches
Compressive strength at 28 days - F'c	4,000 psi

2.03 ADMIXTURES

- A. Provide air-entraining admixture in all concrete. Admixture shall conform to ASTM C 260, except it shall be nontoxic after 30 days and shall contain no chlorides. Furnish manufacturer's compliance statement for these requirements.
- B. All concrete shall contain a water-reducing admixture. The admixture shall conform to ASTM C 494, Type A or Type D, except it shall contain no chlorides, shall be nontoxic after 30 days, and shall be compatible with the air-entraining admixtures. The amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations. Furnish a compliance statement that the admixture used satisfies all requirements of this Specification.
- C. The pozzolan to be used in combination with Type I cement, as previously specified, shall be Class C or Class F fly ash conforming to ASTM C 618-78. Furnish test data confirming that the fly ash in combination with the cement to be used meets all strength requirements, is compatible with air-entraining agents and other additives, and provides increased sulfate resistance equivalent to or better than Type II cement.

2.04 CURING COMPOUNDS

- A. Normal placement without special finish; approved products:
 - 1. Master Builders Company: "Masterseal".
 - 2. Sonneborn-Contech: "Kure-N'Seal".

2.05 DEFORMED REINFORCING BARS

- A. ASTM A615: "Standard Specification for Deformed and Plain Billet-Steel Bars for concrete Reinforcement".
 - 1. Grade: 60
 - 2. Minimum yield strength: 60,000 psi.
- B. Sizes shall be as indicated on the Drawings.

2.06 WELDED WIRE FABRIC

- A. Welded wire fabric shall conform to ASTM A185.

2.07 ACCESSORIES

- A. Tie wires shall be 16-gauge, black, soft-annealed wire.

- B. Bar supports shall be of proper type for use intended. Bar supports in beams and slabs exposed to view after stripping shall be galvanized or plastic coated. Use concrete supports for reinforcing in concrete placed on grade.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Place no concrete until all reinforcing steel, pipes, inserts, sleeves, etc., have been set in place and reviewed by the OWNER. Notify the OWNER of scheduled pours 24 hours prior to placement.
- B. Non-Conforming Work or Materials
 - 1. Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the Contractor.

3.02 PLACING

- A. Place concrete expeditiously in clean forms that are not hot to the touch; spray forms with water just prior to placing concrete. Before placing concrete directly against earth, install vapor barrier to prevent water absorption, secure reinforcement in position, inspect, and approve before placing concrete. Do not rest runways for transporting concrete on the reinforcing steel. Deposit concrete as nearly as practical in final position; and, do not allow concrete to drop freely more than 5 feet. Place all concrete during daylight, unless otherwise authorized. Where reinforcing steel above the top of the cast is coated with concrete while placing below, remove all concrete from such reinforcing steel after the placing is complete and prior to the next cast.
- B. Place slabs-on-grade carefully to avoid damages to the vapor barrier.
- C. Concrete shall not be placed in the rain or when it looks as if it is going to rain unless specifically authorized by the OWNER.
- D. Temperature of Concrete
 - 1. The temperature of concrete when it is being placed shall be not more than 90 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees Fahrenheit, the Contractor shall employ

effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The Contractor shall be entitled to no additional compensation on account of the foregoing requirements. During summer months concrete pours shall be scheduled in the morning or early part of the day when temperatures are cooler.

E. PLACING CONCRETE UNDERWATER (TREMIE CONCRETE)

1. Placing concrete underwater will be permitted only when shown on the Drawings. Concrete deposited under water shall be carefully placed in a compacted mass in final position by means of a tremie, a closed bottom dump bucket or other approved method. Care must be exercised to maintain still water at the point of deposit. Concrete shall not be placed in running water. The consistency of the concrete shall be regulated to prevent segregation of materials. The method of depositing concrete shall be regulated such that the concrete enters the mass of the previously place concrete from within, displacing water with a minimum disturbance to the surface of the concrete.
2. Tremie shall consist of a tube having a diameter of not less than 10 inches and constructed in sections having flanged couplings fitted with gaskets. The tremie shall be supported to permit free movement of the discharge and over the entire top surface of the work and shall permit rapid lowering when necessary to choke off or retard the flow. The discharge end shall be entirely sealed at all times and the tremie tube kept full to the bottom of the hopper. When a batch is dumped into the hopper, the tremie shall be slightly raised, but not out of the concrete at the bottom, until the batch discharges to the bottom of the hopper. The flow shall then be stopped by lowering the tremie. The flow shall be continuous until the placement has been completed.

3.03 CONSOLIDATION

- A. Consolidate concrete in layers by internal vibrating equipment, supplemented by hand rodding and tamping as required. Do not use vibrators to move the concrete laterally inside the forms.
- B. Maintain internal vibrators at speed of at least 5000 impulses per minute when submerged in concrete. Maintain at least 1 spare vibrator in working condition at site at all times.
- C. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation. In no case more than 15 seconds per square foot of exposed surface. Move the vibrator constantly and place in each specific spot only once.

3.04 JOINTS

- A. Construction joints:
 - 1. Locate as illustrated on the Drawings and as reviewed by the OWNER for slabs.
 - 2. Key joints.
- B. Expansion Joints. Place pre-formed expansion joints as indicated on the Drawings.

3.05 CURING

- A. Begin curing of concrete as soon as practicable after placing, but not more than 3 hours thereafter.
- B. Begin curing of the structural elements immediately after removal of forms.
- C. Apply curing compounds as specified.

3.06 FINISHES

- A. Formed surfaces:
 - 1. Patching: immediately after stripping forms, patch all defective areas with mortar similar to the concrete mix; but, without coarse aggregate. Patch minor honeycombs, bulges and other minor defects as designed by the OWNER, only where exposed to view. Clean, dampen, and fill all the holes with patching mortar.
 - a. Major defective areas, as judged by the OWNER, including those resulting from the leakage of forms, excessive honeycombs, large bulges, and large offsets at form joints: chip away to a depth of at least 1/4 inch; and, the surfaces that are to be patched coat with an epoxy-polysulfide adhesive. Press patching mortar in for a complete bond and finish to match adjacent areas.
 - b. Minor defective areas, as judged by the OWNER, including honeycombs, air bubbles, holes resulting from removal of ties and those resulting from leakage of forms: patch with grout without resorting to chipping. Minor bulges and offsets at form joints: finish as specified herein below.
 - 2. Finishes; locations:
 - a. Rough or board finish: for all concrete surfaces not exposed to public view.
 - 3. Finishes; definitions:
 - a. Rough or board finish: reasonably true to line and plane. Tie holes and defects patched, and the fins exceeding 1/4 inch rubbed down, otherwise, surfaces may be left with texture imparted by forms.

- B. Unformed surfaces (flatwork):
 - 1. Finishes:
 - a. General: grade and screed slab to exact elevation, as required. After screeding, tamp mixture thoroughly to drive the coarse aggregate down from surfaces and apply finish specified hereinafter.
 - b. Broom finish: slab on grade.
 - 2. Finishes; definition:
 - a. Broom finish: finish with street type broom as soon as surface water sheen has disappeared.

3.07 FIELD QUALITY CONTROL

- A. Only ready mixed concrete in accordance with ASTM C94 will be accepted.
- B. Place all concrete within 1-1/2 hours after introduction of water to mix.
- C. Under no circumstances may additional water be added to mix.
- D. Discard unused concrete older than 1-1/2 hours. Re-tempering is prohibited.

END OF SECTION

SECTION 03732 CONCRETE REPAIRS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish all materials, labor, equipment, tools, etc., required for the repair, renovation, and replacement of concrete and/or reinforcing steel as indicated on the Drawings, specified herein, and determined by field survey.
- B. The Contractor, in conjunction with the OWNER, shall determine the extent of cracked or deteriorated concrete to be rehabilitated and/or resurfaced. A summary of the work to be performed shall be submitted to the OWNER for review, and such summary shall be approved by the OWNER prior to commencement of the Work.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Shall be as specified in Section 01092, Abbreviations.

1.03 SUBCONTRACTOR/APPLICATOR QUALIFICATIONS

The Contractor shall furnish the name of all subcontractors/applicators which he proposes to use for this work, including necessary evidence and/or experience records to ascertain their qualifications in the application of epoxy, urethane, and polymer-modified mortars. Approved applicator qualifications shall include:

- A. A minimum of 5-years experience in applying epoxy, urethane, and polymer-modified and cement-based compounds similar to those specified in this Section.
- B. A letter from the manufacturer of the specified materials, on the manufacturer's letterhead, signed by an officer of the company, stating that the subcontractor/applicator has been trained in the proper techniques for applying the product, including surface preparation and mixing, placing, curing, and caring for the manufacturer's products. This letter shall further state that the subcontractor/applicator is on the manufacturer's approved list of contractors.

1.04 SUBMITTALS

- A. Material certifications and technical data sheets on all grouts, mortars, epoxy resins, aggregates and repair products specified in this Section.
- B. Subcontractor/Applicator qualifications as specified in Section 1.04.

- C. Shop Drawings detailing any planned deviation from the proposed construction sequence and/or method of repair.
- D. The Contractor, based on their experience in their profession, may submit to the OWNER for approval, alternative materials and/or methods of work to assure the durability and watertight integrity of the repair work performed.

1.05 ADDITIONAL GUARANTEE

- A. The Contractor shall guarantee all repair work performed under this Contract against defects in workmanship resulting in leakage and/or failure of concrete bond for a period of two years from the date of the Certificate of Substantial Completion.

PART 2 - MATERIALS

2.01 WATER

- A. The water used for mixing concrete repair products shall be clean, potable, and free of deleterious substances.

2.02 AGGREGATE

- A. All aggregate shall conform to ASTM C-33. The aggregate supplier shall submit to the OWNER documentation that the proposed aggregates comply with ASTM C-33 and the requirements listed below:
- B. Pea Gravel - Pea gravel shall meet the gradation and material requirements of Standard Size 14 as defined by ASTM C-33. Pea gravel shall be clean and free from deleterious matter and shall contain no limestone.

2.03 EPOXY BONDING AGENT

- A. An epoxy bonding agent shall be used when applying fresh concrete to previously placed concrete. Epoxy bonding agent shall conform to ASTM C-881 Type I, II, IV or V; Grade 2 for epoxy resin adhesives, depending on the application. The class of epoxy bonding agent shall be suitable for all ambient and substrate temperatures. The epoxy resin shall be "Sika Armatec 110" as manufactured by the Sika Corp, Lyndhurst, NJ, "CR 246" as manufactured by Sto Concrete Restoration Division, Atlanta, GA, "Duralbond" as manufactured by Tamms Industries Co., Mentor OH, or equal.

2.04 ANTI-CORROSION REBAR COATING

- A. All reinforcing steel cut or exposed during demolition and/or repair operations shall be protected with an anti-corrosive coating. The anti-corrosive coating shall be a two- component, polymer-modified cementitious material such as "Sika Armatex 110" manufactured by Sika Corp., Lyndhurst, NJ, "IOCR 246" manufactured by Sto Concrete Restoration Division, Atlanta, GA, or equal.

2.05 WATERPROOF INJECTION GROUT

- A. Waterproof crack repair material shall be a one-component, water-activated polyurethane hydrophilic/hydrophobic injection grout capable of 700% expansion. Polyurethane grout shall form a tough flexible/rigid foam seal that is impenetrable to water. Hydrophilic injection grout shall be "Prime Flex 900 LV" manufactured by Prime Resins, Conyers, GA, "Scotch-Seal 5600 Chemical Grout" manufactured by 3M Construction Markets, St. Paul, MN, "Hydro- Active Flex LV" manufactured by De Neef Construction Chemicals, Waller, TX, or approved equal. Hydrophobic injection grout shall be "Prime Flex 920" manufactured by Prime Resins, Conyers, GA, "Sikafix HH" manufactured by Sika Corp., Lyndhurst, NJ, "Hydro-Active Cut" manufactured by De Neef Construction Chemicals, Waller, TX, or equal.

2.06 SPALL REPAIR PATCHING MATERIAL

- A. All spall repairs not requiring formwork shall be repaired using a two-component, polymer- modified cementitious mortar and shall have a minimum 28-day compressive strength of 7000 psi. Spall repair mortar for use in horizontal applications shall be manufactured by Sika Corp., Lyndhurst, NJ, "Duraltop Fast Set" manufactured by Tamms Industries, Mentor, OH, "IOCR 700" manufactured by Sto Concrete Restoration Division, Atlanta, GA, or approved equal.
 - 1. Spall repair mortar for use in vertical applications shall be "Sikatop III" manufactured by Sika Corp., Lyndhurst, NJ, "Duraltop Gel" manufactured by Tamms Industries, Mentor, OH, "CR730" manufactured by Sto Concrete Restoration Division, Atlanta, GA, or equal.
- B. All spall repairs requiring formwork shall be repaired using a two-component, polymer- modified cementitious mortar/pea gravel mixture and shall have a minimum 28-day compressive strength of 6000 psi. Each unit of mortar shall be mixed with Saturated Surface Dry (SSD) pea gravel to form the repair material following the manufacturer's recommendations. Spall repair mortar shall be "Sikatop 111 Plus" manufactured by Sika Corp., Lyndhurst, NJ, "Duraltop Flowable Grout" manufactured by Tamms Industries, Mentor, OH, "CR 730" manufactured by Sto Concrete Restoration Division, Atlanta, GA, or equal.

- C. All spall repair materials shall conform to EPA/USPHS standards for surface contact with potable water supplies.

2.07 STORAGE OF MATERIALS

- A. The Contractor shall provide an area for repair material storage free from exposure to moisture in any form, before, during, and after delivery to the site. Manufactured materials shall be delivered in unbroken containers labeled with the manufacturer's name and product type. All mortar products shall be stored on raised platforms. Materials susceptible to damage by freezing shall be stored in a dry, heated, insulated area. Any material that has hardened, partially set, become caked and/or has been contaminated or deteriorated shall be rejected. All aggregates shall be stored in clean bins, scows or platforms.

PART 3 - INSTALLATION

3.01 GENERAL REQUIREMENTS

- A. No repair work shall be undertaken when ambient temperatures are below manufacturer's safe recommendations. No admixtures, except those required by the manufacturer, shall be used in the repairs specified herein. All products shall be applied in strict accordance with manufacturer's recommendations. The Contractor shall furnish and install safe scaffolding and ladders for the OWNER's prework inspection, the repair work activities, and the OWNER's final inspection
- B. Sandblast or waterblast (3000-4000 psi waterjet) deteriorated areas to remove all loose concrete, existing coatings, unsound material, debris, and laitance. All surfaces shall be clean, free of dirt, grease, loose particles, and deleterious substances and shall be prepared according to manufacturer's requirements.

3.02 EPOXY BONDING AGENT

- A. Existing concrete surfaces shall be roughened prior to application of bonding agent. Concrete surface shall be clean and sound, free of all foreign particles and laitance. Repair material shall be placed while bonding agent is still tacky. If bonding agent cures prior to placement of repair material, bonding agent shall be reapplied.
- B. Repairing concrete with epoxy mortars shall conform to all the requirements of ACI 503.4 "Standard Specification for Repairing Concrete with Epoxy Mortars" (latest edition), except as modified herein.

3.03 ANTI-CORROSION REBAR COATING

- A. Reinforcing steel cut or exposed during demolition and/or repair operations shall be sandblasted and cleaned prior to coating with an anti-corrosive coating. Coating shall thoroughly cover all exposed parts of the steel and shall be applied according to manufacturer's recommendations.

3.04 WATERPROOF INJECTION GROUT

- A. All existing, leaking cracks 1/4" or smaller shall be repaired by pressure injecting a waterproof injection grout into the prepared crack. Seal crack surface and install injection ports per manufacturer's recommendations. Holes drilled for injection ports shall not cut rebar. If rebar is encountered during drilling, the hole shall be abandoned and relocated, and the abandoned hole shall be patched immediately with non-shrink grout flush with the surface of the existing concrete. Once the surface sealing material has cured, inject crack with waterproof injection grout using standard pressure injection equipment as directed by the manufacturer.

3.05 SPALL REPAIR PATCHING MATERIAL

- A. All voids or spalled areas to be repaired shall be chipped back to sound concrete a minimum 1/8" deep, cleaned and repaired with spall repair patching material according to manufacturer's recommendations. All patching shall provide a final finished surface which is flat, level and even with the existing concrete surface. Repair mortar shall not be feathered to meet existing concrete surface. Final patching on horizontal surfaces shall receive a broom finish consistent with the finish on the existing structure.

3.06 CURING

- A. All repair products shall be cured in strict accordance with manufacturer recommendations.

3.07 WORK IN CONFINED SPACES

- A. The Contractor shall provide and maintain safe working conditions for all employees and subcontractors. Fresh air shall be supplied continuously to confined spaces through the combined use of existing openings, forced-draft fans and temporary ducts to the outside, or by direct air supply to individual workers. Fumes shall be exhausted to the outside from the lowest level of the confined space. Electrical fan motors shall be explosion-proof if in contact with fumes. No smoking or open fires shall be permitted in or near areas where volatile fumes may accumulate.

END OF SECTION

DIVISION 5

METALS

SECTION 05500
METAL FABRICATIONS AND CASTINGS

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. Aluminum Association, Inc. (AA): Standards, Specifications, and Data.
2. American National Standards Institute (ANSI):
 - a. A14.3, Ladders, Fixed, Safety Requirements.
 - b. B1.1, Unified Inch Screw Threads (UN and UNR Thread Form).
3. American Society for Testing and Materials (ASTM):
 - a. A36, Standard Specification for Structural Steel.
 - b. A48, Standard Specification for Gray Iron Castings.
 - c. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - d. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - e. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware (R 1987).
 - f. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - g. A193, Standard Specification for Alloy-Steel and Stainless-Steel Bolting Materials for High-Temperature Service.
 - h. A194, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
 - i. A276, Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
 - j. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - k. A325, Standard Specification for High-Strength Bolts for Structural Steel Joints.
 - l. A385, Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip) (R 1991).
 - m. A395, Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
 - n. A489, Standard Specification for Carbon Steel Eyebolts.
 - o. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - p. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 - q. A525, Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

- r. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- s. B308, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Shapes.
- t. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- u. C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- v. D648 E2, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load (R 1988).
- w. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
- x. D746, Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact (R 1987).
- y. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
- z. D1505, Standard Test Method for Density of Plastics by the Density-Gradient Technique (R 1990).
- aa. D1525, Standard Test Method for Vicat Softening Temperature of Plastics.
- bb. F436, Standard Specification for Hardened Steel Washers.
- cc. F468, Standard Specification for Nonferrous Nuts for General Use.
- dd. F844, Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
- 4. American Welding Society (AWS):
 - a. AWS D1.1, Structural Welding Code-Steel.
 - b. AWS D1.2, Structural Welding Code-Aluminum.
- 5. Federal Specifications (FS):
 - a. QQ-F-461C(1), Floor Plate, Steel, Rolled 5/4/77.
 - b. RR-S-001301.

1.2 DEFINITIONS

A. Submerged:

- 1. A location at or below a point 1 foot 6 inches above maximum water surface elevation in water-holding basins and channels.
- 2. A location below the highest incoming pipe invert of gravity sewer manholes and lift station wetwells.

1.3 SUBMITTALS

A. Shop Drawings:

1. Metal fabrications, including welding and fastener information.
2. Specific instructions for all phases of installation including hole size, preparation, placement, procedures, and instructions for safe handling of anchoring systems.

B. Quality Control Submittals:

1. Vinyl Ester and Epoxy Anchors:
 - a. Manufacturer's Certificate of Compliance.
 - b. Manufacturer's past project experience data.
 - c. Test reports for each batch of vinyl ester or epoxy delivered to site.
 - d. Manufacturer's Certificate of Qualification for installers.
 - e. Current test data indicating that cured adhesive anchors meet or exceed design loads.
2. Ladders: Results of load tests.
3. Welders: Evidence of certification.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Welders: Certified in accordance with AWS D1.1, Chapter 5.
2. Vinyl Ester and Epoxy Anchor Manufacturers: Experience on at least three similar projects within the last 3 years.
3. Vinyl Ester and Epoxy Anchor Installers: Trained and certified by manufacturer.

B. Regulatory Requirements:

1. Anchoring Systems:
 - a. Current evaluation and acceptance reports by ICBO or other similar code organization.
 - b. Acceptable for use in potable water structures by EPA and local health agencies or NSF.

C. Welding Procedures: Follow the requirements of AWS D1.1 and AWS D1.2.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Shipment:

1. Insofar as practical, factory assemble items specified herein.
2. Package and clearly tag parts and assemblies that are of necessity shipped unassembled, in a manner that will protect materials from damage, and facilitate identification and field assembly.

B. Storage of Epoxy Adhesive:

1. Store epoxy cartridges on pallets or shelving in a covered storage area.
2. Control temperature above 60 degrees F and dispose of cartridges if shelf life has expired.

C. Storage of Vinyl Ester Products:

1. Store components on pallets or shelving in a covered storage area with locking door.
2. Control temperature within 41 to 77 degrees F and dispose of product if shelf life has expired.

PART 2 PRODUCTS

2.1 MATERIALS

A. Unless Otherwise Indicated, Meet the Following Requirements:

Item	ASTM Specification
Steel Shapes and Plates	A36
Steel Pipe	A501 or A53, Type E or S, Grade B
Structural Steel Tubing	A500, Grade B
Stainless Steel:	
Bars and Shapes	A276, AISI Type 316
Steel Plate, Sheet, and Strip	A167, AISI Type 316
Bolts and Threaded Rods	A193, AISI Type 316, B8MN, B8M2, or B8M3
Nuts	A194, AISI Type 316, B8MN, B8M2, or B8M3

Item	ASTM Specification
Stainless Steel Bolts and Nuts:	
Carbon Steel	AISI Type 316
High-Strength	A325, Type 3
Galvanized Steel Bolts and Nuts	A307 or A36, with A153 Zinc Coating, and ANSI B1.1
Eyebolts	A489
Threaded Rods	A36
Flat Washers (Unhardened)	F844; use A153 for Zinc Coating
Flat Washers (Hardened)	F436
Aluminum, Structural Shapes, and Plates	B209 and B308, Alloy 6061-T6
Aluminum Bolts and Nuts	F468, Alloy 2024-T4

- B. Anchor Bolts: As shown in FASTENER SCHEDULE at the end of this Section and as specified in various equipment sections.
- C. Anchor Bolt Sleeves:
1. High Density Polyethylene Plastic:
 - a. Single unit construction with deformed sidewalls such that the concrete and grout lock in place.
 - b. The top of the sleeve shall be self-threading to provide adjustment of the threaded anchor bolt projection.
 - c. Material Requirements:
 - 1) Plastic: High density polyethylene.
 - 2) Density: ASTM D1505.
 - 3) Vicat Softening Point: ASTM D1525.
 - 4) Brittleness Temperature: ASTM D746.
 - d. Manufacturer: Sinco West, Simi Valley, CA.
 2. Fabricated Steel Sleeve: AISI Type 316 stainless steel.

2.2 ANCHORING SYSTEMS FOR CURED CONCRETE

- A. Wedge Anchors:
1. AISI Type 316 stainless steel throughout.
 2. Manufacturers and Products:
 - a. ITW Ramset/Red Head, Wood Dale, IL; Trubolt Wedge Anchor.
 - b. Hilti, Inc., Tulsa, OK; Kwik-Bolt II Stud Anchor.
 - c. Wej-It Corp., Broomfield, CO; Wej-It Anchor Bolt.
 - d. Molly Division of Emhart Corp., Temple, PA; Parabolt Concrete Anchor.

B. Expansion Anchors:

1. Self-drilling anchors, snap-off type or flush type.
2. Furnish anchors for use with stainless steel bolts.
3. Nondrilling Anchors: Flush type for use with bolt, or stud type with projecting threaded stud.
4. Manufacturers and Product:
 - a. ITW Ramset/Red Head, Wood Dale, IL; Multi-Set Anchor.
 - b. Hilti, Inc., Tulsa, OK; Hilti HDI Drop-In Anchor.

2.3 ACCESS DOORS/ACCESS HATCHES

A. Doors:

1. Exterior type waterproof neoprene gasketed aluminum single- or double-leaf.
2. Component Fabrication:
 - a. Access Door Leaf(s): 1/4-inch diamond pattern plate with reinforcing on underside to withstand a minimum live load of 300 pounds per square foot with maximum deflection of 1/150th of the span and meet AASHTO H20 requirements.
 - b. Angle Frame
 - c. Access hatch leaf to frame seating surfaces to be completely sealed with a heavy-duty resilient gasketing material to prevent odors from escaping wetwell. Equip door(s) with heavy stainless-steel hinges with stainless steel pins.
 - d. Hinges:
 - 1) Through-bolt to cover with tamper-proof stainless-steel bolts or "lock bolts" to resist vandalism.
 - 2) Through-bolted to frame with stainless steel bolts and fiber locknuts.
 - e. Equip doors with fully enclosed and lubricated compression springs with lower enclosing telescopic tube locked into supporting "boot" firmly attached to frame to retard downward motion of door leaves or corrosion-resistant stainless-steel gas springs designed to limit to 17 pounds the lifting force required to open.
 - f. Equipment doors with hold-open arm with positive locking device with conveniently positioned release handle for easy and controlled closing.
 - g. Furnish stainless steel snap lock mounted on bottom of leaf with removable topside handle and socket recessed in cover and provided with threaded plug for flush surface with handle removed. Provide stainless steel hasp on all doors for future padlock installation by OWNER.
 - h. Hardware: Type 316 stainless steel.

3. Aluminum Finish: Mill finish with System No. 27 (as specified in Section 09900, PAINTING AND PROTECTIVE COATINGS) applied to surfaces in contact with concrete.
4. Reinforced for H-20-wheel loading.
5. Manufacturers:
 - a. U.S.F. Fabrication, Inc.
 - b. Bilco Co., Model J-AL-R Series, New Haven, CT.
 - c. Thompson Fabricating Co., Birmingham, AL.
 - d. Halliday Products, Orlando, FL.

PART 3 EXECUTION

3.1 FABRICATION

A. General:

1. Finish exposed surfaces smooth, sharp, and to well-defined lines.
2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in neat, substantial manner.
3. Conceal fastenings where practical; where exposed, flush countersink.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Round sharp edges to small uniform radius. Grind burrs, jagged edges, and surface defects smooth.
6. Material Thinner than 1/8 Inch: Either galvanize before fabrication in accordance with ASTM A525, Coating Designation G210, or after fabrication in accordance with ASTM A123, except the weight of zinc coating shall average minimum 1.2 ounces per square foot of actual surface area with no individual specimen having a weight of less than 1 ounce per square foot.

B. Aluminum:

1. Fabricate in accordance with the Aluminum Association Standards and manufacturers' recommendations as approved.
2. Grind smooth sheared edges exposed in finished work.

3.2 WELDING

A. Steel:

1. Meet requirements of AWS D1.1 for techniques of welding employed, appearance, quality of welds made, and the methods of correcting *defective* work.
2. Meet visual acceptance standards of AWS D1.1, paragraph 8.15.1.
3. Complete welding before applying finish.

B. Aluminum: Meet requirements of AWS D1.2.

3.3 INSTALLATION OF METAL FABRICATIONS

A. General:

1. Install metal fabrications plumb or level, accurately fitted, free from distortion or defects.
2. Install rigid, substantial, and neat in appearance.
3. Erect steel in accordance with applicable portions of AISC Code of Standard Practice, except as modified.
4. Install manufactured products in accordance with manufacturer's recommendations.
5. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
6. Field weld components indicated.
7. Perform field welding in accordance with AWS D1.1.
8. Obtain OWNER's approval prior to site cutting or making-adjustments not scheduled.
9. After erection, apply prime or galvanize coating to welds, abrasions, and surfaces not in contact with concrete.

B. Erection Tolerances:

1. Maximum Offset from True Alignment: 1/4 inch.

C. Aluminum:

1. Erection: In accordance with the Aluminum Association specifications.
2. Do not remove mill markings from concealed surfaces.
3. Remove inked or painted identification marks on exposed surfaces not otherwise coated after installed material has been inspected and approved.

D. Pipe Sleeves:

1. Provide where pipes pass through concrete or masonry.
2. Holes drilled with a rotary drill may be provided in lieu of sleeves in existing walls.
3. Provide a center flange for water stoppage on sleeves in exterior or water-bearing walls.
4. Provide a rubber caulking sealant or a modular mechanical unit to form a watertight seal in the annular space between pipes and sleeves.

3.4 ANCHOR BOLTS

- A. Accurately locate and hold anchor bolts in place with templates at the time concrete is placed.
- B. Use sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt. Minimum bolt size: 1/2 inch diameter by 12 inches long, unless otherwise shown.

3.5 ANCHORING SYSTEMS FOR CONCRETE

- A. Begin installation only after concrete or masonry receiving anchors have attained design strength.
- B. Do not install an anchor closer than six times its diameter to either an edge of concrete or masonry, or to another anchor, unless specifically shown otherwise.
- C. Install in accordance with manufacturer's specific quality control submittal instructions. Hole diameters are critical to installation, use only drills recommended by anchor manufacturer. Follow manufacturer's safe handling instructions.
- D. Epoxy or Adhesive Anchors: Do not install when temperature of concrete is below 40 degrees F or above 100 degrees F, unless stated otherwise in manufacturer's written instructions.
- E. Follow specific manufacturer safe handling practices when handling and installing concrete anchors.

3.6 MANUFACTURERS' SERVICES

- A. Epoxy and Vinyl Ester Anchors: Conduct site training of installation personnel for safe and proper installation, handling, and storage of epoxy or vinyl ester adhesive system. Notify OWNER of time and place for sessions.

3.7 FASTENER SCHEDULE

A. Provide Fasteners as Follows:

Service Use and Location	Product	Remarks
Anchor Bolts Cast Into Concrete for Equipment Bases:		
Dry Areas	Stainless steel bolts, unless otherwise specified with equipment.	
Submerged or Wet Areas	Stainless steel bolts with fusion bond coating unless otherwise specified with equipment.	See System No. 29, Section 09900, PAINTING AND PROTECTIVE COATING
Anchor Bolts Cast Into Concrete for Metal Fabrications and Structural Components:		
Dry or Protected Areas	Stainless steel bolts.	
Exterior, Wet, Washdown, and Chemical Handling Areas	Stainless steel bolts with fusion bond coating.	See System No. 29, Section 09900, PAINTING AND PROTECTIVE COATING
Anchors for Metal Components to Concrete; eg., Electrical Panels and Equipment:		
Dry Areas	Galvanized or stainless-steel wedge or expansion anchors.	
Wet and Damp Areas	Epoxy or adhesive stainless steel anchors.	
Submerged or Buried in Earth	Epoxy or adhesive stainless steel anchors.	
Connections for Steel Fabrications and Wood Components:		
Exterior and Interior	Stainless steel bolts.	
Connections of Aluminum Components:		
Exterior and Interior	Stainless steel bolts.	
All Others:		
Exterior and Interior	Stainless steel fasteners.	

- B. Do not use epoxy anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

END OF SECTION

DIVISION 9

FINISHES

SECTION 09900
PAINTING AND PROTECTIVE COATINGS

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American National Standards Institute (ANSI):
 - a. Standard Colors for Color Identification and Coding.
 - b. A13.1, Scheme for the Identification of Piping Systems.
2. American Water Works Association (AWWA):
 - a. C203, Coal-Tar Protective Coatings and Linings for Steel Water Pipelines-Enamel and Tape-Hot-Applied.
 - b. C210, Liquid Epoxy Coating System for the Interior and Exterior of Steel Water Pipelines.
 - c. C214, Tape Coating Systems for the Exterior of Steel Water Pipelines.
3. NSF International (NSF): 61 Drinking Water System Components-Health Effects.
4. National Association of Corrosion Engineers (NACE): Manual for Painter Safety.
5. Occupational Safety and Health Act (OSHA).
6. Steel Structures Painting Council (SSPC):
 - a. QP1, Standard Procedure for Evaluating Qualifications of Painting Contractors.
 - b. QP2, Standard Procedure for Evaluating the Qualifications of Painting Contractors to Remove Hazardous Paint.
 - c. SP 1, Surface Preparation Specification No. 1, Solvent Cleaning.
 - d. SP 2, Hand Tool Cleaning.
 - e. SP 3, Power Tool Cleaning.
 - f. SP 5, White Metal Blast Cleaning.
 - g. SP 6, Commercial Blast Cleaning.
 - h. SP 7, Brush-Off Blast Cleaning.
 - i. SP 8, Pickling.
 - j. SP 10, Near-White Blast Cleaning.
 - k. SP 11-87T, Power Tool Cleaning to Bare Metal.
 - l. Guide No. 3, PA, Guide to Safety in Paint Applications.

1.2 DEFINITIONS

A. Terms Used in this Section:

1. Coverage: Total minimum dry film thickness in mils, or square feet per gallon.

2. FRP: Fiberglass Reinforced Plastic.
3. HC1: Hydrochloric Acid.
4. MDFT: Minimum Dry Film Thickness.
5. MDFTPC: Minimum Dry Film Thickness Per Coat.
6. Mil: Thousandth of an inch.
7. Military Specification-Paint.
8. PSDS: Paint System Data Sheet.
9. SFPG: Square Feet Per Gallon.
10. SFPGPC: Square Feet Per Gallon Per Coat.
11. SP: Surface Preparation.

1.3 SUBMITTALS

A. Shop Drawings:

1. Data Sheets:
 - a. For each paint system, furnish a Paint System Data Sheet (PSDS), the manufacturer's Technical Data Sheets, and paint colors available (where applicable) for each product used in the paint system. The PSDS form is appended to the end of this Section.
 - b. Submit required information on a system-by-system basis.
 - c. Furnish copies of paint system submittals to the coating applicator.
 - d. Indiscriminate submittal of manufacturer's literature only is not acceptable.

B. Samples:

1. Reference Panel:
 - a. Prior to start of surface preparation, furnish a 4-inch by 4-inch steel panel for each grade of sandblast specified herein, prepared to specified requirements.
 - b. Provide panel representative of the steel used; prevent deterioration of surface quality.
 - c. Upon approval by OWNER, panel to be reference source for inspection.
 - d. Unless otherwise specified, before painting work is started, prepare minimum 8- by 10-inch samples with type of paint and application specified on similar substrate to which paint is to be applied.
 - e. Furnish additional samples as required until colors, finishes, and textures are approved.
 - f. Approved samples to be the quality standard for final finishes.

C. Quality Control Submittals:

1. Applicator's Qualification: Valid SSPC-QP1 Certification.
2. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.

3. If the manufacturer of finish coating differs from that of shop primer, provide both manufacturers' written confirmation that materials are compatible.
4. Manufacturer's written instructions and special details for applying each type of paint.
5. Manufacturers' Certificate of Proper Installation.

D. Contract Closeout Submittals: Special guarantee.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Applicator: Certified in accordance with Steel Structures Painting Council's SSPC-QP1.

B. Regulatory Requirements:

1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds.
2. Perform surface preparation and painting in accordance with recommendations of the following:
 - a. Paint manufacturer's instructions.
 - b. SSPC-PA Guide No. 3, Guide to Safety in Paint Applications.
 - c. Federal, state, and local agencies having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.

B. Shipping:

1. Where precoated items are to be shipped to the site, protect coating from damage. Batten coated items to prevent abrasion.
2. Use nonmetallic or padded slings and straps in handling.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not apply paint in temperatures outside of manufacturer's recommended maximum or minimum allowable, or in dust, smoke-laden atmosphere, damp or humid weather.

B. Do not perform abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air.

1.7 SPECIAL GUARANTEE

- A. Furnish manufacturer's extended guarantee or warranty, with OWNER named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at the option of the OWNER, removal and replacement of Work specified in this Specification section found *defective* during a period of 2 years after the date of Substantial Completion. Duties and obligations for correction or removal and replacement of *defective* Work as specified in the General Conditions.
- B. CONTRACTOR and paint manufacturer shall jointly and severally furnish guarantee.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Coatings Manufacturers Code A (Able to supply most heavy-duty industrial coatings and architectural paints):
 - 1. Agru Sure Grip (HDPE Liner)
 - 2. AquataPoxy – Raven Lining Systems (Epoxy Mortar)
 - 3. Epoxytec Uroflex – Epoxytec International, Inc. (Modified Epoxy)
 - 4. Sauereisen-210 (Epoxy Mortar)
 - 5. Ameron Protective Coatings, Brea, CA.
 - 6. Carboline Coatings Co., St. Louis, MO.
 - 7. Devoe & Raynolds Co., Louisville, KY.
 - 8. DuPont Chemical Co., Wilmington, DE.
 - 9. Hempel/Reliance Paints, Houston, TX.
 - 10. Keeler and Long, Inc., Watertown, CT.
 - 11. Master Builders, Inc., Cleveland, OH.
 - 12. Pittsburgh Paints, Pittsburgh, PA.
 - 13. Plas-Chem Coatings, St. Louis, MO.
 - 14. Porter-International, Louisville, KY.
 - 15. Sigma Coatings, Inc., Harvey, LA.
 - 16. Tnemec Coatings, Kansas City, MO.
 - 17. Valspar Corp., Azusa, CA.
 - 18. Wisconsin Protective Coatings, Green Bay, WI.
- B. Paint Manufacturers Code B (Able to supply most architectural and institutional paints):
 - 1. Ameritone, Long Beach, CA.
 - 2. Benjamin Moore Paints, New York, NY.
 - 3. Detroit Graphite Co., Rockford, IL.
 - 4. Fuller/O'Brien Paint Co., San Francisco, CA.
 - 5. Pratt and Lambert, Inc., Buffalo, NY.

6. Rustoleum Corp., Evanston, IL.
7. Samuel Cabot, Inc., Boston, MA.
8. Sherwin Williams, Cleveland, OH.
9. Textured Coatings of America, Los Angeles, CA.
10. Thoro Systems, Miami, FL.

C. Specialty Manufacturers Code C:

1. Darworth Co., Avon, CT.
2. Jasco Chemical Co., Mountain View, CA.
3. McCloskey Varnish Co., Philadelphia, PA.
4. Olympic Stain & Varnish, Seattle, WA.

D. Elastomeric Coating Manufacturers Code D:

1. Futura Coatings, Hazelwood, MO.
2. Gaco Western, Seattle, WA.
3. 3M Co., St. Paul, MN.
4. Plas-Chem Coatings, St. Louis, MO.
5. Polibrid Coatings, Brownsville, TX.
6. Polymer Development Laboratories, Inc., Orange, CA.
7. Technical Urethanes, Inc., Clearbrook, VA.
8. Thane-Coat, Houston, TX.
9. United Coatings Co., Spokane, WA.

E. Acid-Resistant Coatings Manufacturers Code F: Madewell Products Corp., Roswell, GA.

2.2 MATERIALS

A. General:

1. Material Quality: Manufacturer's highest quality products and suitable for intended service.
2. Materials Including Primer and Finish Coats: Produced by same manufacturer.
3. Thinners, Cleaners, Driers, and Other Additives: As recommended by manufacturer of the particular coating.

B. Products are listed below according to their approximate order of appearance in the systems. The letter designating the manufacturer code refers to Article MANUFACTURERS.

Product	Definition	Manufacturer Code
Tar Stop	Coating designed to prevent bleeding of black asphaltic varnish through finish paint; Shellac is a suitable alternate; not applicable for white and pastel colors	A
Polyamide Epoxy	Potable grade polyamide epoxy coatings approved for potable water contact and conforming to NSF 61	A
Epoxy Primer	Polyamide, anticorrosive, converted epoxy primer containing rust-inhibitive pigments	A
Coal-Tar Epoxy	Amine or phenolic epoxy type; 70 percent volume solids minimum, suitable for immersion service	A
Organic Zinc Rich Primer	Converted epoxy, epoxy/phenolic or urethane type, minimum 10 pounds metallic zinc content per gallon	A
Rust-Inhibitive Primer	Single-package steel primers with anticorrosive pigment loading	A,B
Wash Primer	Vinyl butyral acid	A
Inorganic Zinc Primer	Solvent or water based, 14 pounds metallic zinc content per gallon minimum; follow manufacturer's recommendation for topcoating	A
Elastomeric Polyurethane	100 percent solids, plural component, spray applied, high build, elastomeric polyurethane coating, suitable for the intended service	D
Polyamide High Build Epoxy	Capability of 4 to 8 MDFT per coat	A
Polyamide Epoxy, High Solids	Percent of volume solids 80 percent minimum, suitable for immersion service	A
Polyurethane Enamel	Two-component, aliphatic or acrylic based polyurethane; high gloss finish	A

Product	Definition	Manufacturer Code
Bituminous Paint	Single-component, coal-tar pitch based	A
Water Base Epoxy	A two-component, polyamide epoxy emulsion	A
Fusion Bonded Coating	100 percent solids, thermosetting, fusion bonded, dry powder epoxy or polyurethane resin, suitable for the intended service	E
Fusion Bonded, TFE Lube or Grease Lube	Tetrafluoroethylene, liquid coating; No. 62-4621-4830-5 as manufactured by 3M Co., St. Paul, MN; or open gear grease as supplied by McMaster-Carr Co., Elmhurst, IL; RL 736 manufactured by Amrep, Marietta, GA	E
Anti-corrosion Lining (Concrete)	Mainstay ML-72 Microsilica Cement Mortar with Mainstay DS-5 Epoxy Coating as manufactured by Madewell Products Corp., Roswell, GA	F
Epoxy Lining (Pipe)	High-Build Glass Flake/Quartz Pigment Epoxy: Permite PCS-9043 Type II or Protecto 401 (ceramic epoxy)	F

2.3 MIXING

A. Multiple Component Coatings:

1. Prepare using the contents of the container for each component as packaged by paint manufacturer.
2. No partial batches will be permitted.
3. Do not use multiple component coatings that have been mixed beyond their pot life.
4. Furnish small quantity kits for touchup painting and for painting other small areas.
5. Mix only components specified and furnished by paint manufacturer.
6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

B. Colors: Formulate paints with colorants free of lead, lead compounds, or other materials that might be affected by presence of hydrogen sulfide or other gas likely to be present at the site.

PART 3 EXECUTION

3.1 EXAMINATION

A. Surface Preparation Verifications:

1. Inspect and provide substrate surfaces prepared in accordance with these Specifications and the printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.
2. Provide OWNER minimum 7 days' advance notice to start of shop or field surface preparation work and coating application work.
3. Perform such work only in presence of OWNER, unless OWNER grants prior approval to perform such work in OWNER's absence.

B. Schedule inspection with OWNER in advance for cleaned surfaces and all coats prior to succeeding coat.

3.2 PREPARATION

A. Field Abrasive Blasting: Perform blasting for items and equipment where specified and as required to restore damaged surfaces previously shop or field blasted and primed.

B. Protection of Items Not to be Painted:

1. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted.
2. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.
3. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.
4. Mask openings in motors to prevent paint and other materials from entering the motors.

3.3 PREPARATION OF SURFACES

A. Metal Surfaces:

1. Where Indicated, Meet Requirements of the Following SSPC Specifications:
 - a. Solvent Cleaning: SP 1.
 - b. Hand Tool Cleaning: SP 2.
 - c. Power Tool Cleaning: SP 3.
 - d. White Metal Blast Cleaning: SP 5.

- e. Commercial Blast Cleaning: SP 6.
 - f. Brush-Off Blast Cleaning: SP 7.
 - g. Pickling: SP 8.
 - h. Near-White Blast Cleaning: SP 10.
 - i. Power Tool Cleaning to Bare Metal: SP 11.
2. The words "solvent cleaning," "hand tool cleaning," "wire brushing," and "blast cleaning," or similar words of equal intent in these Specifications or in paint manufacturer's specifications refer to the applicable SSPC Specifications.
3. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Coating manufacturers' recommendations for wet blast additives and first coat application shall apply.
4. DeLavaud Process Ductile Iron Pipe:
 - a. Use SSPC SP grades as guide only.
 - b. For high performance (epoxy) coatings, follow recommendations of pipe and coating manufacturers.
 - c. For conventional (alkyd) coatings, clean asphalt varnish supplied on pipe and apply one full coat of a tar stop before two full coats of the color coats specified.
5. Ductile Iron Pipe Supplied with Asphaltic Varnish Finish: Reference existing surfaces to be painted.
6. Hand tool clean areas that cannot be cleaned by power tool cleaning.
7. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.
8. Welds and Adjacent Areas:
 - a. Prepare such that there is:
 - 1) No undercutting or reverse ridges on weld bead.
 - 2) No weld spatter on or adjacent to weld or any other area to be painted.
 - 3) No sharp peaks or ridges along weld bead.
 - b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
9. Preblast Cleaning Requirements:
 - a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
 - b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
 - c. Clean small isolated areas as above or solvent clean with suitable solvents and clean cloths.
10. Blast Cleaning Requirements:
 - a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer's recommendations.

- b. Select type and size of abrasive to produce a surface profile that meets coating manufacturer's recommendations for particular primer to be used.
 - c. Use only dry blast cleaning methods.
 - d. Do not reuse abrasive, except for designed recyclable systems.
 - e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space entry (if required), and disposition of spent aggregate and debris.
 - 11. Post-Blast Cleaning and Other Cleaning Requirements:
 - a. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wipe with a tack cloth.
 - b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.
- B. Concrete Surfaces:
- 1. Do not begin until 30 days after concrete has been placed.
 - 2. Remove grease, oil, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent, or other suitable cleaning methods.
 - 3. Brushoff blast clean to remove loose concrete and provide a tooth for binding. Upon approval by OWNER, surface may be cleaned by acid etching method. Approval subject to producing desired profile.
 - 4. Secure coating manufacturer's recommendations for additional preparation if required for excessive bug holes exposed after blasting.
 - 5. Unless otherwise required for proper adhesion, ensure surfaces are dry prior to painting.
- C. Existing Surfaces to be Painted:
- 1. Detergent wash and freshwater rinse.
 - 2. Clean loose, abraded, or damaged coatings to substrate by Hand or Power Tool, SP 2 or SP 3.
 - 3. Feather surrounding intact coating.
 - 4. Apply one spot coat of the specified primer to bare areas, overlapping prepared existing coating.
 - 5. Apply one full finish coat of the specified primer or finish coat(s) overall.
 - 6. If an aged, plural-component material is to be topcoated, contact coating manufacturer concerned for additional surface preparation requirements.
 - 7. For ductile iron pipe with asphaltic varnish finish, apply a coat of tar stop seal coat prior to application of a cosmetic finish coat.
 - 8. Application of Cosmetic Coat:

- a. It is assumed that existing coatings have oxidized sufficiently to prevent lifting or peeling when overcoated with paints specified.
 - b. Check compatibility by application to a small area prior to starting painting.
 - c. If lifting or other problems occur, request disposition from OWNER.
9. Perform blasting as required to restore damaged surfaces. Materials, equipment, procedures shall meet requirements of Steel Structures Painting Council.

3.4 SURFACE CLEANING METHODS

A. Brushoff Blast Cleaning:

1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC-SP 7, Brushoff Blast Cleaning.
2. Abrasive: Either wet or dry blasting sand, grit, or nut shell.
3. Select various surface preparation parameters such as size and hardness of abrasive, nozzle size, air pressure, and nozzle distance from surface such that surface is cleaned without pitting, chipping, or other damage.
4. Verify parameter selection by blast cleaning a trial area that will not be exposed to view.
5. OWNER will approve acceptable trial blast cleaned area and will use area as a representative sample of surface preparation.
6. Repair or replace surfaces damaged by blast cleaning.

B. Acid Etching:

1. After precleaning, spread the following solution by brush or plastic sprinkling can: 1-part commercial muriatic acid reduced by 2 parts water by volume. Adding acid to water in these proportions gives an approximate 10 percent solution of HCl.
2. Application:
 - a. Application Rate: Approximately 2 gallons per 100 square feet.
 - b. Work acid solution into surface by hard-bristled brushes or brooms until complete wetting and coverage is obtained.
 - c. Acid will react vigorously for a few minutes, during which time brushing is continued.
 - d. After bubbling subsides (10 minutes), hose down the remaining slurry with high pressure clean water.
 - e. Rinse immediately to avoid formation on the surface of salts that are difficult to remove.
 - f. Thoroughly rinse to remove any residual acid surface condition which can impair adhesion.
3. Ensure surface is completely dry before application of coating.
4. Apply acid etching, to obtain a "grit sandpaper" surface profile. If not, repeat treatment.

C. Solvent Cleaning:

1. Consists of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by using solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods which involve a solvent or cleaning action.
2. Meets requirements of SSPC-SP 1.

3.5 APPLICATION

A. General:

1. For coatings subject to immersion, obtain full cure for completed system. Consult coatings manufacturer's written instructions for these requirements. Do not immerse coating for any purpose until completion of curing cycle.
2. Apply coatings in accordance with these Specifications and the paint manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.
3. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
4. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
5. Fusion Bonded Coatings Method Application: Electrostatic, fluidized bed, or flocking.
6. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
7. On pipelines, terminate coatings along pipe runs to 1 inch inside pipe penetrations.
8. Keep paint materials sealed when not in use.
9. Where more than one coat of a material is applied within a given system, alternate color to provide a visual reference that the required number of coats have been applied.

B. Shop Primed and Factory Finished Surfaces:

1. Schedule inspection with OWNER before shop priming or top-coating factory finished items delivered to site.
2. Prepare surfaces and spot prime using specified primer.
3. Apply mist coat of primer, 1-mil dry film thickness.
4. After welding, prepare and prime holdback areas as required for paint system. Apply primer in accordance with manufacturer's instructions.

C. Manufacturer Applied Paint Systems:

1. Repair abraded areas on factory finished items as recommended by manufacturer.
2. Carefully blend repaired areas into original finish.
3. Fusion Bonded Coatings: Provide appropriate liquid repair kits for field use.

D. Film Thickness:

1. Number of Coats: Minimum required without regard to coating thickness. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturers' products, and atmospheric conditions.
2. Maximum film build per coat shall not exceed coating manufacturer's recommendations.
3. Film Thickness Measurements and Electrical Inspection of Coated Surfaces:
 - a. Perform with properly calibrated instruments.
 - b. Recoat and repair as necessary for compliance with the Specifications.
 - c. All coats are subject to inspection by OWNER and coating manufacturer's representative.
4. Visually inspect concrete, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.
5. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.
6. Thickness Testing:
 - a. After repaired and recoated areas have dried sufficiently, final tests will be conducted by the OWNER.
 - b. Measure coating thickness specified in mils with a magnetic type dry film thickness gauge.
 - c. Test finish coat, except zinc primer, galvanizing, and elastomeric coatings in excess of 25 mils dry, for holidays and discontinuities with an electrical holiday detector.
 - d. Holiday detect coatings in excess of 25 mils dry with high voltage units recommended by the coating manufacturer.
 - e. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after application of coating.

E. Porous Surfaces, Such As Concrete, Masonry:

1. Filler/Surfacer: Use coating manufacturer's recommended product to fill air holes, bug holes, and other surface defects.
2. Prime Coat: May be thinned to provide maximum penetration and adhesion.

3. Type and Amount of Thinning: Determined by paint manufacturer and dependent on surface density and type of coating.
4. Surfaces Specified to Receive Water Base Coating: Damp, but free of running water, just prior to application of coating.

F. Damaged Coatings, Pinholes, and Holidays:

1. Feather edges and repair in accordance with recommendations of paint manufacturer.
2. Apply finish coats, including touchup and damage-repair coats in a manner which will present a uniform texture and color-matched appearance.

G. Unsatisfactory Application:

1. If item has an improper finish color, or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.
2. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather the edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.
3. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.
4. Repair defects in accordance with written recommendations of coating manufacturer.
5. Leave staging and lighting up until OWNER has inspected surface or coating. Replace staging removed prior to approval by OWNER. Provide additional staging and lighting as requested by OWNER.

3.6 FIELD QUALITY CONTROL

A. Testing Gauges:

1. Provide a magnetic type dry film thickness gauge to test coating thickness specified in mils, as manufactured by Nordson Corp., Anaheim, CA, Mikrotest.
2. Provide an electrical holiday detector, low voltage, wet sponge type to test finish coat, except zinc primer, high-build elastomeric coatings, and galvanizing, for holidays and discontinuities as manufactured by Tinker and Rasor, San Gabriel, CA, Model M-1.
3. Provide a high voltage holiday detector for elastomeric coatings in excess of 25 mils dry film thickness. Unit to be as recommended by the coating manufacturer.

3.7 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at site in accordance with Section 01640, MANUFACTURERS' SERVICES, for installation assistance, inspection, and certification of installation.

3.8 CLEANUP

- A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at the end of each day.
- B. Upon completion of the Work, remove staging, scaffolding, and containers from the site or destroy in a legal manner.
- C. Completely remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

3.9 PROTECTIVE COATINGS SYSTEMS

- A. System No. 2 Submerged Metal-Domestic Sewage:

Surface Prep.	Paint Material	Min. Coats, Cover
Abrasive Blast, or Centrifugal Wheel Blast (SP 5)	Prime in accordance with manufacturer's recommendations	
	Coal-Tar Epoxy	2 coats, 16 MDFT

- B. System No. 5 Exposed Metal-Mildly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
Abrasive Blast, or Centrifugal Wheel Blast (SP 10)	Polyamide, Anticorrosive Epoxy Primer	1 coat, 2.5 MDFT
	Polyurethane Enamel	1 coat, 3 MDFT

- C. System No. 19 Domestic Sewage:

Surface Prep.	Paint Material	Min. Coats, Cover
Interior Surfaces: Concrete, ductile iron pipe and fittings	Prime in accordance with manufacturer's recommendations	

Surface Prep.	Paint Material	Min. Coats, Cover
	Concrete: 100 percent solids epoxy with cement liner	2 coats, 50 MDFT each
	Pipe and Fittings: Ceramic epoxy	1 coat, 40 MDFT

- D. System No. 27 Aluminum and Dissimilar Metal Insulation:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1)	Wash Primer	1 coat, 0.4 MDFT
	Bituminous Paint	1 coat, 10 MDFT

3.10 APPLICATION SCHEDULE

- A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from OWNER before starting work in question.
- B. System No. 2 Submerged Metal-Domestic Sewage: Use on the following items or areas:
1. Metal surfaces new below a plane 1 foot above maximum liquid surface, metal surfaces above maximum liquid surface that are a part of immersed equipment, concrete embedded surfaces of metallic items, such as wall pipes, pipes, pipe sleeves, access manholes, gate guides and thimbles, and structural steel.
- C. System No. 5 Exposed Metal-Mildly Corrosive: Use on the following items or areas:
1. Exterior atmospherically exposed ferrous metal surfaces of pipe, fittings, valves, and related items located inside or outside of structures and exposed to weather or in a highly humid atmosphere, such as pipe galleries, valve vaults, and similar areas.
- D. System No. 19 Lining-Domestic Sewage: Use on the following items or areas:
1. 100 Percent Solids Epoxy with Cement Liner: Concrete surfaces below a plane 1 foot above maximum liquid surface, and the following specific surfaces:
 - a. Wetwell interiors - rehabilitated.

- b. Manhole interiors - rehabilitated.
- 2. Ceramic Epoxy: Ductile iron pipes and fittings - interior lining.
- E. System No. 27 Aluminum and Dissimilar Metal Insulation: Use on aluminum surfaces embedded or in contact with concrete.
- F. Surfaces Not Requiring Painting: Unless otherwise stated or shown, the following areas or items will not require painting or coating:
 - 1. Concrete and masonry surfaces (not including the Generator Building).
 - 2. Reinforcing steel.
 - 3. Nonferrous and corrosion-resistant ferrous alloys such as copper, bronze, monel, aluminum, chromium plate, atmospherically exposed weathering steel, and stainless steel, except where:
 - a. Required for electrical insulation between dissimilar metals.
 - b. Aluminum and stainless steel are embedded in concrete or masonry, or aluminum is in contact with concrete or masonry.
 - c. Color coding of equipment and piping is required.
 - 4. Nonmetallic materials such as glass, PVC, wood, porcelain, and plastic (FRP) except as required for architectural painting or color coding.
 - 5. Prefinished electrical and architectural items such as motor control centers, switchboards, switchgear, panelboards, transformers, disconnect switches (if prefinished in OSHA yellow), acoustical tile, cabinets, elevators, building louvers, and wall panels; color coding of equipment is required.
 - 6. Non-submerged electrical conduits attached to unpainted concrete surfaces.
 - 7. Cathodic protection anodes.
 - 8. Items specified to be galvanized after fabrication, unless specified elsewhere or subject to immersion.
 - 9. Insulated piping and insulated piping with jacket will not require exterior coating, except as required for architectural painting or color coding.

3.11 COLORS

- A. Colors: Selected by OWNER or OWNER.
- B. Proprietary identification of colors is for identification only. Selected manufacturer may supply matches.
- C. Equipment Colors:
 - 1. Equipment includes the machinery or vessel itself plus the structural supports and fasteners and attached electrical conduits.
 - 2. Paint equipment and piping one color as selected.
 - 3. Paint non-submerged portions of equipment the same color as the piping it serves, except as itemized below:

- a. Dangerous Parts of Equipment and Machinery: OSHA Orange.
- b. Physical hazards in normal operating area and energy lockout devices, including, but not limited to, electrical disconnects for equipment and equipment isolation valves in air and liquid lines under pressure: OSHA Yellow.

3.12 SUPPLEMENTS

A. The supplement listed below, following "END OF SECTION," are part of this Specification.

- 1. Paint System Data Sheet.

END OF SECTION

PAINT SYSTEM DATA SHEET

Complete and attach manufacturer's Technical Data Sheet to this PSDS for each coating system.

Paint System Number (from Spec):		
Paint System Title (from Spec):		
Coating Supplier:		
Representative:		
Surface Preparation:		
Paint Material (Generic)	Product Name/Number (Proprietary)	Min. Coats, Coverage

SECTION 09972
COATINGS - MORTAR/EPOXY LINER FOR CONCRETE LIFT
STATION WET-WELLS

PART 1 - GENERAL

1.01 SCOPE

- A. Furnish all labor, surface preparation and coating material, tools, rigging, harness, lighting, ventilation, gas monitor and other related items of equipment and materials necessary to clean, prepare, cure, coat and cleanup a complete coating system on all structures and/or equipment as specified or shown on the drawings.
- B. The work includes coating (application of corrosion barrier system) the interior surface of existing and/or new lift station wet-wells. These areas are located within confined space areas. All workers must be confined space certified prior to starting all work. All workers shall abide by OSHA 1910.146.
- C. Clean, prepare, and coat all surfaces in strict accordance with the manufacturer's published recommendations and specifications.
- D. Perform all work by the use of skilled work persons in a safe and productive manner using equipment and procedures consistent with good coating practices.

1.02 RELATED SECTIONS

- A. Section 01300: Submittals

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Prior to preconstruction meeting submit a certification stating the applicator is:
 - 1. Currently approved by the Manufacturer of the specified products.
 - 2. Licensed and qualified in the application of the specified products.

2.02 QUALITY ASSURANCE

- A. Preconstruction meeting: A preconstruction meeting shall be held prior to start of any application of restoration and corrosion barrier system. The CITY is responsible for scheduling the meeting. The attendance of the Applicator, Underground Contractor and CITY Construction Coordinator is required. During the meeting, the process of preparation, application, curing, field inspection and coordination with other work shall be reviewed.
- B. The approved specified products shall be applied in accordance with the Manufacturer's recommendations unless noted otherwise in this specification.
- C. Material delivered to the site shall be in Manufacturer's original, unopened containers and packaging, with label clearly identifying product name and Manufacturer, batch and lot number, and expiration date as applicable. The material shall be protected during storage, handling and application to prevent damage.
- D. The liner manufacturer shall warrant the corrosion barrier system for five (5) years from the time of:
 - 1. First permanent service activation discharging wastewater into the new structure.
- E. The liner manufacturer shall warrant the corrosion barrier system for all labor and materials cost necessary to repair or replace the failed application, including related work (permits, bypass piping, pumps, flow monitoring, restoration, and record information).

2.03 ENVIRONMENTAL CONDITIONS

- A. Do not apply materials under the following conditions:
 - 1. Temperature exceeding the Manufacturer's recommended maximum or minimum allowable.
 - 2. Overflowing water condition

2.04 APPROVED PRODUCTS

- 1. Restoration and Corrosion Barrier System – 100% Solids Epoxy System
 - a. Penetrating Epoxy Primer/Sealer
 - 1) Compatible with Corrosion Barrier Topcoat
 - 2) Composition: 100% solids epoxy
 - 3) Number of components: 2

- b. Penetrating Epoxy Primer/Sealer
 - 1) Compatible with Corrosion Barrier Topcoat
 - 2) Composition: 100% solids epoxy
 - 3) Number of components: 2
- c. Corrosion Barrier Topcoat
 - 1) Composition: 100 percent solids, modified epoxy sprayable coating
 - 2) Thickness: min. of 100 mils in 1 or 2 coats (dry film thickness)
 - 3) Number of components: 2
 - 4) Finish: Gloss
 - 5) Color: White or Gray
- d. Approved products for corrosion barrier systems are Mainstay or equal. Mainstay (DS-5 Epoxy Coating) is manufactured by Madewell Products Corporations, Inc.

Madewell Products Corporation

P.O.Box 902

Roswell, Georgia 30077

(770)-475-8199

(770)-475-8167 Fax

2. Cementitious Corrosion Barrier System

- a. General:
 - 1) Materials for the cementitious corrosion barrier system shall be supplied from a single Manufacturer.
- b. The cementitious corrosion barrier system shall be a pre-packaged ready to use, fiber reinforced, high strength (min. 6,000 psi compressive strength) gunite material.
- c. The cementitious corrosion barrier system shall be comprised of 100% pure calcium aluminate with an aggregate size passing a #8 mesh dry sieve or finer.
- d. The product shall contain no calcium sulfate, calcium chloride, tricalcium aluminate, lime hydrates or aggressive agents which can attack reinforcing steel. The product shall not release calcium hydroxide as a hydration product.
- e. The cementitious coating system shall be applied using dry gunite or low pressure, wet shotcrete equipment. The hand application or finish troweling of the product will not be permitted.
- f. The total thickness of the cementitious corrosion barrier system shall be a minimum of ½-inch for new structures or minimum 1-inch for existing structures to be rehabilitated.

- g. Approved products for corrosion barrier systems are SEWPERCOAT PG, no substitutions. SEWPERCOAT PG is manufactured by Kerneos, Inc.

Kerneos, Inc.

1316 Priority Lane
Chesapeake, VA 23324
(757) 284 - 3200
(757) 284 – 3300 Fax

- h. Water: Any water used for the preparation and/or application of the specified corrosion barrier systems shall be potable and clean. All mix proportions shall be in strict accordance with the Manufacturer's preparation requirements.

3. Green Monster Liner (GML) System

- a. Green Monster Liner is a two component, 100% solids, zero VOC pure polyurea (all amine and polyetheramine-based) that has been developed for concrete restoration, steel corrosion protection, as well as waterproofing.
- b. Green Monster Liner System consists of GML 30/60 early high-strength fast set cementitious mortar used as a resurfacer or structural build back material, and Green Monster primer which is a spray applied plural component material that penetrates deep into the pores of the concrete. GML products are a spray applied at 125 mil thickness.
- c. Green Monster Liner shall display excellent resistance, thermal stability, and maintain flexible characteristics preventing cracking which may allow sewer gases to attack the substrate.
- d. Green Monster Liner system is manufactured by GML Coatings, LLC.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Inspect surfaces to receive restoration and corrosion barrier system for leaks, deteriorated concrete, cracks and voids. Notify the CITY Construction Coordinator in writing if surfaces do not meet the minimum conditions as set by the coating Manufacturer. Do not begin surface preparation or application until unacceptable conditions have been corrected. New structures to be inspected and

COATINGS - MORTAR/EPOXY
LINER for CONCRETE LIFT
STATION WET-WELLS

visibly marked by the CITY Construction Coordinator prior to system application.

- B. Give the CITY Construction Coordinator a minimum of two days advance notice of completion of surface preparation and start of application.
- C. Before application of each material, surfaces to be sprayed or coated will be inspected by the CITY Construction Coordinator. Correct defects or deficiencies before application of subsequent material.
- D. Inspection or the waiver of inspection by the CITY Construction Coordinator of any portion of the work shall not relieve the Contractor of responsibility to perform the work as specified.

3.02 SURFACE PREPARATION

- A. Place covers over inverts to isolate the structure receiving the surface restoration.
- B. Place masking tape to protect equipment not intended for spraying/coating.
- C. Prepare surfaces in accordance with manufacturer's instructions.
- D. Cleaning: Clean surfaces by water (minimum 3500 psi) or abrasive blasting, or hand or power tools as required to remove all previously applied coatings, unsound concrete, contaminants, dirt, debris, and deteriorated reinforcing steel, laitance, efflorescence, form oils and spoiled concrete.

3.03 HYDROSTATIC LEAKS

- A. Stop visible hydrostatic leaks by application of hydraulic cement mortar, after completion of surface preparation.
 - 1. Mix only 1 to 2 pounds of mortar at a time.
 - 2. Add water to form a viscous mass with consistency of modeling clay.
 - 3. Apply by hand or trowel.
 - 4. Press mixed material firmly into place, starting at top of leak and working downward.
 - 5. Inject flowing leaks using a suitable polymer gel or foam. Be sure to remove any excess or spilled material and clean/saturate the concrete surface with water prior to application of the restoration mortar.
 - 6. Prepare surfaces to have a minimum profile of 1/16 inch, with aggregate exposed, then remove the water and any loose material.
 - 7. Inspect surfaces for soundness.
 - 8. Saturate all surfaces thoroughly with clean water.
 - 9. Apply mortar as soon as water sheen is no longer visible (saturated surface dry).

3.04 APPLICATION OF CORROSION BARRIER TOPCOAT

- A. Provide mixing and application equipment designed for mixing and spraying epoxy coating.
- B. Apply penetrating Epoxy primer/sealer and corrosion barrier topcoat epoxy to all prepared surfaces in accordance with manufacturer's instructions.
- C. Apply topcoat as soon as possible after application of penetrating Epoxy primer/sealer.
- D. Do not allow surface contamination to the finished primer/sealer before application of topcoat.
- E. Topcoat Thickness: Spray apply a minimum thickness of 100 mils DFT.
- F. Curing of Corrosion Barrier Topcoat
 - 1. Allow a minimum cure time of 24 hours at 70 degrees F.
 - 2. Curing Conditions:
 - a. Shelter system from direct impingement of water until 1 to 3 hours after application of topcoat, depending on substrate temperatures, after which cure sufficiently to be undamaged by water impingement or immersion at ordinary velocities.
 - b. Sanitary Sewer Systems: It may be necessary to plug services or main lines temporarily in order to achieve these environmental conditions.
 - 3. Immersion Service: Reach a tack-free condition before being immersed.
 - 4. Remove any loose debris, plugs, covers and masking prior to inspection.

3.05 FIELD QUALITY CONTROL:

- A. The Contractor shall hire an independent testing laboratory to perform and certify Check the application for minimum thickness of coatings (minimum ½" of restoration mortar, minimum 100 mils MDFT of epoxy topcoat). The test for the topcoat shall consist of five separate spot measurements (average of three readings each), spaced evenly over each 100 square feet of the area to be tested. The average of five spot measurements for each such 100 square foot area shall not be less than 100 mils MDFT. No single spot measurement in any 100 square foot area shall be less than 80 mils MDFT. Any one of three readings which are averaged to produce each spot measurement may underrun be a greater amount. The five-spot measurement shall be made for each 100 square feet of area as follows:
 - 1. Perform minimum 1 set of tests for every manhole, and minimum of three (3) 100 square foot areas shall be randomly selected and

measured for every wet well.

2. If the dry film thickness for any 100 square foot area is not in compliance with the average of 100 mils MDFT, then each 100 square foot area shall be tested. Check the application for holidays using recognized testing procedures and equipment, such as "high voltage holiday detector test."
- B. Coated Surfaces will be rejected by CITY if they fail:
1. To meet the MDFT requirements, or
 2. To stop inflow, infiltration, exfiltration, or
- C. Rejected Coated Surfaces: Coated and rejected areas must be identified and marked. To repair and recoat: sand or grind down to substrate, clean, spray with approved primer/sealer, and recoat with specified corrosion barrier topcoat. Re- inspection will be required.
1. The certified laboratory performing the testing shall issue a written statement the Department confirming the compliance of each structure.
 2. The Department may require that additional testing of the liner be performed at the manufacturer's expense any time during the five-year warranty period. Any deficiencies in performance shall be corrected without delay by the manufacturer's contractor at no cost to the Department.

PART 4 - SAFETY**4.01 GENERAL**

- A. Make all necessary provisions regarding materials, confined space entry, equipment, personnel, procedures, and practices, to assure that the work is done safely and that the working area is maintained free of all health and safety hazards.
- B. Observe manufacturer's health and safety precautions when storing,
- C. Direct personnel's attention to all product warnings and information given on the labels of all products.
- D. Post warning signs outside of the work to appraise personnel of the hazards in the work area.
- E. Remove waste coating materials and contaminated disposable items from the job site and dispose of them at the completion of work each a day.

END OF SECTION

DIVISION 11

EQUIPMENT

SECTION 11305 SUBMERSIBLE PUMPS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The Pumps, Accessories and Control Panel shall be provided as Owner Furnished Equipment (OFE) to the Contractor for installation, testing and startup. The Contractor shall be responsible for coordinating with the OWNER and the Equipment Supplier for the delivery, storage and release of OFE.
- B. The Contractor shall install, test and place in satisfactory operation the lift station and all appurtenant work, complete and operable, all in accordance with the requirements of the Contract Documents.
- C. Those items which are to be provided by Equipment Supplier are listed herein and specifically identified as OFE on the Drawings. The Contractor shall provide all equipment, precast wetwell, piping, electrical and miscellaneous appurtenances necessary for a complete and operable system, whether or not any specific component is shown or specified.
- D. Any electrical equipment supplied shall comply with the U.S. labeling requirements of Division 16.

1.02 RELATED WORK

- A. Section 01550 – Installation of Owner-Furnished Products
- B. Division 5 – Metal Fabrications and Castings
- C. Division 16 – Electrical

1.03 MANUFACTURERS

- A. **The pumps shall be as manufactured by Flygt or City approved equal.**

1.04 SUBMITTALS

- A. The Contractor shall submit to the OWNER complete shop drawings showing details of fabrication, materials of construction, wiring diagrams, installation and leveling data of all items furnished under this Section. The OWNER shall provide copies of approved shop drawings to the Contractor for installation and startup of OFE.

- B. The Contractor shall submit the following shop drawings and information for the OWNER's review and approval:
1. Manufacturer's/suppliers literature, illustrations, specifications and bill of materials for each component of the system.
 2. Dimensions (including anchor bolt layout), materials, size, weight and performance data.
 3. Drawings showing fabrication, assembly, installation and wiring diagrams.
 4. Shop Drawings illustrating installation plans and sections with construction dimensions and requirements, and all other pertinent data necessary for installation and operation of the OFE.
- C. The Equipment Supplier shall submit the following shop drawings and information for the OWNER's review and approval:
1. Data on the characteristics and performance of the pumps. Data shall include guaranteed performance curves, based on actual shop tests of duplicate units, which show that they meet the specified requirements for head, capacity, efficiency, allowable NPSH, allowable suction lift and horsepower. Curves shall be submitted on 8 ½ by 11" sheets.
 2. A list of the Manufacturer's recommended spare parts. Include gaskets, packing, etc. on the list. List bearings by the bearing manufacturer's numbers only.
 3. A complete description of surface preparation and shop prime painting.
- D. The Equipment Supplier shall submit the Operation and Maintenance Manuals for each equipment supplied under this project for the OWNER's review and approval. Operation and Maintenance manuals shall include the following information:
1. A list of each product included, indexed to content of the volume.
 2. List, with each product, name, address and telephone number of:
 - a. Maintenance contractor, as appropriate.
 - b. Local source of supply for parts and replacement.
 3. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
 4. Product Data:
 - a. Include only those sheets which are pertinent to the specific product.
 - b. Annotate each sheet to:
 - 1) Clearly identify specific product or part installed.
 - 2) Clearly identify data applicable to installation.
 - 3) Delete references to inapplicable information.
 5. Drawings
 - a. Supplement product data with drawings as necessary to clearly illustrate:

- 1) Relations of component parts of equipment and systems.
- 2) Control of flow diagrams.
6. Written text, as required to supplement product data for the particular installation:
 - a. Organize in consistent format under separate headings for different procedures.
 - b. Provide logical sequence of instruction for each procedure.
7. Copy of each warranty, bond and service contract issued.
8. Content, for each unit of equipment and system, as appropriate:
 - a. Description of unit and component parts.
 - b. Function, normal operating characteristics, and limiting conditions.
 - c. Performance curves, engineering data and tests.
 - d. Complete nomenclature and commercial number of replaceable parts.
9. Operating procedures.
 - a. Start-up, break-in, routine and normal operating instructions.
 - b. Regulation, control, stopping, shut-down and emergency instructions.
 - c. Special operating instructions.
10. Maintenance Procedures:
 - a. Routine operations.
 - b. Guide to "Troubleshooting.
 - c. Disassembly, repair and reassembly.
 - d. Alignment, adjusting and checking.
11. Servicing and list of lubricants required.
12. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
 - a. Predicted life of parts subject to wear.
 - b. Items recommended to be stocked as parts.
13. Content, for each electric and electronic system, as appropriate:
 - a. Description of system and component parts.
 - b. Function, normal operating characteristics, and limiting conditions.
 - c. Performance curves, engineering data and tests.
 - d. Complete nomenclature and commercial number of replaceable parts.
14. As-installed color-coded wiring diagrams.

1.05 GUARANTEES, WARRANTIES

- A. After completion, the Equipment Supplier shall furnish to the OWNER the manufacturer's written guarantees, that the pumping equipment will operate with the published efficiencies, heads, and flow ranges and meet these specifications. The Contractor shall also furnish the manufacturer's warranties as published in its literature and as specified.

1.06 HARDWARE

- A. All machine bolts, nuts and cap screws shall be of the hex head type and shall be furnished in 316 stainless steel. Hardware requiring special tools or wrenches shall not be used.

1.07 TOOLS, SUPPLIES AND SPARE PARTS

- A. All standard tools, supplies and spare parts required shall be supplied as OFE. Parts shall be completely identified with a numerical system to facilitate parts inventory, control and stocking. Each part shall be properly identified by a separate number, and those parts which are identical for more than one size unit shall have the same number. The following shall be supplied for each pumping system:
 - 1. Two (2) sets of all special tools required for normal operation and maintenance shall be provided. All such tools shall be furnished in a suitable steel tool chest complete with lock and duplicate keys.
 - 2. One (1) complete set of gaskets, "O"-Rings, etc. for each pump station.
- B. Spare parts lists, included with the shop drawings submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- C. All spare parts shall be properly protected for long periods of storage and packed in containers which are clearly identified with indelible markings as to the contents.

1.08 SHOP PAINTING

- A. Pumps and motor assemblies provide as OFE by the Equipment Supplier shall be delivered to the site pre-painted in accordance with the following criteria: before exposure to weather and prior to shop painting, all surfaces shall be thoroughly cleaned, dry and free from all mill/scale, rust, grease, dirt and other foreign matter.
- B. All pumps and motors shall have an epoxy coating finish.
- C. Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during periods of storage and erection and shall be satisfactory to the OWNER up to the time of the final acceptance.

PART 2 - PRODUCTS

2.01 PUMPS AND CONTROL PANELS

- A. The pumps and control panel shall be supplied by the OWNER.

2.02 INSTRUMENTATION EQUIPMENT

A. Pressure Gauge:

1. General:
 - a. Function: Pressure indication.
 - b. Type:
 - 1) Direct reading bellows for ranges below 10 psig.
 - 2) Bourdon tube actuated for ranges 10 psig and above.
2. Performance:
 - a. Range: As noted. Compound scale when noted.
 - b. Accuracy: Plus or minus 0.5 percent of span.
3. Features:
 - a. Mounting: Lower stem, unless otherwise noted.
 - b. Dial: 4-1/2 inch diameter, unless otherwise noted.
 - c. Case Material: Phenolic plastic, unless otherwise noted.
 - d. Element Material: Phosphor-bronze, unless otherwise noted.
 - e. Dampening: Pulsation dampener (piston type) with multiple choice of piston placement to vary the desired amount of dampening.
 - f. Case Type: Solid front design with solid wall between window and element. Rear of case, gasketed pressure relief.
 - g. Pointer: Micrometer pointer with self-locking adjustment.
 - h. Movement: Stainless steel, rotary geared.
 - i. Liquid Filled Face: Required.
4. Process Connection:
 - a. Line Size: 1/2 inch.
 - b. Connection Type: Threaded.
5. Manufacturers:
 - a. Bellows Type:
 - 1) Ashcroft General Service Series 1180.
 - 2) Robert Shaw Acragage.
 - b. Bourdon Tube Type:
 - 1) Ashcroft Duragauge Model 1279/1379.
 - 2) Robert Shaw Acragage.
 - 3) Marsh Mastergauge.

B. Pressure Seal, Diaphragm:

1. General:
 - a. Function: Isolate sensing element from process fluid.
 - b. Type: Fluid filled, corrosion-resistant.
2. Service:

- a. Pressure: Same as associated sensor.
 - b. Temperature: As noted.
- 3. Features:
 - a. Materials:
 - 1) Lower Housing: Type 316 stainless steel, unless otherwise noted.
 - 2) Diaphragm Material: Type 316 stainless steel, unless otherwise noted.
 - b. Bleed screw in upper housing.
 - c. Fill Fluid: As noted. Factory filled and assembled when possible.
- 4. Process Connections:
 - a. Instrument: 1/2-inch female NPT, unless otherwise noted.
 - b. Process: 1/2-inch female NPT, unless otherwise noted.
 - c. Connection Material: As noted.
- 5. Manufacturers:
 - a. Ametek, Mansfield and Green Division, Type SG.
 - b. Ashcroft, Type 101.

C. High Level

- 1. Roto Float – Normally Open

2.03 ODOR GAS SCRUBBER ASSEMBLY

- A. There shall be supplied and installed at each sewage pump station vent, (1) odor and gas scrubber assembly. Each scrubber shall have an ANSI standard flange of 4" or 6" size. The odor and gas scrubber assembly sizes are as follows:
 - 4" EZ Vent Biovent Package with 12-inch Biovent Cartridge (Model 4"BVC412F)
 - 6" EZ Vent Biovent Package with 12-inch Biovent Cartridge (Model 6"BVC612F)

2.04 SOURCE QUALITY CONTROL

- A. Factory Inspections: Inspect control panels for required construction, electrical connection, and intended function.
- B. Factory Tests and Adjustments: Test all equipment and control panels actually furnished.
- C. Factory Test Report: Include test data sheets, curve test results, performance test logs.
- D. Functional Test: Perform manufacturer's standard.

E. Performance Test:

1. Conduct on each pump.
2. Perform under actual or approved simulated operating conditions.
3. Test for a continuous 3-hour period without malfunction.
4. Test Log: Record the following:
 - a. Total head.
 - b. Capacity.
 - c. Horsepower requirements.
 - d. Driving motor voltage and amperage measured for each phase.
 - e. Throttle discharge valve to obtain pump data points on curve at 2/3, 1/3, and shutoff conditions.

F. Test cables and conductors in accordance with Section 16950, ELECTRICAL TESTING.

2.05 CONTROL PANEL

- A. The pump motor control panel and all related components shall be the responsibility of the pump supplier. Provide a complete control panel and components as shown on the electrical drawings and as specified in Division 16, ELECTRICAL. The panel shall be manufactured with all the specified components, no exceptions. This Section shall have complete responsibility for the supply, manufacturing, coordination with electrical and RTU contractors and all test and startup as specified elsewhere in these Documents.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Pumping equipment shall be installed by the Contractor in accordance with accepted procedures submitted with the shop drawings and as shown on the Drawings.
- B. General installation requirements shall be as specified by the manufacturer's recommendations.

3.02 STARTUP AND TESTING

- A. Contractor shall verify that structures, equipment, pumps and motors are compatible for an efficient and properly operating system.
- B. Contractor shall make equipment adjustments required to place each system in proper operating condition.

- C. The Owner shall contract directly with the pump manufacturer for system startup and testing services for the OFE. Contractor shall coordinate with the pump manufacturer's field services.

*During the operation trip the Contractor, through the manufacturer, shall instruct Owner's personnel as specified in Section 01650 entitled "Facility Startup."

1. Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor.
- D. Contractor shall coordinate the following Performance Testing which shall be performed by the Manufacturer's representative. The operational test shall consist of checking the unit at its rated speed, head, capacity, efficiency and brake horsepower, and at such other conditions of head and capacity to properly establish the performance curve. Signed copies of test curves shall be submitted to the Owner. The Owner shall have access to the raw test data and calculations and shall witness the tests. Contractor shall provide 2-weeks notice to OWNER before testing is performed.
- E. Contractor shall coordinate the following electrical integrity tests which shall be performed by the Manufacturer's representative. The tests shall consist of the following procedures:
1. All motor and cable insulation shall be tested for moisture content and insulation defects prior to pump submergence. A meggar test of each motor shall also be performed.
 2. Prior to submergence, the pump shall run dry to establish correct rotation and mechanical integrity.
 3. After operational test is completed, the insulation shall be retested. A written report stating the foregoing tests that have been conducted shall be submitted to the OWNER with each pump.
 4. Operate each pump for five (5) consecutive hours, during which time no repairs or adjustments shall be required. Demonstrate that each pump starts and stops in response to their level switches or controls. Add clean water to fill each wet well four times each hour to activate the level controls. Repair or adjust equipment until the system functions as installed for the duration of the fire hose test period.

END OF SECTION

DIVISION 15

MECHANICAL

SECTION 15020 PIPE SUPPORTS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall provide all tools, supplies, materials, equipment, and all labor necessary for the furnishing, construction, and installation of all pipe supports, hangers, guides, and anchors shown, specified, or required for a complete and operable piping system, in accordance with the requirements of the Contract Documents.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Commercial Standards
- | | |
|-----------------|--|
| ANSI/ASME B31.1 | Power Piping. |
| ASTM A 123 | Specifications for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip. |

1.03 SUBMITTALS

- A. Shop Drawings
1. The Contractor shall furnish complete shop drawings of all pipe supports, hangers, anchors, and guides, as well as calculations for special supports and anchors, in accordance with Section entitled "Submittals."

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. All supports and parts required for the installation of the piping systems shall conform to the requirements of the ANSI Code for Pressure Piping B-31.1 and MSS Standard practice SP- 58 and SP-69, except as modified and supplemented by the requirements set forth herein. All piping shall be supported in such a manner to fulfill the intent of this Specification.

- B. All piping shall be rigidly supported from the building structure by approved hangers, inserts, or supports. No piping shall be supported from other piping or from metal stairs, ladders, and walkways unless specifically permitted by the OWNER.
- C. Piping supports shall consist of concrete piers or fabricated steel supports as specified below.
- D. Supporting appurtenances shall be arranged to prevent undue stress on equipment to which piping is connected. Supporting appurtenances shall provide the desired pitch as specified or required for proper drainage of the piping. The pipe suspension shall prevent excessive stress, excessive variation in supporting force, and possible resonance with imposed vibration while the system is in operation. All valves and valve operators shall be rigidly supported independently of the piping. Vertical runs of pipe shall be supported independently of the connected horizontal runs. All vertical pipes shall be supported at each floor or at intervals of at least 10 feet by approved pipe collars, clamps, brackets or wall rests. Supporting appurtenances, when used with copper piping, shall be copper, bronze or bronze plated. All piping shall be supported independently of the equipment to which it is connected. All in line devices (flowmeters, etc.) shall be removable without the need for temporary supports for adjacent and connecting piping.
- E. In general, the type of pipe supports to be used shall be as follows unless otherwise shown on the Drawings:

**Height of Centerline
of Pipe Above Floor**

Type of Support

0 - 3 ft.	Concrete Pier
3 - 6 ft.	Adjustable Pipe Saddle or Bracket Supports
Greater than 6 ft.	Hangers

- F. Wall bracket supports shall be used where shown for pipe to be installed adjacent to a wall. Where it is not feasible to install hanger supports, adjustable pipe saddle supports may be used with the permission of the OWNER.
- G. The Contractor shall install pipe supports in conformance with these Specifications unless otherwise shown on the Contract Drawings. Where deviations and modifications are required, they shall be made only with the permission of the OWNER. A detailed layout of pipe supports for each building shall be submitted to the OWNER for review.

- H. For all couplings, supports shall be placed on each side and as close to the coupling as, possible. Supports shall be of the guide type which prevent axial movement resulting in pipe deflection or misalignment.
- I. Structural steel members can be used to support pipe.
- J. Stainless steel piping installed in tanks, channels or conduits shall be supported by hangers, hanger rods, hardware and inserts fabricated of 316 stainless steel.
- K. Where a specific pipe support is called for on the Drawings, this support shall be used as and where indicated for the specific application. In general, spacing of supports shall be as specified herein unless specifically modified by the OWNER.
- L. All support, saddles, bearing plates, and hangers, shall support by direct contact the pipe a minimum of 120 degrees around, except as specified herein.
- M. Where continuous concrete inserts are used, the maximum concentrated load on the end two (2) inches of inserts, with laying lengths of eight (8) inches or longer, shall not be more than 50 percent of the maximum recommended loading of the channel. All pipe supports shall be positioned such that they will not interfere with the use of hoisting equipment, where provided.
- N. Pipes subject to thermal expansion shall be installed perfectly aligned and concentrically guided. These piping (process air, hot water, etc.) support systems shall be roller supports as specified herein and shall be submitted to the OWNER for review. The submittal shall show location of anchors, concentric pipe guides and expansion joints (single or double).

2.02 PIPE ROLLER SUPPORTS

- A. The Contractor shall furnish and install self-lubricating roller supports as specified herein. Roller supports shall be Anvil or equal. Assemblies shall include all directly connected or welded anchorage hardware.
- B. Roller supports shall meet the loading requirements of the design and conforming to the details on the Drawings. The rollers shall have support section fabricated of the same material as is the pipe to be supported, a 300 series stainless steel slide plate, and a carbon steel base to which the Teflon is applied. The support plates at roller supports shall be stitch welded to stainless steel pipe at all roller support locations.
- C. The roller supports shall be installed in the exact locations shown or indicated on the Contract Drawings, at required elevations, true to orientation and level, assuring that the correct half of each roller is in its proper position. The Contractor shall store the rollers to protect them from mechanical damage prior to

installation, and shall protect the same during and after installation from contamination and damage due to placing of concrete and other materials. The Contractor shall clean the operation surfaces of rollers thoroughly before final assembly.

2.03 PIPE SUPPORT SPACING

- A. The distance between supports for each size of pipe shall not exceed those listed in the attached schedule. However, if the pipe size to be supported is not listed in the schedule, the next smaller nominal pipe size spacing shall be used. In all cases, there shall be a minimum of one support per laying length of pipe on uninterrupted horizontal runs. This support shall be placed within one (1) foot of the joint. If the pipe manufacturer recommends a smaller spacing interval than specified herein, then the manufacturer's spacing shall be used.
- B. The distance between supports shall not exceed that listed in the following schedule unless otherwise noted:

<u>Nominal Pipe Size (in.)</u>	<u>Metallic Piping (ft.)</u>	<u>Plastic, Fiberglass and Copper Piping (ft.)</u>
1/2	5	3
3/4 to 1-1/2	6	3
2 to 3	6	4
4	10	5
6 and larger	10	6

2.04 PIPE HANGERS AND HANGER RODS

- A. Where pipe hangers are used, they shall be of the clevis or friction clamp type except where there is longitudinal movement due to temperature changes. Where longitudinal movement occurs, the adjustable yoke roller type hanger shall be used. See the hanger schedule below for location/type of hangers to be used. Pipe hangers shall be capable of supporting the pipe in all conditions of operation. They shall allow free expansion and contraction of the piping, and prevent excessive stress resulting from transferred weight being induced into the pipe or connected equipment.

- B. Hangers shall be designed so that they cannot become disengaged by movements of the supported pipe. Lock nuts shall be used on all hangers. All piping systems shall be supported by means of hangers having an individual means of vertical adjustment for leveling of lines after piping is in place.
- C. Spacing and arrangements shall conform to the requirements of Section 6, Chapter 1 of ANSI B31-1 code for pressure piping. Spacing indicated shall be the maximum spacing.
- D. Hanger rods shall be subject to tensile loading only. At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit swing. Stainless steel hangers required in the pipe hanger schedule shall be supported by hanger rods, hardware and inserts fabricated of 316 stainless steel. All other rods, hardware and inserts shall be fabricated of hot-dip galvanized steel.
- E. All concrete inserts and/or expansion bolts shall be capable of supporting the maximum working load of the rod which is attached to it.
- F. Sheet metal insulation protector saddle shall be used for all hot water piping, refrigerant piping, etc. Saddle shall be Anvil, or equal.
- G. A neoprene isolation pad shall be provided between galvanized clevis and stainless-steel piping.

2.05 SADDLES

- A. Pipe saddles shall be used to cradle horizontal piping when being supported from below except where expansion of pipe requires rollers. All saddles shall be capable of being adjusted after installation.

2.06 BASE ELBOWS, TEES AND CONCRETE PEDESTALS

- A. Base elbows, tees and concrete pedestals shall be provided at the locations shown on the Drawings and as specified. All vertical runs of pipe shall be supported on a base elbow and/or concrete pedestal. After completion of curing of the concrete pedestal, the piping shall be adjusted to the proper grade.

2.07 HARNESSED PIPE SUPPORTS

- A. Pipe harness straps shall be provided on concrete pedestal supports where shown on the Drawings and required by these Specifications.

- B. Harness straps shall be 1/4-inch thick, 316 stainless steel and attached to the concrete pedestal supports by stainless steel anchors.
- C. Strap width shall be in accordance with the Table below:

<u>Pipe Diameter</u>	<u>Strap Width</u>
4 inches and below	2 inches
6 inches and above	3 inches

2.08 METAL FRAMING SYSTEMS

- A. A metal framing system as manufactured by Unistrut, Globe-Strut or approved equal may be used for supporting the piping system. The metal framing system shall be designed and installed according to manufacturer's recommended procedure and shall be capable of supporting the piping system as specified herein.
- B. Channels, inserts and closure strips shall be cold formed mild steel conforming to ASTM A- 245.
- C. Fittings shall be Hot Rolled Steel conforming to ASTM A-30 or ASTM A-245. Fasteners shall conform to ASTM A-30. All pieces shall be hot-dip galvanized after fabrication, unless otherwise noted on the Drawings.

2.09 PLASTIC PIPE SUPPORTS

- A. All pipe supports that will be used with plastic pipe shall be provided with a bearing plate where the width of hanger is less one-half (1/2) of the supported pipe's diameter. The bearing plate must provide bearing 180 degrees around and shall have a minimum laying length of 1/2 the pipe diameter or three (3) inches minimum. The bearing plates shall be rigid, corrosion resistant and not subject to long term plastic flow properties. To assure one hundred (100) percent bearing, the pipe shall be seated on a filler. This material shall be compatible for use with the pipe. Clamps to be used with plastic pipe shall be fitted snug and shall not exert clamp pressure on the pipe.

2.10 THRUST RESTRAINT

- A. Pipe anchors shall be spaced to divide pipe into sections. Anchors shall be located at valves, changes in direction of piping and major branch connections. Anchors shall be of a type recommended by the pipe manufacturer and reviewed by the OWNER.

- B. On all piping where sleeve type couplings and flanged adapters are located near fittings or valves, tie rods shall span across the coupling as specified herein to restrain movements of the pipe along its axial direction. Such restraints can be deleted if both ends of the pipe are anchored in a concrete structure with no fitting or valve occurring within the span length, in the suction piping to a pump where the coupling is between the pump and valve, or when the water pressure measured at the crown of the pipe is less than five (5) feet.
- C. All sleeve type couplings shall be harnessed except where noted. The harnessing shall be as shown on the drawings or as specified herein. Harnesses for steel pipe shall be in accordance with AWWA Manual M11 for the pipe size and pressure, working or test whichever is greater.
- D. Harnesses for ductile iron pipe shall be tie rods spanning between adjacent flanges. Friction clamps shall not be permitted. The size and number of tie rods shall be the same as for steel pipe for the same pressure and pipe size.
- E. Where the distance between adjacent flanges is in excess of ten (10) feet or where a harness cannot be used, the pipe supports adjacent to the coupling shall restrain the piping preventing any linear or angular movement resulting in the pipe separating from the coupling or misalignment in the joint.
- F. Where expansion joints are used, control units shall be provided. All tie rods and control units shall be installed in accordance with the manufacturer's recommended procedures.
- G. Tie rods and associated hardware shall be 316 stainless steel.
- H. In general, all valves and fittings shall be restrained in an approved manner such that the unbalanced force developed at them shall be supported independent of the piping system.

2.11 MANUFACTURED SUPPORTS

- A. Where not specifically shown or detailed, designs, generally accepted as exemplifying good engineering practice, using stock or production parts, shall be utilized wherever possible. Such parts shall be locally available, new, of best commercial quality, designed and rated for the intended purpose.
- B. Support products shall be supplied by the following manufacturers, or equal:
 - 1. Basic Engineers, Pittsburgh, PA;
 - 2. Bergen-Paterson Corp., Boston, MA;
 - 3. Elcen Metal Products Company, Franklin Park, IL;
 - 4. Anvil.

5. NPS Industries, Inc., Secaucus, NJ.

2.12 COATING

- A. Unless otherwise shown or specified, all fabricated pipe supports, other than stainless steel or non-ferrous supports, shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM A 123.
- B. Other than the supports mentioned in Paragraph 2. 12A, all supports shall receive protective coatings in accordance with the requirements of Section entitled "Painting."

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All pipe supports, hangers, brackets, anchors, guides, and inserts shall be fabricated and installed in accordance with the manufacturer's printed instructions and ANSI/ASME B31.1. All concrete inserts for pipe hangers and support shall be coordinated with the formwork.
- B. Pipe supports and hangers shall be positioned in such a way as to produce an orderly, neat piping system. All hanger rods shall be vertical, without offsets. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and venting, as close to ceilings or roofs as possible, without interference with other Work.
- C. The distance between supports for each size of pipe shall not exceed those listed in the attached schedule. However, if the pipe size to be supported is not listed in the schedule, the next smaller nominal pipe size spacing shall be used. In all cases, there shall be a minimum of one support per laying length of pipe on uninterrupted horizontal runs. This support shall be placed within one foot of the joint. If the pipe manufacturer recommends a smaller spacing interval than specified herein, then the manufacturer's spacing shall be used.
- D. Each section of the pipe line shall be laid out and all connections made while the pipe is held in temporary supports. After completion of connections, the pipe may be clamped in position. When piping is correctly installed, a clamp or pipe connection may be loose or removed without displacement of the pipe line.

3.02 FABRICATION

- A. Pipe hangers and supports shall be fabricated and installed by experienced welders and fitters, using the best welding procedures available. Fabricated supports shall be neat in appearance without sharp corners, burrs, and edges.

END OF SECTION

SECTION 15100 VALVES AND OPERATORS

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American National Standards Institute (ANSI):
 - a. B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
 - b. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
2. American Society of Sanitary Engineers (ASSE): 1011, Performance Requirements for Hose Connections Vacuum Breakers.
3. American Society for Testing and Materials (ASTM):
 - a. A276, Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
 - b. A351, Standard Specification for Castings, Austenitic, Austenitic-Ferric (Duplex), for Pressure-Containing Parts.
 - c. B61, Standard Specification for Steam or Valve Bronze Castings.
 - d. B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
 - e. B98, Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
 - f. B127, Standard Specification for Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip.
 - g. B139, Standard Specification for Phosphor Bronze Rod, Bar, and Shapes.
 - h. B164, Standard Specification for Nickel-Copper Alloy Rod, Bar, and Wire.
 - i. B194, Standard Specification for Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar.
 - j. B584, Standard Specification for Copper Alloy Sand Castings for General Applications.
 - k. D429, Test Methods for Rubber Property—Adhesion to Rigid Substrates.
 - l. D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
4. American Water Works Association (AWWA):
 - a. C500, Gate Valves for Water and Sewerage Systems.
 - b. C504, Standard for Rubber-Seated Butterfly Valves.
 - c. C508, Standard for Swing-Check Valves for Waterworks Service, 2 Inch Through 24 Inch NPS.

- d. C509, Resilient-Seated Gate Valves for Water and Sewerage Systems.
- e. C510, Double Check Valve, Backflow-Preventer Assembly.
- f. C511, Required Pressure Backflow-Prevention Assembly.
- g. C540, Power-Actuating Devices for Valves and Sluice Gates.
- h. C550, Protective Epoxy Interior Coatings for Valves and Hydrants.
- i. C606, Grooved and Shouldered Joints.
- j. C800, Underground Service Line Valves and Fittings.
- 5. Manufacturers Standardization Society (MSS):
 - a. SP-81, Stainless Steel, Bonnetless, Flanged Knife Gate Valves.
 - b. SP-88, Diaphragm Type Valves.

1.2 SUBMITTALS

A. Shop Drawings:

- 1. Product data sheets for make and model.
- 2. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.

B. Quality Control Submittals:

- 1. Tests and inspection data.
- 2. Manufacturer's Certificate of Proper Installation.
- 3. Operation and Maintenance Manual.

PART 2 PRODUCTS

2.1 GENERAL

- A. Valve to include operator, actuator, handwheel, chain wheel, extension stem, floor stand, worm and gear operator, operating nut, chain, wrench, and accessories as required for a complete operation.
- B. Valve to be suitable for intended service. Renewable parts not to be of a lower quality than specified.
- C. Valve same size as adjoining pipe.
- D. Valve ends to suit adjacent piping. Valves that fall within the limits of restrained joint piping shall have the valve ends restrained against thrust forces by means of mechanical joint anchor gland devices manufactured by EBBA Iron Inc., MEGALUG, Series 1100; or equal.
- E. Size operator to operate valve for the full range of pressures and velocities.
- F. Valve to open by turning counterclockwise.

G. Factory mount operator, actuator, and accessories.

2.2 MATERIALS

A. Brass and bronze valve components and accessories that have surfaces in contact with water to be alloys containing less than 16 percent zinc and 2 percent aluminum.

B. Approved Alloys are of the Following ASTM Designations:

1. B61, B62, B98 (Alloy UNS No. C65100, C65500, or C66100), B139 (Alloy UNS No. C51000), B584 (Alloy UNS No. C90300 or C94700), B164, B194, and B127.
2. Stainless steel Alloy 18-8 may be substituted for bronze.

2.3 FACTORY FINISHING

A. Epoxy Lining and Coating:

1. Coat all interior and exterior ferrous metal surfaces of buried valves specified in this Section in accordance with AWWA C550. Likewise, coat all interior ferrous metal surfaces of exposed valves.
2. Either two-part liquid material or heat-activated (fusion) material except only heat-activated material if specified as "fusion" or "fusion bonded" epoxy.
3. Minimum 7-mil dry film thickness except where limited by valve operating tolerances.

B. Exposed Valves:

1. In accordance with Section 09900, PAINTING AND PROTECTIVE COATINGS, System No. 5.
2. Safety isolation valves and lockout valves with handles, handwheels, or chain wheels "safety yellow."

2.4 VALVES

A. Gate Valves:

1. Type V100 Gate Valve 3 Inches and Smaller: All-bronze, screwed bonnet, single solid wedge gate, non-rising stem, rated 125-pound SWP, 200-pound WOG.
 - a. Manufacturers and Products:
 - 1) Stockham; B103, threaded end.
 - 2) Crane; 438, threaded end.
 - 3) Stockham; B104, soldered end.
 - 4) Crane; 1324, soldered end.
2. Type V122 Gate Valve 3 Inches and Larger for Buried Service:

- a. Iron body, resilient seated, bronze mounted valves with non-rising stem in accordance with AWWA C509, rated for 200 psi cold water.
- b. Valve shall be seat tested at the rated working pressure of 200 psi with no leakage. Shell test of 400 psi shall be applied to body with valve in the open position with no leakage through the metal, joints, or stem seals.
- c. Resilient seated gate valves to be used in tapping valve service shall conform to AWWA C509, except as modified for passage and clearance of tapping machine cutters. The opening through the valve shall be at least ¼-inch larger than nominal valve diameter. Mating valve flange to the tapping sleeve outlet shall have raised male face for alignment of valve and tapping machine. Tapping valve design shall allow full size cutters to be used. Seating of the disc gate shall not require any sliding or wedging to achieve a zero leakage, bottle-tight seal.
- d. Manufacturers and Products:
 - 1) American Flow Control, Series 2500.
 - 2) Or equal.

B. Ball Valves:

1. Type V300 or V308 Ball Valve 3 Inches and Smaller for General Water and Air Service: All-bronze, three-piece body type, screwed ends, standard bore ports, Teflon seat, blowout-proof stem, hand lever operator, rated 150 psi SWP, 400-pound WOG minimum.
 - a. Manufacturers and Products:
 - 1) Grinnell Supply Sales Co., Figure 3800.
 - 2) Or equal.

C. Plug Valves:

1. Type V405 Eccentric Valve 3 Inches Through 12 Inches:
 - a. Nonlubricated type rated 175 psig CWP, drip-tight shutoff with pressure from either direction, cast iron body with flanged ends or grooved ends in accordance with AWWA C606 for rigid joints, restrained mechanical joint ends for buried valve. Plug cast iron with round or rectangular port of no less than 80 percent of connecting pipe area and coated with Buna-N or Hycar, seats Type 316 stainless steel or nickel, stem bearing self-lubricating stainless steel or reinforced Teflon, stem seal multiple V-rings, U-cups, or O-rings of nitrile rubber, grit seals on stem.
 - b. Valve 3 through 4 inches with wrench lever manual operator. Valve 6 through 12 inches with totally enclosed, geared, manual operator with handwheel, 2-inch nut, or chain wheel.
 - c. Manufacturers and Products:
 - 1) DeZurik; Series 118.

- 2) Or approved equal.
 2. Type V462 Corporation Stop: AWWA C800 type, tapered threaded inlet, except when connecting to tapped fittings which require IPS tapered threads, outlet compression connection or IPS threads to suit connecting pipe, stop 1 inch and smaller rated 100 psi, larger stop rated 80 psi.
 - a. Manufacturers:
 - 1) Ford Meter Box Co.
 - 2) Mueller Co.
- D. Check and Flap Valve:
1. Type V606 Check Valve 2-1/2 Inches Through 12 Inches: Flanged end, cast iron body, bronze mounted swing type, solid bronze hinges, stainless steel hinge shaft, outside lever and weight, heavy duty resilient seat, rated 125-pound SWP, 200-pound WOG.
 - a. Manufacturers and Products:
 - 1) Kennedy
 - 2) Stockham; G-931.
 - 3) Crane Co.; Cat. No. 383.
 2. Type V642 Reduced Pressure Backflow Preventer: Two check valves, independent relief between the valves; NRS isolation gate valve, testing cock, in accordance with AWWA C511, rated 175-pound CWP, meets requirements of USC Cross Connection Control Laboratory.
 - a. Manufacturers and Products:
 - 1) FEBCO; Model 825Y, 825YD.
 - 2) Hersey; Model FRP II, 6CM.

2.5 OPERATORS

A. Manual Operator:

1. General:
 - a. Operator force not to exceed 40 pounds under any operating condition, including initial breakaway. Gear reduction operator when force exceeds 40 pounds.
 - b. Operator self-locking type or equipped with self-locking device.
 - c. Position indicator on quarter-turn valves.
 - d. Worm and gear operators one-piece design worm-gears of gear bronze material. Worm hardened alloy steel with thread ground and polished. Traveling nut type operators threaded steel reach rods with internally threaded bronze or ductile iron nut.
2. Exposed Operator:
 - a. Galvanized and painted handwheels.
 - b. Lever operators allowed on quarter-turn valves 8 inches and smaller.
 - c. Cranks on gear type operators.

- d. Chain wheel operator with tiebacks, extension stem, floor stands, and other accessories to permit operation from normal operation level.
- e. Valve handles to take a padlock, and wheels a chain and padlock.
- 3. Buried Operator:
 - a. Buried service operators on valves larger than 2-1/2 inches shall have a 2-inch AWWA operating nut. Buried operators on valves 2 inches and smaller shall have cross handle for operation by forked key. Enclose moving parts of valve and operator in housing to prevent contact with the soil.
 - b. Design buried service operators for quarter-turn valves to withstand 450 foot-pounds of input torque at the FULLY OPEN or FULLY CLOSED positions, grease packed and gasketed to withstand a submersion in water to 10 psi.
 - c. Buried valves shall have extension stems, bonnets, and valve boxes.

2.6 ACCESSORIES

- A. Tagging: 1-1/2 inch diameter heavy brass or stainless steel tag for each valve operator, bearing the valve tag number shown.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Flange Ends:
 - 1. Flanged valve bolt holes shall straddle vertical centerline of pipe.
 - 2. Clean flanged faces, insert gasket and bolts, and tighten nuts progressively and uniformly.
- B. Screwed Ends:
 - 1. Clean threads by wire brushing or swabbing.
 - 2. Apply joint compound.
- C. Valve Orientation:
 - 1. Install operating stem vertical when valve is installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above finished floor, unless otherwise shown.
 - 2. Install operating stem horizontal in horizontal runs of pipe having centerline elevations between 4 feet 6 inches and 6 feet 9 inches above finish floor, unless otherwise shown.

3. If No Plug Valve Seat Position is Shown, Locate as Follows:
 - a. Horizontal Flow: The flow shall produce an “unseating” pressure, and the plug shall open into the top half of valve.
 - b. Vertical Flow: Install seat in the highest portion of the valve.
- D. Locate valve to provide accessibility for control and maintenance. Install access doors in finished walls and plaster ceilings for valve access.

3.2 TESTS AND INSPECTION

- A. Valve may be either tested while testing pipelines, or as a separate step.
- B. Test that valves open and close smoothly with operating pressure on one side and atmospheric pressure on the other, in both directions for two-way valve and applications.
- C. Inspect air and vacuum valves as pipe is being filled to verify venting and seating is fully functional.
- D. Count and record number of turns to open and close valve; account for any discrepancies with manufacturer's data.
- E. Set, verify, and record set pressures for all relief and regulating valves.

END OF SECTION

SECTION 15992 PIPING LEAKAGE TESTING

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. Chlorine Institute (2001 L Street N.W., Washington D.C. 28036):
Pamphlet 6, Piping Systems for Dry Chlorine.

1.2 SUBMITTALS

A. Quality Control Submittals:

1. Testing Plan: Submit prior to testing and include at least the information that follows.
 - a. Testing dates.
 - b. Piping systems and section(s) to be tested.
 - c. Test type.
 - d. Method of isolation.
 - e. Calculation of maximum allowable leakage for piping section(s) to be tested.
2. Certifications of Calibration: Testing equipment.
3. Certified Test Report.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PREPARATION

A. Notify OWNER in writing 5 days in advance of testing. Perform testing in presence of OWNER.

B. Pressure Piping:

1. Install temporary thrust blocking or other restraint as necessary to protect adjacent piping or equipment and make taps in piping prior to testing.
2. Wait 5 days minimum after concrete thrust blocking is installed to perform pressure tests. If high-early strength cement is used for thrust blocking, wait may be reduced to 2 days.
3. Prior to test, remove or suitably isolate appurtenant instruments or devices that could be damaged by pressure testing.

4. New Piping Connected to Existing Piping:
 - a. Isolate new piping with grooved-end pipe caps, spectacle blinds, blind flanges, or as acceptable to OWNER.
 - b. Test joint between new piping and existing piping by methods that do not place entire existing system under test load, as approved by OWNER.
 5. Items that do not Require Testing Include: Piping between wetwells and wetwell isolation valves, Equipment seal drains, tank overflows to atmospheric vented drains, tank atmospheric vents.
 6. Test Pressure: As specified herein.
- C. Test section may be filled with water and allowed to stand under low pressure prior to testing.
- D. Gravity Piping:
1. Perform testing after service connections, manholes, and backfilling have been completed between stations to be tested.
 2. Determine groundwater level at time of testing by exploratory holes or other method acceptable to OWNER.

3.2 HYDROSTATIC TEST FOR PRESSURE PIPING

- A. Fluid: Clean water of such quality to prevent corrosion of materials in piping system.
- B. Exposed Piping:
1. Perform testing on installed piping prior to application of insulation.
 2. Maximum Filling Velocity: 0.25 foot per second, applied over full area of pipe.
 3. Vent piping during filling. Open vents at high points of piping system or loosen flanges, using at least four bolts, or use equipment vents to purge air pockets.
 4. Maintain hydrostatic test pressure continuously for 60 minutes, minimum, and for such additional time as necessary to conduct examinations for leakage.
 5. Examine joints and connections for leakage.
 6. Correct visible leakage and retest as specified.
 7. Leave pipe full of water after repair of leaks.
- C. Buried Piping:
1. Test after backfilling has been completed.
 2. Expel air from piping system during filling.
 3. Apply and maintain specified test pressure with hydraulic force pump. Valve off piping system when test pressure is reached.

4. Maintain hydrostatic test pressure continuously for 2 hours minimum, reopening isolation valve only as necessary to restore test pressure.
5. Determine actual leakage by measuring quantity of water necessary to maintain specified test pressure for duration of test.
6. Maximum Allowable Leakage:

$$L = \frac{S D(P)^{1/2}}{133,200}$$

where:

L = Allowable leakage, in gallons per hour.
 S = Length of pipe tested, in feet.
 D = Nominal diameter of pipe, in inches.
 P = Test pressure during leakage test, 110 pounds per square inch.

7. Correct leakage greater than allowable, and retest as specified.

3.3 PNEUMATIC TEST FOR PRESSURE PIPING

A. Do Not Perform on:

1. PVC or CPVC pipe.
2. Piping larger than 18 inches.
3. Buried and other nonexposed piping.

B. Fluid: Oil-free, dry air.

C. Procedure:

1. Apply preliminary pneumatic test pressure of 25 psig maximum to piping system prior to final leak testing, to locate visible leaks. Apply soap bubble mixture to joints and connections, examine for leakage.
2. Correct visible leaks and repeat preliminary test until visible leaks are corrected.
3. Gradually increase pressure in system to half of specified test pressure. Thereafter, increase pressure in steps of approximately one-tenth of specified test pressure until required test pressure is reached.
4. Maintain pneumatic test pressure continuously for minimum of 10 minutes and for such additional time as necessary to conduct soap bubble examination for leakage.
5. Correct visible leakage and retest as specified.

- D. Allowable Leakage: Piping system, exclusive of possible localized instances at pump or valve packing, shall show no visual evidence of leakage.
- E. After testing and final cleaning, purge with nitrogen those lines that will carry flammable gases to assure no explosive mixtures will be present in system during filling process.

3.4 HYDROSTATIC TEST FOR GRAVITY PIPING

- A. Testing Equipment Accuracy: Plus or minus 1/2 gallon of water leakage under specified conditions.
- B. Maximum Allowable Leakage: 0.16 gallon per hour per inch diameter per 100 feet. Include service connection footage in test section, subjected to minimum head specified.
- C. Exfiltration Test:
 - 1. Hydrostatic Head:
 - a. At least 6 feet above maximum estimated groundwater level in section being tested.
 - b. No less than 6 feet above inside top of highest section of pipe in test section, including service connections.
 - 2. Length of Pipe Tested: Limit length such that pressure on invert of lower end of section does not exceed 30 feet of water column.
- D. Piping with groundwater infiltration rate greater than allowable leakage rate for exfiltration will be considered *defective* even if pipe previously passed a pressure test.
- E. *Defective* Piping Sections: Replace, and retest as specified.

3.5 FIELD QUALITY CONTROL

- A. Test Report Documentation:
 - 1. Test date.
 - 2. Description and identification of piping tested.
 - 3. Test fluid.
 - 4. Test pressure.
 - 5. Remarks, Including:
 - a. Leaks (type, location).
 - b. Repair/replacement performed to remedy excessive leakage.
 - 6. Signed by CONTRACTOR and OWNER to represent that test has been satisfactorily completed.

END OF SECTION

DIVISION 16

ELECTRICAL

SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

- A. The scope of the Project shall include the complete renovation of each electrical system for the Lift Station Upgrades located in the City of Sunrise Utilities Service areas.
- B. The CONTRACTOR shall provide all the required materials, labor, panels, Remote Telemetry Unit (RTU), controls, instrumentation, hazardous location installations, mounting hardware, electrical utility modifications, and general coordination for a complete electrical system.
- C. The work shall include complete testing of all equipment and wiring at the completion of the work and making any minor connection changes or adjustments necessary for the proper functioning of the system and equipment. All workmanship shall be of the highest quality; sub-standard work will be rejected.
- D. Each bidder or his authorized representative is to visit the job site before preparing his proposal. The submission of the proposal by the bidder shall be considered evidence that he has visited the site and noted the locations and conditions under which the work will be performed and that he takes full responsibility for complete knowledge of all factors governing his work.
- E. It is the intent of these specifications that the electrical system shall be suitable in every way for the service required. All material and all work, which may be reasonably implied as being incidental to the work of this section, shall be furnished at no extra cost.

1.02 RELATED SECTIONS

- A. Requirements specified within this Section apply to all sections in Division 16, ELECTRICAL. Work specified herein shall be performed as if specified in the individual sections.
- B. Pump control panel as shown on Drawings.

1.03 ELECTRICAL COORDINATION

- A. The CONTRACTOR shall coordinate the installation of 480V, 3-phase service with Florida Power & Light, as required.
- B. Electric Utility Project Allowance: An allowance has been made part of the bid for those costs associated with the work of Florida Power & Light. The money in this allowance shall only be used for fee charged by Florida Power & Light. The CONTRACTOR shall pay all fees charged by Florida Power & Light and be reimbursed by this allowance. No other costs will be paid from this allowance. The CONTRACTOR shall pay all costs associated with the conduit, cable/wire, and equipment to provide new electrical service to the proposed lift stations as shown and described herein.
- C. The CONTRACTOR shall be responsible for coordinating all electrical utility requirements with the Florida Power & Light. The CONTRACTOR shall notify Florida Power & Light of all service upgrades and work that needs to be performed. For work on this project, the CONTRACTOR shall coordinate with the Florida Power & Light Service Area Coordinator.

1.04 SUBMITTALS

- A. Quality Control Submittals:
 - 1. Control Panel
 - 2. Control devices
 - 3. Raceways and fittings
 - 4. Factory test certification and reports for all major electrical equipment
 - 5. Conductors
 - 6. RTU and antenna
 - 7. Meter can
 - 8. Disconnect switch
 - 9. Surge protection devices
 - 10. Electrical equipment rack and antenna with structural engineering wind load certification.

1.05 ENVIRONMENTAL CONDITIONS

- A. The lift station wet wells are classified as hazardous, Class 1, Division 1. Refer to the Drawings for hazardous locations above grade.

1.06 INTERPRETATION OF DRAWINGS

- A. The Drawings are not intended to show exact locations of conduit runs.

- B. All three-phase circuits shall be run in separate conduits unless otherwise shown on the Drawings.
- C. Unless otherwise approved by the OWNER, conduit shown exposed shall be installed exposed; conduit shown concealed shall be installed concealed.
- D. Where circuits are shown as "home-runs," all necessary fittings and boxes shall be provided for a complete raceway installation.
- E. The locations of equipment shown on the Drawings are approximate only. Exact locations shall be as approved by the OWNER during construction. Obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the OWNER and furnish all labor and materials necessary to complete the work in an approved manner.
- F. Circuit layouts shown are not intended to show the number of fittings; or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power and other electrical systems shown. Additional circuits shall be installed wherever needed to conform to the specific requirements of the equipment.
- G. The ratings of motors and other electrically operated devices together with the size shown for their branch circuit conductors and conduits are approximate only and are indicative of the probable power requirements insofar as they can be determined in advance of the purchase of equipment.
- H. All connections to equipment shall be made as shown, specified and directed and in accordance with the approved shop drawings, regardless of the number of conductors shown on the Electrical Drawings.

1.07 RECORD DRAWINGS

- A. As the work progresses, legibly record all field changes on a set of project Contract Drawings. When the project is complete, furnish a complete set of reproducible "As-built" drawings for the Project Record Documents.
- B. As-built drawings shall be provided in 22" x 34" format and AutoCAD format.

1.08 COMPONENT INTERCONNECTIONS

- A. Component equipment furnished under this Specification will not be furnished as integrated systems.

- B. Analyze all systems components and their shop drawings; identify all terminals and prepare drawings or wiring tables necessary for component interconnection.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide materials and equipment listed by UL wherever standards have been established by that agency.
- B. Equipment Finish:
 - 1. Provide manufacturers' standard finish and color, except where specific color is indicated.
 - 2. If manufacturer has no standard color, provide equipment with ANSI No. 61, light gray color.

PART 3 - EXECUTION

3.01 GENERAL

- A. Electrical Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. Install work in accordance with NECA Standard of Installation, unless otherwise specified.
- C. Work shall be directed by a certified Journeyman Electrician meeting all county and city requirements.

3.02 LOAD BALANCE

- A. Drawings and Specifications indicate circuiting to electrical loads and distribution equipment.
- B. Balance electrical load between phases as nearly as possible on switchboards, panelboards, motor control centers, and other equipment where balancing is required.
- C. When loads must be reconnected to different circuits to balance phase loads, maintain accurate record of changes made, and provide circuit directory that lists final circuit arrangement.

3.03 CHECKOUT AND STARTUP

A. Voltage Field Test:

1. Check voltage at point of termination of power company supply system to project when installation is essentially complete and is in operation.
2. Check voltage amplitude and balance between phases for loaded and unloaded conditions.
3. Unbalance Corrections:
 - a. Make written request to power company to correct condition if balance (as defined by NEMA) exceeds 1 percent, or if voltage varies throughout the day and from loaded to unloaded condition more than plus or minus 4 percent of nominal.
 - b. Obtain a written certification from a responsible power company official that the voltage variations and unbalance are within their normal standards if corrections are not made.

B. Equipment Line Current Tests:

1. Check line current in each phase for each piece of equipment.
2. Make line current check after Power Company has made final adjustments to supply voltage magnitude or balance.
3. If any phase current for any piece of equipment is above rated nameplate current, prepare Equipment Line Phase Current Report that identifies cause of problem and corrective action taken.

C. Meg test all conductors and motors with a 500-ohm megger and submit results in writing.

D. Provide qualified electrician as required during test and startup.

END OF SECTION

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

PART 1 - GENERAL

1.01 1.1 SCOPE

- A. The requirements of this specification shall apply to the new electrical distribution system for the OWNER. The end result shall be a fully protected and properly coordinated system with proper arc flash safety labels and personal protective equipment recommendations.
- B. The CONTRACTOR shall furnish a Short-Circuit Study and a Protective Device Coordination Study as described herein. The Protective Device Coordination Study shall begin with the utility company's feeder protective device and include all of the electrical protective devices down to, and including, the main breaker and feeder circuits in each panelboard. The study shall also include all electrical equipment including as applicable to this project, transformers, variable frequency drives, reduced-voltage starters, emergency and/or standby generators, distribution switchgear and protective devices.
- C. The CONTRACTOR shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E® - Electrical Safety in the Workplace, reference Article 130.3 and Annex D.

1.02 1.2 RELATED SECTIONS

- A. Requirements specified within this Section apply to all sections in Division 16, ELECTRICAL. Work specified herein shall be performed as if specified in the individual sections.
- B. Pump control panel as shown on Drawings.

1.03 1.3 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 01420.
- B. The results of the Short-Circuit Study; Protective Device Coordination Study and Arc Flash Analysis shall be summarized in a preliminary and final summary report.
- C. All Power Systems Design & Analysis "source" files in electronic format shall be provided to the OWNER.
- D. The preliminary Short Circuit Study and Protective Device Coordination Study shall be

submitted within 30-days of Notice to Proceed and shall form the basis for approval of all other equipment in the power distribution system.

- E. The CONTRACTOR is expected to review the results of the preliminary Short-Circuit Study and Protective Device Coordination Study against all other applicable shop drawings, including industrial control panels, prior to shop drawing submittal to coordinate appropriate fault duty ratings of all electrical equipment.
- F. The final Short Circuit Study and Protective Device Coordination Study shall incorporate all comments from the shop drawing submittals and include the Arc Flash Analysis.
- G. The CONTRACTOR shall ensure proper, permanent adhesive non-fading and complete Arc Flash warning labels are applied to all appropriate electrical equipment installed under this contract when the final studies have been approved.

PART 2 - PRODUCTS

2.01 2.1 GENERAL

- A. CONTRACTOR shall furnish all field data (feeder cable sizes, approximate feeder length motor data, generator data, existing relay settings, etc.) as required for the power system studies. The Engineer performing the Short Circuit Study, the Protective Device Coordination Study and the Arc Flash Analysis shall furnish the CONTRACTOR with a listing of required data immediately after Contract Award. The CONTRACTOR shall expedite collection of the data to eliminate unnecessary delays and assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.
- A. Source combination may include present and future utility supplies, motors and generators.
- B. Load data utilized may include existing and proposed loads obtained from the Contract Documents provided by the Owner.
- C. Equipment and component titles used in the studies shall be identical to the equipment and component titles shown on the Drawings.
- D. Perform complete fault calculations for all busses on utility and generator power sources. Perform load flow and voltage drop studies for major feeds and with long feeder runs. Analysis shall include expected fault currents at industrial control panels manufactured in accordance with UL 508A and NEC Article 409.

- E. Fault source combinations shall include large motors, large transformers, utility and generator.
 - F. Utilize proposed and existing load data for the study obtained from Contract Documents and field survey. Coordinate with the local power utility for available fault currents.
 - G. Provide a comprehensive document containing the Short Circuit Study, the Protective Device Coordination Study and the Arc Flash Analysis. As a minimum the report structure shall contain:
 - 1. Executive Summary;
 - 2. Methodology;
 - 3. One Line Diagram(s);
 - 4. Short Circuit Analysis;
 - 5. Short Circuit Analysis Results/Conclusions/Recommendations;
 - 6. Protective Device Coordination Analysis;
 - 7. Recommended protective devices settings;
 - 8. Arc Flash Analysis;
 - 9. Arc Flash PPE recommendations;
- B. The Electrical Systems Analysis Software shall be SKM SYSTEM ANALYSIS INC, Power*Tools for Windows, latest edition, no equal.

2.2 STUDY

- A. The short circuit study shall be in accordance with ANSI Standard C37.010 and C37.13, shall be performed to check the adequacy, and to verify the correct application of circuit protective devices and other system components specified. The study shall address the case when the system is being powered from the normal source as well as from the on-site generating facilities. Minimum as well as maximum possible fault conditions shall be adequately covered in the study.
- B. Fault contribution of all motors shall be considered. The CONTRACTOR shall be responsible for obtaining all required data of equipment. All back-up calculations shall become part of the final report. The calculations shall be in sufficient detail to allow easy review.
- C. The flash arc analysis study shall include the calculations of flash protection boundary limits and the incident energy exposure for the maximum arc producing flash expected from the electrical equipment. The study will determine incident energy exposure level and flash arc protection boundaries for the electrical equipment, based on IEEE-1584 and NFPA-70E. The study shall be based on the protective device settings and interrupting device clearing time.

- D. The study shall include representation of the power company's system, the base quantities selected, impedance source-data, calculation methods and tabulations, one-line and impedance diagrams, conclusions and recommendations. Short-circuit momentary duties, shall be calculated on the basis of an assumed bolted three-phase short circuit at each 480-volt switchboard bus, 480-volt motor control center, distribution panelboard, pertinent branch circuit panelboard, and other significant locations throughout the systems. The short circuit tabulations shall include significant X to R ratios, asymmetry factors, KVA, and symmetrical fault current.
- E. A protective device time current coordination study shall be included with coordination plots of key and/or limiting devices, tabulated data, rating, and/or settings selected. The study shall present an Engineering balance between the competing objectives of protection and continuity of service for the system specified, taking-into-account the basic factors of sensitivity, selectivity and speed.
- F. Existing protective device settings in key locations shall be reviewed to ensure selectivity under the new conditions. Recommended changes shall be indicated in the report. The CONTRACTOR shall be made aware of the required changes immediately.
- G. Required settings for breakers and relays shall be maximized to provide the most effective protection possible.
- H. Tabulations indicating recommended set points for all protective devices shall be provided.
- I. Flash Arc study shall include representation of the calculation methods and tabulations, and a one-line drawing of all identifying equipment included in this study. The complete study shall be turned over to the OWNER as per 01420. as part of the study, the Contractor shall affix permanent adhesive non-fading labeling indicating the equipment ID number and required information as required by NFPA 70E. Samples of arc flash warning labels are presented below:

⚠ WARNING	
Arc Flash & Shock Hazard Appropriate PPE Required	
Flash Protection Flash Hazard Category 1 Incident Energy <u>2.8</u> (cal/cm ²)	Shock Protection 480 VAC Shock Hazard When Cover is Removed
Flash Protection Boundary <u>30 inches</u>	Limited Approach Boundary <u>42 inches</u>
Glove Class <u>00</u>	Restricted Approach Boundary <u>12 inches</u>
PPE REQUIRED CAT. 1 OR 2 FR SHIRT & PANTS, AR FACE SHIELD, SAFETY GLASSES, LEATHER GLOVES, EAR PLUGS	Prohibited Approach Boundary <u>1 inch</u>
*Warning: Changes in equipment settings or system configuration will invalidate the calculated values and PPE requirements. Review every 5 yrs.	
Bus Name: <u>CLKR-CLR-EF</u> Prot: <u>PD-CLKR-CLR</u> February 4, 2018	

⚠ WARNING	
Arc Flash and Shock Hazard Appropriate PPE Required	
Arc Flash Protection • Flash Protection Boundary: _____ • Hazard Risk Category: _____ • Incident Energy at 18" (cal/cm ²): _____	Required PPE ☐ Hard Hat ☐ T-shirt ☐ Safety Glasses ☐ FR Shirt ☐ Safety Goggles ☐ FR Pants ☐ Face Shield ☐ FR Coverall ☐ Flash Hood ☐ Flash Suits ☐ Ear Protection ☐ Leather Shoes ☐ Long Pants ☐ Leather Gloves ☐ Long Sleeve Shirt ☐ Cotton Underwear ☐ Voltage Rated Gloves
Shock Protection Shock Hazard when cover is OPENED or REMOVED: _____ • Limited Approach: _____ • Restricted Approach: _____ • Prohibited Approach: _____	
Equipment ID: _____	Date: _____

- C. Motor Current-Time Characteristic Curves. A complete independent set of current-time characteristic curves for all medium voltage motor drives indicating coordination between the protective relays and the thermal characteristics of the motor shall be provided.
- D. The CONTRACTOR shall obtain from the motor supplier, the necessary information to perform the study. Certified curves for, "Safe time vs. current at 100 percent voltage," and "Accelerating time vs. current at 100 percent voltage," shall become part of the final report.
- E. Motor Starting Study. A motor starting study for all large electric drives to determine voltage dip or power inrush limitations at selected locations due to starting of motors shall be provided. This applies to both the normal and the emergency mode.
- F. Generator protective Devices. Not used.
- G. General Information for Time-Current Curves Presentation. The coordination plots shall include complete titles, representative one-line diagrams, legends, associated power company's relay or system characteristics, significant motor starting characteristics, complete parameters for power, and substation transformers, and complete operating bands for low-voltage circuit breaker trip devices.
- H. The coordination plots shall define the types of protective devices selected, together with the proposed coil taps, time-dial settings and pickup settings required.
- I. The short-time region shall indicate the medium voltage relay instantaneous elements, the magnetizing in-rush, and ANSI withstand transformer parameters, the low-voltage circuit breaker instantaneous trip devices, fuse manufacturing to tolerance bands, and significant symmetrical and asymmetrical fault currents.
- J. Each primary protective device required for a delta-to-wye connected transformer shall be selected so that the characteristic or operating band is within the transformer parameters; which, where feasible, shall include a parameter equivalent to 58 percent of the ANSI withstand point to afford protection for secondary line-to-ground faults.
- K. Low-voltage power circuit breakers shall be separated from each other and the associated primary protective device, where feasible, by a 16 percent current margin for coordination and protection in the event of secondary line-to-line faults.
- L. Protective relays shall be separated, where feasible, by a 0.3 second time margin when the maximum three-phase fault flows, to assure proper

selectivity.

PART 3 - EXECUTION

3.01 3.1 GENERAL

- A. Adjust relay and protective devices according to values established by coordination study.
- B. Make minor modifications to equipment as required accomplishing conformance with the Short Circuit Study and Protective Device Coordination Study.
- C. Notify OWNER in writing of any required major equipment Modifications.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. American National Standards Institute (ANSI):
 - a. C55.1, Standard for Shunt Power Capacitors.
 - b. C62.11, Standard for Metal-Oxide Surge Arrestors for AC Circuits.
 - c. Z55.1, Gray Finishes for Industrial Apparatus and Equipment.
 2. American Society for Testing and Materials (ASTM):
 - a. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - b. A240, Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
 - c. A570, Standard Specification for Steel, Sheet, and Strip, Carbon, Hot-Rolled, Structural Quality.
 3. Federal Specifications (FS):
 - a. W-C-596, Connector, Receptacle, Electrical.
 - b. W-S-896E, Switches, Toggle, Flush Mounted.
 4. National Electrical Contractor's Association, Inc. (NECA): 5055, Standard of Installation.
 5. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
 - b. AB 1, Molded Case Circuit Breakers and Molded Case Switches.
 - c. CP 1, Shunt Capacitors.
 - d. ICS 2, Industrial Control Devices, Controllers, and Assemblies.
 - e. KS 1, Enclosed Switches.
 - f. LA 1, Surge Arrestors.
 - g. PB 1, Panelboards.
 - h. ST 20, Dry-Type Transformers for General Applications.
 - i. WD 1, General Requirements for Wiring Devices.
 6. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 7. Underwriters Laboratories, Inc. (UL):
 - a. 67, Standard for Panelboards.

- b. 98, Standard for Enclosed and Dead-Front Switches.
- c. 198C, Standard for Safety High-Interrupting-Capacity Fuses, Current-Limiting Types.
- d. 198E, Standard for Class Q Fuses.
- e. 486E, Standard for Equipment Wiring Terminals.
- f. 489, Standard for Molded Case Circuit Breakers and Circuit Breaker Enclosures.
- g. 508, Standard for Industrial Control Equipment.
- h. 810, Standard for Capacitors.
- i. 943, Standard for Ground-Fault Circuit Interrupters.
- j. 1059, Standard for Terminal Blocks.
- k. 1561, Standard for Dry-Type General-Purpose and Power Transformers.
- l. All county, state, and local specifications.

1.02 SUBMITTALS

A. Shop Drawings:

- 1. Device boxes and fittings for use in hazardous areas.
- 2. Junction and pull boxes used at, or below, grade.
- 3. Terminal junction boxes.
- 4. Panelboards and circuit breaker data.
- 5. Fuses.
- 6. Contactors.
- 7. Transformers.
- 8. Control panel.
- 9. Relays, phase monitors, surge protection, and lightning arrestors.
- 10. RTU/Antenna

1.03 QUALITY ASSURANCE

- A. UL Compliance: Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.
- B. Hazardous Areas: Materials and devices shall be specifically approved for hazardous areas of the class, division, and group shown and of a construction that will ensure safe performance when properly used and maintained.

1.04 COORDINATION

- A. The CONTRACTOR will pay all costs for electrical service to the station as required.

- B. CONTRACTOR shall coordinate contractor activities with the OWNER and electrical utility.

PART 2 - PRODUCTS

2.01 METERING FACILITIES

- A. Furnish materials as required by electric utility for utility's installation of metering equipment, service conductors, and mounting of utility company equipment.

2.02 OUTLET AND DEVICE BOXES

- A. PVC-Coated Cast Metal:

1. Type: One-piece.
2. Material: Malleable iron, cast ferrous metal or cast aluminum.
3. Coating:
 - a. All exterior surfaces; 40-mil PVC.
 - b. All interior surfaces, 2 mils urethane.
4. Manufacturers:
 - a. Robroy Industries.
 - b. Ocal.

2.03 JUNCTION AND PULL BOXES

- A. Outlet Boxes Used as Junction or Pull Box: As specified under Article OUTLET AND DEVICE BOXES.
- B. Cast Metal Box, Hazardous Locations:
1. NEMA 250, Type 7 or 9 as required for Class, Division, and Group involved.
 2. Box: Copper-free aluminum with drilled and tapped conduit entrances.
 3. Cover: Hinged with screws.
 4. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.
 5. Manufacturers and Products:
 - a. Crouse-Hinds; Type EJB.
 - b. Appleton; Type JBEW.
- C. Stainless Steel Box:
1. NEMA 250, Type 4X.

2. Box: 14-gauge, ASTM A240, Type 316 stainless steel with white enamel painted interior mounting panel.
3. Cover: Hinged with clamps.
4. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.
5. Manufacturers:
 - a. Hoffman Engineering Co.
 - b. Robroy Industries.

2.04 WIRING DEVICES

A. Switches:

1. NEMA WD 1 and FS W-S-896E.
2. Specification grade, totally-enclosed, ac type, with quiet tumbler switches and screw terminals.
3. Capable of controlling 100 percent tungsten filament and fluorescent lamp loads.
4. Rating: 20 amps, 120/277 volts.
 - a. Color: Brown.
5. Manufacturers: Hubbell HBL Series.

B. Receptacle, Single and Duplex:

1. NEMA WD 1 and FS W-C-596.
2. Specification grade, two-pole, three-wire grounding type with screw type wire terminals suitable for No. 10 AWG.
3. High strength, thermoplastic base color.
 - a. Color: Brown.
4. Contact Arrangement: Contact to be made on two sides of each inserted blade without detent.
5. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps.
6. Manufacturers: Hubbell 5261, 5262.

C. Receptacle, Ground Fault Circuit Interrupter: Duplex, specification grade, tripping at 5 mA.

1. Color: Brown.
2. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps, capable of interrupting 5,000 amps without damage.
3. Size: For 2-inch by 4-inch outlet boxes.
4. Standard Model: NEMA WD 1, with No. 12 AWG copper USE/RHH/RHW-XLPE insulated pigtails and provisions for testing.
5. Manufacturers: Hubbell 5362/GFI.

2.05 DEVICE PLATES

- A. General: Sectional type plates not permitted.
- B. Metal:
 - 1. Material: Specification grade, one-piece, 0.040-inch nominal thickness stainless steel.
 - 2. Finish: ASTM A167, Type 302/304, satin.
 - 3. Mounting Screw: Oval-head, finish matched to plate.
- C. Weatherproof:
 - 1. For Receptacles: Gasketed, cast metal or stainless steel, with individual cap over each receptacle opening.
 - a. Mounting Screw: Stainless steel.
 - b. Cap Spring: Stainless steel.
 - c. Manufacturers: Hubbell 5400 Series.
 - 2. For Switches: Gasketed, cast metal incorporating external operator for internal switch.
 - a. Mounting Screw: Stainless steel.
 - b. Manufacturers:
 - 1) Crouse-Hinds; DS-181 or DS-185.

2.06 PUSHBUTTON, INDICATING LIGHT, AND SELECTOR SWITCHES

- A. In accordance with Section 16960, LIFT STATION CONTROL CABINET.

2.07 TERMINAL JUNCTION BOX

- A. Box: NEMA 7.
- B. Terminal Blocks: Provide separate connection point for each conductor entering or leaving box. Number all terminals.
 - 1. Spare Terminal Points: 25 percent.
- C. Interior Mounting Panel: Steel with white enamel or paint finish.

2.08 TERMINAL BLOCK (0 TO 600 VOLTS)

- A. In accordance with Section 16960, LIFT STATION CONTROL CABINET.
- B. Marking system allowing use of permanent shrink tube type.

2.09 MAGNETIC CONTROL RELAY

- A. In accordance with Section 16960, LIFT STATION CONTROL CABINET.

2.10 ELAPSED TIME METER

- A. In accordance with Section 16960, LIFT STATION CONTROL CABINET.

2.11 LOW VOLTAGE, SECONDARY SURGE PROTECTIVE EQUIPMENT

- A. In accordance with Section 16960, LIFT STATION CONTROL CABINET.

2.12 INTRINSIC SAFETY BARRIER

- A. In accordance with Section 16960, LIFT STATION CONTROL CABINET.

2.13 NAMEPLATES

- A. Material: Laminated plastic.
- B. Attachment Screws: Stainless steel.
- C. Color: White, engraved to a black core.
- D. Engraving:
 - 1. Pushbuttons/Selector Switches and Pilot Lights: Name of drive controlled on one, two, or three lines, as required.
 - 2. Panelboards: Panelboard designation, service voltage, and phases.
- E. Letter Height:
 - 1. Pushbuttons/Selector Switches: 1/8 inch.
 - 2. Panelboards: 1/4 inch.

2.14 SUPPPORT AND FRAMING CHANNELS

- A. Stainless Steel Framing Channels: Rolled ASTM A167, Type 316 stainless steel, 12 gauge.
- B. Miscellaneous Hardware: Type 316 stainless steel.
- C. Manufacturers:
 - 1. B-Line Systems, Inc.

2. Unistrut Corp.
3. Aickinstrut.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install equipment in accordance with NECA 5055.
- B. Use appropriate conduit and conductor entry fittings with enclosures to maintain the specified enclosure environmental capability after installation.

3.02 OUTLET AND DEVICE BOXES

- A. Install suitable for conditions encountered at each outlet or device in the wiring or raceway system, sized to meet NFPA 70 requirements.

3.03 JUNCTION AND PULL BOXES

- A. Install where shown and where necessary to terminate, tap-off, or redirect multiple conduit runs.
- B. Install pull boxes where necessary in raceway system to facilitate conductor installation.
- C. Install in conduit runs at least every 150 feet or after the equivalent of three right-angle bends.
- D. Use outlet boxes as junction and pull boxes wherever possible and allowed by applicable codes.
- E. Installed boxes shall be accessible.
- F. Do not install on finished surfaces.
- G. Install plumb and level.
- H. Support boxes independently of conduit by attachment to structural member.
- I. Boxes embedded in concrete or masonry need not be additionally supported.
- J. At or Below Grade:
 1. Install boxes for below grade conduits flush with finished grade in locations outside of paved areas, roadways, or walkways.

2. If adjacent structure is available, box may be mounted on structure surface just above finished grade in accessible but unobtrusive location.
 3. Obtain OWNER's written acceptance prior to installation in paved areas, roadways, or walkways.
 4. Use boxes and covers suitable to support anticipated weights.
- K. Mounting Hardware: Type 316L stainless steel.
- L. Location/Type:
1. Outdoor, Wet and Corrosive: NEMA 250, Type 4X.
 2. Underground Conduit: Concrete.

3.04 WIRING DEVICES

- A. Switches:
1. Mounting Height: See Article OUTLET AND DEVICE BOXES.
 2. Install with switch operation in vertical position.
 3. Install single-pole, two-way switches such that toggle is in up position when switch is on.
- B. Receptacles:
1. Install with grounding slot down except where horizontal mounting is shown, in which case install with neutral slot up.
 2. Ground receptacles to boxes with grounding wire only.
 3. Weatherproof Receptacles:
 - a. Install in cast metal box.
 - b. Install such that hinge for protective cover is above receptacle opening.
 4. Special-Purpose Receptacles: Install in accordance with manufacturer's instructions.

3.05 DEVICE PLATES

- A. Securely fasten to wiring device; ensure a tight fit to the box.
- B. Flush Mounted: Install with all four edges in continuous contact with finished wall surfaces without use of mats or similar materials. Plaster fillings will not be acceptable.
- C. Surface Mounted: Plate shall not extend beyond sides of box unless plates have no sharp corners or edges.
- D. Install with alignment tolerance to box of 1/16 inch.

3.06 PUSHBUTTON, INDICATING LIGHT, AND SELECTOR SWITCH

- A. Heavy-Duty, Oiltight Type: Locations (Unless Otherwise Shown): Nonhazardous, indoor, dry locations, including motor control centers, control panels, and individual stations.

3.07 TERMINAL JUNCTION BOX

- A. Install in accordance with Article JUNCTION AND PULL BOXES.
- B. Label each block and terminal with permanently attached, non-destructible tag.

3.08 DRY TYPE TRANSFORMER (0- TO 600-VOLT PRIMARY)

- A. Provide in field panel as shown.
- B. Connect voltage taps to achieve (approximately) rated output voltage under normal plant load conditions.

END OF SECTION

SECTION 16110 RACEWAYS

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American Association of State Highway and Transportation Officials (AASHTO): Division I, Standard Specifications for Highway Bridges, Fourteenth Edition.
2. American National Standards Institute (ANSI):
 - a. C80.1, Rigid Steel Conduit-Zinc Coated.
 - b. C80.3, Electrical Metallic Tubing-Zinc Coated.
 - c. C80.5, Rigid Aluminum Conduit.
 - d. C80.6, Intermediate Metal Conduit (IMC)-Zinc Coated.
3. American Society for Testing and Materials (ASTM):
 - a. A123 E1, Standard Specification for Zinc-Coated (Galvanized) Coatings on Iron and Steel Products.
 - b. C857, Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
4. National Electrical Contractor's Association, Inc. (NECA): 5055, Standard of Installation.
5. National Electrical Manufacturers Association (NEMA):
 - a. RN 1, Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - b. TC 2, Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
 - c. TC 3, PVC Fittings for Use with Rigid PVC Conduit and Tubing.
 - d. TC 6, PVC and ABS Plastic Utilities Duct for Underground Installation.
 - e. VE 1, Metallic Cable Tray Systems.
6. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
7. Underwriters Laboratories, Inc. (UL):
 - a. 1, Standard for Safety Flexible Metal Conduit.
 - b. 6, Standard for Safety Rigid Metal Conduit.
 - c. 360, Standard for Safety Liquid-Tight Flexible Steel Conduit.
 - d. 514B, Standard for Safety Fittings for Conduit and Outlet Boxes.
 - e. 514C, Standard for Safety Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.
 - f. 651, Standard for Safety Schedule 40 and 80 PVC Conduit.
 - g. 651A, Standard for Safety Type EB and Rigid PVC Conduit and HDPF Conduit.
 - h. 797, Standard for Safety Electrical Metallic Tubing.

- i. 870, Standard for Safety Wireways, Auxiliary Gutters, and Associated Fittings.
- j. 1242, Standard for Safety Intermediate Metal Conduit.
- k. 1660, Standard for Safety Liquid-Tight Flexible Nonmetallic Conduit.

1.2 SUBMITTALS

A. Shop Drawings:

- 1. Manufacturer's Literature:
 - a. PVC-coated rigid galvanized steel conduit.
 - b. PVC-coated conduit fittings.
- 2. Precast Manholes and Handholes:
 - a. Dimensional drawings and descriptive literature.
 - b. Traffic loading calculations.
 - c. Accessory information.

1.3 UL COMPLIANCE

- A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 PRODUCTS

2.1 CONDUIT AND TUBING

A. PVC-Coated Rigid Galvanized Steel Conduit:

- 1. Meet requirements of NEMA RN 1.
- 2. Material:
 - a. Conduit: Meet requirements of ANSI C80.1 and UL 6.
 - b. PVC Coating: 40 mils nominal thickness, bonded to metal.
 - c. Coated inside and out.

B. Rigid Nonmetallic Conduit

- 1. Rigid nonmetallic conduit shall be for use under the provisions of NEC Article 347.
- 2. PVC conduit shall be rigid polyvinyl chloride Schedule 80 as manufactured by Carlon, An Indian Head Co., Kraloy Products Co., Inc., Highland Plastics Inc., or approved equal.

C. Liquidtight Flexible Metal Conduit, Couplings and Fittings

- 1. Liquidtight flexible metal conduit shall be for use under the provisions of NEC Article 351A.

2. Liquidtight flexible metal conduit shall be Sealtite, Type UA, manufactured by the Anaconda Metal Hose Div., Anaconda American Brass Co., American Flexible Conduit Co., Inc., Universal Metal Hose Co., or approved equal.
3. Fittings used with liquidtight flexible metal conduit shall be of the screw-in type as manufactured by the Thomas and Betts Co., Crouse-Hinds Co., or approved equal.

2.2 FITTINGS

A. PVC-Coated Rigid Galvanized Steel Conduit:

1. Meet requirements of UL 514B.
2. Fittings: Rigid galvanized steel type, PVC coated by conduit manufacturer.
3. Conduit Bodies: Cast metal hot-dipped galvanized or urethane finish. Cover shall be of same material as conduit body. PVC coated by conduit manufacturer.
4. Finish: 40-mil PVC exterior, 2-mil urethane interior.
5. Overlapping pressure sealing sleeves.
6. Conduit Hangers, Attachments, and Accessories: PVC-coated.
7. Manufacturers:
 - a. Robroy Industries.
 - b. Ocal.
8. Expansion Fitting Manufacturer and Product: Ocal; OCAL-BLUE XJG.

B. Watertight Entrance Seal Device:

1. New Construction:
 - a. Material: Oversized sleeve, malleable iron body with sealing ring, pressure ring, grommet seal, and pressure clamp.
 - b. Manufacturer: O.Z. Gedney; Type FSK or WSK, as required.
2. Cored-Hole Application:
 - a. Material: Assembled dual pressure disks, neoprene sealing ring, and membrane clamp.
 - b. Manufacturer: O.Z. Gedney; Series CSM.

C. Corrosive Locations:

1. Material: 40-mil PVC-coated rigid steel.
2. Manufacturers: Robroy Industries.

2.3 ACCESSORIES

A. Identification Devices:

1. Warning Tape:

- a. Material: Polyethylene, 4-mil gauge.
- b. Color: Red.
- c. Width: Minimum 3 inch.
- d. Designation: Warning on tape that electric circuit is located below tape.
- e. Manufacturers:
 - 1) Blackburn, Type RT.
 - 2) Griffolyn Co.

PART 3 EXECUTION

3.1 GENERAL

- A. Conduit and Tubing sizes shown are based on the use of copper conductors. Reference Section 16120, CONDUCTORS, concerning conduit sizing for aluminum conductors.
- B. All installed Work shall comply with NECA 5055.
- C. Crushed or deformed raceways not permitted.
- D. Maintain raceway entirely free of obstructions and moisture.
- E. Immediately after installation, plug or cap raceway ends with watertight and dust-tight seals until time for pulling in conductors.
- F. Sealing Fittings: Provide drain seal in vertical raceways where condensate may collect above sealing fitting.
- G. Avoid moisture traps where possible. When unavoidable in exposed conduit runs, provide junction box and drain fitting at conduit low point.
- H. Group raceways installed in same area.
- I. Follow structural surface contours when installing exposed raceways. Avoid obstruction of passageways.
- J. Run exposed raceways parallel or perpendicular to walls, structural members, or intersections of vertical planes.
- K. Install watertight fittings in outdoor, underground, or wet locations.
- L. All metal conduit to be reamed, burrs removed, and cleaned before installation of conductors, wires, or cables.
- M. Do not install raceways in concrete equipment pads, foundations, or beams.
- N. Horizontal raceways installed under floor slabs shall lie completely under slab, with no part embedded within slab.

- O. Install concealed, embedded, and buried raceways so that they emerge at right angles to surface and have no curved portion exposed.

3.2 INSTALLATION IN CAST-IN-PLACE STRUCTURAL CONCRETE

- A. Minimum cover 1-1/2 inches.
- B. Provide support during placement of concrete to ensure raceways remain in position.
- C. Floor Slabs:
 - 1. Outside diameter of conduit not to exceed one-third of the slab thickness.
 - 2. Separate conduit by minimum six times conduit outside diameter, except at crossings.

3.3 CONDUIT APPLICATION

- A. Diameter: Minimum 1-inch minimum.
- B. Conduit to and from the Wetwell: PVC coated rigid galvanized steel.
- C. Conduit not extending to and from the Wet Well: PVC Schedule 80

3.4 PENETRATIONS

- A. Make at right angles, unless otherwise shown.
- B. Notching or penetration of structural members, including footings and beams, not permitted.

3.5 SUPPORT

- A. Support from structural members only, at intervals not exceeding NFPA 70 requirements, and in any case not exceeding 8 feet. Do not support from piping, pipe supports, or other raceways.
- B. Provide and attach wall brackets, strap hangers, or ceiling trapeze as follows:
 - 1. Concrete or Brick: Expansion shields, or threaded studs driven in by powder charge, with lock washers and nuts.
 - 2. Steelwork: Machine screws.
- C. Nails or wooden plugs inserted in concrete or masonry for attaching raceway not permitted. Do not weld raceways or pipe straps to steel structures. Do not use wire in lieu of straps or hangers.
- D. All supports, straps, screws, and hardware shall be Type 316 stainless steel.

3.6 BENDS

- A. Install concealed raceways with a minimum of bends in the shortest practical distance.
- B. Make bends and offsets of longest practical radius.
- C. Install with symmetrical bends or cast metal fittings.
- D. Avoid field-made bends and offsets, but where necessary, make with acceptable hickey or bending machine. Do not heat metal raceways to facilitate bending.
- E. Make bends in parallel or banked runs from same center or centerline with same radius so that bends are parallel.
- F. Factory elbows may be installed in parallel or banked raceways if there is change in plane of run, and raceways are same size.

3.7 EXPANSION/DEFLECTION FITTINGS

- A. Provide on all raceways at all structural expansion joints, and in long tangential runs.
- B. Provide expansion/deflection joints for 50 degrees F maximum temperature variation.
- C. Install in accordance with manufacturer's instructions.

3.8 PVC-COATED RIGID STEEL CONDUIT

- A. Install in accordance with manufacturer's instructions.
- B. Provide PVC boot to cover all exposed threading.
- C. Utilize proper tools, dies, wrenches, etc.

3.9 TERMINATION AT ENCLOSURES

- A. Cast Metal Enclosure: Provide manufacturer's pre-molded insulating sleeve inside metallic conduit terminating in threaded hubs.
- B. Sheet Metal Boxes, Cabinets, and Enclosures:
 - 1. PVC-Coated Rigid Galvanized Steel Conduit: Provide PVC-coated, liquid-tight, metallic connector.

- C. Motor Control Center, and Free-Standing Enclosures: Terminate conduit entering bottom with grounding bushing; provide a grounding jumper extending to equipment ground bus or grounding pad.

3.10 UNDERGROUND RACEWAYS

- A. Grade: Maintain minimum grade of 4 inches in 100 feet, either from one manhole, handhole, or pull box to the next, or from a high point between them, depending on surface contour.
- B. Cover: Maintain minimum 2-foot cover above conduit unless otherwise shown.
- C. Make routing changes as necessary to avoid obstructions or conflicts.
- D. Couplings: In multiple conduit runs, stagger so that couplings in adjacent runs are not in same transverse line.
- E. Union type fittings not permitted.
- F. Support conduit so as to prevent bending or displacement during backfilling or concrete placement.
- G. Installation with Other Piping Systems:
 - 1. Crossings: Maintain minimum 12-inch vertical separation.
 - 2. Parallel Runs: Maintain minimum 12-inch separation.
 - 3. Installation over valves or couplings not permitted.
- H. Metallic Raceway Coating: At couplings and joints, coat with raceway coating.
- I. Backfill:
 - 1. As specified in Section 02225, TRENCH BACKFILL.
 - 2. Do not backfill until inspected by OWNER.

3.11 EMPTY RACEWAYS

- A. Provide permanent, removable cap over each end.
- B. Provide PVC plug with pull tab for underground raceways with end bells.
- C. Provide nylon pull cord.
- D. Identify, as specified in Article IDENTIFICATION DEVICES, with waterproof tags attached to pull cord at each end, and at intermediate pull point.

3.12 IDENTIFICATION DEVICES

- A. Warning Tape: Install approximately 12 inches above underground or concrete-encased raceways. Align parallel to, and within 12 inches of, centerline of runs.

3.13 PROTECTION OF INSTALLED WORK

- A. Protect products from effects of moisture, corrosion, and physical damage during construction.
- B. Provide and maintain manufactured watertight and dust-tight seals over all conduit openings during construction.
- C. Touch up painted conduit threads after assembly to cover nicks or scars.
- D. Touch up damage to coating on PVC-coated conduit with patching compound approved by manufacturer.

END OF SECTION

SECTION 16120 CONDUCTORS

PART 1 - GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. American National Standards Institute (ANSI): 386, Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V.
 2. American Society for Testing and Materials (ASTM):
 - a. A167, Standard Specification for Stainless and Heat Resisting Chromium-Nickel-Plated Steel Plate, Sheet, and Strip.
 - b. B3, Standard Specification for Soft or Annealed Copper Wire.
 - c. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - d. B263, Standard Test Method for Determination of Cross-Sectional Area of Stranded Conductors.
 3. Association of Edison Illuminating Companies (AEIC):
 - a. CS 5, Crosslinked Polyethylene Insulated Shielded Power Cables Rated 5 Through 35 kV.
 - b. CS 6, Ethylene-Propylene-Rubber-Insulated Shielded Power Cables Rated 5 Through 69 kV.
 4. Insulated Cable Engineer's Association, Inc. (ICEA): T-29-250, Procedure for Conducting Vertical Cable Tray Flame Test With a Theoretical Heat Input of 210,000 Btu/hour.
 5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. 48, Standard Test Procedures and Requirements for High-Voltage Alternating Current Cable Terminations.
 - b. 404, Standard for Cable Joints for Use with Extruded Dielectric Cable Rated 5,000V through 46,000V and Cable Joints for Use with Laminated Dielectric Cable Rated 2,500V through 500,000V.
 6. National Electrical Contractors Association, Inc. (NECA): 5055, Standard of Installation.
 7. National Electrical Manufacturers' Association (NEMA):
 - a. CC 1, Electric Power Connectors for Substations.
 - b. WC 3, Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 - c. WC 5, Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

- d. WC 7, Crosslinked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- e. WC 8, Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- f. WC 55, Instrumentation Cables and Thermocouple Wire.
- 8. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
- 9. Underwriters Laboratories, Inc. (UL):
 - a. 13, Standard for Safety Power-Limited Circuit Cables.
 - b. 44, Standard for Safety Rubber-Insulated Wires and Cables.
 - c. 62, Standard for Safety Flexible Cord and Fixture Wire.
 - d. 486A, Standard for Safety Wire Connector and Soldering Lugs for Use with Copper Conductors.
 - e. 486B, Standard for Safety Wire Connectors and Soldering Lugs for Use with Aluminum Conductors.
 - f. 510, Standard for Safety Insulating Tape.
 - g. 854, Standard for Safety Service-Entrance Cables.
 - h. 910, Standard for Safety Test Method for Fire and Smoke Characteristics of Electrical and Optical-Fiber Cables Used in Air Handling Spaces.
 - i. 1072, Standard for Safety Medium-Voltage Power Cables.
 - j. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
 - k. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.

1.02 SUBMITTALS

- A. Shop Drawings:
 - 1. Wire and cable descriptive product information.
 - 2. Wire and cable accessories descriptive product information.

1.03 UL COMPLIANCE

- A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 - PRODUCTS

2.01 CONDUCTORS 600 VOLTS AND BELOW

- A. Conform to applicable requirements of NEMA WC 3, WC 5, and WC 7.

- B. Conductor Type: All circuits stranded copper.
- C. Insulation: Type THHN/THWN, except for sizes No. 6 and larger, with XHHW insulation.
- D. Flexible Cords and Cables:
 - 1. Type SOW-A/50 with ethylene propylene rubber insulation in accordance with UL 62, 600-volt rating.
 - 2. Conform to physical and minimum thickness requirements of NEMA WC 8.

2.02 600 VOLT RATED CABLE

- A. General:
 - 1. Type: TC, meeting requirements of UL 1277, including Vertical Tray Flame Test at 20,000 Btu/hr, and NFPA 70, Article 340, or UL 13 Listed Power Limited Circuit Cable meeting requirements of NFPA 70, Article 725.
 - 2. Permanently and legibly marked with manufacturer's name, maximum working voltage for which cable was tested, type of cable, and UL listing mark.
 - 3. Suitable for installation in open air, in cable trays, or conduit.
 - 4. Minimum Temperature Rating: 90 degrees C dry locations, 75 degrees C wet locations.
 - 5. Overall Outer Jacket: PVC, flame-retardant, sunlight- and oil-resistant.
- B. Type 1, Multiconductor Control Cable:
 - 1. Conductors:
 - a. No. 14 AWG, seven-strand copper.
 - b. Insulation: 15-mil PVC with 4-mil nylon.
 - c. UL 1581 listed as Type THHN/THWN rated VW-1.
 - d. Conductor group bound with spiral wrap of barrier tape.
 - e. Color Code: In accordance with NEMA WC 5, Method 1, Sequence K-2.
 - 2. Cable: Passes the ICEA T-29-520 210,000 Btu/hr Vertical Tray Flame Test.
 - 3. Cable Sizes:

No. of Conductors	Max. Outside Diameter (Inches)	Jacket Thickness (Mils)
3	0.41	45
5	0.48	45
7	0.52	45
12	0.72	60

19	0.83	60
25	1.00	60
37	1.15	80

4. Manufacturers:
 - a. Okonite Co.
 - b. Rome Cable.
 - c. General Cable.
- C. Type 3-No. 16 AWG, Twisted, Shielded Pair, Instrumentation Cable: Single pair, designed for noise rejection for process control, computer, or data log applications meeting NEMA WC 55 requirements.
1. Outer Jacket: 45-mil nominal thickness.
 2. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer overlapped to provide 100 percent coverage.
 3. Dimension: 0.31-inch nominal OD.
 4. Conductors:
 - a. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8.
 - b. 20 AWG, seven-strand tinned copper drain wire.
 - c. Insulation: 15-mil nominal PVC.
 - d. Jacket: 4-mil nominal nylon.
 - e. Color Code: Pair conductors black and red.
 5. Manufacturers:
 - a. Okonite Co.
 - b. Alpha Wire Corp.
- D. Type 4-No. 16 AWG, Twisted, Shielded Triad Instrumentation Cable: Single triad, designed for noise rejection for process control, computer, or data log applications meeting NEMA WC 55 requirements.
1. Outer Jacket: 45-mil nominal.
 2. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer, overlapped to provide 100 percent coverage.
 3. Dimension: 0.32-inch nominal OD.
 4. Conductors:
 - a. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8.
 - b. 20 AWG, seven-strand, tinned copper drain wire.
 - c. Insulation: 15-mil nominal PVC.
 - d. Jacket: 4-mil nylon.
 - e. Color Code: Triad conductors black, red, and blue.
 5. Manufacturers:
 - a. Okonite Co.
 - b. Alpha Wire Corp.

2.03 GROUNDING CONDUCTORS

- A. Equipment: Stranded copper with green, Type USE/RHH/RHW-XLPE or THHN/THWN, insulation, 19 strand MTW.
- B. Direct Buried: Bare stranded copper.

2.04 ACCESSORIES FOR CONDUCTORS 600 VOLTS AND BELOW

- A. Tape:
 - 1. General Purpose, Flame Retardant: 7-mil, vinyl plastic, Scotch Brand 33, rated for 90 degrees C minimum, meeting requirements of UL 510.
 - 2. Flame Retardant, Cold and Weather Resistant: 8.5-mil, vinyl plastic, Scotch Brand 88.
- B. Identification Devices:
 - 1. Sleeve: Permanent, PVC, yellow or white, with legible machine-printed black markings.
 - 2. Marker Plate: Nylon, with legible designations permanently hot stamped on plate.
 - 3. Grounding Conductor: Permanent green heat-shrink sleeve, 2-inch minimum.
- C. Connectors and Terminations:
 - 1. Nylon, Self-Insulated Crimp Connectors:
 - a. Manufacturers and Products:
 - 1) Thomas & Betts; Sta-Kon.
 - 2) Burndy; Insulink.
 - 3) ILSCO.
 - 2. Nylon, Self-Insulated, Crimp Locking-Fork, Torque-Type Terminator:
 - a. Manufacturers and Products:
 - 1) Thomas & Betts; Sta-Kon.
 - 2) Burndy; Insulink.
 - 3) ILSCO.
- D. Cable Lugs:
 - 1. In accordance with NEMA CC 1.
 - 2. Rated 600 volts of same material as conductor metal.
 - 3. Insulated, Locking-Fork, Compression Lugs:
 - a. Manufacturers and Products:
 - 1) Thomas & Betts; Sta-Kon.
 - 2) ILSCO; ILSCONS.

4. Uninsulated Crimp Connectors and Terminators:
 - a. Manufacturers and Products:
 - 1) Square D; Versitide.
 - 2) Thomas & Betts; Color-Keyed.
 - 3) ILSCO.
5. Uninsulated, Bolted, Two-Way Connectors and Terminators:
 - a. Manufacturers and Products:
 - 1) Thomas & Betts; Locktite.
 - 2) Brundy; Quiklug.
 - 3) ILSCO.
- E. Cable Ties: Nylon, adjustable, self-locking, and reusable.
 1. Manufacturer and Product: Thomas & Betts; TY-RAP.
- F. Heat Shrinkable Insulation: Thermally stabilized, crosslinked polyofin.
 1. Manufacturer and Product: Thomas & Betts; SHRINK-KON.

2.05 PULLING COMPOUND

- A. Nontoxic, noncorrosive, noncombustible, nonflammable, wax-based lubricant; UL listed.
- B. Suitable for rubber, neoprene, PVC, polyethylene, hypalon, CPE, and lead-covered wire and cable.
- C. Suitable for zinc-coated steel, aluminum, PVC, bituminized fiber, and fiberglass raceways.
- D. Manufacturers and Products:
 1. Ideal Co.; Yellow 77.
 2. Polywater, Inc.
 3. Cable Grip Co.

2.06 SOURCE QUALITY CONTROL

- A. Conductors 600 Volts and Below: Test in accordance with UL 44 and 854 Standards.

PART 3 - EXECUTION

3.01 GENERAL

- A. Conductor installation to be in accordance with NECA 5055.

- B. Conductor and cable sizing shown is based on copper conductors.
- C. Do not exceed cable manufacturer's recommendations for maximum pulling tensions and minimum bending radii.
- D. Tighten screws and terminal bolts in accordance with UL 486A for copper conductors.
- E. Cable Lugs: Provide with correct number of holes, bolt size, and center-to-center spacing as required by equipment terminals. Only one wire per lug.
- F. Bundling: Where single conductors and cables in manholes, handholes, vaults, cable trays, and other indicated locations are not wrapped together by some other means, bundle conductors from each conduit throughout their exposed length with cable ties placed at intervals not exceeding 18 inches on center.
- G. Ream, remove burrs, and clear interior of installed conduit before pulling wires or cables.

3.02 POWER CONDUCTOR COLOR CODING

A. Conductors 600 Volts and Below:

- 1. No. 6 AWG and Larger: Apply general purpose, flame retardant tape at each end, and at accessible locations wrapped at least six full overlapping turns, covering an area 1-1/2 to 2 inches wide.
- 2. No. 8 AWG and Smaller: Provide colored conductors.
- 3. Colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts Single-Phase, Three-Wire	Grounded Neutral One Hot Leg Other Hot Leg	White Black Red
208Y/120 Volts Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White Black Red Blue
240/120 Volts Three-Phase, Four-Wire Delta, Center Tap Ground on Single-Phase	Grounded Neutral Phase A High (wild) Leg Phase C	White Black Orange Blue
480Y/277 Volts Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White Brown Purple Yellow

System	Conductor	Color
NOTE: Phase A, B, C implies direction of positive phase rotation.		

4. Tracer: Outer covering of white with an identifiable colored strip other than green in accordance with NFPA 70.

3.03 CIRCUIT IDENTIFICATION

A. All Circuits:

1. Assign circuit name based on device or equipment at load end of circuit.
2. Where this would result in same name being assigned to more than one circuit, add number or letter to each otherwise identical circuit name to make it unique.
3. All conductors shall be numbered and color coded at each terminal.

B. Method:

1. Conductors No. 3 AWG and Smaller: Identify with sleeves.
2. Cables and Conductors No. 2 AWG and Larger:
 - a. Identify with marker plates.
 - b. Attach marker plates with nylon tie cord.
3. Taped-on markers or tags relying on adhesives not permitted.

3.04 CONDUCTORS 600 VOLTS AND BELOW

- A. Install 10 AWG or 12 AWG conductors for branch circuit power wiring in lighting and receptacle circuits.
- B. Do not splice incoming service conductors and branch power distribution conductors No. 6 AWG and larger unless specifically indicated or approved by OWNER.
- C. Connections and Terminations:
 1. Install wire nuts only on solid conductors.
 2. Install nylon self-insulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 6 AWG and smaller.
 3. Install uninsulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 4 AWG through No. 2/0 AWG.
 4. Install uninsulated, bolted, two-way connectors and terminators for power circuit conductors No. 4/0 AWG and larger.
 5. Install uninsulated bolted, two-way connectors for motor circuit conductors No. 12 and larger.
 6. Tape insulate all uninsulated connections.

7. Place no more than one conductor in any single-barrel pressure connection.
 8. Install crimp connectors with tools approved by connector manufacturer.
 9. Install terminals and connectors acceptable for type of material used.
 10. Compression Lugs:
 - a. Attach with a tool specifically designed for purpose.
 - b. Tool shall provide complete, controlled crimp and shall not release until crimp is complete.
 - c. Do not use plier type crimpers.
 11. All conductors and terminals to permanently identify at each terminal point.
- D. Do not use soldered mechanical joints.
- E. Splices and Terminations:
1. Install splices with compression type butt splices and insulate using a heat-shrink sleeve:
 - a. In NEMA Type 4 or NEMA Type 4X areas, provide heat-shrink sleeves that are listed for submersible applications.
 2. Splices in below grade pull boxes, in any box subject to flooding, and in wet areas shall be made waterproof using:
 - a. A heat shrink insulating system listed for submersible applications.
 - b. Or an epoxy resin splicing kit.
- F. Cap spare conductors and conductors with UL listed end caps. Identify spare conductors as spares.
- G. Cabinets, Panels, and Motor Control Centers:
1. Remove surplus wire, bridle and secure.
 2. Where conductors pass through openings or over edges in sheet metal, remove burrs, chamfer edges, and install bushings and protective strips of insulating material to protect the conductors.
- H. Control and Instrumentation Wiring:
1. Where terminals provided will accept such lugs, terminate control and instrumentation wiring, except solid thermocouple leads, with insulated, locking-fork compression lugs.
 2. Terminate with methods consistent with terminals provided, and in accordance with terminal manufacturer's instructions.
 3. Locate splices in readily accessible cabinets or junction boxes using terminal strips.

4. Cable Protection:
 - a. Under Infinite Access Floors: May be installed without bundling.
 - b. All Other Areas: Install individual wires, pairs, or triads in flex conduit under the floor or grouped into bundles at least 1/2 inch in diameter.
 - c. Maintain integrity of shielding of instrumentation cables.
 - d. Ensure grounds do not occur because of damage to jacket over the shield.

- I. Extra Conductor Length: Install minimum 6 feet of extra conductor in freestanding panels and minimum 2 feet in other assemblies.

3.05 FIELD QUALITY CONTROL

- A. In accordance Section 16950, ELECTRICAL TESTING.

END OF SECTION

SECTION 16450 GROUNDING

PART 1 - GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
 - 1. American National Standards Institute (ANSI): C2, National Electrical Safety Code (NESC).
 - 2. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).

1.02 SUBMITTALS

- A. Shop Drawings:
 - 1. Product Data:
 - a. Exothermic weld connectors.
 - b. Mechanical connectors.
 - c. Compression connectors.
 - d. Ground Rods.

1.03 UL COMPLIANCE

- A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 - PRODUCTS

2.01 GROUND ROD

- A. Material: Copper-clad.
- B. Diameter: Minimum 5/8 inch.
- C. Length: 10 feet.

2.02 GROUND CONDUCTORS

- A. As specified in Section 16120, CONDUCTORS.

2.03 CONNECTORS

- A. Exothermic Weld Type:
 - 1. Outdoor Weld: Suitable for exposure to elements or direct burial.
 - 2. Indoor Weld: Utilize low-smoke, low-emission process.
 - 3. Manufacturers:
 - a. Erico Products, Inc.; Cadweld and Cadweld Exolon.
 - b. Thermoweld.
- B. Mechanical Type: Split-bolt, saddle, or cone screw type; copper alloy material.
 - 1. Manufacturers:
 - a. Burndy Corp.
 - b. Thomas and Betts Co.

2.04 GROUNDING WELLS

- A. Ground rod box complete with cast iron riser ring and traffic cover marked GROUND ROD.
- B. Manufacturers:
 - 1. Christy Co.
 - 2. Lightning and Grounding Systems, Inc.

PART 3 - EXECUTION

3.01 GENERAL

- A. Grounding shall be in compliance with NFPA 70 and ANSI C2.
- B. Ground electrical service neutral at service entrance equipment to supplementary grounding electrodes.
- C. Ground each separately derived system neutral to nearest effectively grounded building structural steel member or separate grounding electrode.
- D. Bond together system neutrals, service equipment enclosures, exposed noncurrent-carrying metal parts of electrical equipment, metal raceways, ground conductor in raceways and cables, receptacle ground connections, and metal piping systems.
- E. Shielded Power Cables: Ground shields at each splice or termination in accordance with recommendations of splice or termination manufacturer.

- F. Shielded Control Cables:
 - 1. Ground shield to ground bus at power supply for analog signal.
 - 2. Expose shield minimum 1 inch at termination to field instrument and apply heat shrink tube.
 - 3. Do not ground control cable shield at more than one point.
- G. The ground plane shall consist of copper ground rods spaced at a minimum of 20' apart as shown on the drawings. Rods and system ground shall be connected to the service entrance ground as required by the drawings. The ground resistance shall be tested and additional rods or plates added to achieve a dry season resistance not exceeding 5 ohms. The Contractor shall test the ground resistance of the system by 3-point method fall of potential.

3.02 WIRE CONNECTIONS

- A. Ground Conductors: Install in conduit containing power conductors and control circuits above 50 volts.
- B. Nonmetallic Raceways and Flexible Tubing: Install an equipment grounding conductor connected at both ends to noncurrent-carrying grounding bus.
- C. Connect ground conductors to raceway grounding bushings.
- D. Extend and connect ground conductors to ground bus in all equipment containing a ground bus.
- E. Connect enclosure of equipment containing ground bus to that bus.
- F. Bolt connections to equipment ground bus.
- G. Bond grounding conductors to metallic enclosures at each end, and to intermediate metallic enclosures.
- H. Junction Boxes: Furnish materials and connect to equipment grounding system with grounding clips mounted directly on box, or with 3/8-inch machine screws.

3.03 GROUND RODS

- A. Install full length with conductor connection at upper end.
- B. Install with connection point below finished grade, unless otherwise shown.

3.04 GROUNDING WELLS

- A. Install riser ring and cover flush with surface.
- B. Place 6 inches crushed rock in bottom of each well.

3.05 CONNECTIONS

- A. General:
 - 1. Above grade Connections: Use mechanical.
 - 2. Below grade Connections: Install exothermic weld connectors.
 - 3. Remove paint, dirt, or other surface coverings at connection points to allow good metal-to-metal contact.
 - 4. Notify OWNER prior to backfilling ground connections.
- B. Exothermic Weld Type:
 - 1. Wire brush or file contact point to bare metal surface.
 - 2. Use welding cartridges and molds in accordance with manufacturer's recommendations.
 - 3. Avoid using badly worn molds.
 - 4. Mold to be completely filled with metal when making welds.
 - 5. After completed welds have cooled, brush slag from weld area and thoroughly clean joint.
- C. Mechanical Type:
 - 1. Apply homogeneous blend of colloidal copper and rust and corrosion inhibitor before making connection.
 - 2. Install in accordance with connector manufacturer's recommendations.
 - 3. Do not conceal mechanical connections.

3.06 METAL STRUCTURE GROUNDING

- A. Provide electrical contact between metal frames and railings supporting pushbutton stations, receptacles, and instrument cabinets, and raceways carrying circuits to these devices.

3.07 SURGE PROTECTION EQUIPMENT GROUNDING

- A. Connect surge arrestor ground terminals to equipment ground bus.

3.08 FIELD QUALITY CONTROL

- A. As specified in Section 16950, ELECTRICAL TESTING.

END OF SECTION

SECTION 16950 ELECTRICAL TESTING

PART 1 - GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. American National Standards Institute (ANSI):
 - a. 450, Recommended Practice for Maintenance, Testing, and Replacement of Large lead Storage Batteries for Generator Stations and Substations.
 - b. C2, National Electrical Safety Code.
 - c. C37.20.1, Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear.
 - d. C37.20.2, Metal-Clad and Station-Type Cubicle Switchgear.
 - e. C37.20.3, Metal-Enclosed Interrupter Switchgear.
 - f. C62.33, Standard Test Specifications for Varistor Surge-Protective Devices.
 2. American Society for Testing and Materials (ASTM):
 - a. D665, Standard Test Method for Rust Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water.
 - b. D877, Standard Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes.
 - c. D923, Standard Test Method for Sampling Electrical Insulating Liquids.
 - d. D924, Standard Test Methods for A-Class Characteristics and Relative Permittivity (Dielectric Constant) of Electrical Insulating Liquids.
 - e. D971, Standard Test Method for Interfacial Tension of 0.1 Against Water by the Ring Method.
 - f. D974, Standard Test Method for Acid and Base Number by Color-Indicator Titration.
 - g. D1298, Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method.
 - h. D1500, Standard Test Method for ASTM Color of Petroleum Products.
 - i. D1524, Standard Test Method for Visual Examination of Used Electrical Insulating Oils of Petroleum Origin in the Field.
 - j. D1533, Standard Test Methods for Water in Insulating Liquids.

- k. D1816, Standard Test Method for Dielectric Breakdown Voltage of Insulating Oils of Petroleum Origin Using VDE Electrodes.
 - l. D2285, Standard Test Method for Interfacial Tension of Electrical Insulating Oils of Petroleum Origin Against Water by the Drop-Weight Method.
- 3. Institute of Electrical and Electronics Engineers (IEEE):
 - a. 43, Recommended Practice for Testing Insulating Resistance of Rotating Machinery.
 - b. 48, Standard Test Procedures and Requirements for High-Voltage Alternating-Current Cable Terminators.
 - c. 81, Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
 - d. 95, Recommended Practice for Insulation Testing of Large AC Rotating Machinery with High Direct Voltage.
 - e. 118, Standard Test Code for Resistance Measurement.
 - f. 400, Guide for Making High-Direct-Voltage Tests on Power Cable Systems in the Field.
- 4. National Electrical Manufacturers Association (NEMA):
 - a. AB 4, Guideline for Inspection and Preventive Maintenance of Molded Case Circuit Breakers Used in Commercial and Industrial Applications.
 - b. PB 2, Deadfront Distribution Switchboards.
 - c. WC 7, Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 - d. WC 8, Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- 5. International Electrical Testing Association (NETA): ATS, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- 6. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 70E, Standard for Electrical Safety Requirements for Employee Workplaces.

1.02 SUBMITTALS

- A. Administrative Submittals: Submit 30 days prior to performing inspections or tests:
 - 1. Schedule for performing inspection and tests.

2. List of references to be used for each test.
 3. Sample copy of equipment and materials inspection form(s).
 4. Sample copy of individual device test form.
 5. Sample copy of individual system test form.
- B. Quality Control Submittals: Submit within 30 days after completion of test:
1. Test or inspection reports and certificates for each electrical item tested.
- C. Contract Closeout Submittals:
1. Operation and Maintenance Data:
 - a. In accordance with Section 01700 CONTRACT CLOSEOUT.
 - b. After test or inspection reports and certificates have been reviewed by OWNER and returned, insert a copy of each in operation and maintenance manual.

1.03 QUALITY ASSURANCE

- A. Testing Firm Qualifications:
1. Corporately and financially independent organization functioning as an unbiased testing authority.
 2. Professionally independent of manufacturers, suppliers, and installers, of electrical equipment and systems being tested.
 3. Employer of engineers and technicians regularly engaged in testing and inspecting of electrical equipment, installations, and systems.
 4. Supervising engineer accredited as Certified Electrical Test Technologist by National Institute for Certification of Engineering Technologists (NICET), or International Electrical Testing Association and having a minimum of 5 years testing experience on similar projects.
 5. Technicians certified by NICET or NETA.
 6. Assistants and apprentices assigned to project at ratio not to exceed two certified to one noncertified assistant or apprentice.
 7. Registered Professional Engineer to provide comprehensive project report outlining services performed, results of such services, recommendations, actions taken, and opinions.
 8. In compliance with OSHA Title 29, Part 1907 criteria for accreditation of testing laboratories or a full Member Company of International Electrical Testing Association.
- B. Test equipment shall have an operating accuracy equal to, or greater than, requirements established by NETA ATS.
- C. Test instrument calibration shall be in accordance with NETA ATS.

1.04 SEQUENCING AND SCHEDULING

- A. Perform inspection and electrical tests after equipment has been installed.
- B. Perform tests with apparatus de-energized whenever feasible.
- C. Inspection and Electrical Tests on Energized Equipment are to be:
 - 1. Scheduled with OWNER prior to de-energization.
 - 2. Minimized to avoid extended period of interruption to the operating plant equipment.
- D. Notify OWNER at least 24 hours prior to performing tests on energized electrical equipment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

- A. Tests and Inspection shall Establish that:
 - 1. Electrical equipment is operational within industry and manufacturer's tolerances.
 - 2. Installation operates properly.
 - 3. Equipment is suitable for energization.
 - 4. Installation conforms to requirements of Contract Documents and NFPA 70, NFPA 70E, and ANSI C2.
- B. Perform inspection and testing in accordance with NETA ATS, industry standards, and manufacturer's recommendations.
- C. Adjust mechanisms and moving parts for free mechanical movement.
- D. Adjust adjustable relays and sensors to correspond to operating conditions, or as recommended by manufacturer.
- E. Verify nameplate data for conformance to Contract Documents.
- F. Realign equipment not properly aligned and correct unlevelness.
- G. Properly anchor electrical equipment found to be inadequately anchored.

- H. Tighten accessible bolted connections, including wiring connections, with calibrated torque wrench to manufacturer's recommendations, or as otherwise specified.
- I. Clean contaminated surfaces with cleaning solvents as recommended by manufacturer.
- J. Provide proper lubrication of applicable moving parts.
- K. Inform OWNER of working clearances not in accordance with NFPA 70.
- L. Investigate and Repair or Replace:
 - 1. Electrical items that fail tests.
 - 2. Active components not operating in accordance with manufacturer's instructions.
 - 3. Damaged electrical equipment.
- M. Electrical Enclosures:
 - 1. Remove foreign material and moisture from enclosure interior.
 - 2. Vacuum and wipe clean enclosure interior.
 - 3. Remove corrosion found on metal surfaces.
 - 4. Repair or replace, as determined by OWNER, door and panel sections having dented surfaces.
 - 5. Repair or replace, as determined by OWNER, poor fitting doors and panel sections.
 - 6. Repair or replace improperly operating latching, locking, or interlocking devices.
 - 7. Replace missing or damaged hardware.
 - 8. Finish:
 - a. Provide matching paint and touch up scratches and mars.
 - b. If required due to extensive damage, as determined by OWNER, refinish the entire assembly.
- N. Replace fuses and circuit breakers that do not conform to size and type required by the Contract Documents.

3.02 LOW VOLTAGE CABLES, 600 VOLTS MAXIMUM

- A. Visual and Mechanical Inspection:
 - 1. Inspect Each Individual Exposed Power Cable No. 6 and Larger for:
 - a. Physical damage.
 - b. Proper connections in accordance with single-line diagram.
 - c. Cable bends not in conformance with manufacturer's minimum allowable bending radius where applicable.
 - d. Color coding conformance with specifications.

- e. Proper circuit identification.
 2. Mechanical Connections for:
 - a. Proper lug type for conductor material.
 - b. Proper lug installation.
 - c. Bolt torque level in accordance with NETA ATS, Table 10.1, unless otherwise specified by manufacturer.
 3. Shielded Instrumentation Cables for:
 - a. Proper shield grounding.
 - b. Proper terminations.
 - c. Proper circuit identification.
 4. Control Cables for:
 - a. Proper termination.
 - b. Proper circuit identification.
 5. Cables Terminated Through Window Type CTs: Verify that neutrals and grounds are terminated for correct operation of protective devices.
- B. Electrical Tests for Conductors No.6 and Larger:
 1. Insulation Resistance Tests:
 - a. Utilize 1,000-volt dc megohmmeter for 600-volt insulated conductors.
 - b. Test each conductor with respect to ground and to adjacent conductors per IEEE 118 procedures for 1 minute.
 - c. Evaluate ohmic values by comparison with conductors of same length and type.
 - d. Investigate values less than 50 megohms.
 2. Continuity test by ohmmeter method to ensure proper cable connections.

3.03 MOLDED AND INSULATED CASE CIRCUIT BREAKERS

- A. General: Inspection and testing limited to circuit breakers rated 100 amperes and larger and to motor circuit protector breakers rated 100 amperes and larger.
- B. Visual and Mechanical Inspection:
 1. Proper mounting.
 2. Proper conductor size.
 3. Feeder designation according to nameplate and one-line diagram.
 4. Cracked casings.
 5. Connection bolt torque level in accordance with NETA ATS, Table 10.1.
 6. Operate breaker to verify smooth operation.
 7. Compare frame size and trip setting with circuit breaker schedules or one-line diagram.

8. Verify that terminals are suitable for 75 degrees C rated insulated conductors.

C. Electrical Tests:

1. Insulation Resistance Tests:
 - a. Utilize 1,000-volt dc megohmmeter for 480- and 600-volt circuit breakers.
 - b. Pole-to-pole and pole-to-ground with breaker contacts opened for 1 minute.
 - c. Pole-to-pole and pole-to-ground with breaker contacts closed for 1 minute.
 - d. Test values to comply with NETA ATS, Table 10.2.
2. Contact Resistance Tests:
 - a. Contact resistance in microhms across each pole.
 - b. Investigate deviation of 50 percent or more from adjacent poles and similar breakers.
3. Primary Current Injection Test to Verify:
 - a. Long-time minimum pickup and delay.
 - b. Short-time pickup and delay.
 - c. Ground fault pickup and delay.
 - d. Instantaneous pickup by run-up or pulse method.
 - e. Trip characteristics of adjustable trip breakers shall be within manufacturer's published time-current characteristic tolerance band, including adjustment factors.
 - f. Trip times shall be within limits established by NEMA AB 4, Table 5-3.
 - g. Instantaneous pickup value shall be within values established by NEMA AB 4, Table 5-4.

3.04 INSTRUMENT TRANSFORMERS

A. Visual and Mechanical Inspection:

1. Visually Check Current, Potential, and Control Transformers for:
 - a. Cracked insulation.
 - b. Broken leads or defective wiring.
 - c. Proper connections.
 - d. Adequate clearances between primary and secondary circuit wiring.
2. Verify Mechanically that:
 - a. Grounding and shorting connections have good contact.
 - b. Withdrawal mechanism and grounding operation, when applicable, operate properly.
3. Verify proper primary and secondary fuse sizes for potential transformers.

B. Electrical Tests:

1. Current Transformer Tests:
 - a. Insulation resistance test of transformer and wiring-to-ground at 1,000 volts dc for 30 seconds.
 - b. Polarity test.
2. Potential Transformer Tests:
 - a. Insulation resistance test at test voltages in accordance with NETA ATS, Table 7.1.1 for 1 minute on:
 - 1) Winding-to-winding.
 - 2) Winding-to-ground.
 - b. Polarity test to verify polarity marks or H1-X1 relationship as applicable.
3. Insulation resistance measurement on instrument transformer shall not be less than that shown in NETA ATS, Table 7.1.1.

3.05 METERING

A. Visual and Mechanical Inspection:

1. Verify meter connections in accordance with appropriate diagrams.
2. Verify meter multipliers.
3. Verify that meter types and scales conform to Contract Documents.
4. Check calibration of meters at cardinal points.
5. Check calibration of electrical transducers.

3.06 GROUNDING SYSTEMS

A. Visual and Mechanical Inspection:

1. Equipment and circuit grounds in motor control centers and panelboards assemblies for proper connection and tightness.
2. Ground bus connections in motor control centers and panelboards assemblies for proper termination and tightness.
3. Effective transformer core and equipment grounding.
4. Accessible connections to grounding electrodes for proper fit and tightness.
5. Accessible exothermic-weld grounding connections to verify that molds were fully filled and proper bonding was obtained.

B. Electrical Tests:

1. Fall-Of-Potential Test:
 - a. In accordance with IEEE 81, Section 8.2.1.5 for measurement of main ground system's resistance.
 - b. Main ground electrode system resistance to ground to be no greater than 5 ohms.
2. Two-Point Direct Method Test:

- a. In accordance with IEEE 81, Section 8.2.1.1 for measurement of ground resistance between main ground system, equipment frames, and system neutral and derived neutral points.
- b. Equipment ground resistance shall not exceed main ground system resistance by 0.50 ohm.

3.07 GROUND FAULT SYSTEMS

A. Inspection and Testing Limited to:

1. Zero sequence grounding systems.
2. Residual ground fault systems.

B. Visual and Manual Inspection:

1. Neutral Main Bonding Connection to Assure:
 - a. Zero sequence sensing system is grounded ahead of neutral disconnect link.
 - b. Ground strap sensing system is grounded through sensing device.
 - c. Neutral ground conductor is solidly grounded.
2. Verify that control power has adequate capacity for system.
3. Manually Operate Monitor Panels for:
 - a. Trip test.
 - b. No trip test.
 - c. Nonautomatic rest.
4. Zero sequence system for symmetrical alignment of core balance transformers about current carrying conductors.
5. Relay check for pickup and time under simulated ground fault conditions.
6. Verify nameplate identification by device operation.

C. Electrical Tests:

1. Test system neutral insulation resistance with neutral ground link removed. System neutral insulation resistance minimum 1 megohm.
2. Determine relay pickup by primary current injection at the sensor. Relay pickup current within plus or minus 10 percent of device dial or fixed setting.
3. Test relay timing by injecting 300 percent of pickup current, or as specified by manufacturer. Relay operating time in accordance with manufacturer's time-current characteristic curves.
4. Test system operation at 55 percent rated control voltage, if applicable.
5. Test zone interlock system by simultaneous sensor current injection and monitoring zone blocking functions.

3.08 AC INDUCTION MOTORS

- A. General: Inspection and testing limited to motors rated 5 horsepower and larger.
- B. Visual and Mechanical Inspection:
 - 1. Proper electrical and grounding connections.
 - 2. Shaft alignment.
 - 3. Blockage of ventilating air passageways.
 - 4. Operate Motor and Check for:
 - a. Excessive mechanical and electrical noise.
 - b. Overheating.
 - c. Correct rotation.
 - d. Check vibration detectors, resistance temperature detectors, or motor inherent protectors for function ability and proper operation.
 - e. Excessive vibration.
 - 5. Check operation of space heaters.
- C. Electrical Tests:
 - 1. Insulation Resistance Tests:
 - a. In accordance with IEEE 43 at test voltages established by NETA ATS, Table 10.2 for:
 - 1) Motors above 200 horsepower for 10-minute duration with resistances tabulated at 30 seconds, 1 minute, and 10 minutes.
 - 2) Motors 200 horsepower and less for 1-minute duration with resistances tabulated at 30 and 60 seconds.
 - b. Insulation resistance values equal to, or greater than, ohmic values established by manufacturers.
 - 2. Calculate polarization index ratios for motors above 200 horsepower. Investigate index ratios less than 1.5 for Class A insulation and 2.0 for Class B insulation.
 - 3. Insulation resistance test on insulated bearings in accordance with manufacturer's instructions.
 - 4. Measure running current and voltage, and evaluate relative to load conditions and nameplate full-load amperes.

3.09 LOW VOLTAGE MOTOR CONTROL

- A. Visual and Mechanical Inspection:
 - 1. Proper barrier and shutter installation and operation.
 - 2. Proper operation of indicating and monitoring devices.
 - 3. Proper overload protection for each motor.
 - 4. Improper blockage of air-cooling passages.

5. Proper operation of draw out elements.
6. Integrity and contamination of bus insulation system.
7. Check Door and Device Interlocking System by:
 - a. Closure attempt of device when door is in OPEN position.
 - b. Opening attempt of door when device is in ON or CLOSED position.
8. Check Key Interlocking Systems for:
 - a. Key captivity when device is in ON or CLOSED position.
 - b. Key removal when device is in OFF or OPEN position.
 - c. Closure attempt of device when key has been removed.
 - d. Correct number of keys in relationship to number of lock cylinders.
 - e. Existence of other keys capable of operating lock cylinders; destroy duplicate sets of keys.
9. Check Nameplates for Proper Identification of:
 - a. Equipment title and tag number with latest one-line diagram.
 - b. Pushbuttons.
 - c. Control switches.
 - d. Pilot lights.
 - e. Control relays.
 - f. Circuit breakers.
 - g. Indicating meters.
10. Verify that fuse and circuit breaker sizes and types conform to Contract Documents.
11. Verify that current and potential transformer ratios conform to Contract Documents.
12. Check Bus Connections for High Resistance by Low Resistance Ohmmeter.
 - a. Ohmic value to be zero.
13. Check Operation and Sequencing of Electrical and Mechanical Interlock Systems by:
 - a. Closure attempt for locked open devices.
 - b. Opening attempt for locked closed devices.
 - c. Key exchange to operate devices in OFF-NORMAL positions.
14. Verify performance of each control device and feature furnished as part of the motor control center.
15. Control Wiring:
 - a. Compare wiring to local and remote control, and protective devices with elementary diagrams.
 - b. Check for proper conductor lacing and bundling.
 - c. Check for proper conductor identification.
 - d. Check for proper conductor lugs and connections.
16. Exercise active components.
17. Inspect Contactors for:
 - a. Correct mechanical operations.
 - b. Correct contact gap, wipe, alignment, and pressure.

- c. Correct torque of all connections.
- 18. Compare overload heater rating with full-load current for proper size.
- 19. Compare motor protector and circuit breaker with motor characteristics for proper size.
- 20. Perform phasing check on double-ended motor control centers to ensure proper bus phasing from each source.
- B. Electrical Tests:
 - 1. Insulation Resistance Tests:
 - a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 10.2.
 - b. Bus section phase-to-phase and phase-to-ground for 1 minute on each phase.
 - c. Contactor phase-to-ground and across open contacts for 1 minute on each phase.
 - d. Starter section phase-to-phase and phase-to-ground on each phase with starter contacts closed and protective devices open.
 - e. Test values to comply with NETA ATS, Table 10.2.
 - 2. Overpotential Tests:
 - a. Maximum applied dc voltage in accordance with NETA ATS, Table 7.1.2.
 - b. Phase-to-phase and phase-to-ground for 1 minute for each phase of each bus section.
 - c. Test results evaluated on pass/fail basis.
 - 3. Current Injection Through Overload Unit at 300 Percent of Motor Full-Load Current and Monitor Trip Time:
 - a. Trip time in accordance with manufacturer's published data.
 - b. Investigate values in excess of 120 seconds.
 - 4. Control Wiring Tests:
 - a. Apply secondary voltage to control power and potential circuits.
 - b. Check voltage levels at each point on terminal boards and each device terminal.
 - c. Insulation resistance test at 1,000 volts dc on control wiring except that connected to solid state components.
 - 1) Insulation resistance to be 1 megohm minimum.
 - 5. Operational test by initiating control devices to affect proper operation.

3.10 LOW VOLTAGE SURGE ARRESTORS

- A. Visual and Mechanical Inspection:
 - 1. Adequate clearances between arrestors and enclosures.
 - 2. Ground connections to ground bus.

B. Electrical Tests:

1. Varistor Type Arrestors:
 - a. Clamping voltage test.
 - b. Rated RMS voltage test.
 - c. Rated dc voltage test.
 - d. Varistor arrester test values in accordance with ANSI C62.33, Sections 4.4 and 4.7.

END OF SECTION

SECTION 16960 LIFT STATION CONTROL CABINET

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Control Diagrams and One Line Diagrams and these Specifications depict the minimum functional requirements of the control system provided under this section. The CONTRACTOR shall provide all materials, labor and controls necessary to provide a safe and operable system at all Pump Stations. The specific control system proposed shall be subject to the approval of the OWNER. The Radio Telemetry System Components discussed in this Section are to be supplied and installed by the CONTRACTOR.
- B. See Division 1, GENERAL REQUIREMENTS, Section 11305, SUBMERSIBLE PUMPS AND CONTROL PANELS, Section 16010, BASIC ELECTRICAL REQUIREMENTS, Section 16050, BASIC ELECTRICAL MATERIALS AND METHODS, and all related Sections of Division 16.
- C. All discrete input and output signals of the control panel to/from devices external to this pump package shall be isolated normally OPEN contact closures rated for 10 amps, 120V ac continuous service.
- D. All panel construction shall be completed in UL 508 Panel Fabricator Shop and be UL 508 labeled.
- E. The CONTRACTOR shall provide two (2) interchangeable level Multi-Functional Level Control Systems; Ultrasonic System and Pressure System. The Ultrasonic System shall be installed and proven to perform as intended. If the installation is to the satisfaction of the OWNER, the Pressure System shall be turned over to the OWNER. If the Ultrasonic Transducer is not acceptable to the Owner, the CONTRACTOR shall remove it and replace with the Pressure Transducer. The Ultrasonic system is then to be turned over to the OWNER. The control panel is to maintain its UL listing at all times. Note: the level controller will remain the same.

1.02 SUBMITTALS

- A. Comply with Division 1, GENERAL REQUIREMENTS.
- B. Provide complete and detailed manufacturer's descriptive information and integrated Shop Drawings on the following items proposed for each pump station:
 - 1. Wiring and control ladder diagrams showing both options for the Multi-functional level controllers.

2. Interconnection diagram.
 3. Enclosure Shop Drawing.
 4. Power supply.
 5. Terminal blocks.
 6. Control relays.
 7. Electrical transient protection.
 8. Alarm lights.
 9. Pushbutton, indicating lights, and selection switches.
 10. Elapsed time meters.
 11. Multi-functional level controllers.
 12. Motor starters.
 13. Dry type transformers, enclosure, and ventilator.
 14. Phase monitors.
 15. Alternators.
 16. Circuit breaker and interlocks.
 17. Relays.
 18. Instrumentation system schematic.
 19. Special mechanical and electrical features (e.g., power cables, etc.) required for pump systems to meet Class I, Division 1 (Groups C and D) requirements.
- C. Incomplete submittals by the pump system's supplier (e.g., catalog cuts with no integrated or coordinated drawing depicting equipment function or operation) will be returned without action.

1.03 SYSTEM SUPPLIER

- A. The SYSTEM SUPPLIER shall be one of the following firms:
1. Barneys Pumps, Lakeland, FL
 2. CC Control Corp., West Palm Beach, Florida.
 3. Champion Controls, Fort Lauderdale, FL
 4. Revere Controls, Lakeland, FL

PART 2 - PRODUCTS

2.01 CONTROL CABINET

- A. The Control Panel shall Include:
1. An emergency circuit breaker interlocked mechanically with the main circuit breaker.
 2. A combination circuit breaker-starter for each motor.
 3. Terminal blocks for all incoming or outgoing conductors.
 4. All identified and necessary operator interface devices.
 5. Control hardware.

6. All necessary control and time delay relays.
 7. All necessary alarms, fuses, control power transformer, circuit breakers and other miscellaneous items necessary to fulfill the functions described or required in this and other applicable sections of these Specifications.
 8. Circuit breakers shall not be externally operable.
 9. Each motor starter shall be separated from the rest of the panel by a metal or insulating barrier.
 10. Other electrical equipment shall be as specified herein.
 11. Provide volatile corrosion inhibiting capsules in each control panel to protect all exposed metal surfaces for a period of at least 2 years.
 12. Dead front construction with all breakers, gauges, resets, etc. operable and readable without opening dead front.
 13. Intrusion alarm with contacts closed when panel door is open.
 14. Elapse time meters for each motor.
 15. HOA switches for each motor.
 16. Run lights for each motor.
 17. Emergency Generator Receptacle.
 18. Surge capacitor and lightning arrestor.
 19. Provision for pump motor thermal overloads and leak detection.
 20. Ultrasonic level control shall act as primary and backup floats shall serve to provide High Level Protection and Low-Level Alarm.
 21. Should the Ultrasonic level control be found to be unacceptable to the OWNER, Pressure Level Control shall act as primary and backup floats shall serve to provide High Level Protection and Low-Level Alarm.
 22. Provide laminated wiring diagram and pump data sheets fastened to inside of panel door.
- B. Control cabinet fabrication, electrical components and wiring, and workmanship shall conform to the following requirements:
1. Cabinet: NEMA 250, Type 4X, Industrial Use, with dead front, unless otherwise shown.
 2. Material: 14-gauge Type 316 stainless steel.
 3. All doors shall be rubber-gasketed with continuous hinge with a 3-point latch. A suitably sized Type 316L stainless steel hasp and staple shall be mounted on the cabinet for pad locking of the enclosure.
 4. Provide swing arm which will lock doors in the open position during maintenance.
 5. Circuit breaker handles shall extend through and control devices shall be mounted on a swingout inner door providing dead front construction of all internal wiring.
 6. Provide a hand switch-controlled LED light and a G.F.I. protected 120-volt, 20-amp duplex receptacle within the panel.
 7. Power Supply:
 - a. The power supply to the panel will be a 480-volt, 3-phase, 60-Hz service entrance from the utility. The panel shall be rated for an

- available fault current of 25,000 amps, rms symmetrical, minimum.
- b. A generator receptacle shall be mounted on the side of the control cabinet to provide for connection of a 480-volt, 3 phase, 60 Hz generator for standby power. Receptacle shall match OWNER's existing requirements
8. Power Distribution Within Cabinets:
- a. Control Transformer:
 - 1) Two winding, 120-volt secondary, primary voltage to suit.
 - 2) Two current limiting fuses for primary circuit.
 - 3) One fuse in secondary circuit.
 - 4) Mount within panel, or as shown.
 - b. Provide a main circuit breaker for service entrance from the utility and a circuit breaker for the circuit from the generator breaker. Circuit breakers shall be mechanically interlocked by an externally mounted mechanism so that only one breaker can be closed at a time.
 - c. Provide a circuit breaker on each individual circuit distributed from the cabinet. The circuit breakers shall be grouped on a single subpanel. Provide subpanel placement so that there is a clear view of and access to the breakers when the exterior door is open. Circuit breakers shall meet specifications for circuit breakers elsewhere in this Section.
 - d. Power wiring shall be distributed using solid copper power distribution terminal blocks; leap frogging will not be acceptable.
9. Wiring:
- a. All electrical wiring shall be in accordance with the applicable requirements of Paragraph CONDUCTORS. Wires shall be
 - b. 600-volt class, PVC insulated stranded copper and shall be of the sizes required for the current to be carried, but not below 14 AWG enclosed in either sheet metal raceway or plastic wiring duct.
 - c. All interconnecting wires between panel mounted equipment and external equipment shall be terminated at numbered terminal blocks. All wires shall be identified with shrink sleeve markers using machine written lettering.
10. Terminal Blocks:
- a. Terminal blocks shall be one piece molded plastic blocks with screw type terminals and barriers rated for 600 volts. Terminals shall be double sided and supplied with removable covers to prevent accidental contact with live circuits. Terminals shall have permanent, legible identification, clearly visible with the protective cover removed.
 - b. Wires shall be terminated at the terminal blocks with crimp type, pre-insulated, fork tongue lugs. Lugs shall be of the appropriate size for the terminal block screws and for the number and size of the wires terminated. No double lugging will be allowed.

11. Relays:

- a. Control circuit switching shall be accomplished with relays. These relays, for interfacing and control applications, shall be the compact general-purpose plug-in type having low coil inrush and holding current characteristics. Contact arrangements shall be as noted or shown, and shall be rated for not less than 10 amperes at 120V ac or 28V dc. Non-latching relays shall have a single coil. Latching relays shall have two coils, unlatching being accomplished by energizing one coil, and latching being accomplished by energizing the other coil. Relays shall have plain plastic dust covers, test buttons, and mounting sockets with screw terminals and hold-down springs. Relays shall be UL recognized. Relays shall be Potter and Brumfield KUL Series.
- b. Time delay functions shall be accomplished with time delay relays. Units shall be adjustable time delay relays with the number of contacts and contact arrangements as shown. Contacts shall be rated for 10 amperes at 120V ac. Integral knob with calibrated scale shall be provided for adjustment of time delay. Initial setting shall be as shown with time delay range approximately three times the initial setting. Time delay rangeability shall be at least 10 to 1. Operating voltage shall be 150V ac, plus 10 percent at 60-Hz. Operating temperature shall be -20 degrees F to 165 degrees F. Repeat timing accuracy shall be plus or minus 10 percent over the operating range. Units shall be Amerace Corp., Control Products Division, Agastat Series 7000; Cutler Hammer Series D 87; or equal. All relays shall have a screw terminal interface. Terminals shall have a permanent, legible identification. Relays shall be mounted such that the terminal identifications are clearly visible and the terminals are readily accessible.

12. Nameplates:

- a. Nameplates shall be engraved, rigid, laminated plastic type fastened with brass 6/32 screws. Color shall be black with white letters and letter height shall be 3/16 inch.
- b. Control devices for each motor shall be identified on the dead front swing out panel.
- c. Panel shall be provided with a face mounted laminated nameplate as specified above. Color shall be black with white letters 1/2 inch high.

13. Electrical Power and Control Wiring:

- a. Wiring in control panels shall be restrained by plastic ties or ducts. Hinge wiring shall be secured at each end so that any bending or twisting will be around the longitudinal axis of the wire and the bend area shall be protected with a sleeve.

- b. Arrange wiring neatly, cut to proper length, and remove surplus wire. Provide abrasion protection for any wire bundles which pass through holes or across edges of sheet metal.
 - c. Use manufacturer's recommended tool with the proper sized anvil, for all crimp terminations. No more than two wires may be terminated in a single crimp lug and no more than two lugs may be installed on a single screw terminal.
 - d. Wiring shall not be spliced or tapped except at device terminals or terminal blocks.
 - e. Grounding conductors shall be terminated on individual terminals on a common ground buss.
14. Electrical Transient Protection: Panels shall be equipped with suitable surge arresting devices to protect the equipment from damage due to electrical transients induced in the interconnecting lines from lightning discharges or nearby electrical devices. Protective devices used on 120V ac inputs shall be secondary valve surge protectors conforming to the requirements of IEEE Standard 28 1972 and UL 1449 (August 1998 Testing) (ANSI C62.1 1971). Provide analogs, signal surge protection for all analog signals.
15. Thermal and moisture protector monitoring relay; install and wire any required protector monitoring relay provided by pump manufacturer.
16. Generator receptacle shall be Crouse Hinds AR2041 for 200 amp and AR4041 for 400 amp mounted 48-inch max AFF.
17. Electrical Surge and Transient Protection:
- a. General: Equip control panels with surge arresting devices to protect equipment from damage due to electrical transients induced in interconnecting lines from lightning discharges and nearby electrical devices.
 - b. Suppressor Locations:
 - 1) At point of connection between each equipment item, including ac powered transmitters and its power supply conductors (direct wired equipment).
 - 2) On analog pairs at each end when the pair travels outside of building.
 - 3) In other locations where equipment sensitivity to surges and transients requires additional protection beyond that inherent to design of equipment.
 - c. Power Supply Suppressor Assemblies: Suitable for connection to 480-volt, three phase power supplies; Square D J9200 9A.
 - d. Analog Signal Cable Suppressor Assemblies:
 - 1) Epoxy encapsulated within a phenolic enclosure.
 - 2) Flame retardant.
 - 3) Four lead devices; include a threaded mounting/grounding stud.
 - 4) Manufacturers and Products:
 - 1. EDCO; SRA 64 Series.

2. Joslyn; Series 1800 and 1669.
- e. Grounding: Coordinate surge suppressor grounding in field panels and field instrumentation as specified in Section 16450, GROUNDING, and suppressor manufacturer's requirements. Furnish control panels with an integral copper grounding bus for connection of suppressors and other required instrumentation.
18. Loss of Phase: Diversified SLA 230Y.
19. UL Compliance:
 - a. Panel shall be constructed to UL508 standards and bear a UL508 label.
 - b. Panel shall be suitable for use as Service Equipment and be furnished with a UL label indicating that it is suitable as Service Entrance Equipment.

2.02 MULTI-FUNCTIONAL LEVEL CONTROL SYSTEM - ULTRASONIC

- A. The multi-functional level control system (level system) shall employ acoustic echo-ranging technology to determine the distance between the transducer and monitored surface, as a basis for display, output, and digital communication. The level system shall consist of a microprocessor-based level controller and an ultrasonic transducer (transducer) for single point operation. The level controller shall be operator configurable to meet specific application requirements by implementation of available signal processing and process control functions, in any allowable combination.
- B. Multi-Functional Level Control System shall consist of a Siemens Milltronics Hydro Ranger 200 (or approved equal) ultrasonic controller and an Echomax XPS- 15 (or approved equal) ultrasonic transducer.
- C. The level controller shall:
 1. Employ an ultrasonic transceiver suitable for providing excitation to, and processing resultant signals from the attached ultrasonic transducer.
 2. Create a digitized echo profile, and apply patented Sonic Intelligence echo processing techniques to select and verify the echo representing the reflective surface monitored.
 3. Calculate the distance between the transducer face and reflective surface based on the echo selected. The calculated distance may be converted to represent: material level, space, material volume, vessel ullage, pumped volume, or head, and/or total flow volume.
 4. Compensate temperature-induced variation in the acoustic wave propagation velocity in air. This compensation shall be based on the signals received from the ultrasonic transducer, and/or a TS-3 temperature sensor, or an operator entered value representing the air temperature of the transmission medium.
 5. Provide two analog signal outputs, directly or inversely proportional and scalable to the configured process variable.

6. Provide six relay contact outputs based on the level conversion or other process variable as set by the user configurable relay parameters.
 7. Provide two discrete inputs that may be configured to override normal Process Control Functions.
 8. Provide one analog signal input that may be scaled to a monitored process variable, to be used as a basis for level controller Process Control Functions.
 9. Store data related to the digitized echo profiles, distance calculations, signal processing functions, process control functions, and system configuration.
 10. Map stored data to Modbus type read/write and read only registers, as defined by the level controller supplier.
- D. The level controller shall provide an assortment of process control function that may be user implemented in any allowable combination. These functions shall include at a minimum:
1. 0/4–20 mA output directly / inversely proportional and scalable to:
 - level, space, or distance
 - volume (geometric, piecewise linear, or cubic spline approximation derived)
 - volume rate (derived from change in volume per time interval)
 2. Pre-configured application selections for:
 - duplex wetwell pump control by level or rate of change
 - general alarms
 3. Alarms based on on/off setpoints:
 - High, Low, High High, or Low Low level
 - Level in bounds, out of bounds, rate of change
 - Temperature
 4. Loss of Echo or Cable Fault alarm
 5. Pump Control - fixed roster, alternating duty assist or back-up, service ratio duty assist or back-up, or FIFO duty assist.
 6. Pump Control Modifiers – pump run-on, pump start and power resumption delays, wall cling reduction, independent pump group rotations, and pump cycle activated flush operation.
 7. Pump Control Overrides based on discrete inputs such as point level switches or pump fault sensors
 8. Remote relay state control via communications
 9. Failsafe operation on measurement loss, including independent mA output and relay operation configuration.

2.03 MULTI-FUNCTIONAL LEVEL CONTROL SYSTEM - PRESSURE

- A. Submerged Pressure Level Measurement System. The level measurement system shall comprise a submerged pressure transducer (Pressure Transmitter, PT), factory attached and sealed interconnecting cable, and junction/termination box with front panel mounted loop-powered indicator (Level Indicator, LI) that

indicates the depth of process fluid in the vessel being monitored. Within the pressure transmitter, process pressure variations shall be sensed by a barrier diaphragm and transferred via a non-compressible fill liquid to a Wheatstones Bridge strain gage diffused onto a silicon diaphragm. The electronics within the element shall produce an analog signal proportional to the process pressure.

- B. Multi-Functional Level Control System – Pressure shall consist of a Siemens Milltronics HydroRanger 200 (or approved equal) pump controller and a Blue Ribbon Birdcage BC001-10-40 (or approved equal) pressure transducer.

1. Performance:
 - a. Static accuracy of the pressure transmitter shall be less than or equal to 0.25% full scale including the combined effects of nonlinearity, hysteresis and non-repeatability, based on a Best Fit Straight Line at 70 degrees F.
 - b. The pressure transmitter shall be temperature compensated between 0- and 140-degrees F.
 - c. 0 to 10 PSI.
 - d. The shielded and vented interconnecting cable shall be of continuous length (**no splices**) to allow the pressure transmitter to be properly located within the wet well, etc. being monitored. The cable shall be able to withstand 200 pounds of tensile strength, allowing the transducer to be suspended directly by the cable. The cable shall include stainless steel braiding for protection.
 - e. The cable shall be equipped with a desiccant filter at the surface end of the vent tube.
 - f. Transducer shall include 316 stainless steel spacers, nuts, and bolts to protect and keep the diaphragm off the tank floor.
 - g. Transducer shall be provided with a sealed air bag for compensating for atmospheric changes and to ensure that no external moisture reaches the internal electronics.
2. Materials:
 - a. Exterior pressure transmitter parts – 316 Stainless Steel and Viton.
 - b. Interconnecting cable jacket – Polyurethane with SS braiding.
 - c. 5ft ½” 316 stainless steel pipe extension
 - d. 1/8” 316 SS chain to hang transducer from pump/float cord bracket.
 - e. 316 stainless steel D Rings.
 - f. Protective standoff plate, all stainless-steel construction.
3. Electrical:
 - a. Transmitter excitation: Loop powered.
4. Manufacturer, Model series:
 - a. Blue Ribbon Birdcage BC-001-10-40
 - b. Approved equal.

2.04 RADIO TELEMETRY SYSTEM COMPONENTS

- A. Furnish and install the appropriate number and type of dry contacts to accommodate the telemetry system.
- B. Furnish and install all other interface wiring, terminals, circuit breakers, etc., required to interface and power the telemetry unit from the control panel.
- C. All appropriate space (e.g., blanks in pangs, etc.) within the control cabinet for telemetry related accessories.
- D. Coordinate with the construction contractor and the telemetry manufacturer regarding interface between cabinet and telemetry equipment.
- E. All telemetry wiring shall be prewired from relays, sensors and switches to terminal strip TB1 as per current Boca standard sewer detail wiring diagrams. Submittals of control panel prints must be approved by Boca Utilities and telemetry personnel before panel is built. Terminal strip TB2 shall be termination points between main panel and inner instrumentation door. Install antenna and install new ground rod and conductor.

2.05 PUSHBUTTONS, INDICATING LIGHTS, AND SELECTOR SWITCHES

- A. Contact Rating: NEMA ICS 2, Type A600.
- B. Selector Switch Operating Lever: Standard. Spring return from HAND to OFF position.
- C. Indicating Lights: Transformer. Push to test type.
- D. Pushbutton Color:
 - 1. ON or START: Black.
 - 2. OFF or STOP: Red.
- E. Pushbuttons and selector switches lockable in the OFF position where indicated.
- F. Legend Plate:
 - 1. Material: Aluminum.
 - 2. Engraving: 11 characters/spaces on one line, 14 character/spaces on each of two lines, as required, indicating specific function.
 - 3. Letter Height: 7/64 inch.
- G. Manufacturers:
 - 1. Square D 9001 Series.
 - 2. Heavy-Duty, Oiltight Type: As shown on Drawings.

3. Heavy-Duty, Watertight, and Corrosion-Resistant Type: As shown on Drawings.

2.06 TERMINAL BLOCKS 0 TO 600 VOLTS

- A. Provide terminal blocks for termination of all control circuits leaving or entering equipment, panels, or boxes. Terminal blocks shall be single piece 600V, 30-amp barrier type with strap screw lugs, and shall be capable of accepting forked tongue type lugs for wire sizes up to and including No. 10 AWG. Compression type or sectional type terminal blocks are not acceptable. Provide General Electric Type EB 25, Marathon Series 1500, or equal. Meet UL 486E and UL1059.

2.07 ELAPSED TIME METERS

- A. Provide synchronous motor-driven, elapsed time meters, 0 to 99,999.9-hour range, non-reset type, suitable for semi flush, panel mounting. Provide Square D or equal.

2.08 MOTOR STARTERS (1 TO 25 HP)

- A. Provide each motor with a suitable controller with thermal overload protection meeting ICS 2, Class A, NEC, and UL. Provide controller-mounted overload relays of the manually reset type. Select and install overload relay heaters after the actual nameplate full-load current rating of the motor has been determined. Starters shall be Westinghouse A200 Series.

2.09 SOLID STATE STARTERS (> 25 HP)

- A. Reduced Voltage Solid State Starter:
 1. Reduced voltage starter shall be combination solid state motor controller with circuit breaker manufactured by Cutler Hammer or approved equal.
 2. Starters shall be provided with integral bypass contactors. Selector switch shall be on the PCP inner door. AIC rating shall be 25,000 amps.
 3. Motor starter shall have a 120-volt operating coil, overload relay in each phase and control power transformer.
 4. Motor starter shall have 1-N.O. and 1-N.C. auxiliary contacts. Additional auxiliary contacts shall be furnished where shown on the Drawings or as required by the control scheme.
 5. Overload relays (integral to soft starters) shall be bi-metallic, adjustable and manually reset by push button in compartment door. Replaceable

individual overload relay heaters of the proper size shall be installed in each phase.

6. Control power transformer shall be sized for additional load where required. Transformer secondaries shall be equipped with time-delay fuses.
7. Motor circuit protector shall be molded case with adjustable magnetic trip only. They shall be specifically designed for use with solid state reduced voltage starters. Motor circuit protectors shall have auxiliary disconnect contacts when used with starters having external control circuits.
8. The following options shall be required:
 - a. Soft start
 - b. Soft stop
 - c. Protective module - line side of each starter
9. Door mounted devices shall be as shown on the starter elementary diagrams.

2.10 INTRINSIC SAFETY BARRIERS

- A. Intrinsic safety barriers shall provide a safe energy level for exposed wiring in a Class I, Division I, Group D area when the circuit in the nonhazardous area is connected to a nominal 24V dc source, maximum 26V dc with not more than 250V available under fault conditions. The circuit in the hazardous area shall be a contact closure. The entire circuit shall be floating with a negative signal common ground. The intrinsic safety barrier shall be rated 50 mA, minimum. Intrinsic safety barriers shall be mounted in boxes in such a manner as to make separation of hazardous and nonhazardous wiring convenient. The box shall have the words "Intrinsically Safety Circuit" on the lid. Intrinsic safety barriers shall be by R. Stahl, or MTL.
- B. Intrinsic safety barriers shall be used for float signal, thermal switch, and moisture sensor circuits.

2.11 CIRCUIT BREAKERS

- A. Furnish indicating type molded circuit breakers providing ON/OFF and TRIPPED positions of the operating handle. Furnish thermal magnetic, quick make, quick break circuit breakers which are non-interchangeable in accordance with the NEC. Do not use tandem or dual circuit breakers in normal single pole spaces. Do not use single pole circuit breakers with handle ties where multipole circuit breakers are indicated. Utilize multipole circuit breakers designed so that an overload on one pole automatically causes all poles to open. Provide circuit breakers meeting requirements of NEMA AB 1 and having a minimum interrupting rating of 22,000 amps symmetrical at 240 volts. Where circuit

breakers are used as service entrance equipment, provide units UL labeled for that use. Provide circuit breaker handle padlocking provisions.

- B. Acceptable Manufacturers: Cutler Hammer (Westinghouse).
- C. Mechanical Interlocks: Furnish externally mounted mechanical interlocks as indicated on the Drawings.

2.12 PHASE MONITORING RELAYS

- A. Provide phase monitoring relay properly filled with Metal Oxide Varistors (MOVs) having 10,000-volt transient protection to protect against single-phase voltage and incorrect phase rotation. Diversified Electronics 8 pin monitor SLA 230 V.

2.13 CONDUCTORS

- A. General: The use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired only. Products of other manufacturers will be considered in accordance with the General Conditions.
- B. Conductors
 - 1. Conductors 600 Volts and Below:
 - a. Unless otherwise indicated, provide stranded conductors.
 - b. Utilize only conductors meeting applicable requirements of NEMA WC 3, WC 5, WC 7, and ICEA S 19 81, S 61 402, and S 66 524.
 - 2. Provide conductors with Type THHN/THWN, except for sizes No. 6 and larger, provide conductors with XHHW insulation.
 - 3. Tag control conductors with an identification system consisting of the terminal numbers of the major equipment and instruments as indicated on the wiring diagrams furnished with the equipment.

2.14 SPARE PARTS AND TOOLS

- A. General: Provide the following spare parts for the pumps and lift station control cabinet in addition to other manufacturer recommended spare parts for each lift station:
 - 1. One relay and base.
 - 2. One set of overload heaters for each size provided.
 - 3. One phase monitor for each voltage.
 - 4. One alternator.
 - 5. One elapsed time meter.
 - 6. One of each size control fuse.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install equipment in accordance with NEMB ICS 2.3, Submittal Drawings, and Manufacturer's Instructions and Recommendations.
- B. Secure equipment to mounting pads with anchor bolts of sufficient size and number adequate for specified wind loading conditions.
- C. Install equipment plumb and in longitudinal alignment with pad or wall.
- D. Coordinate terminal connections with installation of secondary feeders.
- E. Grout mounting channels into floor or mounting pads.
- F. Retighten current-carrying bolted connections and enclosure support framing and panels to manufacturer's recommendations.

3.02 CIRCUIT BREAKERS

- A. Field adjust trip settings of motor starter magnetic-trip-only circuit breakers.
- B. Adjust to approximately 11 times motor rated current.
- C. Determine motor rated current from motor nameplate following installation.

3.03 OVERLOAD RELAY

- A. Select and install overload relay heaters after the actual nameplate full-load current rating of motor has been determined.

3.04 MOTOR DATA

- A. Provide typed, self-adhesive label attached inside each motor starter enclosure door displaying the following information:
 - 1. Motor served by tag number and equipment name.
 - 2. Nameplate horsepower.
 - 3. Motor code letter.
 - 4. Full load amperes.
 - 5. Service Factor: Minimum 1.25.
 - 6. Installed overload relay heater catalog number.

3.05 FIELD PANELS

- A. Mount all field panels with door opening and generator receptacles configured for easy access and acceptable to city personnel. Field coordinate these locations.
- B. Arc flash warning labels shall be on the panel exterior door.

END OF SECTION

DIVISION 17

INSTRUMENTATION & CONTROLS

SECTION 17300

REMOTE TELEMETRY UNIT (RTU)

PART 1 – GENERAL

1.01. SCOPE OF WORK

- A. Work includes engineering, furnishing, installing, testing, documenting and placing in operation a Remote telemetry Unit (RTU). Training of the OWNER's personnel is also included.
- B. The RTU shall be a NEMA 4 316 Stainless Steel dead-front enclosure containing the following major elements:
 - 1. The SCADAPAK 344E Controller that, under normal operation, monitors site operations.
 - 2. Radio equipment for interconnection with the OWNER's existing Supervisory Control and Data Acquisition (SCADA) system.
 - 3. Uninterruptible Power Supply.
- C. It is the ultimate responsibility of the CONTRACTOR to furnish a complete and fully operable system that reliably performs the specified functions. However, it is the intent of these Contract Documents that a single entity (henceforth referred to as the RTU SUPPLIER) be retained by the CONTRACTOR to have overall responsibility for coordinating the control system equipment described in the Contract Documents.
- D. The RTU SUPPLIER shall design, furnish and install all interior wiring within the RTU and furnish complete wiring diagrams showing the electrical circuits inside the panel and interconnections between the panel and the external instruments and components.
- E. Size the RTU enclosure to adequately dissipate heat generated by equipment mounted inside or on the panel front face and to accommodate components necessary to support all future equipment.
- F. The SUPPLIER shall be one of the following:
 - a. Barneys Pumps, Lakeland, FL
 - b. CC Control Corp., West Palm Beach, Florida.
 - c. Champion Controls, Fort Lauderdale, FL
 - d. Approved equal as defined in part 1.03 herein.
- G. The CONTRACTOR shall be responsible for:

1. Equipment storage and protection until installed following the storage and handling instructions recommended by the RTU SUPPLIER. Anti-static and winterization requirements shall be per the RTU SUPPLIER's instructions and the RTU SUPPLIER shall periodically verify that these instructions are followed.
 2. Including within the electrical subcontractor's scope the provision, installation and termination of field and power wiring to the RTU Panel. Termination shall be made in accordance with final accepted interconnection diagrams developed by the RTU SUPPLIER. The electrical subcontractor shall mark on the interconnect diagram the field wire numbers used for each termination point. The RTU SUPPLIER shall finalize the interconnect diagrams by including these field wire numbers in the final as built version.
 3. Physical installation of the control equipment. The CONTRACTOR shall require the RTU SUPPLIER to observe and advise on the installation of the control equipment to the extent required to certify, with the operational check-out tests, that the equipment will perform as required.
 4. Provision and installation of the radio antenna mast and installation of the appurtenances thereon.
- H. All engineering development required by the RTU SUPPLIER will be in accordance with the Conditions of this Contract.
- I. Equipment found to be defective prior to system acceptance shall be replaced and installed at no additional cost to the OWNER.
- J. In the bid price, the RTU SUPPLIER shall include the services of authorized field personnel from the manufacturer of components or systems provided under this section but not manufactured by the RTU SUPPLIER. Should these personnel be required during installation, start-up and checkout of the control system, such services shall be provided at no additional cost to the OWNER.

1.02. RELATED WORK

- A. All conduits, power and field wiring and cables are provided and installed under Division 16, Electrical.

1.03. SUBMITTALS

- A. Furnish, as prescribed under the General Requirements, all required submittals covering the items included under this section.
- B. Submit complete, neat, orderly, and indexed submittal packages. Handwritten diagrams are not acceptable and all documentation submittals shall be made using CADD generated utilities as specified herein.

- C. Partial submittals or submittals that do not contain sufficient information for complete review or are unclear will not be reviewed and will be returned by the OWNER as not approved.
- D. Provide a single RTU shop drawing submittal containing the following:
 - 1. System interconnect diagram that shows all connections required between component parts of the items covered in this section and between the various other systems specified in this Contract. Number all electrical terminal blocks and field wiring. Identify each line at each termination point with the same number. Do not use this number again for any other purpose in the complete control scheme.
 - 2. Bill of Materials: A list of all components, including all 3rd party software. Group components by type and include component model number and part number, component description, quantity supplied, and reference to component catalog information.
 - 3. Descriptive Information: Catalog information, descriptive literature, performance specifications, internal wiring diagrams, power and grounding requirements, power consumption, and heat dissipation of all elements. Clearly mark all options and features proposed for this project.
 - 4. Installation Details. Equipment installation drawings showing external dimensions, enclosure material and spacing, mounting connections, and installation requirements.
 - 5. Power requirements and heat dissipation summary for all control panels. Power requirements shall state required voltages, currents, and phase(s). Heat dissipations shall be maximums and shall be given in Btu/hr. Summary shall be supplemented with calculations.
 - 6. A list of, and descriptive literature for, spares, expendables, and test equipment.
- E. Test Procedures: Submit the procedures proposed to be followed during all system testing. Procedures shall include test descriptions, forms, and check lists to be used to control and document the required tests.
- F. Test Reports: Upon completion of each required test, document the test by submitting a copy of the signed off test procedures to the OWNER.

1.04. QUALITY CONTROL

- A. Base bids for the SYSTEM SUPPLIER shall be as listed in the Contract Proposal. SYSTEM SUPPLIERS seeking OWNER approval shall have extensive experience in systems of similar size and complexity. Panel fabrication shop shall be a UL listed panel shop. Acceptance of alternates shall be made based on price, location of the fabrication shop, accessibility of personnel, programming

knowledge, and OWNER confidence. The SYSTEM SUPPLIER shall be subcontracted by and paid by the CONTRACTOR.

- B. The SYSTEM SUPPLIER shall meet all of the requirements of these specifications, and, unless specifically stated otherwise, no prior acceptance of any subsystem, equipment, or materials has been made.
- C. All equipment furnished by the SYSTEM SUPPLIER shall be of the latest and most recent design and shall have overall accuracy as guaranteed by the manufacturer.
- D. Materials and equipment used shall be U.L. approved wherever such approved equipment and materials are available.
- E. Component equipment shall be as supplied by one of the manufacturers named in the individual specification sections or approved equal. The design of the SCADA is based on the first-named manufacturer's equipment if there is a difference.
- F. To facilitate the OWNER's operation and maintenance, products shall be of the same major manufacturer, with panel mounted devices of the same type and model as far as possible.
- G. In order to insure the interchangeability of parts, the maintenance of quality, the ease of interfacing between the various subsystems, and the establishment of minimums with regard to ranges and accuracy, strict compliance with the above requirements shall be maintained.
- H. The SYSTEM SUPPLIER shall designate a single point of contact for interface with the OWNER on this project. The OWNER reserves the sole right to approve or reject this point of contact.
- I. The SYSTEM SUPPLIER's selected project personnel shall meet the following requirements:
 - 1. Project OWNER shall have at least 10-years experiences in installing similar systems and shall have a minimum of secondary education in the field of electronics or similar technical discipline.
 - 2. Project technician assisting the project OWNER for field element calibration and check out shall have at least 5-years experiences in installing similar systems.
 - 3. Key staff resumes shall be submitted for OWNER's approval with the Project Plan as further detailed under submittals.

- J. Service Facility: The SYSTEM SUPPLIER shall have an established service facility from which qualified technical service personnel and parts may be dispatched upon call.
- K. The SYSTEM SUPPLIER shall provide experienced personnel on-site to coordinate and/or perform installation, termination, and adjustment; on-site testing, OWNER training; and startup assistance for the SCADA.
- L. The SYSTEM SUPPLIER shall provide, on-site, an experienced project OWNER to supervise and coordinate all of the on-site SCADA activities. An experienced technician may be provided to assist the project OWNER in field element installation, field calibration, and checkout tests. The SYSTEM SUPPLIER's project OWNER shall be on-site during the period required to effect all of the critical on-site activities related to the SCADA, particularly the software debugging, SCADA training, and witnessed testing activities.

1.05. FINAL DOCUMENTATION

- A. After the demonstration tests have been completed and as a part of the final acceptance requirements, submit the record drawings. Record drawings shall include, corrected for any changes that may have been made up through Substantial Completion:
 - 1. Complete wiring diagrams
 - 2. Panel elevations
 - 3. Interconnection diagrams showing terminal numbers at each wiring termination
- B. Record drawings shall be developed or converted to the latest version of AutoCAD. Provide two copies of all AutoCAD files on separate Compact Disks.
- C. Operating and Maintenance (O&M) Manuals: Provide three (3) complete sets of three-ring bound O&M manuals in accordance with Division 1. Include descriptive material, drawings, and figures bound in appropriate places. Include:
 - 1. Operating and maintenance instructions in sufficient detail to facilitate the operation, removal, installation, adjustment, calibration and maintenance of each component provided.
 - 2. All the submittal data for each component from the approved shop drawing submittals with corrections made on approved as noted items.
 - 3. A Compact Disk containing the shop drawing data in PDF format in the binder sleeve.
- D. Provide the following additional final documentation:
 - 1. licenses in the OWNER's name for all software supplied

2. final copies of all programming files on Compact Disk
3. a complete, fully commented hard copy printout of all RTU program logic.

1.06. STANDARDS

- A. The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable state and local requirements. UL listing and labeling shall be adhered to under this Contract.
- B. Instrument Society of America (ISA) and National Electrical Manufacturers Association (NEMA) standards shall be used where applicable in the design of the control system.
- C. Any equipment that does not have a UL, FM CSA, or other approved testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that the equipment furnished has been manufactured in accordance with the National Electric Code and OSHA requirements.
- D. Any additional work needed resulting from any deviation from codes or local requirements shall be at no additional cost to the OWNER.

1.07. WARRANTY AND GUARANTEES

- A. In accordance with Division 1, the RTU SUPPLIER shall furnish to the OWNER a written two-year guarantee commencing with substantial completion, that all equipment and parts thereof, material and/or workmanship are of top quality and free from defects.

PART 2 - PRODUCTS

2.01. GENERAL REQUIREMENTS

- A. All equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single MANUFACTURER, insofar as possible, and shall consist of equipment models which are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion through the installation of plug-in circuit cards or additional cabinets.

2.02. RTU PANEL

- A. General:
 1. The SCADA controller shall be an intelligent, modular unit, capable of

both data acquisition and local data processing. It shall monitor and control local equipment in a stand-alone mode as well as being an intelligent node in a distributed system. It shall be based on multiprocessor architecture, in which a co-processor is used for handling on-board input/output channels. To facilitate initial installation, maintenance and future expansion, all external input/output modules shall connect to the basic controller using a high-speed internal bus.

2. The SCADA controller shall be configured and programmed with standard programming languages such as Relay Ladder Logic (RLL), as well as supporting the IEC 61131 programming environment. Programs shall be developed and downloaded either directly to the controller using a standard RS-232 interface cable, or remotely through the communication network media such as phone lines, Ethernet, dedicated lines, or wireless radios.
3. The controller must be supplied with the number and type of input/output modules and communication ports as indicated elsewhere in the specifications. Future expansion may be made by simply plugging in additional input/output modules to the I/O bus.

B. SCADA controller hardware specifications:

1. Central Processing Unit (CPU):
 - a) The central processing unit shall be a high speed (minimum 32 MHz), 32-bit CMOS microprocessor. The design should incorporate two separate co-processors for controlling input/output channels.
 - b) The CPU shall be equipped with at least 4 MB CMOS SRAM for application programs, 16 MB Flash ROM for firmware and application programs.
 - c) The option will exist to be able to load the application program within the existing FLASH memory.
 - d) The CPU shall include a real time clock/calendar, accurate to within one minute per month, with lithium battery backup. The battery will maintain the memory and clock/calendar for two years of power off time.
 - e) All electronic IC components must be surface mounted.
 - f) Diagnostic LEDs shall be included for the following:
 - (1) Power Mode
 - (2) Program Run/Stop
 - (3) Communication parameters such as transmit, receive, clear to send and carrier detect
 - (4) CPU Status
 - (5) Forcing
 - g) To minimize power consumption, the controller shall support the following:

- (1) Sleep—Mode shall allow Custom power-saving features including multiple configurable power modes to reduces power consumption to at least 15mW. The Sleep-Mode must be controlled by the application program.
 - (2) All LEDs controlled by the CPU must be disabled to reduce power consumption. A push button switch on the CPU module shall allow the LEDs to turn on when field service is being performed.
2. Mixed process input/output:
 - a) The controller shall include the following base I/O:
 - (1) 1 Dry Contact Digital Input Counter, jumper-selectable for 5KHz or 10KHz maximum frequency.
 - (2) 2 Turbine Meter Inputs, jumper-selectable for use with turbine meter amplifiers or dry contact closure, 10KHz maximum frequency.
 - (3) 8 Analog Inputs, Software configurable, 0-20mA, 4-20mA, 0-10V and 0-5V.
 - (4) 16 Digital Inputs, Factory configurable for 12/24V, 48V, 115/125V, and 240V.
 - (5) 10 Digital Outputs, Form A Contacts (Normally open), 5 contacts per common.
 - (6) 2 Analog Outputs, Software configurable, 0-20mA, 4-20mA, 0-10V and 0-5V
 - b) The controller shall include one internal temperature measurement channel, readable in C or F to indicate the operating temperature, for remote monitoring via the communication network, or use within the application software.
 - c) The controller shall include one RAM battery voltage measurement channel which can be monitored remotely via the communication network.
 - d) The controller I/O shall be controlled by a high-performance co-processor.
 - e) The expansion I/O shall be controlled by a second-high performance co-processor.
 - f) The state of digital and/or analog output shall be configurable to hold last output value or go to off condition when the application program is stopped.
 - g) Terminal blocks shall be removable and will accommodate solid or standard wires from 22 to 12 AWG. This will allow for module replacement without disturbing the field wiring.
 - h) The controller must be capable of supporting the following additional input/output points in total through expansion modules:
 - (1) 512 digital inputs
 - (2) 512 digital outputs
 - (3) 128 analog inputs

- (4) 64 analog outputs
 - (5) 64 frequency inputs
- 3. Communication:
 - a) The RTU shall possess a minimum of three (3) built-in communication ports with the following characteristics:
 - b) Two serial port (DTE) jumper-configurable to RS-232 (full or half duplex RTS/CTS control) or RS-485 (two-wire half-duplex) with operation to 115,200 baud
 - c) One USB 2.0 port, Type "B" Peripheral.
 - d) The RTU shall support asynchronous operating mode, half and full duplex transmission.
 - e) SDI-12 (Serial Data Interface at 1200 baud): The controller shall support communication to SDI-12 slave devices as follows:
 - (1) The controller shall have an independent C++ to generate SDI-12 protocol messages.
 - (2) Protocol messages shall be triggered by means of a companion Ladder Logic or IEC61131-3 application via a Modbus register table
 - (3) SDI-12 protocol messages shall be sent out of an RS232 port.
 - (4) An external interface shall be provided to convert serial SDI-12 RS-232 signal levels to SDI-12 levels.
- 4. Mechanical Design:
 - a) The controller shall be DIN rail mounted with screw clamp for vibration resistance. Front access to all controls, indicators, lithium battery, communication ports and power supply shall be provided. Communication ports shall be standard RS-232, Terminal block and/or RJ45, to allow easy access using standard cables. No proprietary communication cables shall be allowed.
 - b) All boards shall be coated with conformal coating, for protection against humidity and corrosion.
 - c) All system components must be constructed of corrosion resistant zinc plated steel with removable metal covers.
- 5. Environment:
 - a) The controller shall operate over an ambient temperature range of -40°F to 158°F, (-40°C to 70°C) with a relative humidity 5% to 95%, non-condensing.
- 6. Certifications and Standards:
 - a) All inputs and outputs (except the serial communication ports) must survive ANSI/IEEE C37.90 surge withstand capability (SWC) tests without damage.
 - b) The controller must be certified for electrical safety as non-incendive electrical equipment for use in Class 1, Division 2 Groups A, B, C and D Hazardous Locations.

C. Communication Protocol:

1. The RTU shall support the industry standard DNP3 protocol, as well as DNP/TCP and DNP/UDP for Ethernet communication, with the following minimum features:
 - a) DNP3 Level 2
 - b) Local and remote configuration via DNP3 and file transfer
 - c) Peer-Peer communications
 - d) Routing - serial-serial, serial-Ethernet communications
 - e) Issue controller commands remotely (file, application, event management, diagnostic capture, etc.)
 - f) Reporting to up to 3 independent DNP3 Masters
 - g) Proprietary protocols will not be allowed.
2. The controller shall be able to receive information from other sites and retransmit the message to another site, using the same communication port.
3. The controller shall allow flexible communication algorithms on all communication ports. Any of the ports can act as a Level 2 or 3 Master, Level 1 Slave or Level 3 mimic at any time during the execution of the application program.
4. The controller shall be capable of storing up to 20,000 DNP3 events. There shall be No user scripting required to generate or send events.
5. Time-stamped events can be selectively generated per digital point and per analog point alarm limit.
6. Individual alarm limits on analog points can selectively generate DNP3 unsolicited reports.
7. The RTU shall support the industry standard Modbus protocol, as well as Modbus/TCP and UDP for Ethernet communication, with the following minimum features:
 - a) Allows up to 65,535 stations in one system.
 - b) Ability to transfer complete programs and data over the communication network.
 - c) Support high data security techniques such as Cyclic Redundancy Check CRC16.
 - d) Proprietary protocols will not be allowed.
8. The controller shall be able to receive information from other sites and retransmit the message to another site, using the same communication port.
9. The controller shall allow flexible communication algorithms on all communication ports. Any of the ports can act as Master, Slave or Store-and-Forward at any time during the execution of the application program.
10. The RTU shall be able to function as an interconnection point between different communication systems such as radio, leased lines, and radios with different frequencies.
11. The RTU shall be able to send broadcasting messages to a number of

locations.

12. The RTU shall be able to perform report-by-exception (event driven communications) under the control of the application program.
13. The RTU shall be capable of supporting both DNP3 and Modbus concurrently on the same communications ports.
14. The RTU shall support programming of custom protocols for data interchange on any of the communication ports.
15. Each communication port shall be configurable with a unique station number when used with the standard protocol.
16. Any port running the standard communications protocol shall allow for programming via local or remote communications.

D. Network Protocols

1. Ethernet Network protocols shall consist of IP, ARP, TCP, TFTP, UDP and ICMP.
2. Rockwell (Allen Bradley) DF1 Protocol Half / Full Duplex modes BCC / CRC error check modes.

E. Operating System:

1. The software shall be based on a multi-tasking executive system optimized for a real-time environment.

F. Programming Software:

1. The programming software shall allow downloading of Relay Ladder Logic and/or standard C++ programs from within one package. The software shall allow the user to develop and download the application and system configuration over the communication network via radios, Ethernet, leased and dial-up lines.
2. The RTU shall allow Ladder and C++ applications to run concurrently. Any failure in the Ladder application shall not affect other applications running under C++.
3. The Relay Ladder Logic shall include the following functions:
 - a) PID feedback control.
 - b) Data logging function with time & data
 - c) Modem dialing and control.
 - d) Timers, counters, mathematical functions, memory functions.
 - e) Standard Ladder Logic functions such as coils and contacts.
 - f) Boolean logic functions.
 - g) Bit transfer functions.
 - h) Block transfer functions.
 - i) Scaling function
 - j) Totalizing function

- k) Flow function
- 4. On-line monitoring of Relay Ladder Logic power flow shall be included to facilitate start-up and debugging of programs.
- 5. Relay Ladder Logic program shall be up to 12K words in size, with no fixed limit on the number of networks.
- 6. The programming software shall support on-line monitoring and forcing of any register in the protocol database when utilizing the built-in protocol. Forcing shall write a value to the register and prevent modification of the register content by the communication protocol or the application software. A global command to remove all forcing must be included.
- 7. In addition to forcing, the software shall be capable of writing a value to any register in the protocol database but continue to allow the protocol or application software to modify the contents of the register.
- 8. The controller shall be capable of processing up to 32 PID loops with individual execution time bases from 0.1 to 25.5 seconds.
- 9. Standard C++ tools shall support the following functions:
 - a) Database functions.
 - b) Modem dial-up functions.
 - c) PID functions.
 - d) System functions.
 - e) Protocol functions.
- 10. When downloading C++ programs, the communication message size must be configurable to a minimum of 26 bytes and a maximum of 256 bytes.
- 11. The software communication settings must allow configurable number of retries in addition to message time-out of up to 99 seconds.
- 12. The unit must also support IEC 61131-3 programming using Sequential Function Chart (SFC), Functional Block Diagram (FBD), Ladder Diagram (LD), Structured Text (ST), Instruction List (IL), Flow Chart (FC) languages using a separate programming tools.

G. Data Logging functionality

- 1. The Controller shall support Data Logging via Removable USB Mass Storage devices which include:
 - a) USB Flash Memory Stick
 - b) USB External Hard Drive
- 2. There shall be three Operating Modes to choose from:
 - a) Datalog Memory Expansion
 - b) Reduced power mode for Solar Applications
 - c) Walk-up SCADA
- 3. Log to USB Mass Storage
 - a) USB mass storage device remains connected to controller
 - b) Multiple data logs may be configured to write data to USB storage (Data is buffered to non-volatile RAM and written once per

- minute.)
- c) At some point in time when the USB storage device is removed, the data continues to be logged, but is stored to internal non-volatile memory.
- d) When a USB storage device is re-inserted the buffered data is copied to the USB storage device.
- 4. Solar Application Log to Mass Storage, Minimum On-Time Requirement: large storage capacity but at minimum power
 - a) Data logs are configured to write to the USB storage device as specified the previous mode. However, USB host port is normally kept powered OFF to reduce power consumption.
 - b) While the host port is powered down USB storage is not accessible. Data shall be buffered to internal non-volatile RAM. At defined intervals the USB host is powered up for a fixed amount of time. When this happens, the USB storage device is recognized and the data logs are written to the USB storage device.
 - c) The USB storage device shall be able to be exchanged and taken to a PC where the data can be imported from the USB storage device.
- 5. Log Internally with Transfer to USB Mass Storage
 - a) One or more data logs are configured to write data to the Controllers internal file system with the auto transfer feature enabled.
 - b) When a USB mass storage device is inserted, the data logs are automatically transferred to the USB storage device.
 - c) The USB storage device is removed from the controller and connected to a PC, which then imports the log files from the USB storage device.
- 6. Update frequency shall be selectable by the user and can vary from .1 seconds to 999 months.
- 7. Configuration of the data log function shall be made through the ladder logic programming software or IEC61131-3 programming software.
- 8. Logs must have the capability of being triggered by timers or process events.
- H. Radio Telemetry Equipment. Radio telemetry shall be implemented using the ISM 900 MHz band and meeting the following requirements:
 - 1. Radio - Part # MDSSD9CES MDS SD9 Ethernet and Serial 900MHZ. One 10/100 Base T IP/Ethernet with two serial ports, COM2 port programmable RS232/485. Includes 9710 emulation mode, AES 128 encryption and VRC. Supports packet and transparent modes and IP/Ethernet bridging.
 - a) Set radio mode to X710
 - b) Set Frequencies to:
 - TX: 928.73125

- RX: 952.73125
- c) Connect COMM2 on Radio to COMM2 on RTU
 2. Provide the following to the Contractor for installation on the antenna mast by others:
 - a. Antenna – Decibel model DB806TL-Y or approved equal.
 - b. Two 316 Stainless Steel side mount brackets
 - c. Lead-in Cable – 100 feet of 50-ohm foam dielectric coaxial cable. Andrews LDF5-50A or larger where required.
 - d. Weatherproof heat shrink on all exterior antenna cable connections.
 2. In-line Surge Suppressor – Polyphaser IS-B50LN-C2 or approved equal.
 3. Provide miscellaneous accessories as shown in the Contract Drawings and as required for a complete installation.
- I. Battery Back-up: Provide a 12V 10AH (Amp Hours) battery within the RTU panel capable of maintaining the RTU including radio telemetry functions for 10 minutes.

2.03. RTU ELECTRICAL TRANSIENT PROTECTION

- A. All electrical and electronic elements shall be protected against damage due to electrical transient induced in interconnecting lines from lightening discharges and nearby electrical systems.
- B. Manufacturer's Requirements: All surge suppressor devices shall be manufactured by a company that has been engaged in the design, development and manufacture of such devices for at least 5 years.
- C. Suppressor Locations: As a minimum, provide surge suppressors of the following locations:
 1. At any connections between AC power and electrical and electronic equipment, including panels, assemblies and field mounted analog transmitters.
 2. At the field, panel or assembly connections of all analog signal circuits that have any portion of the circuit extending outside of a protection building.
 3. Between the radio and external mounted antenna.

2.04. RTU PANEL REQUIREMENTS

- A. General:
 1. All conduit entry shall be from the bottom only.
 2. The panel shall be provided with an isolated copper grounding bus to ground all signal shield connections.

3. The panel shall be equipped with an internal, hand-switch controlled, LED light and 120V, 15-amp, duplex utility receptacle. These shall be serviced through a dedicated breaker.
4. Furnish cooling fans, vents, or an air conditioning unit as necessary to maintain internal components below their maximum operating temperature. Maintain NEMA 3R protection level.
5. All internal components shall be equipped with identification tags
6. The panel shall be protected from internal corrosion by the use of corrosion – inhibiting vapor capsules. Provide:
 - a. Northern Instruments Model Zerust VC-6-2
 - b. Hoffman, model A-HC15E
 - c. Approved equal.

B. Doors:

1. All control panels shall have a continuous piano hinge door for ease of access. A minimum of 80% of the panel interior shall be exposed by doors.
2. The door shall use a lockable hasp mechanism, and be able to accept a cyber lock with 3/8" shackle.
3. The inside of each door shall be equipped with a print pocket.
4. The panel nameplate shall be equipped with a screw mounted laminated plastic nameplate. The use of adhesive to mount the nameplate will not be acceptable.

C. Electrical:

1. Main circuit breaker and branch circuit breaker for each branch circuit as required to distribute power from the main power feed.
2. All breakers accessible when the panel door is open.
3. No more than 20 devices on any single circuit.
4. No more than 12 amps for any branch circuit.
5. Panel (or site) lighting, receptacles, heaters, controls, telemetry and fans on separate branch circuits.

D. Wiring:

1. Power wiring shall be THWN stranded copper, No. 12 AWG size, for 120V service. Colors shall be per OWNER standards as follows:
 - a. Line: Red
 - b. Neutral: White
 - c. Ground: Green
2. Discrete wiring shall be THWN stranded copper, sized for the current carried, but not smaller than No. 16 AWG.

3. Analog signal wiring shall be stranded copper in twisted shield pairs, no smaller than No. 16 AWG. Analog wiring shall be black and white per OWNER standards.
 4. Panel wiring shall be routed within wire troughs or panduits.
 5. Hinge wiring shall be secured at each end with the bend portion protected by a plastic sleeve.
 6. Analog or dc wiring shall be separated from any ac power or control wiring by at least six inches.
 7. Each wire shall be uniquely identified at all terminations using machine printed plastic sleeves.
 8. Terminal blocks shall be provided for all field wiring entering the panel. The greater of 4 or 15% spare terminal blocks shall be provided. Terminal blocks shall meet the following requirements:
 - a. Screw terminals capable of accepting 10-26 AWG wire.
 - b. Fused disconnect style.
 - c. DIN-rail mounting.
 - d. Connectors shall be either copper or steel. Use of aluminum connectors shall not be permitted without prior approval of the OWNER.
 - e. Phoenix Contact UT4 HES1 or approved equal.
- E. Control/Interposing Relays: All relays shall meet the following:
1. Compact, general-purpose, plug-in type.
 2. Socket mounted.
 3. Contacts rated for not less than 10 amperes at 120V.
 4. Equipped with neon status lights and test buttons.
 5. Permanent, legible identification.
 6. Potter & Brumfield series KRPA or approved equal.
- F. Construction:
1. Minimum metal thickness: 14-gauge.
 2. Stiffeners as required to prevent deflection under instrument loading and permit lifting without racking or distortion.
 3. When required, removable lifting rings and fill plugs to replace rings after installation.
 4. All components and terminals shall be accessible without removing other components except for covers.
 5. Provide sunshields on the front and sides only. A sunshield is not required on the back of the enclosure. The sunshield material shall match the material of the enclosure.
- G. The panel shall be a manufactured item, Hoffman Engineering, or equal.

2.05. SPARES AND EXPENDABLES

- A. Provide the following spare parts:
 - 1. One spare d.c. power supply of each type provided.
 - 2. One (1) spare 12v 10ah spare battery.
 - 3. Five percent (rounded up) spare surge suppressors of each type provided
- B. Provide the following expendables:
 - 1. Ten percent (rounded up) spare fuses of each type and rating supplied.

PART 3 - EXECUTION

3.01. GENERAL

- A. Prerequisite Activities and Lead Times: Do not start the following key project activities until the listed prerequisite activities have been completed and lead times have been satisfied:
 - 1. Hardware Purchasing, Fabrication, and Assembly: Associated design related submittals completed (no exceptions, or approved as noted).
 - 2. Shipment: Completion and approval of all design related submittals.
 - 3. Startup: Operational Checkout Tests.
 - 4. OWNER Training: Owner Training Plan completed and O&M manuals delivered.
 - 5. Demonstration Tests: Operational Check-out Tests, Startup, OWNER Training, and Demonstration Test Procedures must be complete. Give four (4) weeks' notice prior to the planned test start date.
- B. The RTU shall be assembled as far as possible at the RTU SUPPLIER's shop. No work, other than correction of minor defects or minor transit damage, shall be done on the panels at the jobsite.
- C. Substantial Completion: Substantial Completion for the project is as defined in the General Conditions. However, the following requirements must be fulfilled before consideration will be given for Substantial Completion of the control system:
 - 1. All control system submittals have been completed.
 - 2. The control system has successfully completed the Demonstration Tests.
 - 3. The required Owner Training Plan has been implemented.
 - 4. All spares, expendables, and test equipment have been received by OWNER.

- D. Final Acceptance: control system final acceptance is defined as the date when the OWNER issues a written notice of final acceptance. For this Section, the following must have been completed before consideration will be given to the issuance of notice of final acceptance:
1. All punch-list items have been checked off.
 2. Revisions to the control system O&M Manuals have been made (that may have resulted from the Demonstration Tests).

3.02. PRODUCT HANDLING

- A. Adequately pack manufactured material to prevent damage during shipping, handling, storage and erection. Pack all material shipped to the project site in a container properly marked for identification. Use blocks and padding to prevent movement.
- B. Ship materials that must be handled with the aid of mechanical tools in wood-framed crates.
- C. Ship all materials to the project site with at least one layer of plastic wrapping or other approved means to make it weatherproof. Anti-stat protection shall be provided for all sensitive equipment.
- D. Inspect the material prior to removing it from the carrier. Do not unwrap equipment until it is ready to be installed. If any damage is observed, immediately notify the carrier so that a claim can be made. If no such notice is given, the material shall be assumed to be in undamaged condition, and any subsequent damage that is discovered shall be repaired and replaced at no additional expense to the OWNER.
- E. Store and protect equipment until installation following the storage and handling instructions recommended by the equipment manufacturers. Place special emphasis on proper anti-static protection of sensitive equipment.
- F. ESD Protection: Provide for the proper handling, storage, and environmental conditions required for the control system components deemed static sensitive by the equipment manufacturer. Utilize anti-stat wrist straps and matting during installation of these items to prevent component degradation.
- G. Protection during Construction: Throughout this Contract, provide protection for materials and equipment against loss or damage and from the effects of weather. Prior to installation, store items in indoor, dry locations. Provide heating in storage areas for items subject to corrosion under damp conditions. Provide covers for panels and other elements that may be exposed to dusty construction environments. Specific storage requirements shall be in accordance with the RTU SUPPLIER's recommendations.

- H. Corrosion Protection: Protect all consoles, panels, enclosures, and other equipment containing electrical or instrumentation and control devices, including spare parts, from corrosion through the use of corrosion-inhibiting vapor capsules. Prior to shipment, include capsules in the shipping containers, and equipment as recommended by the capsule manufacturer. During the construction period, periodically replace the capsules in accordance with the capsule manufacturer's recommendations. Replace all capsules just prior to Final Acceptance.
- I. The CONTRACTOR shall be responsible for any damage charges resulting from the handling of the materials.

3.03. INSTALLATION

- A. Install the RTU in the location indicated on the Drawings and follow manufacturers' installation instructions explicitly, unless otherwise indicated. Wherever any conflict arises between manufacturers' instruction, and these Contract Documents, follow OWNER's decision, at no additional cost. Keep copy of manufacturers' instructions on the jobsite available for review at all times
- B. Install materials and equipment in a workmanlike manner utilizing craftsmen skilled in the particular trade. Provide work which has a neat and finished appearance. Coordinate I&C work with the OWNER and work of other trades to avoid conflicts, errors, delays, and unnecessary interference with operation of the existing plant during construction.
- C. Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from premises and from interior and exterior of all devices and equipment. Touch-up scratches, scrapes, or chips in interior and exterior surfaces of devices and equipment with finishes matching as nearly as possible the type, color, consistency, and type of surface of the original finish. Clean and polish the exterior of all panels and enclosures upon the completion of the demonstration tests.
- D. Ground each analog signal shield on one end at the receiver end only. Properly ground all surge and transient protection devices. Coordinate grounding system with Division 16, Electrical.

3.04. TRAINING

- A. The cost of training programs to be conducted with OWNER's personnel shall be included in the Contract price.
- B. The RTU SUPPLIER shall provide detailed manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project.

- C. The RTU SUPPLIER shall make use of teaching aids, manuals, slide/video presentations, etc. After the training services, such materials shall be delivered to OWNER.
- D. The training program shall represent a comprehensive program covering all aspects of the operation and maintenance of the RTU system.
- E. All training schedules shall be coordinated with, and at the convenience of the OWNER. Shift training may be required to correspond to the OWNER's working schedule.
- F. Maintenance: Provide a minimum of eight (8) hours of hardware and software maintenance training for up to two (2) of the OWNER's personnel in the maintenance of the equipment which shall include:
 - 1. Training in standard hardware maintenance for the equipment provided.
 - 2. Specific training for the actual hardware configuration to provide a detailed understanding of how the equipment and components are arranged, connected, and set up.
 - 3. Test, adjustment, and calibration procedures.
 - 4. Troubleshooting and diagnosis.
 - 5. Component removal and replacement.
 - 6. Periodic maintenance.
 - 7. Maintenance and use of the software.

3.05. TESTING - GENERAL

- A. All elements of the RTU system, both hardware and software, shall be tested to demonstrate that the total system satisfies all of the requirements of the Contract Documents
- B. As a minimum, the testing shall include shop tests, operational check-out tests, and Field Acceptance Test.
- C. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and, upon the system producing the correct result (effect), the specific test requirements will have been satisfied.
- D. All tests shall be conducted in accordance with, and documented on, prior approved procedures, forms, and checklists. Each specific test to be performed shall be described and a space provided after it for signoff by the appropriate party after its satisfactory completion. Copies of these signoff test procedures, forms, and checklists will constitute the required test documentation.
- E. Provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical

to test with real process variables, equipment, and data, provide suitable means of simulation. Define these simulation techniques in the test procedures.

- F. The RTU SUPPLIER shall coordinate all of their testing with the CONTRACTOR, the OWNER, all affected suppliers, and the OWNER.
- G. The OWNER reserves the right to test or retest any and all specified functions whether or not explicitly stated in the approved test procedures. The OWNER's decision shall be final regarding the acceptability and completeness of all testing.

3.06. OPERATIONAL READINESS TEST (ORT)

- A. Prior to startup and demonstration testing, certify that the RTU system (inspected, tested and documented) is ready for operation. These inspections and tests shall include Loop/Component inspections and tests. The RTU SUPPLIER shall fully debug problems in the system as a whole. Final approval of control software will not be based on written descriptions of software functions alone, but on actual performance in the field.
- B. Check the entire control system for proper installation, calibration and adjustment on a loop-by-loop and component-by-component basis to ensure that it is in conformance with related submittals and the control system Specifications.
- C. The Component Inspections and Tests shall be implemented using approved forms and checklists. These shall be developed by the RTU SUPPLIER and submitted for approval.
- D. Witnessing: These inspections and tests do not require witnessing. However, the OWNER will review the Status Sheets and Component Calibration Sheets and spot-check their entries periodically and upon completion of the Operational Check-out Tests. Correct any deficiencies found.

3.07. FIELD ACCEPTANCE TEST (FAT)

- A. Once the RTU system has passed the ORT, the RTU SUPPLIER shall perform a witnessed Field Acceptance Test (FAT) on the complete RTU system. The FAT shall demonstrate that the RTU system is operating and in compliance with the Contract requirements. Each specified function shall be demonstrated on a paragraph-by-paragraph basis.
- B. The system shall operate for a continuous 40 hours without failure before this test will be considered successful.
- C. The FAT shall cover the entire system, including control functions, alarms, and status monitoring. Test procedures used for shop tests may be adopted for these tests if modified as required.

3.08. RTU PROGRAMMING

- A. RTU I/O shall match the existing City RTU standard.
- B. The integrator shall load and test the City provided RTU program.
- C. The integrator will closely coordinate all work and testing of the RTU system with the City SCADA department.
- D. The CITY will perform all work at the SCADA master site needed to incorporate the RTU into the system, including but not limited to screen development and programming.

END OF SECTION

SECTION 17330 RADIO ANTENNA MAST

PART 1 - GENERAL

1.01. SCOPE OF WORK

- A. This Specification Section covers work related to the provision and installation of a radio antenna mast.
- B. The Work also includes a radio survey as further defined herein. The survey shall be performed by a firm certified and approved for such work by Advantage Communications, Hollywood, FL, or approved equal.
- C. The Contractor is to assume full responsibility for additional costs which may result from unauthorized deviations from the specifications.

1.02. RELATED WORK

- A. The antenna, mounting hardware, antenna cable and surge suppressor will be supplied by the SYSTEM SUPPLIER defined in Specification Section 17300.

1.03. SUBMITTALS

- A. Furnish, as prescribed under the General Requirements, all required submittals covering the items included under this section.
- B. Submit complete, neat, orderly, and indexed submittal packages. Handwritten diagrams are not acceptable and all documentation submittals shall be made using CADD generated utilities.
- C. Partial submittals or submittals that do not contain sufficient information for complete review or are unclear will not be reviewed and will be returned by the OWNER as not approved.
- D. Submit detailed construction and installation drawings for the mast and appurtenances. The foundation and mast designs complete with all appurtenances shall be certified as compliant with Florida building codes and other applicable codes, by a Florida-registered Professional Engineer.
- E. The foundation and mast design shall be certified as having a wind survivability rating in accordance with the 2014 FBC by a Florida-registered Professional Engineer.
- F. Submit a radio survey report as further defined in Part 3 hereof.

1.04. STANDARDS

- A. The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable state and local requirements. UL listing and labeling shall be adhered to under this Contract.
- B. Any equipment that does not have a UL, FM CSA, or other approved testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that the equipment furnished has been manufactured in accordance with the National Electric Code and OSHA requirements.
- C. Any additional work needed resulting from any deviation from codes or local requirements shall be at no additional cost to the OWNER.

PART 2 - PRODUCTS

2.01. ANTENNA MAST

- A. The antenna mast shall be self-supporting. The mast shall be a minimum of 5" Outside Diameter Aluminum tube with vibration dampers; final diameter sizing shall be based on radio survey as defined in paragraph 3.01.
- B. Final height of the mast to be determined based on radio survey as defined in paragraph 3.01.
- C. The foundation and mast design shall be certified as having a wind survivability rating in accordance with the 2014 FBC by a Florida-registered Professional Engineer.
- D. Approved mast manufacturers are Hapco, RTA Series; Valmont or equal.

PART 3 - EXECUTION

3.01. RADIO SURVEY

- A. Prior to ordering antenna masts or certifying mast installation, the contractor shall perform a radio survey to confirm the viability of a 900 MHz band telemetry path between the OWNER's existing master site and the Work site.
- B. Perform the tests at an initial remote site antenna height of 20 feet. If the RSSI for any path is weaker than -90 dBm but stronger than -110 dBm, repeat the test with increasingly higher (in 5 feet increments) remote antenna heights until a -90 dBm reading is obtained or a height of 50 feet is reached.
- C. The survey shall be documented in a report that contains, as a minimum, the following information:

1. Description of test apparatus used, including model number and configuration of radio transceivers.
2. A list by name of all sites tested.
3. The latitude and longitude of all sites tested.
4. Photographs of site vicinity in direction of the master site for all sites tested.
5. Date, time and prevailing weather conditions for all measurements.
6. Path length, remote antenna height and RSSI for all paths.

3.02. INSTALLATION

- A. Install the masts in accordance with the approved, P.E. certified design drawings.
- B. Install other equipment as shown in the Contract Drawings.
- C. Weatherproof all antenna cable connections using butyl rubber tape or weatherproof heat shrink.

END OF SECTION

Appendix 1

Approved Utility Products List



Community Development - Engineering Division
1601 NW 136 Ave., Bldg. A Sunrise, FL 33323 P: 954.746.3270 F: 954.746.3287

APPROVED PRODUCTS LIST FOR WATER DISTRIBUTION/SANITARY SEWER UTILITY CONSTRUCTION

Effective November 2011

ALL ITEMS TO BE MANUFACTURED IN THE
UNITED STATES

Project Name: _____

Concurrence of Underground
Utility Contractor:

Signature

Date

Print Name

Company

Concurrence of the Engineer:

Signature

Date

Print Name

Firm

By signature above, the Underground Utility Contractor for referenced project agrees to adhere to the following product specifications. It is understood that the Engineering Division of the Community Development Department will reject construction not in accordance with this document.

Basis: The following products and specifications have been found to be acceptable and/or desirable in their respective groups. Shop drawings need not be submitted for approval if the contractor uses products on this list. Any substitutions or changes for these products must be submitted to the City of Sunrise, Community Development Department, Engineering Division for approval prior to their use. For all items not listed on the "City of Sunrise Approved Products List", the Contractor shall submit **five** (5) sets of standard shop drawings or manufacturer's catalogs with the model number or type of the item circled or otherwise designated. The City shall have the right to reject any product not listed within the "City of Sunrise Approved Product List". *One (1) set of the submittals shall bear the original signed approval of the Underground Utility Contractor and the Engineer of Record, the remaining four (4) sets can be a copy.*

WATER DISTRIBUTION SECTION

WATER DISTRIBUTION PVC PIPE

Brand Name	Model Type	Specifications and Requirements
J-M Pipe	Push-On Pipe	PVC shall conform to ANSI/AWWA C900-07: • Class 305 DR14 for 4" and 6" • Class 235 DR18 for 8" through 12" • PVC 14" and up shall conform to ANSI/AWWA C905 DR25 Pipe shall be blue in color
Diamond		
North American (NAPCO)		
National Pipe & Plastics		
Not Applicable		

WATER DISTRIBUTION DUCTILE PIPE

WATER DISTRIBUTION SYSTEM PIPE		
Brand Name	Model Type	Specifications and Requirements
American Cast Iron Co.	Push-on Pipe	Conforms to ANSI/AWWA C.150/A21.50 and C151/A21.51 with Interior Cement lining and seal coating ANSI/AWWA C104/A21.4 and Exterior Asphaltic Coating • Class 52 or better for 4" and 6" • Pressure class 350 for 8" through 24" • Pressure class 250 for 30" through 64" • Class 50 or higher for 8" and up Pipe shall be color coded per FAC 62-555.320
U.S. Pipe		
McWane/Clow		
Griffin Pipe		
Not Applicable		

WATER DISTRIBUTION LOCATION WIRE AND TAPE

Brand Name	Model Type	Specifications and Requirements
Any Manufacturer	Blue coated wire	Wire shall be 14 gauge multiple stranded
	Location tape	2" wide for water main installation
Not Applicable		

WATER DISTRIBUTION PIPE FITTINGS

Brand Name	Model Type	Specifications and Requirements
American Cast Iron Pipe	Full Body	Mechanical joint full body ductile per ANSI/AWWA C110/A21.10, cement lined and seal coated per ANSI/AWWA C104/A21.4
Tyler/Union/McWane		
Star Pipe Products		
U.S. Pipe		
Not Applicable		

WATER DISTRIBUTION PIPE RESTRAINTS – Fittings & Valves

Brand Name	Model Type	Specifications and Requirements
Ebba Iron	DIP – Megalug – 1100 Series	For DIP @ MJ connections – Fittings and Valves
	PVC – Megalug 2000 PV Series	For PVC @ MJ connections – Fittings and Valves
Sigma	DIP – One-Lok D-SLDE (Domestic)	For DIP @ MJ connections – Fittings and Valves
	PVC – One-Lok D-SLCE (Domestic)	For PVC @ MJ connections – Fittings and Valves
Star Pipe Products	DIP-Stargrip series 3000 (Domestic)	For DIP @ MJ connections – Fittings and Valves
	PVC-Stargrip series 4000 (Domestic)	For PVC @ MJ connections – Fittings and Valves
Tyler Union	DIP – TufGrip – 1000 Series (Domestic)	For DIP @ MJ connections – Fittings and Valves
	PVC- TufGrip – 2000 Series (Domestic)	For PVC @ MJ connections – Fittings and Valves
Not Applicable		

WATER DISTRIBUTION PIPE RESTRAINTS – Bell & 2nd MJ Restraint

Brand Name	Model Type	Specifications and Requirements
Ebba Iron	Series 1500TD	For bell and second MJ restraint
Star Pipe Products	1100 Series (Domestic)	
Ford/Uniflange	Series 1390-CU	
Not Applicable		

WATER DISTRIBUTION PIPE RESTRAINTS – Restraining Gaskets

Brand Name	Model Type	Specifications and Requirements
U.S. Pipe/McWane	Field LOC gasket	To be used for ductile pipe through a casing only
American Cast Iron Pipe	Fast grip gasket	
Griffin Pipe Products	Talon RJ gasket	
Not Applicable		

WATER DISTRIBUTION TAPPING SLEEVES – Mechanical Joint

Brand Name	Model Type	Specifications and Requirements
American Flow Control	2800 series	Mechanical joint tapping sleeve for the tapping of Cast Iron, Ductile and C-900 PVC pipe
Mueller	H615	
Tyler/Union/McWane	MJ Cast Iron 5-149-CI	
Not Applicable		

WATER DISTRIBUTION TAPPING SLEEVES – Stainless Steel

Brand Name	Model Type	Specifications and Requirements
Mueller	H-304SS	Full Stainless Steel with wrap around gasket for the tapping of Asbestos Cement and Class 160-200 SDR 26-21 PVC (SCH 40 OD) pipe
JCM Industries	JCM 432	
Smith-Blair	664-665	
Ford Meter Box Co.	FTSS Series	
Not Applicable		

WATER DISTRIBUTION TAPPING SLEEVES – Epoxy Coated

Brand Name	Model Type	Specifications and Requirements
JCM Industries	JCM 412	Epoxy coated with stainless steel bolts to be pre-approved by City Engineering Inspector for use
Smith-Blair	622	
Not Applicable		

WATER DISTRIBUTION TAPPING VALVES

Brand Name	Model Type	Specifications and Requirements
American Flow Control	2500 series	Conforms to ANSI/AWWA C509 or C515 Flange by mechanical joint with centering ring and stainless steel flange accessories – resilient wedge
Clow/McWane	F-6114	
Mueller	T2360	
Not Applicable		

WATER DISTRIBUTION BUTTERFLY VALVES

Brand Name	Model Type	Specifications and Requirements
Mueller	Lineseal III	Conforms to ANSI/ASTM C504
Pratt	Groundhog	
Dezurik	BAW	
Clow/M&H Valve/McWane	4500 Series	
Not Applicable		

WATER DISTRIBUTION GATE VALVES

Brand Name	Model Type	Specifications and Requirements
American Flow Products	2500 series	Mechanical joint; conforms to ANSI/AWWA C509 or C515 Resilient seat or resilient wedge non rising stem
Mueller	A-2360	
M&H/McWane	Style 4067	
Kennedy Valve/McWane	Ken-seal-FW	
Clow/McWane	F-6100 resilient wedge	
Not Applicable		

WATER DISTRIBUTION AIR RELEASE VALVES

Brand Name	Model Type	Specifications and Requirements
Val-matic	45	Stainless steel trim AWWA C-512 Meeting application and type of main
Crispin	PL-20A	
DeZurik/Apco	200-A	
Empire/Golden-Anderson	920	
Not Applicable		

WATER DISTRIBUTION VALVE BOX AND COVER

Brand Name	Model Type	Specifications and Requirements
Tyler/Union/McWane	6850 Series 461-S Type	Screw Type with Cast iron cover marked "WATER"
Bingham Taylor	4905 Series	
Not Applicable		

WATER DISTRIBUTION CAST IRON BLOW OFF BOX

Brand Name	Model Type	Specifications and Requirements
U.S. Foundry	USF #7630	Raised "W" on lid
Not Applicable		

FIRE HYDRANTS

Brand Name	Model Type	Specifications and Requirements
Mueller	Centurion #A-423	Breakaway traffic type with 5-1/4" minimum main valve opening. Factory yellow. Bury to suit. No drain vents or plugs. No extensions will be allowed.
American Flow Control	B84B 5-1/4"	
Clow/McWane	Medallion F-2545	
Kennedy Valve/McWane	Guardian K-81-A	
American Flow Control	B84B 6"	If required by project specifications
Not Applicable		

WATER DISTRIBUTION BRASS ID TAGS

Brand Name	Model Type	Specifications and Requirements
Wager Company	Bronze ID Disk	Permanent tags required at the valve box and fittings
Not Applicable		

WATER DISTRIBUTION CASING SPACERS AND END SEALS

Brand Name	Model Type	Specifications and Requirements
Cascade	Style CCS Style CCES	Casing spacers to be stainless steel for pipe to be positioned in center of casing. End seals to be neoprene with stainless steel bands.
PSI	Spacer S12G-2 End Seal Model "S"	
Not Applicable		

SERVICE SADDLE

Brand Name	Model Type	Specifications and Requirements
Ford Meter Box Co.	202B	Bronze saddle with brass bales Iron pipe thread
Mueller	BR2B Series	
AY McDonald	#3826	
Not Applicable		

CORPORATION STOPS

Brand Name	Model Type	Specifications and Requirements
Ford Meter Box Co.	FB1100-I.P.	Brass ball valve type - conforms to ANSI/AWWA C800 Iron pipe threads by PJ/110 Compression
Mueller	B25028-I.P.	
AY McDonald	4704B-22-I.P.	
Not Applicable		

WATER SERVICE LINE POLYETHYLENE TUBING

Brand Name	Model Type	Specifications and Requirements
Performance Pipe/Chevron Phillips	Driscoplex 5100 Black with blue stripes and blue writing	P.E. 3408/4710-DR-9 AWWA C-901 ASTM D2737
Endot	Endopure- Blue with white or black writing	
Vanguard	Bruiser HDPE –Blue with white or black	
Charter Plastics	Blue Ice-Blue with white or black writing	
Not Applicable		

WATER SERVICE CASING PIPE

Brand Name	Model Type	Specifications and Requirements
Charlotte	Schedule 40 PVC Pipe	ASTM D1785/D2665
National Pipe and Plastics		
North American Pipe		
J-M Pipe		
Not Applicable		

CURB STOPS

Brand Name	Model Type	Specifications and Requirements
AY McDonald	4602B-22 IP	Lock wing angle ball valve type Brass - conforms to ANSI/AWWA C800
Mueller	300 Series	
Ford Meter Box Co.	BA-43 Series BFA-43 Series	
Not Applicable		

BRANCH VALVE ASSEMBLIES

Brand Name	Model Type	Specifications and Requirements
Mueller	H-15363	1 1/2" compression X M.I.P. with lock wing angle ball curb stops
AY McDonald	O9U2EW	
Ford Meter Box Co.	UVB43-62W	
Not Applicable		

SERVICE FITTINGS, COUPLINGS, CLAMPS & HARDWARE

Brand Name	Model Type	Specifications and Requirements
Mueller	110 Conductive	Compression couplings for Polyethylene tubing. Not allowed to be used to extend tubing lengths.
Ford Meter Co.	C14;C84;C44	
AY McDonald	4753-22,4754-22 and 4758-22	
Not Applicable		

WATER METERS LARGER THAN 2-INCH *(Meter size and type will be noted on plans)*

Brand Name	Model Type	Specifications and Requirements
Neptune	HP Turbine	Turbine meters over 2" in size
Sensus	OMNI C-2	Compound meters over 2" in size
Not Applicable		

Note: City to supply meters and meter boxes for meters 2-inch in size and smaller.

SANITARY SEWER SECTION

GRAVITY SANITARY SEWER PVC PIPE *(Circle appropriate brand & specifications)*

Brand Name	Model Type	Specifications and Requirements
J-M Pipe	Push-on Pipe	PVC Pipe shall conform to: • ASTM D3034 SDR 26 for 4" through 15" • ASTM F679 PS115 for 18" through 48" Heavy Wall Pipe Pipe shall be green in color
North American (NAPCO)		
National Pipe & Plastics		
Diamond		
J-M Pipe	Push-on Pipe	PVC Pipe shall conform to: • ANSI/AWWA C900-07: Class 235 DR18 for 4" through 12" • PVC 14" and up shall conform to ANSI/AWWA C905 DR25 Pipe shall be green in color
North American (NAPCO)		
National Pipe & Plastics		
Diamond		
Not Applicable		

SANITARY SEWER FORCE MAIN PVC PIPE

Brand Name	Model Type	Specifications and Requirements
J-M Pipe	Push-on Pipe	PVC shall conform to ANSI/AWWA C900-07: • Class 305 DR14 for 4" through 12" Pipe shall be green in color
North American (NAPCO)		
National Pipe & Plastics		
Diamond		
Not Applicable		

GRAVITY SANITARY SEWER AND FORCE MAIN DUCTILE PIPE

Brand Name	Model Type	Specifications and Requirements
American Cast Iron Pipe	Push-on Pipe	Conforms to ASTM A716/A746 Ceramic Epoxy Lined – Protecto 401 (40 mils); asphalt coated on the outside - Pressure Class 350 for 4” through 24” OR - Class 50 or higher for 4” through 24” Pipe shall be green stripped
McWane/Clow		
U.S. Pipe		
Griffin Pipe		
Not Applicable		

GRAVITY SANITARY SEWER PVC PIPE FITTINGS *(Circle appropriate brand & specs)*

Brand Name	Model Type	Specifications and Requirements
Multi Fittings	Push - on	PVC Pipe shall conform to: • ASTM D3034 SDR 26 for 4" through 15" • ASTM F679 PS115 for 18" through 48" Heavy Wall
Plastic Trends		
Harco		
Multi Fittings	Push - on	PVC Pipe shall conform to: • C900 DR18 for 4" through 12" • C905 DR25 for 14" and up Non-pressure (gravity sewer only)
Plastic Trends		
Harco		
Not Applicable		

SANITARY SEWER DUCTILE PIPE FITTINGS

Brand Name	Model Type	Specifications and Requirements
U.S. Pipe	Full body	Mechanical joint full body ductile per ANSI/AWWA C110/A21.10, Conforms to ASTM A716/A746 Ceramic Epoxy Lined – Protecto 401 (40 mils); asphalt coated on the outside
American Cast Iron Pipe		
Star Pipe Products		
Tyler/Union Foundry/McWane		
Not Applicable		

SANITARY SEWER FORCE MAIN PIPE RESTRAINTS – Fittings & Valves

Brand Name	Model Type	Specifications and Requirements
Ebba Iron	DIP – Megalug – 1100 Series	For DIP @ MJ connections – Fittings and Valves
	PVC – Megalug 2000 PV Series	For PVC @ MJ connections – Fittings and Valves
Sigma	DIP – One-Lok D-SLDE (Domestic)	For DIP @ MJ connections – Fittings and Valves
	PVC – One-Lok D-SLCE (Domestic)	For PVC @ MJ connections – Fittings and Valves
Star Pipe Products	DIP-Stargrip series 3000 (Domestic)	For DIP @ MJ connections – Fittings and Valves
	PVC-Stargrip series 4000 (Domestic)	For PVC @ MJ connections – Fittings and Valves
Tyler Union	DIP – TufGrip – 1000 Series (Domestic)	For DIP @ MJ connections – Fittings and Valves
	PVC- TufGrip – 2000 Series (Domestic)	For PVC @ MJ connections – Fittings and Valves
Not Applicable		

SANITARY SEWER FORCE MAIN PIPE RESTRAINTS – Bell & 2nd MJ Restraint

Brand Name	Model Type	Specifications and Requirements
Ebba Iron	Series 1500TD	For bell and second MJ restraint
Star Pipe Products	1100 Series (Domestic)	
Ford/Uniflange	Series 1390-CU	
Not Applicable		

SANITARY SEWER FORCE MAIN PIPE RESTRAINTS – Restraining Gaskets

Brand Name	Model Type	Specifications and Requirements
U.S. Pipe/McWane	Field LOC gasket	To be used for ductile pipe through a casing only
American Cast Iron Pipe	Fast grip gasket	
Griffin Pipe Products	Talon RJ gasket	
Not Applicable		

SANITARY SEWER FORCE MAIN TAPPING SLEEVES – Mechanical Joint

Brand Name	Model Type	Specifications and Requirements
American Flow Control	2800 series	Mechanical joint tapping sleeve for the tapping of Cast Iron, Ductile and C-900 PVC pipe
Mueller	H615	
Tyler/Union/McWane	MJ Cast Iron 5-149-CI	
Not Applicable		

SANITARY SEWER FORCE MAIN TAPPING SLEEVES – Stainless Steel

Brand Name	Model Type	Specifications and Requirements
Mueller	H-304SS	Full Stainless Steel with wrap around gasket for the tapping of Asbestos Cement and Class 160-200 SDR 26-21 PVC (SCH 40 OD) pipe
JCM Industries	JCM 432	
Smith-Blair	665	
Not Applicable		

SANITARY SEWER FORCE MAIN TAPPING SLEEVES – Epoxy Coated

Brand Name	Model Type	Specifications and Requirements
JCM Industries	JCM 412	Epoxy coated with stainless steel bolts to be pre-approved by City Engineering Inspector for use
Smith-Blair	622	
Not Applicable		

SANITARY SEWER FORCE MAIN TAPPING VALVES

Brand Name	Model Type	Specifications and Requirements
American Flow Control	2500 series	Conforms to ANSI/AWWA C509 or C515 Flange by mechanical joint with centering ring and Stainless Steel flange accessories – resilient wedge
Clow/McWane	F-6114	
Mueller	T2360	
Not Applicable		

SANITARY SEWER FORCE MAIN GATE VALVES

CRITICAL SERVICE FORCE MAIN GATE VALVES		
Brand Name	Model Type	Specifications and Requirements
American Flow Products	2500 series	Mechanical joint; conforms to ANSI/AWWA C509 or C515 Resilient seat or resilient wedge non-rising stem
Mueller	A-2360	
M&H/McWane	Style 4067	
Kennedy Valve/McWane	Ken-seal-FW	
Clow/McWane	F-6100 resilient wedge	
Not Applicable		

SANITARY SEWER FORCE MAIN AIR RELEASE VALVES

Sewer Force Main Air Release Valves		
Brand Name	Model Type	Specifications and Requirements
Val-matic	48	Stainless steel trim AWWA C-512 Meeting application and type of main
Crispin	SL-20(sewer)	
DeZurik/Apco	400	
Empire/Golden-Anderson	925	
Not Applicable		

SANITARY FORCE MAIN VALVE BOX AND COVER

Brand Name	Model Type	Specifications and Requirements
Tyler/Union/McWane	6850 Series 461-S Type	Screw Type with Cast iron cover marked "SEWER"
Bingham Taylor	4905 Series	
Not Applicable		

SANITARY SEWER FORCE MAIN BRASS ID TAGS

Brand Name	Model Type	Specifications and Requirements
Wager Company	Bronze ID Disk	Permanent tags required at the valve box and fittings
Not Applicable		

SANITARY SEWER PVC MANHOLE ADAPTORS

Brand Name	Model Type	Specifications and Requirements
Harco	PVC Sewer Adapter	Grouted repair coupling for connecting to existing manholes only
Not Applicable		

SANITARY SEWER CAST IN PLACE FLEXIBLE MANHOLE BOOTS

Brand Name	Model Type	Specifications and Requirements
Chardon Rubber Co./Wabtec Rubber Products	LockJoint flexible Manhole Sleeve CP-Series	Manhole boot supplied by precast company with stainless steel bands
A-LOK Products	Z-LOK F208-8	
Not Applicable		

SANITARY SEWER MANHOLE RING AND COVER

Brand Name	Model Type	Specifications and Requirements
U.S. Foundry	420-SU	Raised letters "SANITARY SEWER" & "CITY OF SUNRISE"
U.S. Foundry	420-C	Raised letters "SANITARY SEWER" Only for Manholes not Maintained by the City of Sunrise (Private)
Not Applicable		

SANITARY SEWER CLEAN OUT BOX IN ASPHALT

Brand Name	Model Type	Specifications and Requirements
U.S. Foundry	7635	Raised "S" on lid
Not Applicable		

SANITARY SEWER FORCE MAIN CASING SPACERS AND END SEALS

Brand Name	Model Type	Specifications and Requirements
Cascade	Style CCS Style CCES	Casing spacers to be stainless steel for pipe to be positioned in center of casing. End seals to be neoprene with stainless steel bands.
PSI	Spacer S12G-2 End Seal Model "S"	
Not Applicable		

SANITARY SEWER PRECAST INTERIOR MANHOLE & LIFT STATION COATING

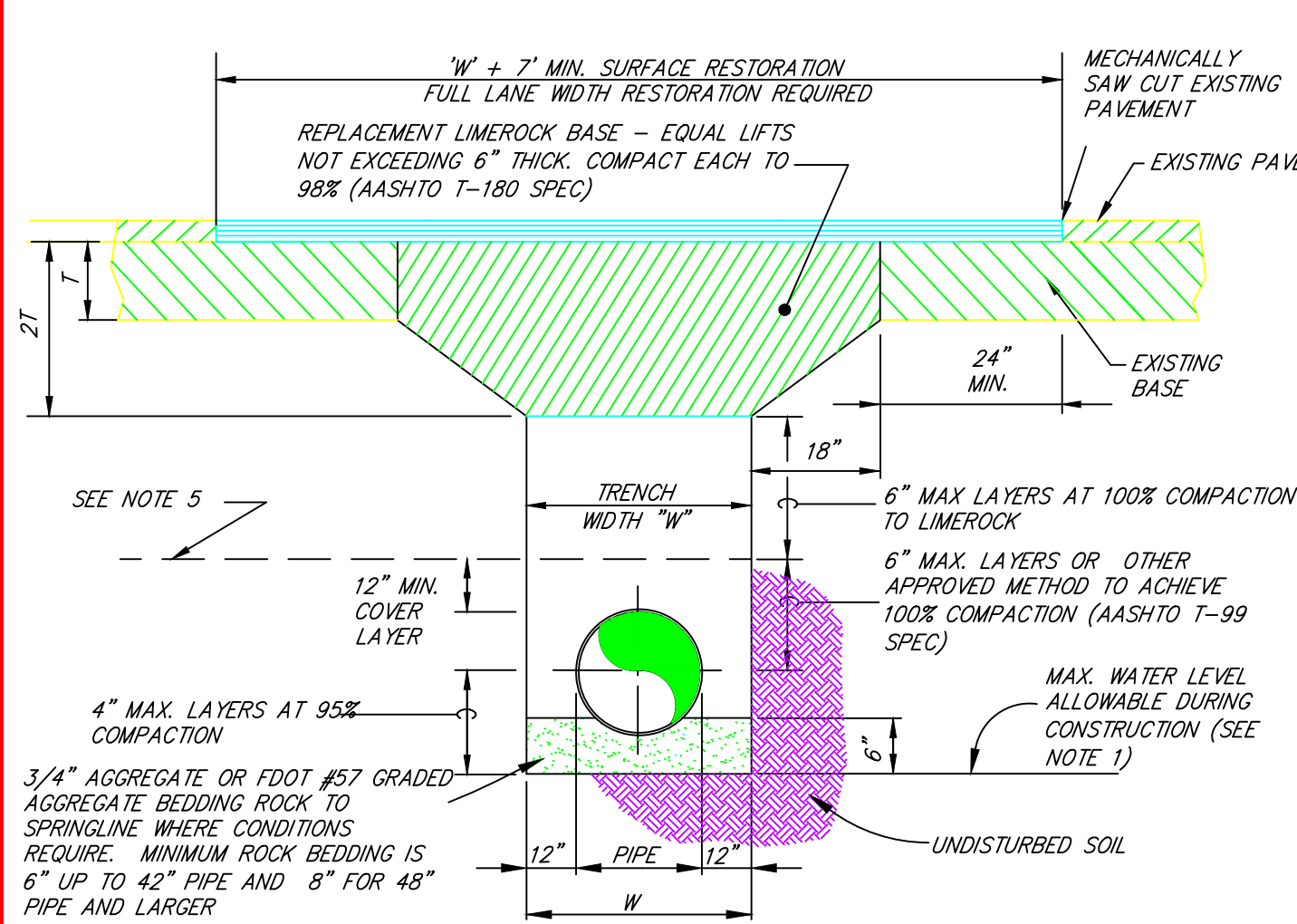
Brand Name	Model Type	Specifications and Requirements
Madewell Products Corp.	Mainstay Composite Liner	ML-72(Half inch application) DS-5 (100 mil application)
Not Applicable		

SANITARY SEWER FORCE MAIN LOCATION WIRE AND TAPE

Brand Name	Model Type	Specifications and Requirements
Any Manufacturer	Green coated wire	Wire shall be 14 gauge multiple stranded
	Location tape	2" wide for force main installation
Not Applicable		

Appendix 2

General Water and Sanitary Sewer Details and Notes

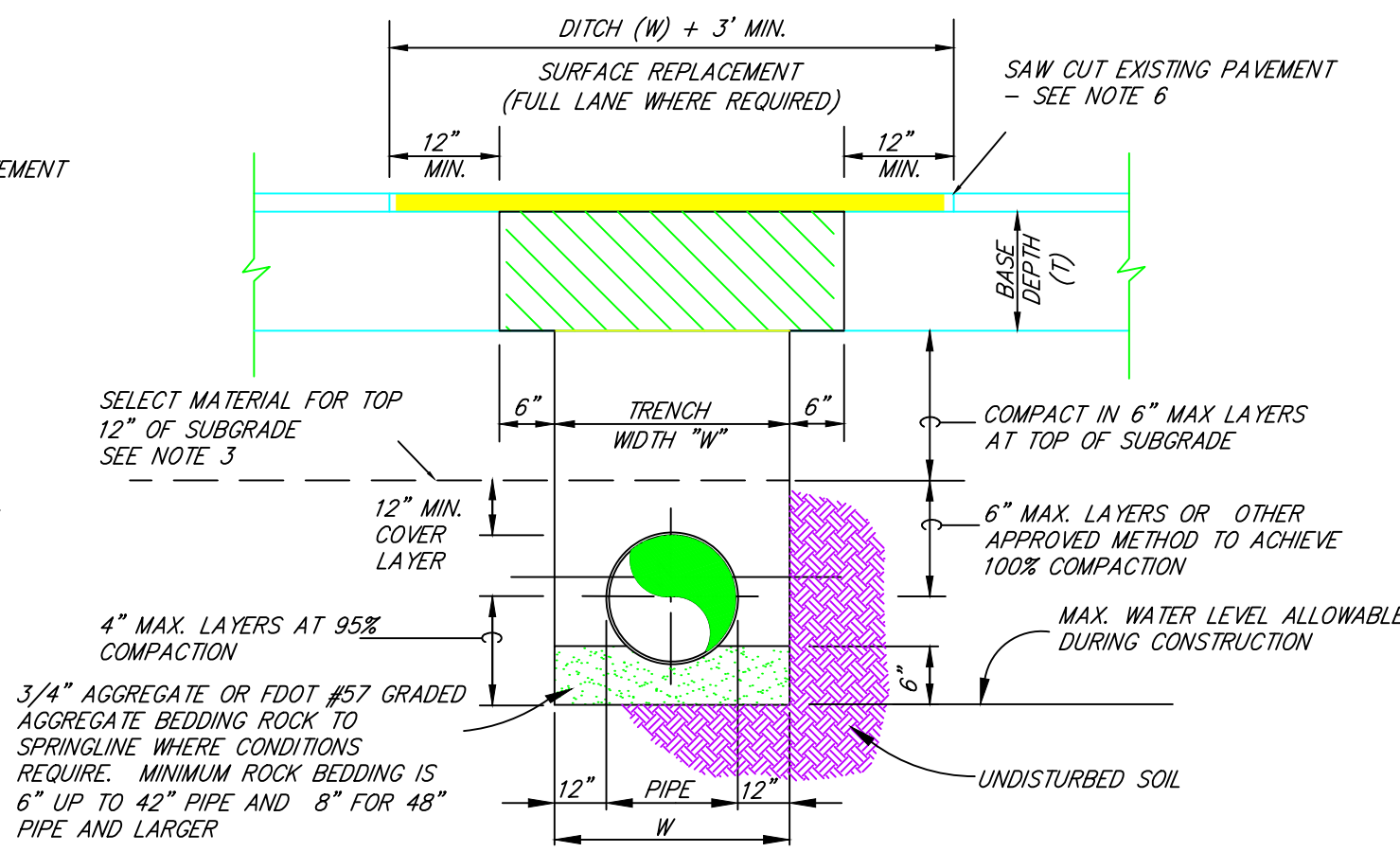


TRENCH & RESTORATION NOTES:

- WHERE SOIL CONDITIONS CANNOT BE MAINTAINED AS SHOWN ABOVE PROVIDE APPROVED METHOD OF CONSTRUCTION.
- SHEETING WILL BE REQUIRED AS DETERMINED IN THE FIELD.
- NEW SURFACING MATERIALS SHALL BE CONSISTENT WITH EXISTING AND SHALL HAVE LAPPED AND FEATHERED JOINTS (2" MIN. THICKNESS).
- ALL ROADWAY RESTORATION SHALL COMPLY WITH THE CITY OF SUNRISE REQUIREMENTS OR OTHER JURISDICTIONAL AUTHORITIES WHERE APPLICABLE.
- MECHANICAL COMPACTION NOT ALLOWED BELOW THIS LINE.
- BACKFILL COMPACTION SHALL BE IN ACCORDANCE WITH CITY OF SUNRISE STANDARDS. COMPACTION PERCENTAGES FOR BACKFILL REFER TO AASHTO T-99 STANDARD PROCTOR. COMPACTION PERCENTAGES FOR ROCK BASE REFER TO AASHTO T-180 MODIFIED PROCTOR SPEC.
- SURFACE RESTORATION WIDTH MAY BE ADJUSTED BY THE CITY.
- FULL LANE RESTORATION REQUIRED. EXISTING PAVEMENT TO BE MILLED 1" MINIMUM OR REMOVED TO BASE ROCK OUTSIDE THE TRENCH AREA.
- MAINTAIN TRENCH WALL PER OSHA REQUIREMENTS AND STATE OF FLORIDA TRENCH SAFETY ACT.

TYPE 1 - TRENCH AND PAVEMENT RESTORATION

SCALE: NONE



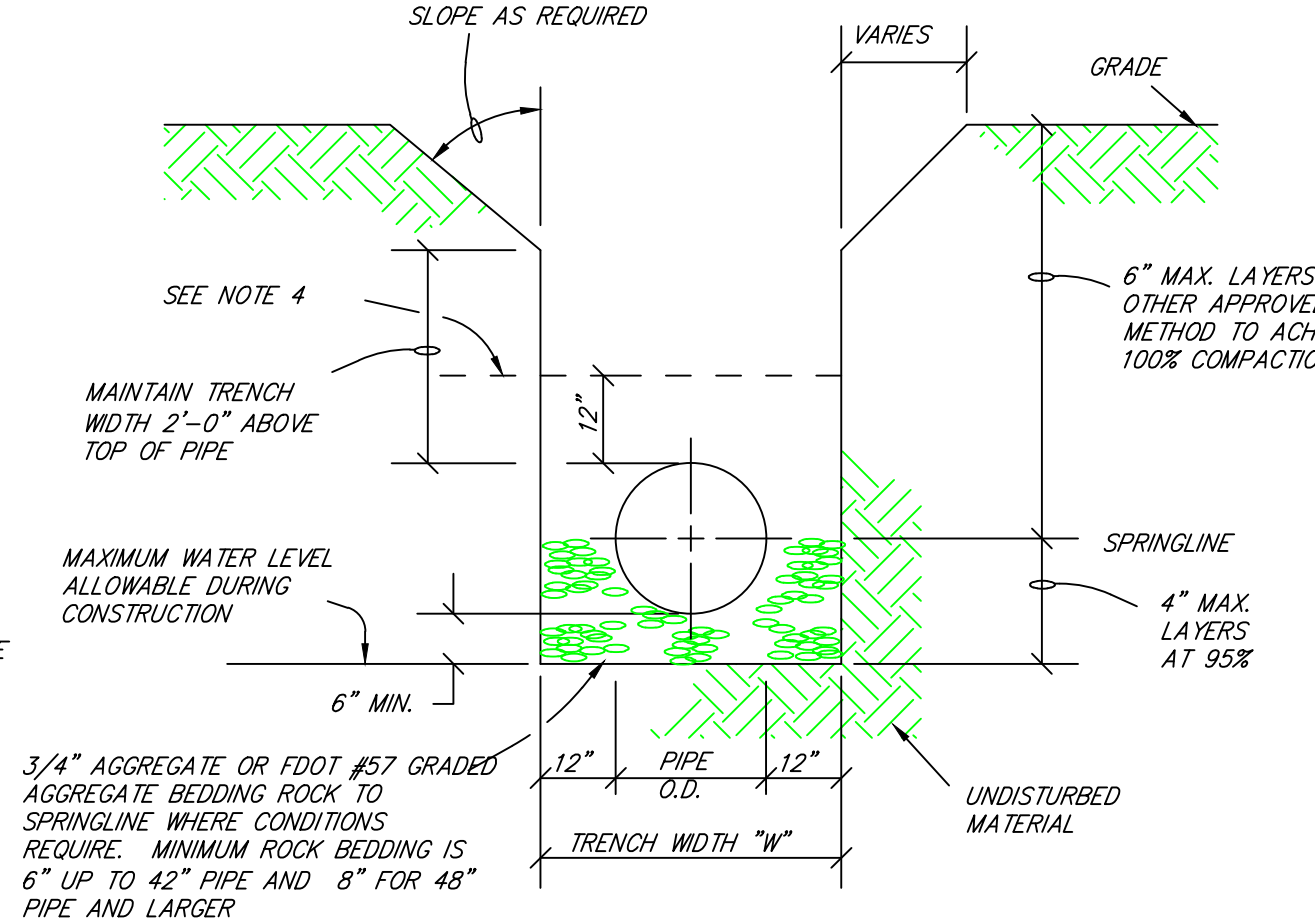
USE OF THIS DETAIL IS LIMITED TO PARKING LOTS AND OTHER LOW TRAFFIC VOLUME PAVEMENTS OUTSIDE OF RIGHT-OF-WAYS WHICH ARE NOT SUBJECT TO TRUCK TRAFFIC OR TO NON-TRAFFIC PAVEMENTS (BIKEPATHS, ETC.). CITY MAY LIMIT THE USE OF THIS PAVEMENT REPLACEMENT.

NOTES:

- BASE MATERIAL EXCEEDING 8" THICK SHALL BE PLACED IN MULTIPLE EQUAL LIFTS NOT EXCEEDING 6" IN THICKNESS AND SHALL MATCH EXISTING BASE THICKNESS. COMPACT BASE THOROUGHLY BY ROLLING OR TAMPING TO A MINIMUM DENSITY OF 98% PER AASHTO T-180 MODIFIED PROCTOR SPEC.
- THE TOP 12" OF THE SUBGRADE SHALL BE SELECT STABILIZED MATERIAL WITH A MINIMUM LBR OF 40. AN ADDITIONAL 6" LAYER OF LIMEROCK MAY BE USED IN PLACE OF THE STABILIZED MATERIAL IF THE AVAILABLE MATERIALS DO NOT MEET THE MINIMUM LBR-40 REQUIREMENTS.
- BACKFILL COMPACTION SHALL BE IN ACCORDANCE WITH CITY OF SUNRISE STANDARDS. COMPACTION PERCENTAGES FOR BACKFILL REFER TO AASHTO T-99 STANDARD PROCTOR.
- SURFACE MATERIAL WILL BE CONSISTENT WITH THE EXISTING SURFACE. (1" MIN. THICKNESS) SURFACE RESTORATION WIDTH MAY BE ADJUSTED BY THE CITY.
- PAVEMENT SURFACE SHALL BE REMOVED A MINIMUM OF 12" ON EACH SIDE OF THE TRENCH BEYOND UNDISTURBED BASE. RESTORE FULL LANE WHERE REQUIRED. FOR FULL LANE RESTORATION EXISTING PAVEMENT TO BE MILLED 1" MINIMUM OR REMOVED TO BASE ROCK OUTSIDE THE TRENCH AREA.
- EXISTING ASPHALT PAVEMENT SHALL BE SAW CUT AT EXPOSED EDGES. ALL ASPHALT JOINTS SHALL BE MECHANICALLY SAIED
- MAINTAIN TRENCH WALL PER OSHA REQUIREMENTS AND STATE OF FLORIDA TRENCH SAFETY ACT.

TYPE 1 - TRENCH AND PAVEMENT RESTORATION (LIMITED AREAS)

SCALE: NONE

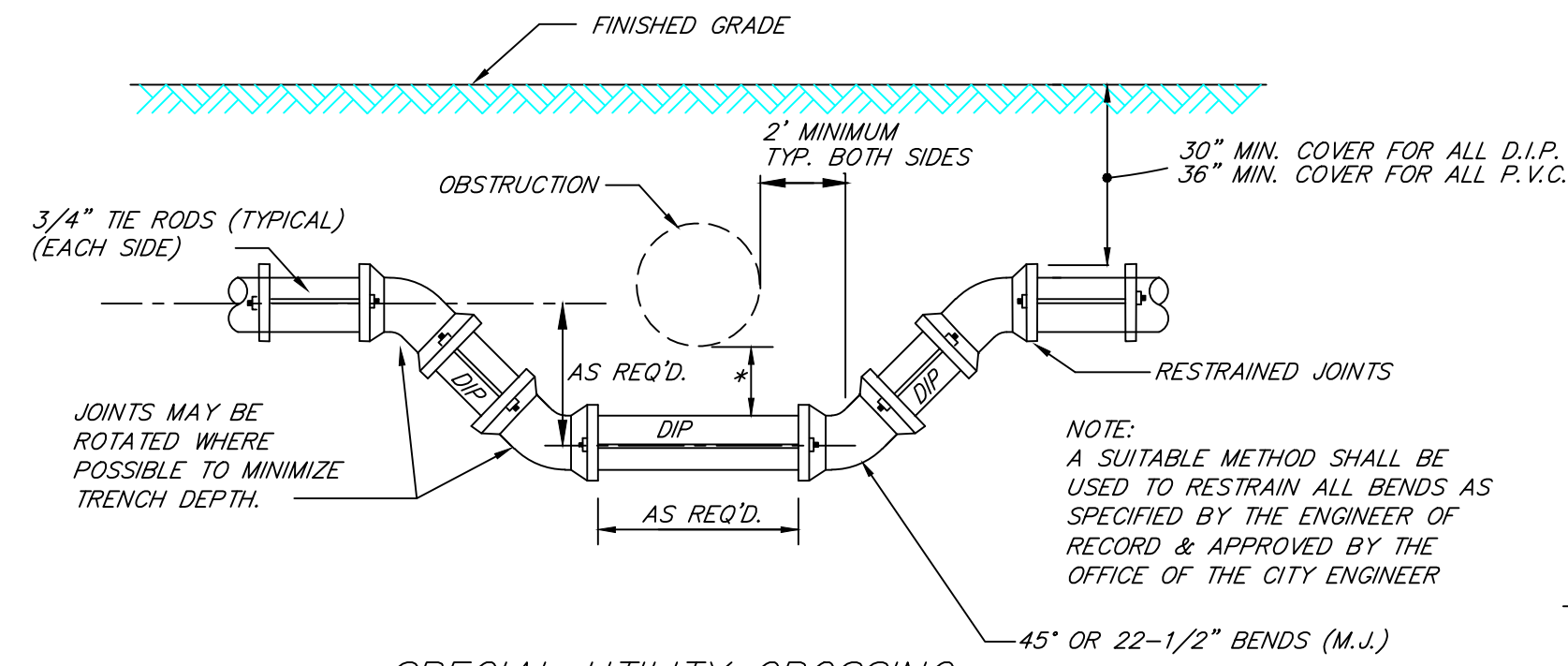


TRENCH CONSTRUCTION NOTES

- WHERE SOIL CONDITIONS CANNOT BE MAINTAINED AS SHOWN ABOVE THE CONTRACTOR SHALL PROVIDE HIS ALTERNATE PLAN FOR TRENCH CONSTRUCTION TO THE ENGINEER OF RECORD AND THE CITY FOR APPROVAL.
- SHEETING REQUIREMENTS WILL BE DETERMINED IN THE FIELD. SEE PROJECT SPECIFICATIONS.
- COMPACTION PERCENTAGES REFER TO AASHTO T-99 STANDARD PROCTOR.
- MECHANICAL COMPACTION NOT ALLOWED BELOW 12" ABOVE THE PIPE.
- PVC AND HDPE PIPE TO HAVE ROCK BACKFILL TO PIPE SPRINGLINE AND SAND OR AGGREGATE BEDDING AND/OR ENVELOPE AS REQUIRED IN AREAS WHERE TRENCH BACKFILL IS NOT SUITABLE DUE TO ROCK. ENVELOPE TO BE MIN. 12 INCHES AROUND THE PIPE.
- MAINTAIN TRENCH WALL PER OSHA REQUIREMENTS AND STATE OF FLORIDA TRENCH SAFETY ACT.

TRENCH CONSTRUCTION DETAIL

SCALE: NONE



SPECIAL UTILITY CROSSING

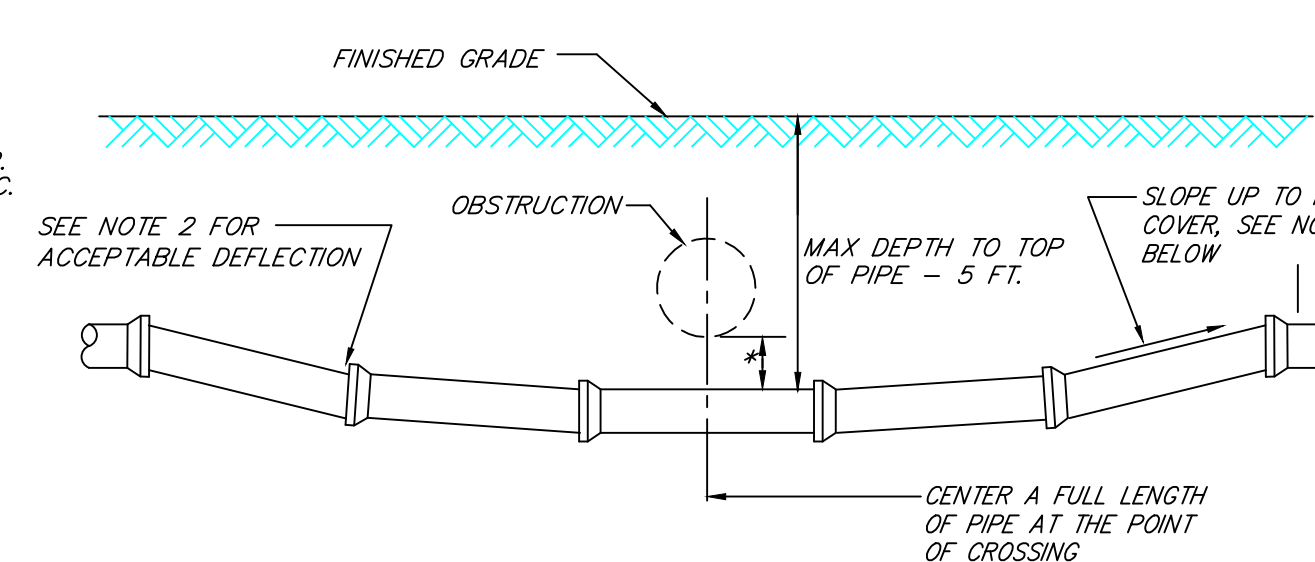
NOTES:

- THE DEFLECTION TYPE CROSSING SHALL BE USED WHENEVER POSSIBLE ONLY UNDER SPECIFIC ORDERS BY THE ENGINEER SHALL THE FITTING TYPE CROSSING BE ALLOWED.
- CONSTRUCT STANDARDS CROSSING USING 75% OF MANUFACTURER'S MAXIMUM JOINT DEFLECTION (MAX.)
- COAT TIE RODS WITH A BITUMINOUS COATING (2 COATS MIN.) AFTER INSTALLATION WHEN THE RODS ARE USED FOR PIPE RESTRAINT.
- CITY OF SUNRISE ENGINEERING INSPECTOR SHALL BE NOTIFIED AT LEAST 48 HOURS IN ADVANCE OF ALL DEFLECTION OPERATIONS.

* 18" MIN. CLEARANCE REQUIRED FOR WATER AND SEWER MAIN CROSSING. 12" MIN. CLEARANCE REQUIRED FOR OTHER TYPE UTILITIES CROSSING. ENCASEMENT IN CONCRETE IS NOT PERMITTED

UTILITY CROSSINGS

SCALE: NONE



STANDARD SHALLOW UTILITY CROSSING - DEFLECTION TYPE

- NO WATER OR SEWER FORCE MAINS OF ANY SIZE PVC OR DIP PIPE THAT CROSS OTHER UTILITIES AND WILL NOT MAINTAIN A MIN. 18" VERTICAL SEPARATION WILL NOT BE INSTALLED BY WAY OF DEFLECTION OTHER THAN FOUR 45 DEGREE BENDS WITH MEGALUGS AND RESTRAINED WITH THREADED RODS AT ALL JOINTS. PIPE RESTRAINTS ARE REQUIRED TO TOP 45 DEGREE BENDS.

FIELD INSPECTION BY CITY'S ENGINEERING INSPECTOR IS REQUIRED PRIOR TO INSTALLATION.

Thrust Restraint

- All bends, tees, crosses, reducers, and dead ends shall be restrained through an approved means of mechanical joint restraint using MEGALUGS and all thread rods. All branch valves shall be restrained with MEGALUGS and all thread rods. Any line terminated as a construction phase that is a known future extension, shall have a plugged valve at the end and restrained with MEGALUGS and all thread rods.
- All bends, tees, crosses, reducers, and dead ends for 16" diameter pipe and larger shall have mechanical joints with MEGALUGS and all thread rods or approved equal for restraint in lieu of thrust blocks.
- The following table shall serve as a general guide only. It is the Engineer of Record's responsibility to correctly design and specify the minimum lengths of restrained pipe considering the existing soil composition and pipe laying conditions. The minimum test pressure shall be 150 psi with a 2.5 safety factor.

Pipe Diameter	Full Thrust Conditions: 90° Elbow		45° Elbow Horizontal or Vertical up	22-1/2° Elbow Horizontal or Vertical up	11-1/4° Elbow Horizontal or Vertical up	Dead Ends
	Vertical Elbows down	Branch of Tee or Cross Reducers				
4"	2L		1L	1L	1L	3L
6"	3L		2L	1L	1L	4L
8"	4L		2L	1L	1L	5L
10"	5L		2L	1L	1L	6L
12"	6L		3L	2L	1L	8L
16"						

** L = ONE PIPE LENGTH (20 FEET)

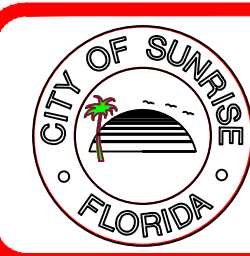
48 HOURS BEFORE DIGGING
BROWARD • PALM BEACH • INDIAN RIVER
ST. LUCIE • MARTIN COUNTIES
CALL TOLL FREE
1-800-432-4770
SUNSHINE STATE 1 CALL
UNDERGROUND UTILITIES
NOTIFICATION CENTER

Designed By: _____

Drawn By: _____

Checked By: _____

SYMBOL	NO.	DATE	REVISIONS	BY
	2	3/1/12	HEALTH DEPT. UPDATES	SD
	1	4/10/09	UPDATES DUE TO SPEC. REVISIONS	JF



CITY OF SUNRISE

APPROVED BY: _____

REGISTERED ENGINEER NO. _____
STATE OF FLORIDA

GENERAL WATER AND
SANITARY SEWER
DETAILS AND NOTES

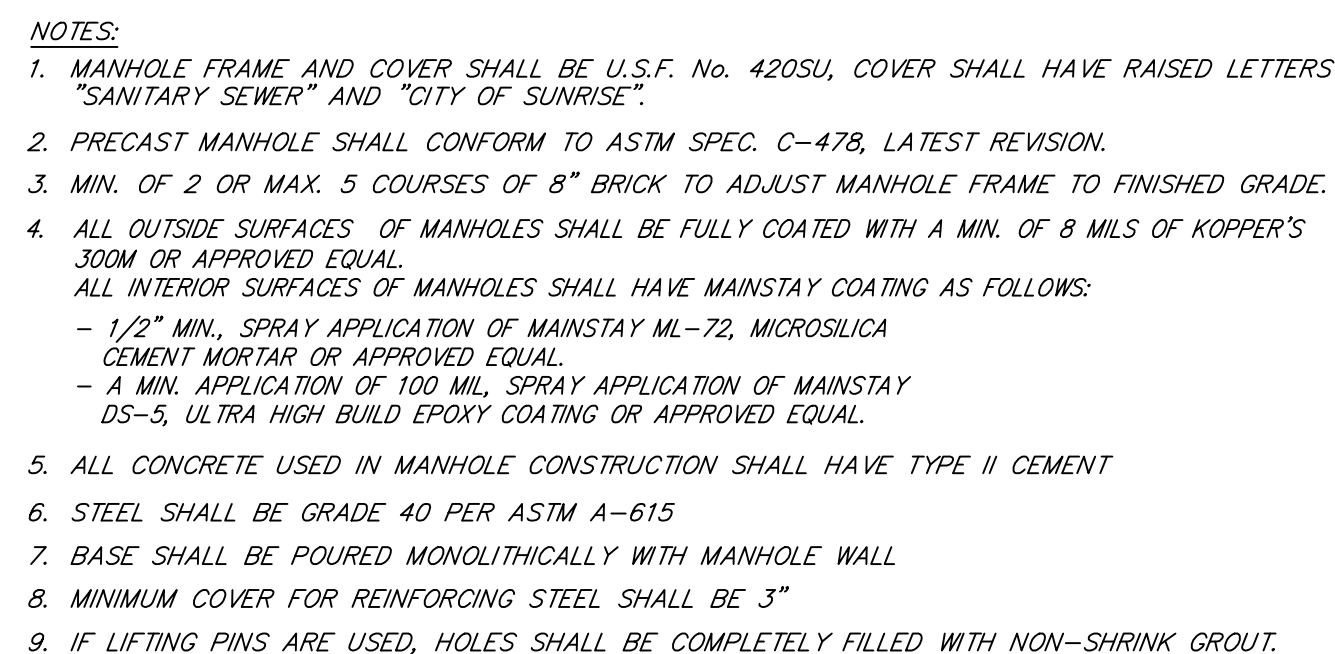
ORIGINAL ISSUE
DATE: 03/26/97

PROJECT
NUMBER

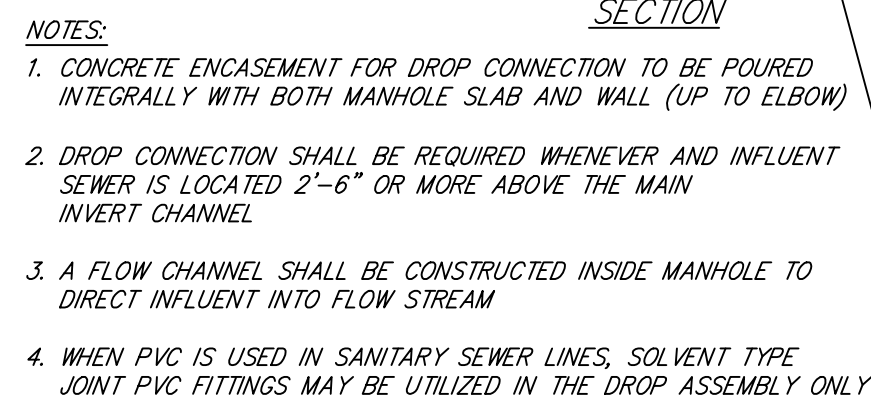
NOT TO
SCALE

Appendix 3

Standard Sanitary Sewer Details and Notes



SCALE: NONE



SCALE: NONE



SCALE: NONE



1. THE UTILITY PROVIDING SEWER SERVICE TO THIS PROJECT IS THE CITY OF SUNRISE, FLORIDA.
2. PRECAST CONCRETE MANHOLES SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478 AND 64. ALL PRECAST MANHOLES SHALL BEAR THE STAMP OF A CERTIFIED ENGINEERING TESTING LABORATORY, SIGNED AND DATED, CERTIFYING THAT THEY MEET THE REQUIREMENTS OF ASTM C-478 FOR CONCRETE STRENGTH, STEEL REINFORCEMENT AREA AND PLACEMENT, AND APPEARANCE WHEN MANUFACTURED. PRECAST MANHOLES MUST BE INSPECTED BY THE CITY BEFORE UNLOADING.

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3. MINIMUM WALL AND BASE THICKNESS FOR PRECAST MANHOLES SHALL BE 8 INCHES. BASE SECTIONS SHALL BE MONOLITHIC.
4. CONCRETE FOR PRECAST MANHOLES OR CAST IN PLACE MANHOLES SHALL HAVE NOT LESS THAN 4000 PSI COMPRESSIVE STRENGTH AT 28 DAYS. CEMENT SHALL BE TYPE II ACID RESISTANT.
5. REINFORCING STEEL FOR MANHOLES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A-615 AND A-305. LATEST REVISION. SPICES SHALL HAVE A MINIMUM LAP OF 24 BAR DIAMETERS. MINIMUM COVER OVER REINFORCING STEEL SHALL BE 3 INCHES. GRADE 60 STEEL SHALL BE USED FOR THE TOP AND BOTTOM SLABS.
6. ALL OPENINGS IN PRECAST MANHOLES SHALL BE CAST AT THE TIME OF MANUFACTURE.
7. PRECAST MANHOLE SHOP DRAWINGS SHALL BE SUBMITTED TO THE CITY OF SUNRISE AND TO THE DEVELOPER'S ENGINEER AND APPROVED PRIOR TO FABRICATION.
8. ALL OUTSIDE SURFACES OF MANHOLES, WETWELLS AND VALVE PITS SHALL BE FULLY COATED WITH A MIN. OF 8 MILS OF KOPPER'S 300M OR APPROVED EQUAL.
 - a. ALL INTERIOR SURFACES OF MANHOLES, WETWELLS AND VALVE PITS SHALL HAVE MAINSTAY COATING AS FOLLOWS:
 - 1/2" MIN. SPRAY APPLICATION OF MAINSTAY ML-72, MICROSLICA CEMENT MORTAR OR APPROVED EQUAL.
 - A MIN. APPLICATION OF 100 MIL. SPRAY APPLICATION OF MAINSTAY DS-5, ULTRA HIGH BUILD EPOXY COATING OR APPROVED EQUAL.
9. ALL MANHOLES SHALL BE SET PLUMB TO LINE AND GRADE AND SHALL REST ON A FIRM, CAREFULLY GRADED SUBGRADE, WHICH SHALL PROVIDE UNIFORM BEARING UNDER THE BASE.
10. MANHOLE SECTIONS SHALL BE JOINED WITH A MASTIC COMPOUND PROVIDING A WATER TIGHT BOND. THE REMAINING SPACE SHALL BE FILLED WITH CEMENT MORTAR AND FINISHED SO AS TO PRODUCE A SMOOTH CONTINUOUS SURFACE INSIDE AND OUTSIDE THE WALL SECTIONS. ALL EXTERIOR MANHOLE JOINTS SHALL THEN BE SEALED WITH A NEOPRENE SLEEVE, AS MANUFACTURED BY INFISHIELD, INC., OR APPROVED EQUAL.
11. ALL CONCRETE AND MORTAR USED IN MANHOLE CONSTRUCTION SHALL HAVE TYPE II CEMENT.
12. ALL SPACES AROUND PIPES ENTERING OR LEAVING MANHOLES SHALL BE COMPLETELY FILLED WITH EMBECO MORTAR (NON-METALLIC) OR BONSAL (NON-SHRINKING).
13. SANITARY MANHOLES AND LIDS SHALL BE CAPABLE OF WITHSTANDING PASHTO H-20 LOADING. THE WORDS "CITY OF SUNRISE" SHALL BE CAST INTO ALL SANITARY MANHOLE LIDS.
14. ALL GRAVITY SEWER PIPE SHALL BE PVC OR DUCTILE IRON. PVC PIPE SHALL CONFORM TO ASTM A-1303, SDR 26, LATEST REVISION, WITH MAXIMUM 13 FOOT LENGTHS AND PUSH-ON RUBBER GASKET JOINTS. DUCTILE IRON GRAVITY PIPE SHALL CONFORM TO THE SAME SPECIFICATIONS AS DUCTILE IRON PIPE (DIP) FORCE MAIN.
15. THE MINIMUM DESIGN SLOPES FOR GRAVITY SEWERS AS FOLLOWS:

FOR PVC: 8" - 0.31%	10" - 0.24%	12" - 0.10%
FOR DIP: 8" - 0.36%	10" - 0.28%	12" - 0.22%
16. THE CONTRACTOR SHALL TEST THE COMPLETED SEWER LINE TO DETERMINE ALIGNMENT AND TIGHTNESS OF THE JOINTS. TESTING SHALL BE LAMPED AND MUST SHOW A FULL CIRCLE OF LIGHT. INFILTRATION AND EXFILTRATION TESTING SHALL BE CONDUCTED. LEAKAGE SHALL NOT EXCEED 100 GALLONS PER INCH DIAMETER PER MILE PER DAY.
17. CLEAN OUTS SHALL BE INSTALLED AT MAXIMUM 75 FOOT INTERVALS ON ALL SEWER SERVICES EXCEEDING 75 FEET IN LENGTH.
18. ALL FORCE MAIN PIPE SHALL BE EPOXY-NEUTRAL DUCTILE IRON PIPE (DIP), UNLESS AN EXEMPTION IS SPECIFICALLY GRANTED BY THE CITY ENGINEER FOR THE USE OF PVC FORCE MAIN PIPE. ALL PIPE 8 INCHES AND LARGER SHALL BE CLASS 50 OR BETTER. FOUR (4) AND SIX (6) INCH DIAMETER DUCTILE IRON PIPE SHALL BE CLASS 52 OR BETTER. ALL PIPE SHALL CONFORM TO THE REQUIREMENTS OF ANSI/AWWA C151/A21.51-86 AND SHALL BE ASPHALT COATED OUTSIDE PER ANSI/AWWA C104/A21.4-90.
19. ALL FITTINGS FOR FORCE MAINS SHALL BE CAST IRON OR DUCTILE IRON CONFORMING TO THE REQUIREMENTS OF ANSI/AWWA C110/A21.10-82.
20. ALL DUCTILE IRON PIPE (DIP) FORCE MAINS SHALL BE INSTALLED WITH A MINIMUM CLEAR COVER OF 30 INCHES.
21. WHEN PVC IS USED FOR FORCE-MAINS, A 14-GAUGE MULTISTRAND COPPER WIRE SHALL BE INSTALLED THE LENGTH OF THE PIPE. ALL PVC C-900 FORCE MAINS SHALL BE INSTALLED WITH A MINIMUM CLEAR COVER 36".
22. INSTALLATION AND TESTING OF FORCE MAINS SHALL BE DONE IN ACCORDANCE WITH THE CITY OF SUNRISE SPECIFICATIONS.
23. CONNECTING TO THE EXISTING SYSTEM: ALL CONNECTIONS TO EXISTING FORCE MAINS SHALL BE MADE UNDER THE DIRECTION OF THE COMMUNITY DEVELOPMENT DEPT. - ENGINEERING INSPECTORS.

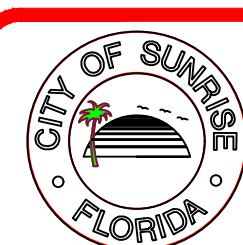
FORCE MAIN VALVES SEPARATING THE MAINS BEING INSTALLED FROM THE EXISTING MAINS SHALL BE OPERATED BY OR UNDER THE DIRECTION OF THE UTILITIES DEPARTMENT REPRESENTATIVE ONLY.

FORCE MAIN VALVES SEPARATING THE MAINS BEING INSTALLED FROM THE EXISTING MAINS SHALL BE OPERATED BY OR UNDER THE DIRECTION OF THE UTILITIES DEPARTMENT REPRESENTATIVE ONLY.

LEAVE BLANK - FOR CITY USE ONLY

48 HOURS BEFORE DIGGING
BROWARD • PALM BEACH • INDIAN RIVER
ST LUCIE • MARTIN COUNTIES
CALL TOLL FREE
1-800-432-4770
SUNSHINE STATE 1 CALL
UNDERGROUND UTILITIES
NOTIFICATION CENTER

Designed By: _____				
Drawn By: _____				
Checked By: _____	2	3/1/12	HEALTH DEPT. UPDATES	SD
	1	4/10/98	UPDATES DUE TO SPEC. REVISIONS	JF
	SYMBOL	NO	DATE	REVISIONS
				BY



CITY OF SUNRISE

APPROVED BY: _____ DATE: _____

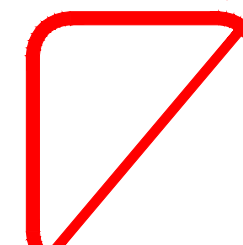
 REGISTERED ENGINEER NO. _____
 STATE OF FLORIDA

STANDARD SANITARY SEWER DETAILS AND NOTES

ORIGINAL ISSUE
DATE: 03/26/8

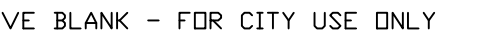
PROJECT
NUMBER

NOT TO
SCALE



Appendix 4

Standard Water Details and Notes

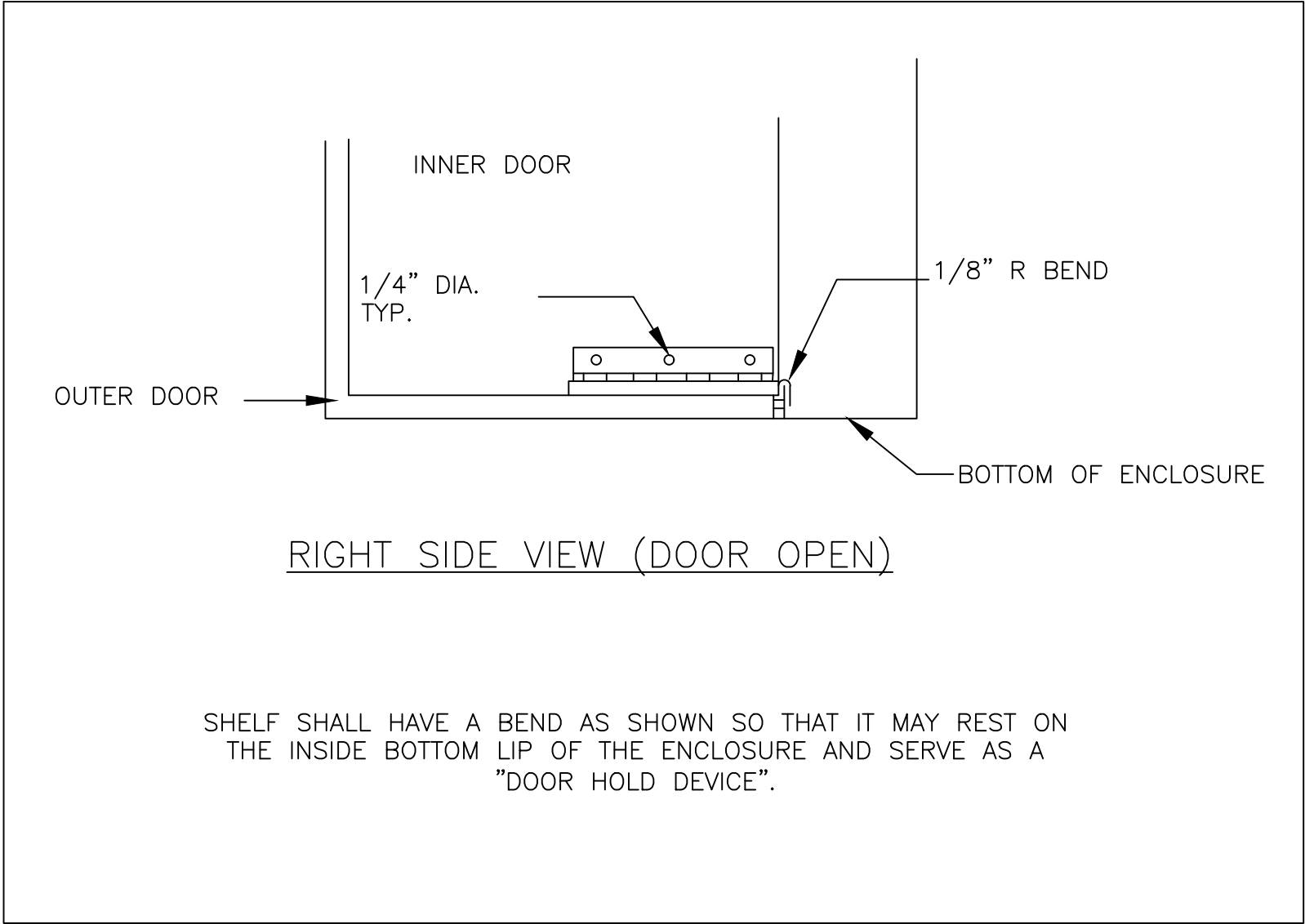
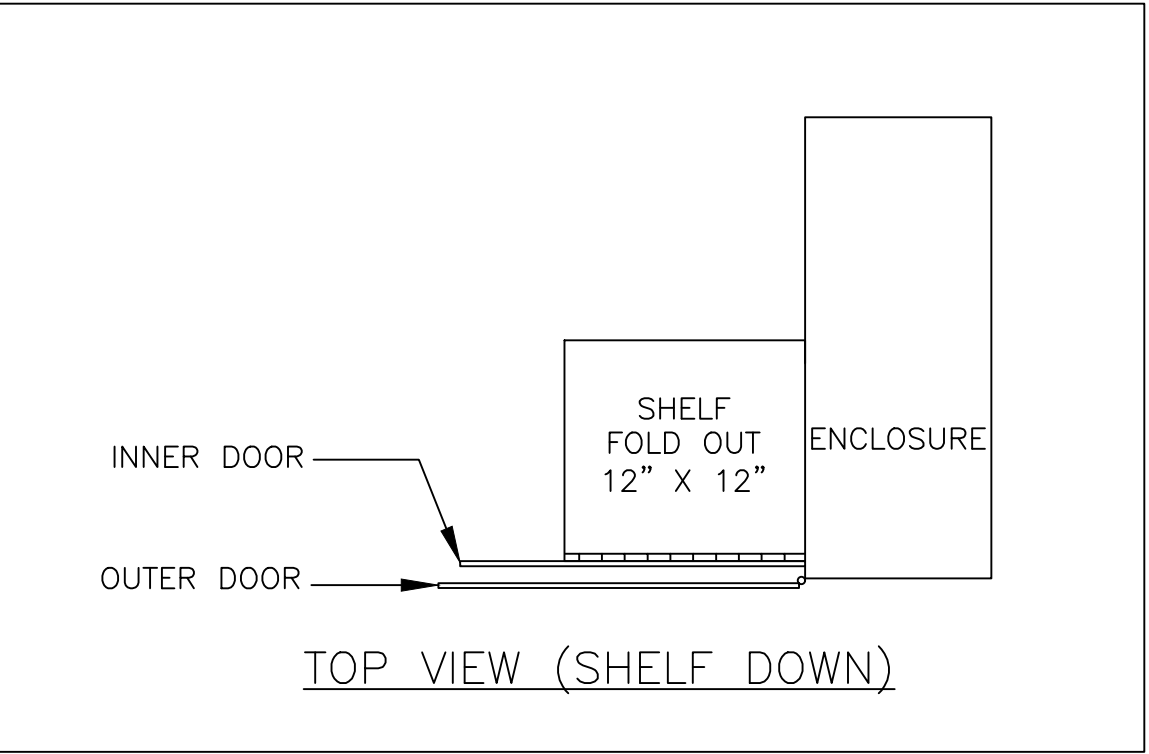
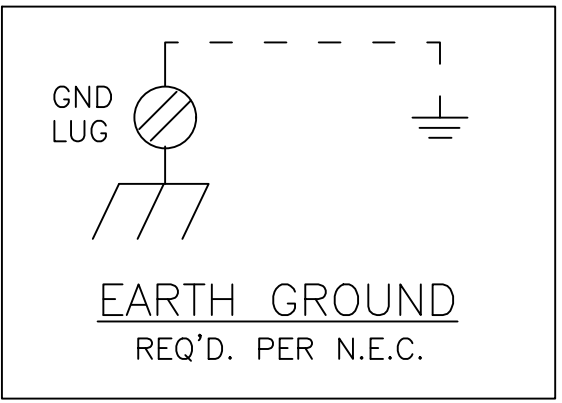
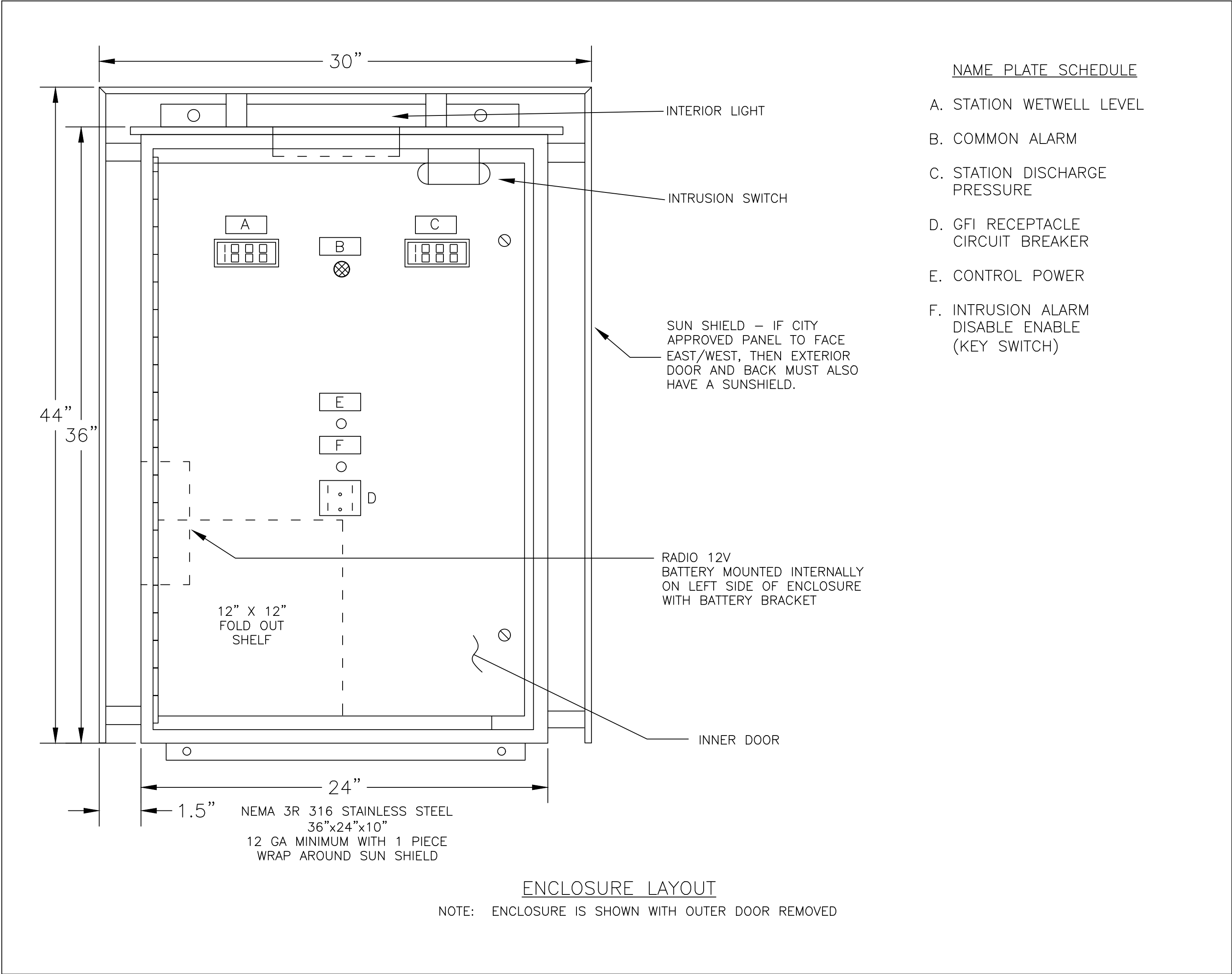
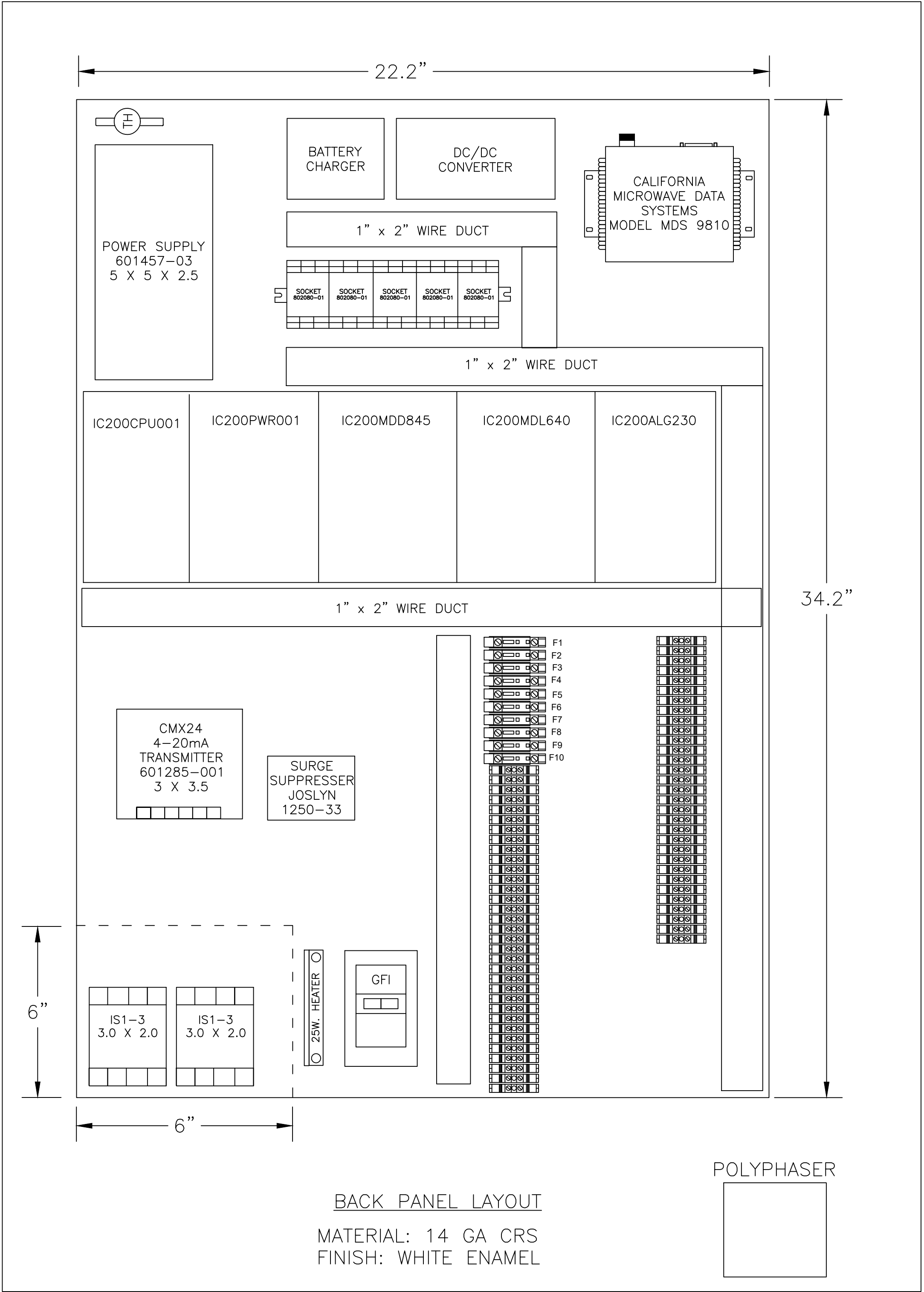


Appendix 5

Standard Lift Station Details and Notes

(Total of 5 Sheets)

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LEAVE BLANK - FOR CITY USE ONLY

48 HOURS BEFORE DIGGING
BROWARD • PALM BEACH • INDIAN RIVER
ST. LUCIE • MARTIN COUNTIES
CAL. TEL. TOLL
1-800-432-4770
SUNSHINE STATE 1 CALL
UNDERGROUND UTILITIES
NOTIFICATION CENTER

Designed By:					
Drawn By:					
Checked By:					
SYMBOL	NO.	DATE	REVISIONS	CITY	BY
	2	08/08	UPDATE TO ALL DETAILS		
	1	04/04	UPDATE TO ALL DETAILS	FV	



CITY OF SUNRISE

APPROVED BY: _____ DATE: _____
REGISTERED ENGINEER NO. _____
STATE OF FLORIDA

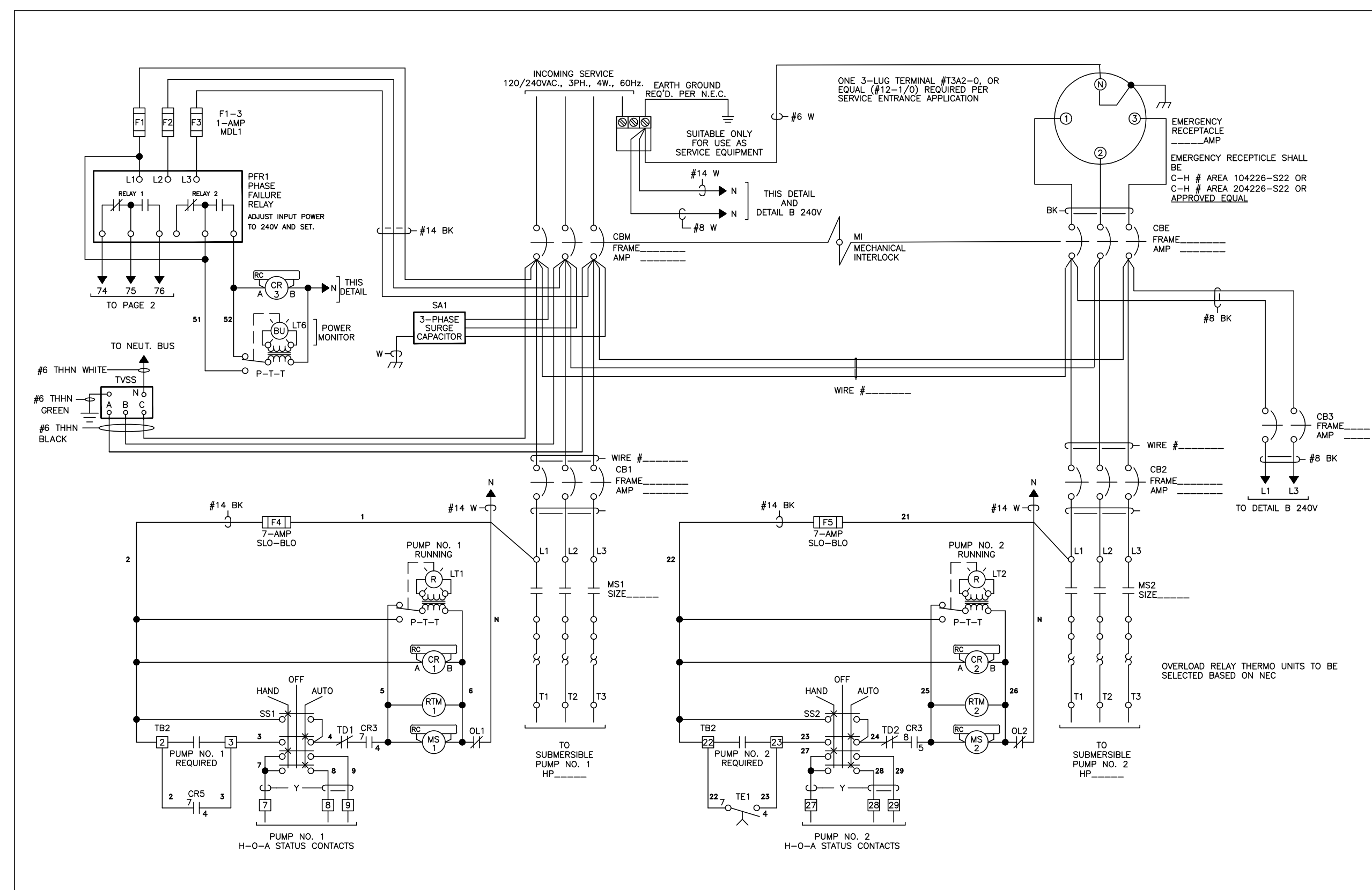
PLC/RTU PANEL

ORIGINAL ISSUE
DATE: 04/10/98

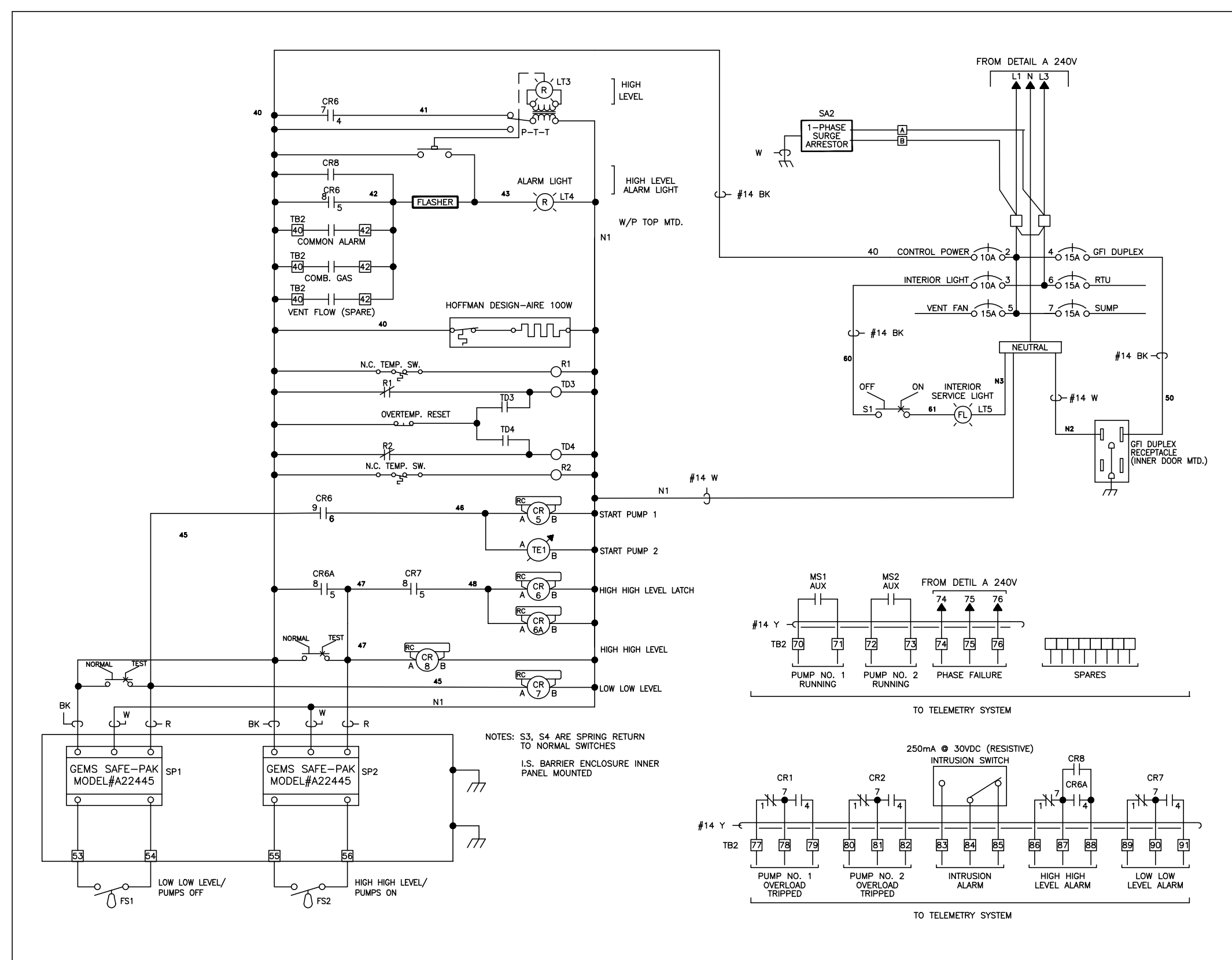
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SCALE

PROJECT
NUMBER

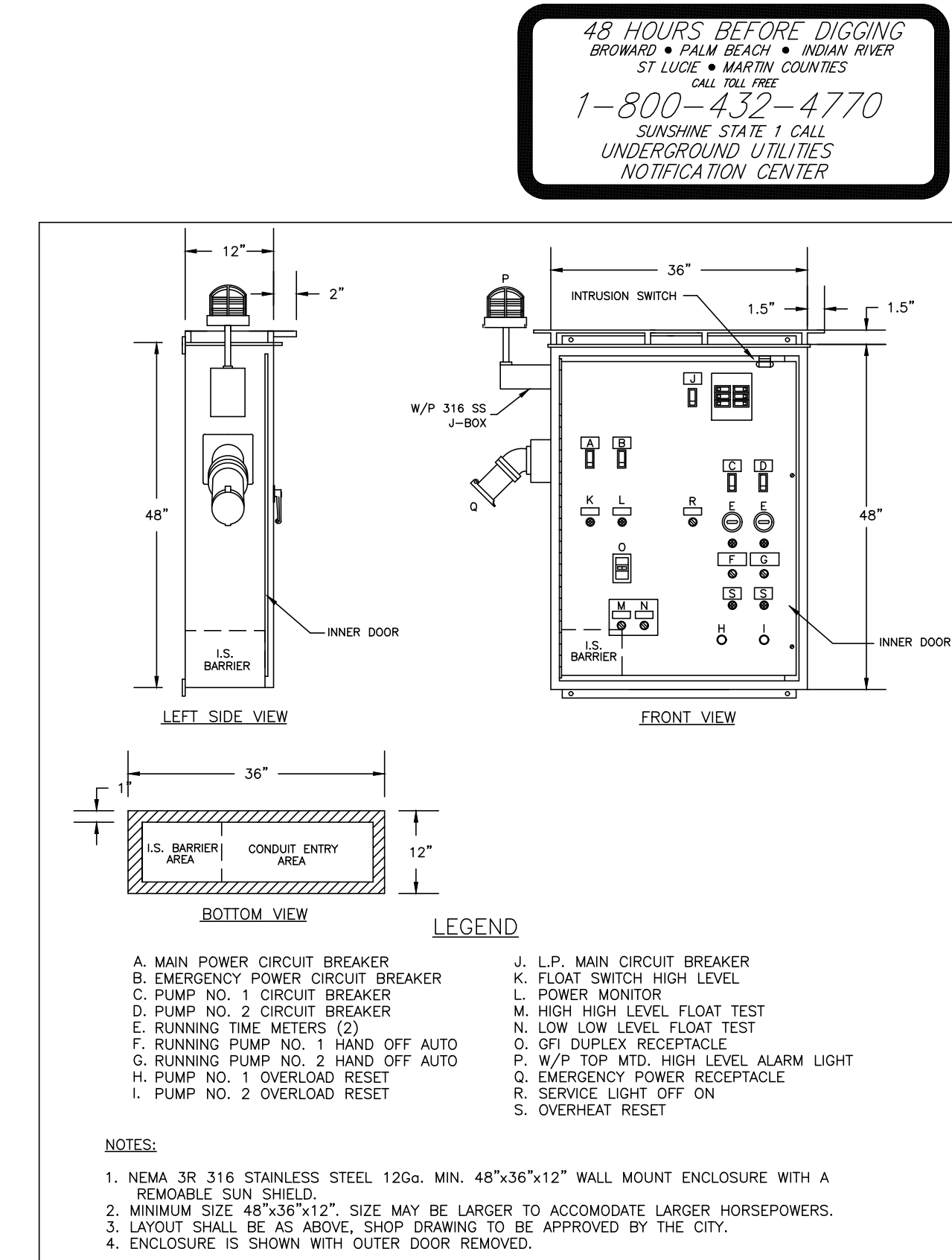
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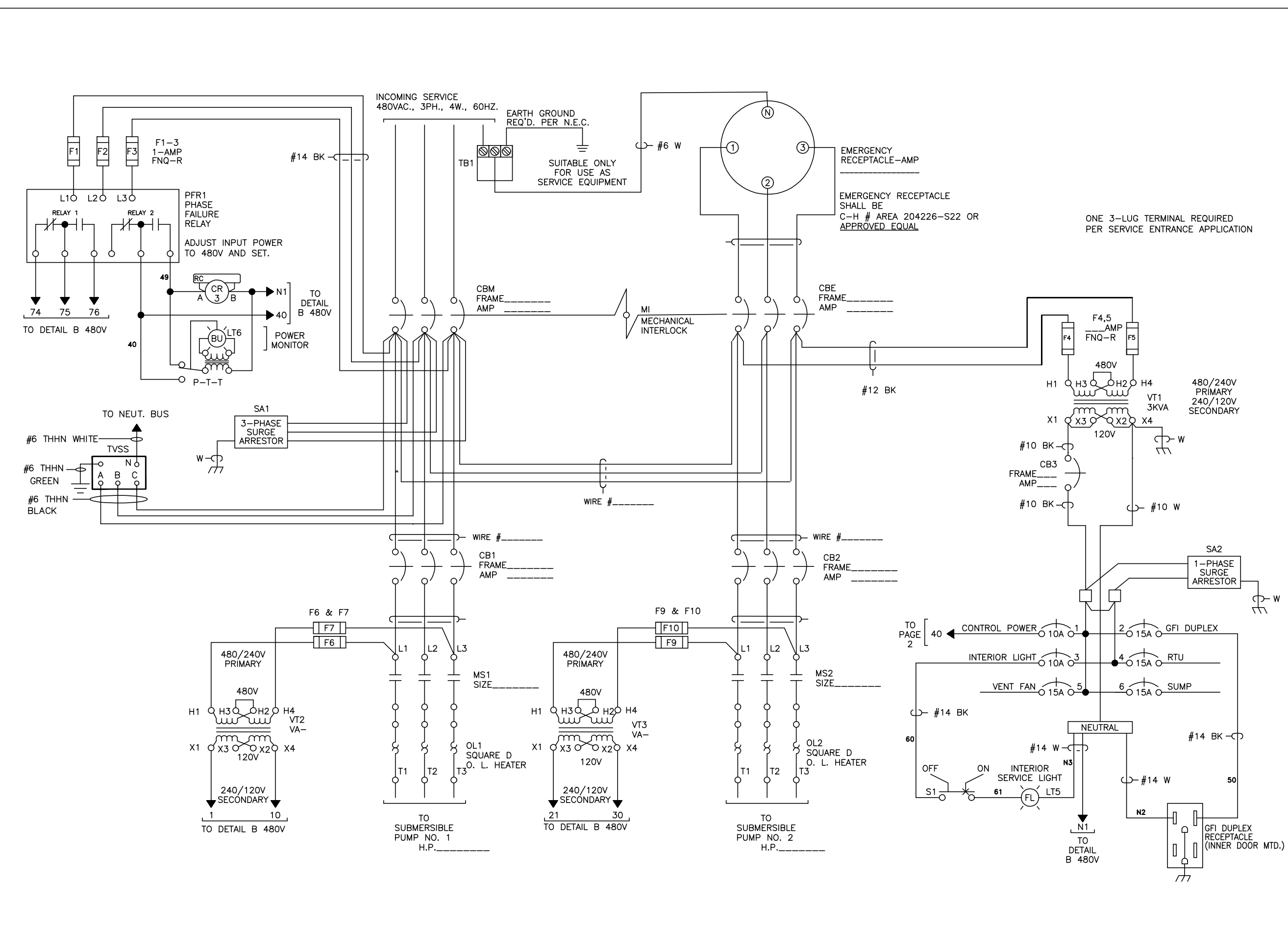
STANDARD 240V LIFT STATION PUMP CONTROL DETAIL A



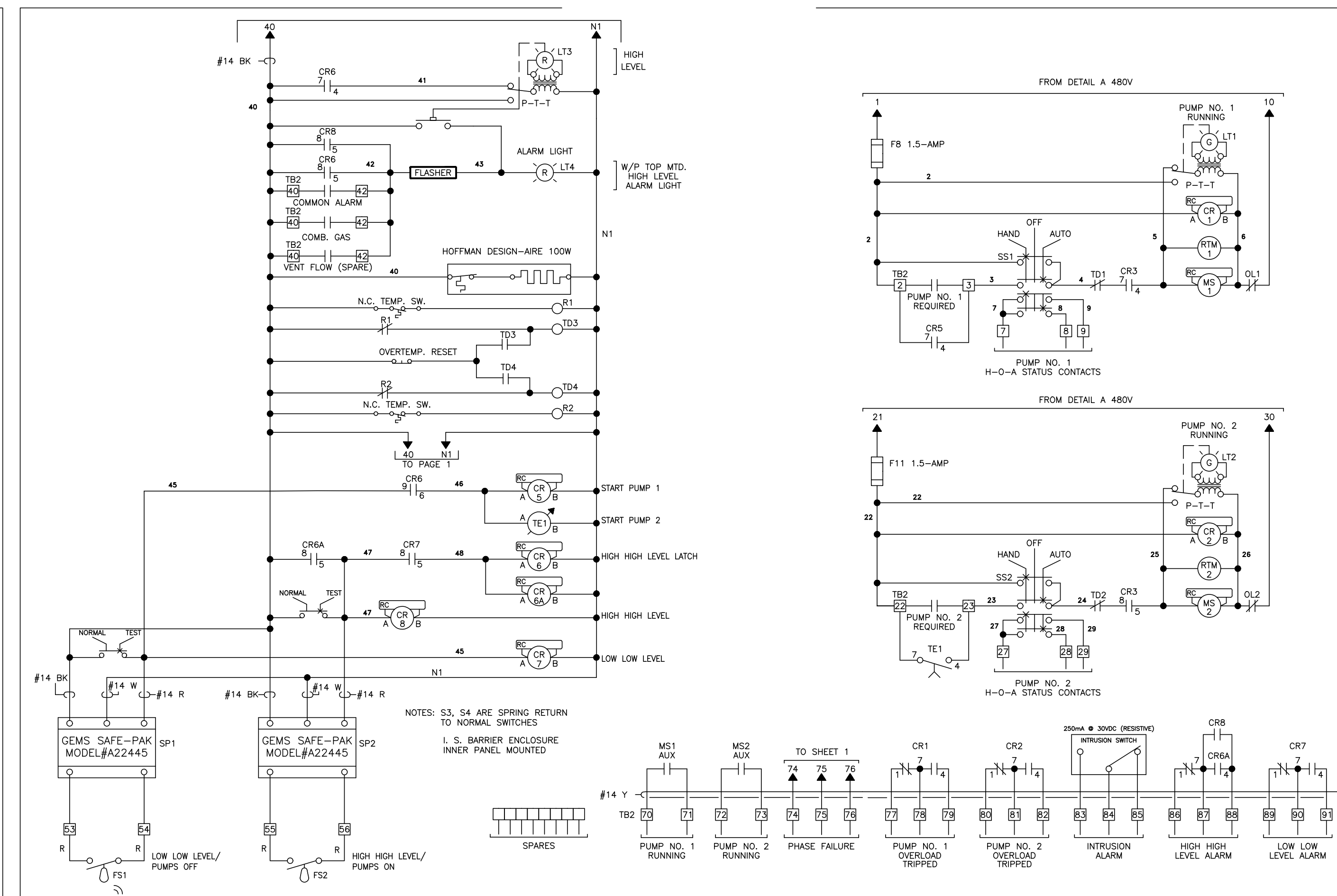
STANDARD 240V LIFT STATION PUMP CONTROL DETAIL B



STANDARD CONTROL PANEL



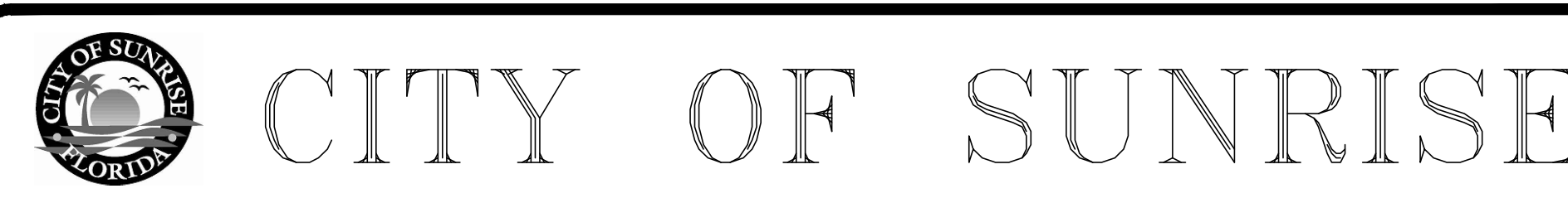
STANDARD 480V PUMP CONTROL DETAIL A



STANDARD 480V PUMP CONTROL DETAIL B

LEAVE BLANK -- FOR CITY USE ONLY

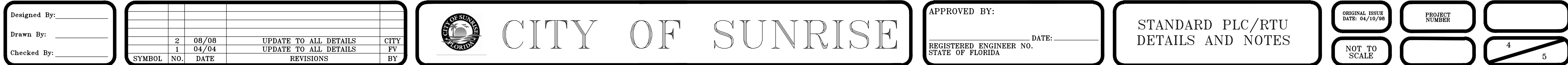
Designed By:				
Drawn By:				
Checked By:				
	3	11/11	UPDATE TO ALL DETAILS	CITY
	2	08/08	UPDATE TO ALL DETAILS	CITY
	1	04/04	UPDATE TO ALL DETAILS	FV
			REVISIONS	BY



APPROVED BY: _____
REGISTERED ENGINEER NO. _____
STATE OF FLORIDA

STANDARD LIFT STATION PUMP
CONTROLS DETAILS AND NOTES

ORIGINAL ISSUE DATE: 04/10/98	PROJECT NUMBER	240V & 480V CONTROL PANELS
NOT TO SCALE		3 5



Appendix 6

Non-Standard Lift Station Details

WALL PENETRATION SEAL

SEEPAGE RING

DIP PIPE SLEEVE

PASSING PIPE

SEAL VOID W/NON-SHRINK GROUT BOTH SIDES

NOTES:

1. ALL DIMENSIONS ARE GIVEN IN INCHES.

2. USE ON NEW CONSTRUCTION, UNLESS OTHERWISE APPROVED BY BCWS.

PIPE SIZE	NOMINAL SLEEVE DIA	"A"
2	4	6
2-1/2	4	7
3	5	7-1/2
4	6	9
6	10	13
8	12	15
10	14	17

PIPE SIZE	NOMINAL SLEEVE DIA	"A"
12	16	19
14	18	21
16	20	23-1/2
18	22	25
20	24	27-1/2
24	28	32

WALL SLEEVE PENETRATION
DETAIL
NTS

WALL PENETRATION SEAL

PASSING PIPE

SEAL VOID W/NON-SHRINK GROUT BOTH SIDES

NOTES:

1. ALL DIMENSIONS ARE GIVEN IN INCHES.

2. USE ON EXISTING CONSTRUCTION.

PIPE SIZE	"A"
2	4
2-1/2	4
3	5
4	6
6	10
8	12
10	14

PIPE SIZE	"A"
12	16
14	18
16	20
18	22
20	24
24	28

CORE DRILL PENETRATION
DETAIL
NTS

ROUND EXCESS CONCRETE TO SHED RAINWATER

6" DIAMETER SCHEDULE 40 STEEL PIPE FILLED WITH CONCRETE

COLOR OF FINISH COAT SHALL BE OSHA SAFETY YELLOW (REFLECTIVE)

FINISHED GRADE

3000 PSI CONCRETE

BOLLARD
DETAIL
NTS

PLUG VALVE

PIPE FLANGE

CHAMFER TOP EDGE 3/4", 45 DEG

CONCRETE SUPPORT PEDESTAL FORMED IN PLACE

PIPE DIA. + 4"

CONSTRUCT 18" x 18" x 6" CONC BASE WITH #4 REINFORCING STEEL @ 5" OCEW IF SUPPORT IS NOT LOCATED ON AN EXISTING SLAB.

NOTES:

1. CONCRETE SHALL BE 4000 PSI, UNREINFORCED.

2. SEE PLANS AND SECTIONS FOR PIPE ELEVATION REQUIREMENT.

3. PIPE SUPPORT SUITABLE FOR PIPE SIZES 3" THROUGH 24" DIA.

4. SUPPORT STRAIGHT PIPE SECTION, FITTING OR PLUG VALVE. DO NOT PLACE UNDER CHECK VALVE.

PIPE SUPPORT - CONCRETE PEDESTAL
DETAIL
NTS

WETWELL WALL

1/2" DIA 316 SST EXP ANCHOR WASHER & NUT (TYP OF 4) PENETRA 5" MIN

NON-SHRINK GROUT

DRILL 5/8" DIA HOLE (TYP)

1/2" DIA 316 SST U-BOLT WASHER & NUT

LIFT STATION PUMP DISCHARGE PIPE

L 3"x3"x1/4" 316 SST EXTEND WALL TO WALL INSIDE WET WELL

PLAN

SECTION A-A

9" x 9" x 1/4" 316 SST BASE PLA INSTALL BEFORE LINING

5/8" DIA HOLE (TYP OF 4)

L 3" x 3" x 1/4" 316 SST

NOTE: MAX DISTANCE BETWEEN SUPPORTS SHALL NOT EXCEED 10 FEET

LIFT STATION PUMP DISCHARGE PIPE
SUPPORT
DETAIL
NTS

DESIGN BY: DN

DRAWN BY: DN

CHECKED BY: N/A

SCALE:

AS NOTED

CALL 48 HOURS BEFORE YOU DIG

IT'S THE LAW! DIAL 811

Know what's below. Call before you dig.

SUNSHINE STATE ONE CALL OF FLORIDA, INC.

REV	DESCRIPTION	DATE

REVISIONS

UTILITIES DEPARTMENT

777 SAWGRASS CORPORATE PKWY

SUNRISE, FL 33325

CITY OF SUNRISE

NON-STANDARD DETAILS

LIFT STATION DETAILS

SEAL

DRAFT

DATE: 02/14/2022

REVISION:

DRAWING NO. LS-01

SHEET NO. 1 of 1