LIFT STATION DESIGN AND CONSTRUCTION STANDARDS

2019 - 1ST EDITION

VOLUME 2 OF 2 - STANDARD PLATES

"The Clean Water Team"

Clark County Water Reclamation DISTRICT

LIFT STATION DESIGN AND CONSTRUCTION STANDARDS

2019 - 1ST EDITION

VOLUME 2 OF 2 - STANDARD PLATES

CLARK COUNTY
WATER RECLAMATION
DISTRICT

CLARK COUNTY WATER RECLAMATION DISTRICT
LIFT STATION DESIGN AND CONSTRUCTION STANDARDS, 2019 – 1ST EDITION

VOLUME 2 OF 2 – STANDARD PLATES

LIST OF STANDARD PLATES

CLARK COUNTY WATER RECLAMATION DISTRICT
LIFT STATION DESIGN AND CONSTRUCTION STANDARDS, 2019 – 1ST EDITION

VOLUME 2 OF 2 – STANDARD PLATES

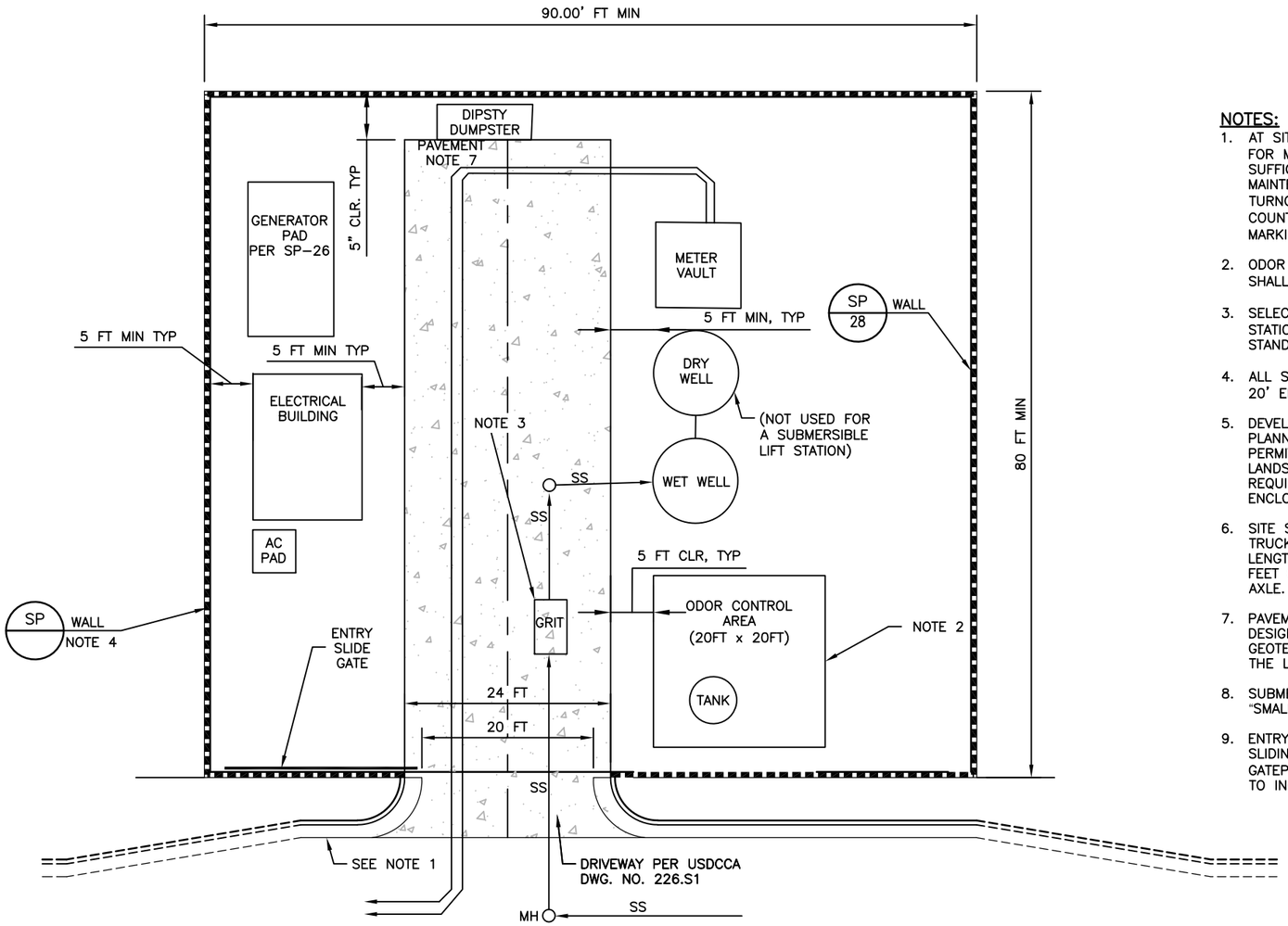
CLARK COUNTY WATER RECLAMATION DISTRICT
LIFT STATION DESIGN AND CONSTRUCTION STANDARDS, 2019 – 1ST EDITION

VOLUME 2 OF 2 – STANDARD PLATES

These Lift Station Design and Construction Standards, 1st Edition, have been adopted by Resolution of their governing body as follows:

CLARK COUNTY WATER RECLAMATION DISTRICT
Adopted by Board of Trustees May 7, 2019

CLARK COUNTY WATER RECLAMATION DISTRICT
5857 East Flamingo Road
Las Vegas, Nevada 89122
(702) 668-8160 (Engineering Counter)
(702) 668-8205 (Inspections)



PLAN

SCALE: 3/4"=1'-0"

NOTES:

1. AT SITES WITH SINGLE ENTRY GATE (OR WHERE TURNAROUND FOR MAINTENANCE VEHICLES IS NOT PROVIDED), AND WHERE SUFFICIENT PARKING LANE IS NOT PROVIDED IN ROADWAY FOR MAINTENANCE VEHICLE SAFETY, CCWRD MAY REQUIRE A "BUS TURNOUT" (SPECIAL STATION REQUIREMENT) PER CLARK COUNTY STANDARD DWG NO. 234.1 (WITHOUT BUS MARKINGS/SIGNAGE OR SHELTER PAD)
2. ODOR CONTROL AREA FOR "SMALL" OR "DUPLEX" STATIONS SHALL BE 20'X20' PAD.
3. SELECT LIFT STATIONS REQUIRE A "GRIT SUMP" (SPECIAL STATION REQUIREMENT) PRIOR TO THE WET WELL. SEE STANDARDS AND COORDINATE WITH CCWRD REPRESENTATIVE.
4. ALL SITES SHALL BE SECURED WITH 8' SECURITY WALL AND 20' ENTRY GATE(S) AS PER STANDARD PLATES SP-28.
5. DEVELOPER SHALL CONFORM SITE DESIGN TO CLARK COUNTY PLANNING & ZONING REQUIREMENTS, SETBACKS, SPECIAL USE PERMITS, AND DESIGN REVIEW REQUIREMENTS, INCLUDING LANDSCAPING PER TITLE 30 AND ARCHITECTURAL REQUIREMENTS OF BUILDINGS, SHADE STRUCTURES, GENERATOR ENCLOSURE, WALLS, OR OTHER FACILITIES AS APPLICABLE.
6. SITE SHALL BE DESIGNED TO BE ACCESSIBLE BY A "VACTOR TRUCK 2100 SERIES", HAVING DIMENSIONS OF 41 FT TOTAL LENGTH, WITH 260-IN WHEEL BASE AND APPROXIMATELY 8 FEET OF TRUCK AND EQUIPMENT IN FRONT OF THE STEERING AXLE.
7. PAVEMENTS WITHIN THE LIFT STATION SITE SHALL BE ASPHALT, DESIGNED BY THE DESIGN ENGINEER TO CONFORM TO THE GEOTECHNICAL REPORT CONDITIONS. ALL OTHER AREAS WITHIN THE LIFT STATION SITE SHALL BE TYPE 2 AGGREGATE SURFACE.
8. SUBMERSIBLE LIFT STATIONS WILL ONLY BE CONSIDERED AT "SMALL" LIFT STATIONS, ON A CASE BY CASE BASIS.
9. ENTRY SLIDE GATE TO BE INDUSTRIAL HEAVY DUTY CANTILEVER SLIDING GATE WITH POWER GATE OPERATOR SYSTEM. GATEPOLE(S) TO INCLUDE #4/0 GROUNDING. TOP OF GATE TO INCLUDE BARBED WIRE 3 STRANDS OR EQUIVALENT.

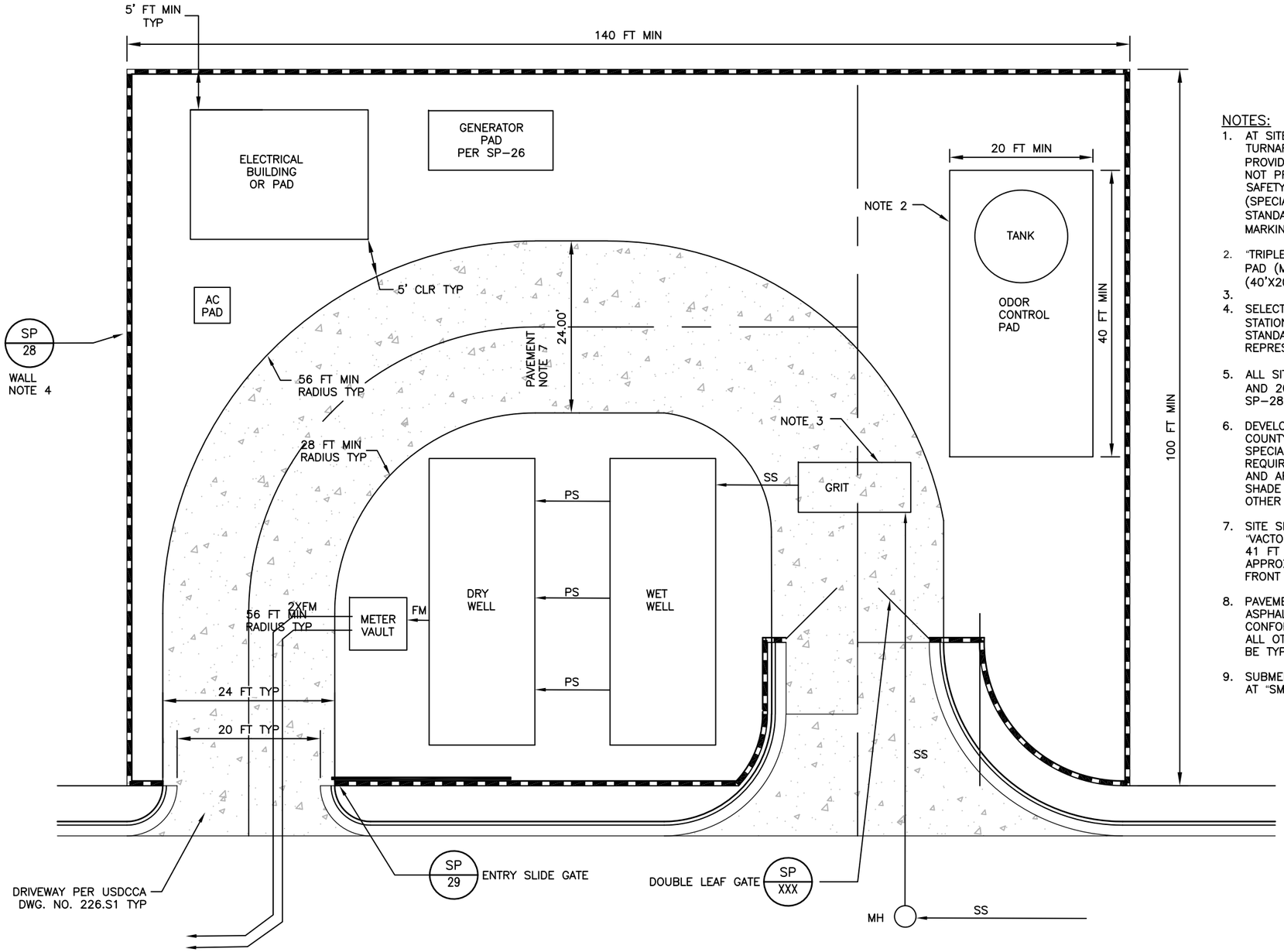
ABBREVIATIONS

SS GRAVITY SEWER
PS PUMP SUCTION
FM FORCE MAIN
MH MANHOLE

TYPICAL SITE PLAN - SMALL OR DUPLEX STATIONS

NUMBER: SP-01

ISSUED:-



NOTES:

1. AT SITES WITH SINGLE ENTRY GATE (OR WHERE TURNAROUND FOR MAINTENANCE VEHICLES IS NOT PROVIDED), AND WHERE SUFFICIENT PARKING LANE IS NOT PROVIDED IN ROADWAY FOR MAINTENANCE VEHICLE SAFETY, CCWRD MAY REQUIRE A "BUS TURNOUT" (SPECIAL STATION REQUIREMENT) PER CLARK COUNTY STANDARD DWG NO. 234.1 (WITHOUT BUS MARKINGS/SIGNAGE OR SHELTER PAD)
2. "TRIPLEX" OR "LARGE" STATIONS SHALL HAVE A 800 SF PAD (MIN) WITH A MINIMUM SIDE DIMENSION OF 20 FEET (40'X20' TYP).
3.
4. SELECT LIFT STATIONS REQUIRE A "GRIT SUMP" (SPECIAL STATION REQUIREMENT) PRIOR TO THE WET WELL. SEE STANDARDS AND COORDINATE WITH CCWRD REPRESENTATIVE.
5. ALL SITES SHALL BE SECURED WITH 8' SECURITY WALL AND 20' ENTRY GATE(S) AS PER STANDARD PLATES SP-28 AND SP-29.
6. DEVELOPER SHALL CONFORM SITE DESIGN TO CLARK COUNTY PLANNING & ZONING REQUIREMENTS, SETBACKS, SPECIAL USE PERMITS, AND DESIGN REVIEW REQUIREMENTS, INCLUDING LANDSCAPING PER TITLE 30 AND ARCHITECTURAL REQUIREMENTS OF BUILDINGS, SHADE STRUCTURES, GENERATOR ENCLOSURE, WALLS, OR OTHER FACILITIES AS APPLICABLE.
7. SITE SHALL BE DESIGNED TO BE ACCESSIBLE BY A "VACTOR TRUCK 2100 SERIES", HAVING DIMENSIONS OF 41 FT TOTAL LENGTH, WITH 260-IN WHEEL BASE AND APPROXIMATELY 8 FEET OF TRUCK AND EQUIPMENT IN FRONT OF THE STEERING AXLE.
8. PAVEMENTS WITHIN THE LIFT STATION SITE SHALL BE ASPHALT, DESIGNED BY THE DESIGN ENGINEER TO CONFORM TO THE GEOTECHNICAL REPORT CONDITIONS. ALL OTHER AREAS WITHIN THE LIFT STATION SITE SHALL BE TYPE 2 AGGREGATE SURFACE.
9. SUBMERSIBLE LIFT STATIONS WILL ONLY BE CONSIDERED AT "SMALL" LIFT STATIONS, ON A CASE BY CASE BASIS.

ABBREVIATIONS	
SS	GRAVITY SEWER
PS	PUMP SEWER
FM	FORCE MAIN
MH	MAN HOLE

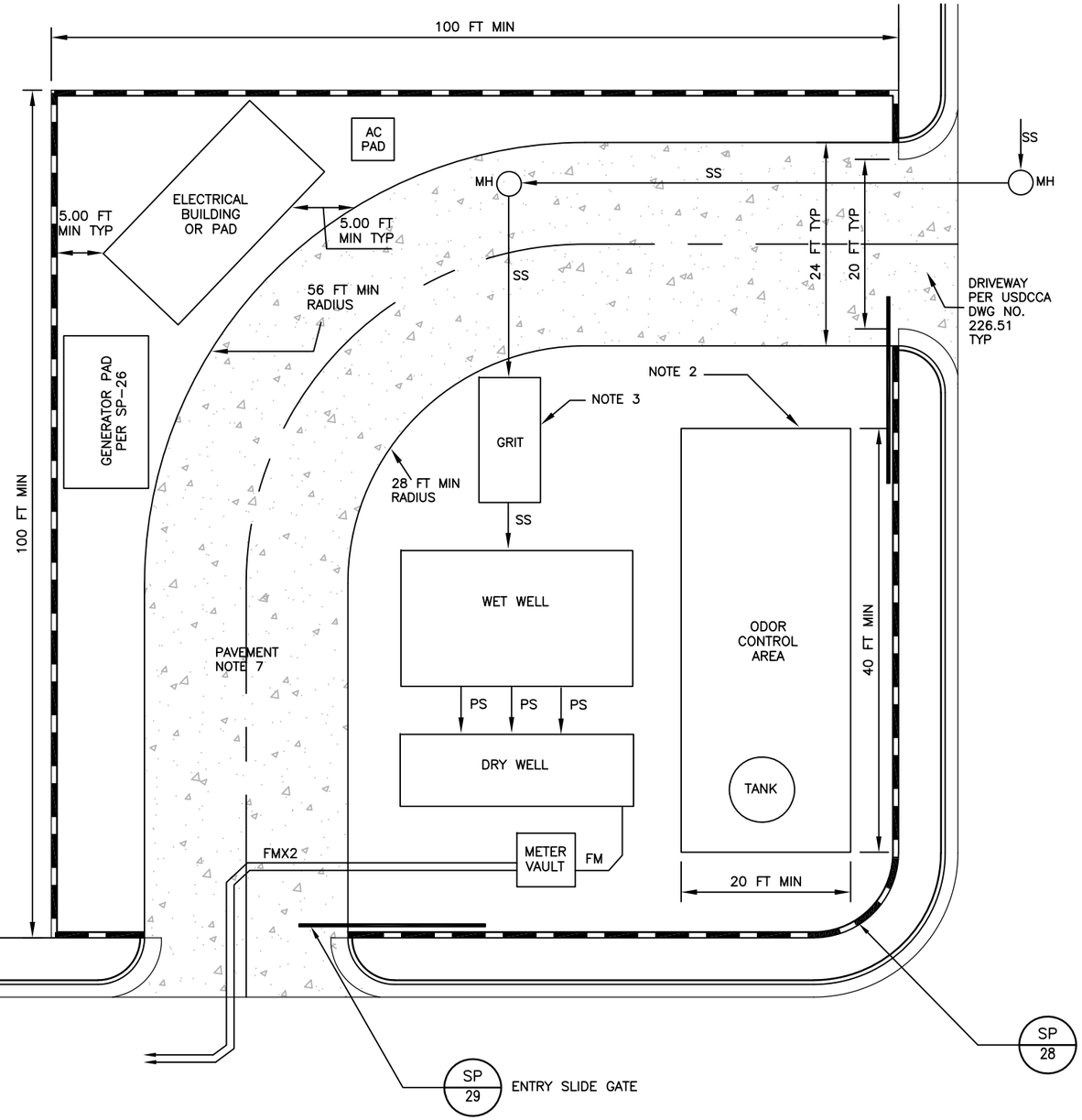
PLAN

SCALE: 3/4"=1'-0"

TRIPLEX AND LARGE STATIONS - TWO ENTRY

NUMBER: SP-02

ISSUED: -



PLAN
SCALE: 3/4"=1'-0"

NOTES:

1. AT SITES WITH SINGLE ENTRY GATE (OR WHERE TURNAROUND FOR MAINTENANCE VEHICLES IS NOT PROVIDED), AND WHERE SUFFICIENT PARKING LANE IS NOT PROVIDED IN ROADWAY FOR MAINTENANCE VEHICLE SAFETY, CCWRD MAY REQUIRE A "BUS TURNOUT" (SPECIAL STATION REQUIREMENT) PER CLARK COUNTY STANDARD DWG NO. 234.1 (WITHOUT BUS MARKINGS/SIGNAGE OR SHELTER PAD)
2. "TRIPLEX" OR "LARGE" STATIONS SHALL HAVE A 800 SF PAD (MIN) WITH A MINIMUM SIDE DIMENSION OF 20 FEET (20'X20' TYP).
3. SELECT LIFT STATIONS REQUIRE A "GRIT SUMP" (SPECIAL STATION REQUIREMENT) PRIOR TO THE WET WELL. SEE STANDARDS AND COORDINATE WITH CCWRD REPRESENTATIVE.
4. ALL SITES SHALL BE SECURED WITH 8' SECURITY WALL AND 20' ENTRY GATE(S) AS PER STANDARD PLATES SP-28 AND SP-29.
5. DEVELOPER SHALL CONFORM SITE DESIGN TO CLARK COUNTY PLANNING & ZONING REQUIREMENTS, SETBACKS, SPECIAL USE PERMITS, AND DESIGN REVIEW REQUIREMENTS, INCLUDING LANDSCAPING PER TITLE 30 AND ARCHITECTURAL REQUIREMENTS OF BUILDINGS, SHADE STRUCTURES, GENERATOR ENCLOSURE, WALLS, OR OTHER FACILITIES AS APPLICABLE.
6. SITE SHALL BE DESIGNED TO BE ACCESSIBLE BY A "VACTOR TRUCK 2100 SERIES", HAVING DIMENSIONS OF 41 FT TOTAL LENGTH, WITH 260-IN WHEEL BASE AND APPROXIMATELY 8 FEET OF TRUCK AND EQUIPMENT IN FRONT OF THE STEERING AXLE.
7. PAVEMENTS WITHIN THE LIFT STATION SITE SHALL BE ASPHALT, DESIGNED BY THE DESIGN ENGINEER TO CONFORM TO THE GEOTECHNICAL REPORT CONDITIONS. ALL OTHER AREAS WITHIN THE LIFT STATION SITE SHALL BE TYPE 2 AGGREGATE SURFACE.
8. SUBMERSIBLE LIFT STATIONS WILL ONLY BE CONSIDERED AT "SMALL" LIFT STATIONS, ON A CASE BY CASE BASIS.

ABBREVIATIONS	
SS	GRAVITY SEWER
PS	PUMP SUCTION
FM	FORCE MAIN
MH	MANHOLE

LARGE LIFT STATIONS - CORNER LOT

NUMBER: SP-03

ISSUED:-

PUMP INFORMATION

TYPE: NON-CLOG PUMP(S)

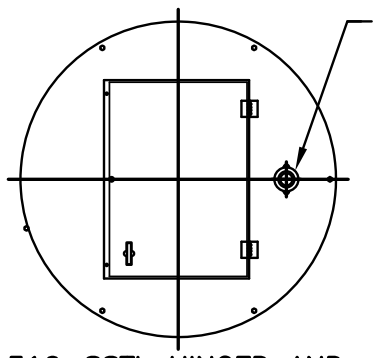
MODEL NO.:_____

RATING:_____GPM_____TDH

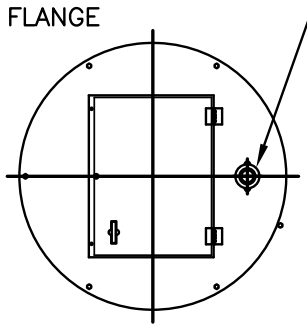
MOTOR:_____ HP_____ RPM

ELEC:_____ PH_____HZ_____v

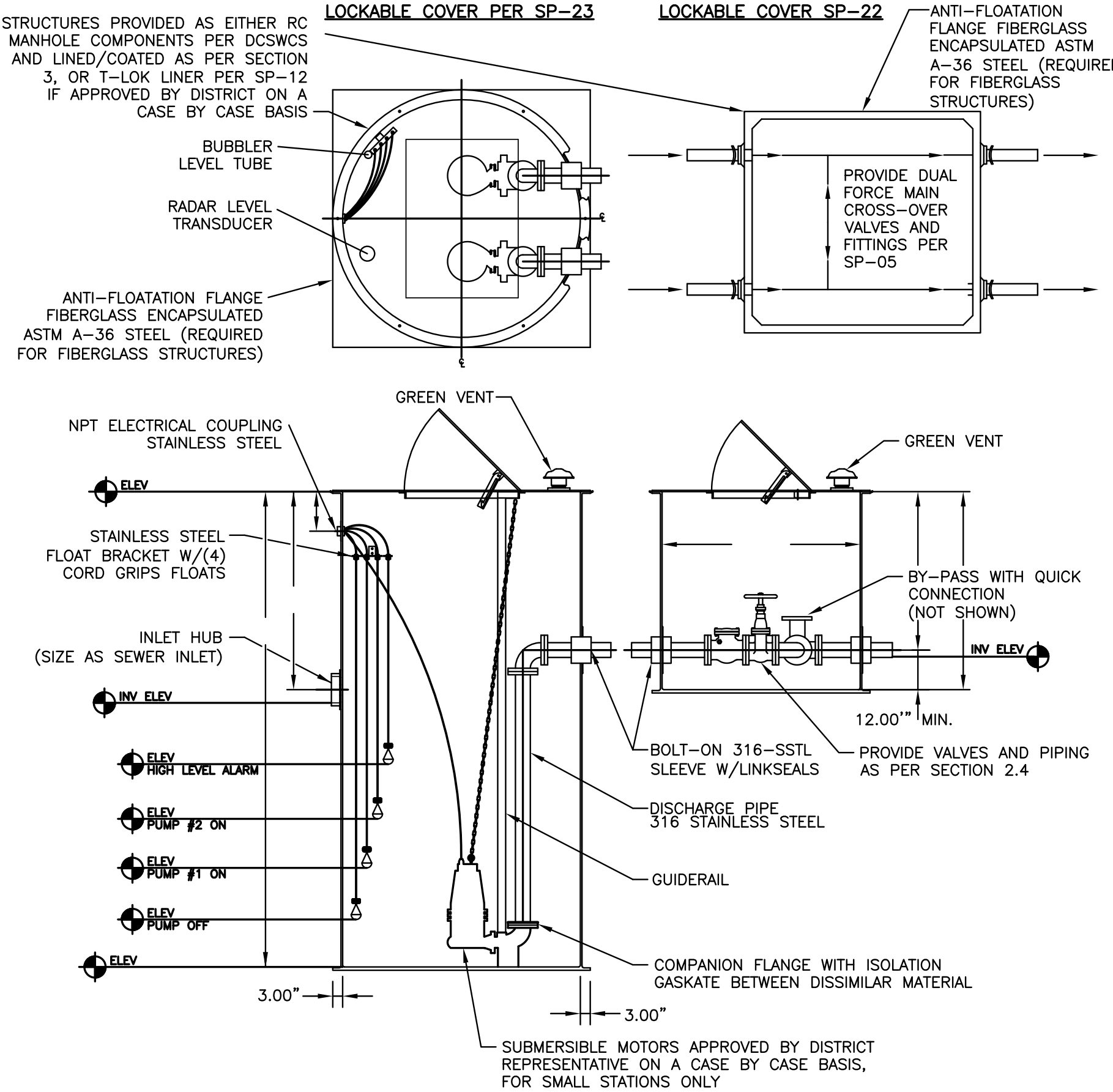
ELEC:_____ FL AMPS



316-SSTL HINGED AND LOCKABLE COVER PER SP-23

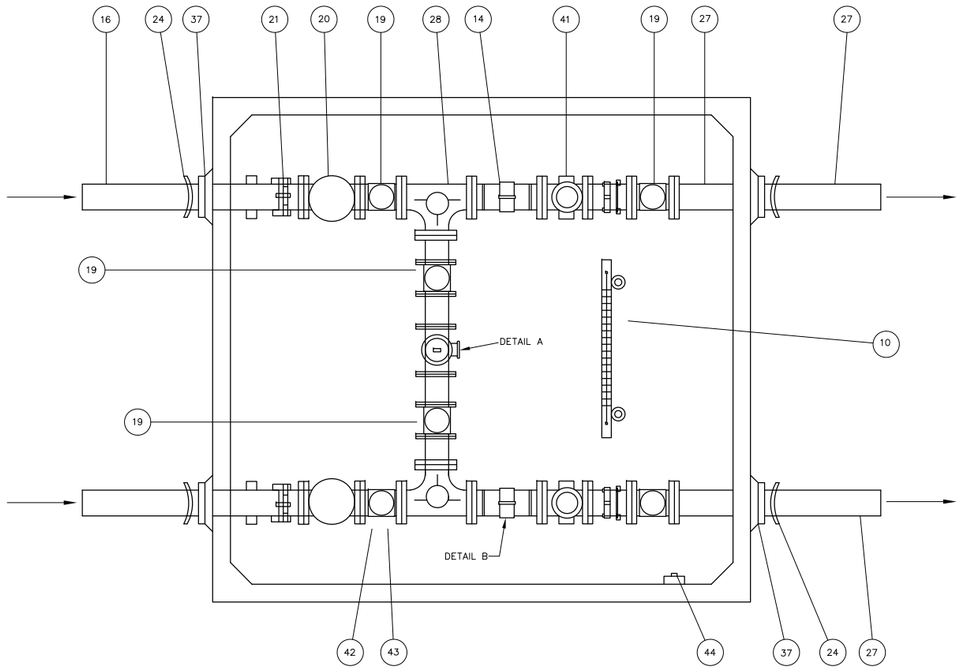


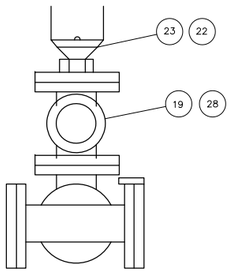
316-SSTL HINGED AND LOCKABLE COVER SP-22



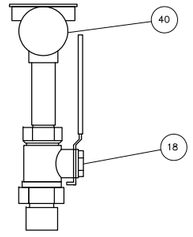
SUBMERSIBLE STATION - SMALL

ISSUED: -	NUMBER: SP-04





DETAIL A
NOT TO SCALE



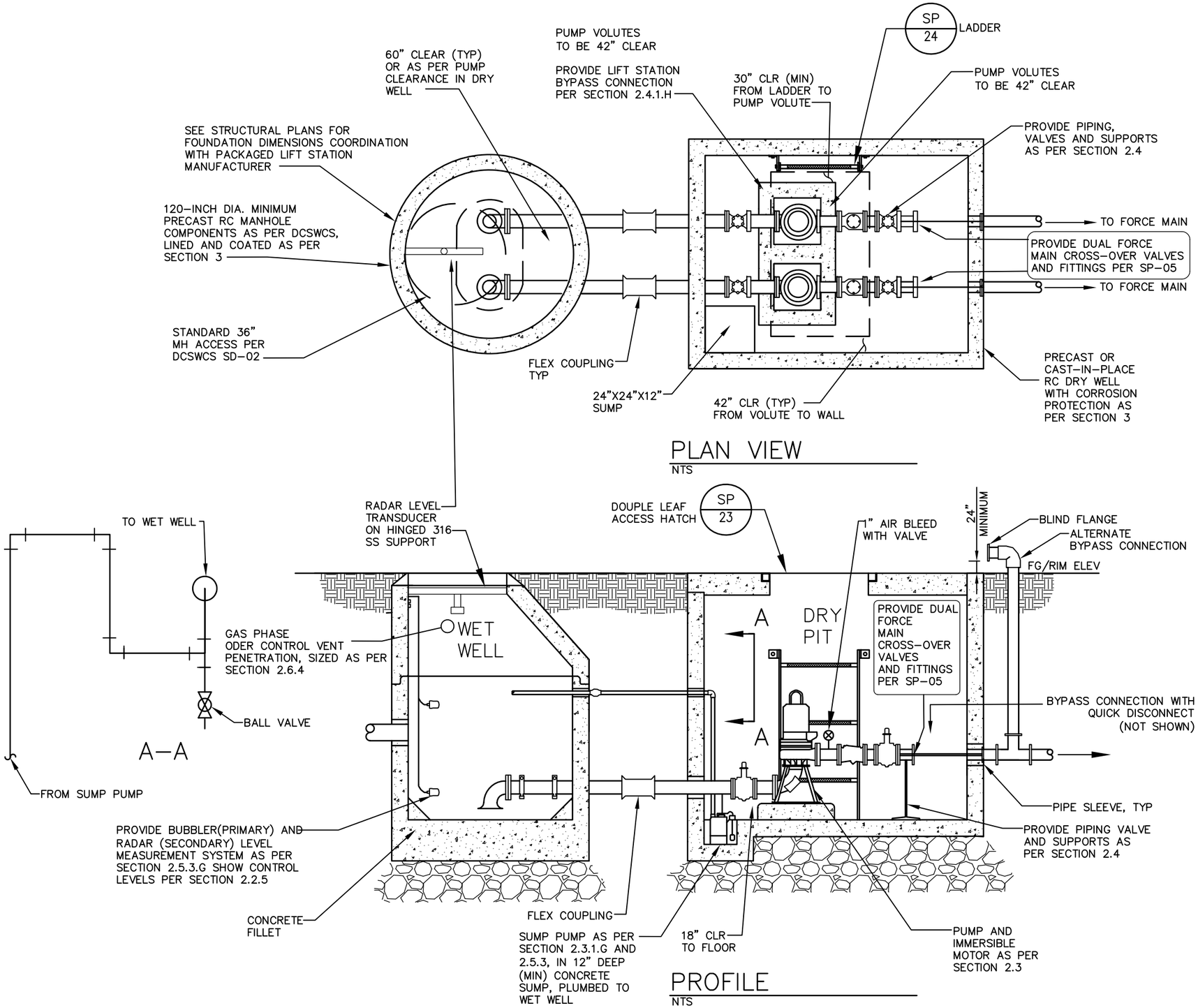
DETAIL B
NOT TO SCALE

ITEM	DESCRIPTION
1	DISCHARGE CLAMP – 316SS – .5in –STRUTMOUNT
2	BASE – W – 687
3	COATING – TNEMEC N69 – EXTERIOR AND 14 " UP INTERIOR
4	RISER – W – 687 x 2ft
5	HATCH – W – 687 – H20
6	TOP SLAB – W – 687 – H20
7	VALVE KEY – BRACKET
8	VALVE KEY – EXTENDABLE GATE WRENCH
9	VALVE KEY – 24in – HAND WRENCH
10	LADDER W/ 3ft EXTENSION
11	PIPESTAND
12	PIPESTAND
13	PIPE STAND – BASE
14	SPOOL – FLGxPE – W/ TAP
15	PIPE
16	PIPE
17	NIPPLE
18	BALL VALVE
19	PLUG VALVE – ECCENTRIC – DIRECT OP NUT
20	CHECK VALVE – LEVER & WEIGHT
21	RFCA
22	CAM LOCK – PLUG x MNPT
23	CAM LOCK – SOCKET CAP
24	HEAVY DUTY RETAINER GLAND
25	SPOOL FLGxFLG
26	SPOOL
27	SPOOL
28	TEE
29	BUSHING
30	FLANGE – BLIND – FNPT TAP
31	GASKET – FLANGE
32	GASKET KIT – FLANGE – ISOLATING
33	HANDRAIL – ASSEMBLY – ALUMINUM
34	HANDRAIL SOCKET – EDGE MOUNT
35	UNISTRUT – SLOTTED
36	SEALANT
37	KOR–N–SEAL
38	PIPE – PVC PVC CONDUIT
39	ADAPTER – SLIP x FNTP
40	PRESSURE TRANSMITTER – DWYER
41	FLOWMETER
42	PROXY SWITCH
43	PROXY SWITCH – CONNECTING CABLE
44	FLOAT SWITCH

VALVE VAULT

NUMBER: SP-05

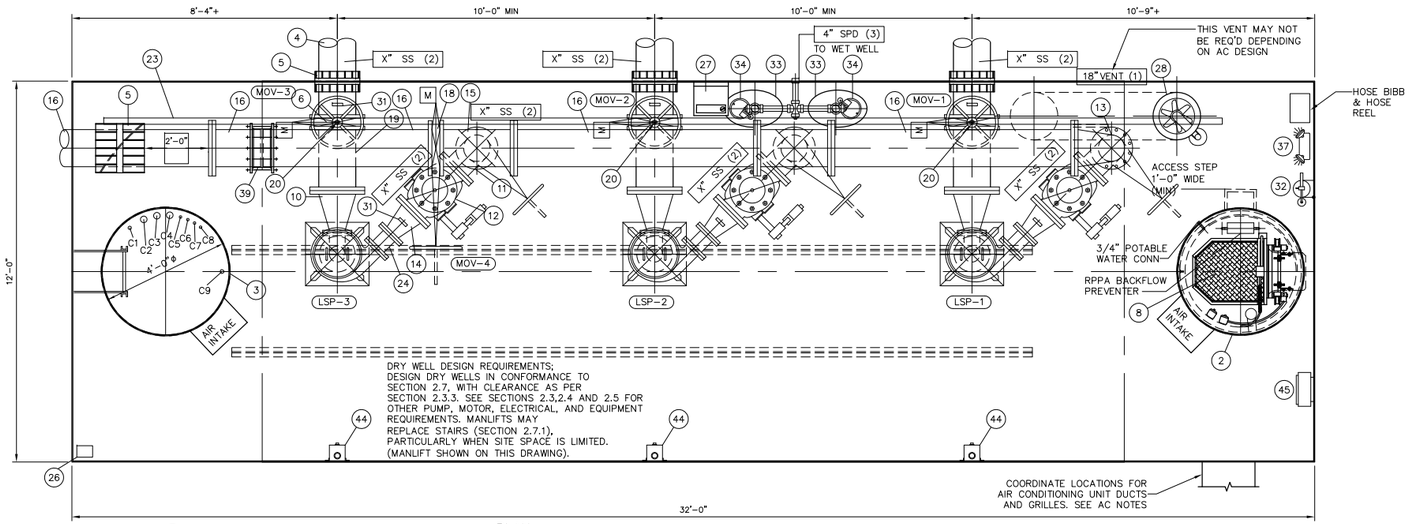
ISSUED: -



DUPLEX DRY-WELL/ WET WELL/LIFT STATION TYPICAL LAYOUT

NUMBER: **SP-06**

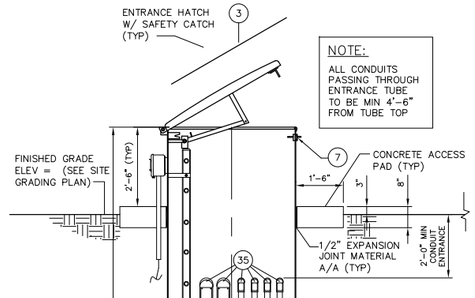
ISSUED: -

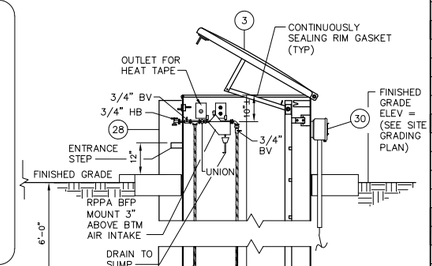


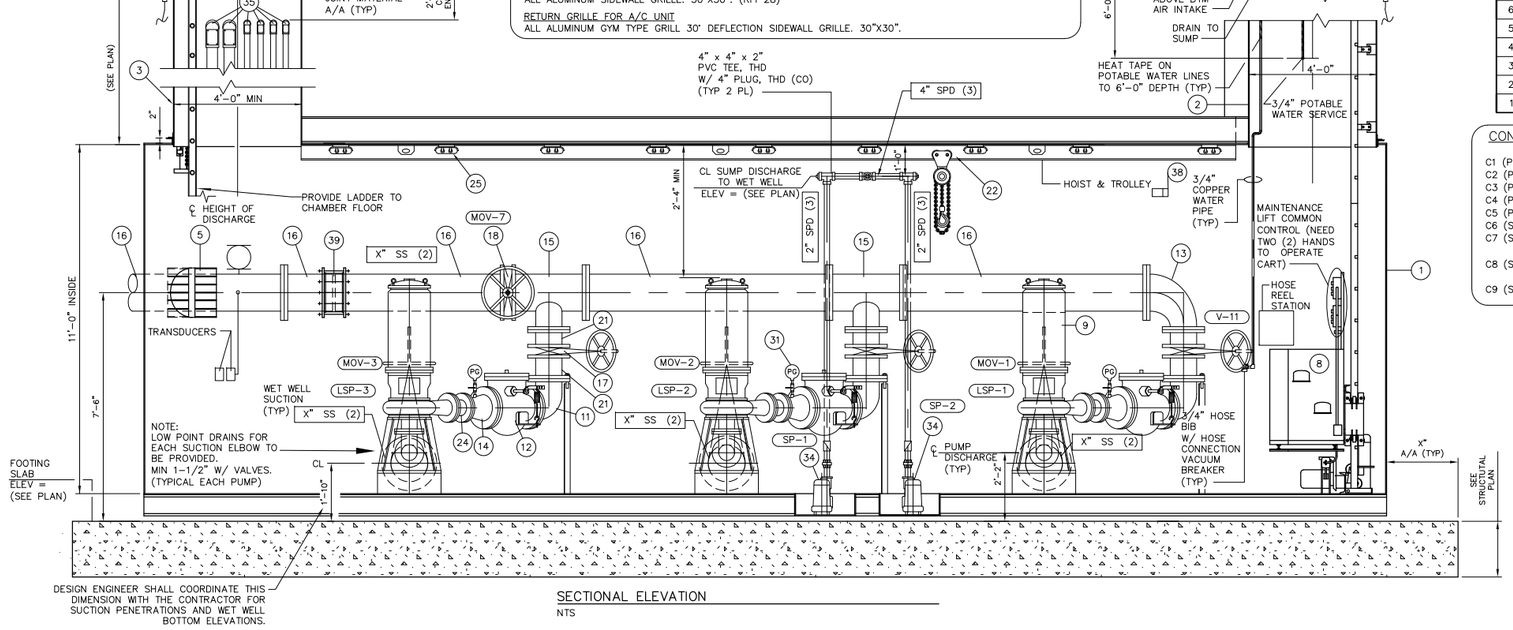
PLAN

NTS

LIFT STATION SCHEDULE		
ITEM	QUANTITY	DESCRIPTION
45	1	POWER DISTRIBUTION AND LOCAL CONTROL PANEL
44	3	LOCAL PUMP START/STOP BUTTON PANEL– SEE SPECIFICATIONS AND ELEC DWGS
40	2	SAFETY LANDING
39	1	12" SLEEVE STYLE COUPLING ("DRESSER" STYLE 38)
38	1	GAS DETECTION AND INTERCOM SYSTEMS
37	1	EMERGENCY LIGHTING
36	3	PUMP & MOTOR MAINTENANCE LIFTING HOOKS
35	–	CONDUITS – (SEE LIST BELOW) (SEE ELECTRICAL FOR COMPLETE LIST)
34	2	SUMP PUMP W/ 2" UNION, THD & 2" CHECK VALVE, THD
33	2	SUMP PUMP PIT – (14"W x 20"L x 8"D)
32	1	FIRE EXTINGUISHER W/ MOUNTING BRACKET
31	7	DUAL PRESSURE GUAGES/ PRESSURE TRANSMITTER AND ONE INCH AIR BLEED WITH VALVE
30	–	IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM– SPECIAL STATION REQUIREMENT AND FOR STEEL STATIONS
		WITH TWO (2) DPI TEST PANELS
29	2	FRESH AIR INLETS 1/4"PL STEEL W/SCREEN INSERTS
28	1	VENTILATION BLOWER – IF REQ'D IN COORD. W/AC
		W/18" SCH. 40 STEEL, EXHAUST VENT DUCTING W/SCREEN INSERT
27	1	DEHUMIDIFIER PLUMED TO SUMP
26	1	CAMERA
25	7	STATION LIGHTING – LED FIXTURES
24	3	6"ø DI SPOOL, FLG (LENGTH VARIES)
23	1	MONORAIL WITH CRANE
22	1	MONORAIL WITH MOTORIZED CRANE
21	6	X"ø DI SPOOL, FLG (LENGTH VARIES)
20		X" KNIFE GATE VALVE, FLG W/MOTOR OPER & HDWHL OVERRIDE – SUCTION
19	3	X"ø DI SPOOL, FLG (LENGTH VARIES)
18	1	X" KNIFE GATE VALVE, FLG W/ MOTOR OPER & HDWHL OVERRIDE – DISCHARGE
17	3	X" KNIFE GATE VALVE, FLG W/ HDWHL & GEAR OPER – DISCHARGE
16	1	DISCHARGE HEADER – X"ø DI PIPE CL 52, FLG x FLG & FLG x PE (FLG x PE CONN @ DISC)
15	2	X" x X" x X" DI REDUCING TEE, FLG
14	3	X" x X" DI CONCENTRIC REDUCER, FLG
13	1	X" x X" DI INCREASING ELBOW, FLG
12	3	X" CHECK VALVE, FLG W/ OSW&L
11	3	X" x 90° DI ELBOW W/BASE BEND, FLG
10	3	X" x X" DI ECCENTRIC REDUCER, FLG
9	3	PUMP: XXXX GPM, XX TDH
		MOTOR: IMMERSIBLE TYPE XXXX RPM, XX HP, 460V/60HZ/3PH
8	1	MAINTENANCE LIFT
7	2	ACCESS HATCH LATCH W/ T–HANDLE & 5 PIN TUMBLER
6	3	X" KNIFE GATE VALVE, FLG W/ MOTOR OPER & HDWHL OVERRIDE – SUCTION
5	4	1/4" STL WALL TRANSITION SLEEVE W/"LINK SEALS" (TWO SETS EA SLEEVE)
4	3	PUMP SUCTION – X"ø DI PIPE CL 52, FLG x GE (LENGTH VARIES)
3	1	EQUIPMENT TUBE – RC, STEEL OR FIBERGLASS RISER W/HATCH
2	1	PERSONNEL TUBE – RC, STEEL OR FIBERGLASS RISER W/HATCH
1	1	STEEL OR REINFORCED CONCRETE DRY WELL TO BE DESIGNED BY A NEVADA STRUCTURAL ENGINEER







SECTIONAL ELEVATION

NTS

PACKAGED LIFT STATION

AIR CONDITIONING NOTES:

THE AIR CONDITIONING COMPONENTS SPECIFIED BELOW SHALL BE COORDINATED WITH DESIGN OF DRY WELL WORKING SPACE, INCLUDING HEAT REJECTION FROM PUMPS, ELECTRICAL EQUIPMENT, INSTRUMENTATION, AND PIPING. THE MANUFACTURER AND CONTRACTOR SHALL COORDINATE PIPING AND ELECTRICAL CONNECTIONS AS REQUIRED AND GENERALLY SHOWN IN THE CIVIL DRAWINGS.

SLAB MOUNTED HVAC UNIT FOR THE LIFT STATION DRY WELL
DESIGN ENGINEER SHALL SIZE AC UNIT AND VENTILATION AS PER SECTION 2.6.5 TO PROVIDE A SAFE WORKING ENVIRONMENT AT 72 DEGREE F AT FULL LOAD, INCLUDING HEAT REJECTION FORM PUMPS, ELECTRICAL EQUIPMENT, INSTRUMENTATION, AND PIPING

SUPPLY AND RETURN DUCTWORK FOR LIFT STATION A/C
20" ROUND, BURIED UNDERGROUND DUCTWORK. 4X4 ML (INSIDE AND OUT) COATED DUCTWORK. INSTALL UNDERGROUND ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. EXTERNALLY INSULATE ALL DUCTWORK EXPOSED ABOVE–GROUND WITH 1.5" THICK FIBERGLASS 0.75" DENSITY. PROVIDE ALUMINUM JACKETING AND SILICONE SEALANT TO PROVIDE WATER–TIGHT SEAL FOR JACKETING.

SUPPLY GRILLE FOR A/C UNIT
ALL ALUMINUM SIDEWALL GRILLE. 30"X30". (RFI 28)

RETURN GRILLE FOR A/C UNIT
ALL ALUMINUM GYM TYPE GRILL 30' DEFLECTION SIDEWALL GRILLE. 30"X30".

CONDUITS

C1 (P07) – 1–1/4"C – PB1 – MOV–1,2,3,4 (POWER)
C2 (P09) – 2–1/2"C – PB1 – LP–1 (POWER)
C3 (P11) – 2–1/2"C – PB1 – LP–2 (POWER)
C4 (P13) – 2–1/2"C – PB1 – LP–3 (POWER)
C5 (P15) – 1"C – PB2 – LIFT STATION MISC (POWER)
C6 (S06) – 1"C – PB2 – MOV–1,2,3,4 (DIGITAL)
C7 (S07) – 1"C – PB2 – EXHAUST FAN (DIGITAL), SUMP (DIGITAL), AMBIENT TEMP (ANALOG)
C8 (S08) – 1"C – PB2 – PRESSURE SWITCHES & CHECK VALVES (DIGITAL)
C9 (SPARE) – 1 1/2"C – (CAPPED END)

NOTES:

1. ONLY ONE POSSIBLE LIFT STATION DRY WELL DESIGN IS SHOWN. ALTERNATE DESIGNS SHALL PROVIDE ALL COMPONENTS SHOWN AND AS SPECIFIED, MAINTAINING LATERAL SPACING AND NECESSARY WORKING SPACES AROUND THE MECHANICAL EQUIPMENT. OTHER DIMENSIONS MAY VARY. DESIGN ENGINEER SHALL COORDINATE ALL PENETRATION DIMENSIONS WITH CONTRACTOR.
2. DESIGN OF CONCRETE SETTING SLAB, ANCHORING, WET WELL AND ALL EXTERIOR ELECTRICAL AND/OR PIPING CONNECTIONS TO THE STATION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR SHALL COORDINATE WITH DESIGN ENGINEER AND PROVIDE ELECTRICAL CONNECTIONS AND WORK INSIDE STATION DURING ASSEMBLY AND INSTALLATION. THE COST OF THIS ELECTRICAL WORK INSIDE THE STATION SHALL BE INCLUDED WITH THE BID, AND DONE AT NO ADDITIONAL COST TO THE OWNER.
3. ALL ELECTRICAL PANELS SHALL BE LOCATED AT GROUND LEVEL IN A SEPARATE STRUCTURE.
4. ALL ELECTRICAL JUNCTION BOXES, MOTORS AND ELECTRICAL APPURANTESES LOCATED INSIDE THE DRY WELL SHALL BE IMMERSION RATE TO AT LEAST TWICE THE SUBMERGENCE DEPTH.

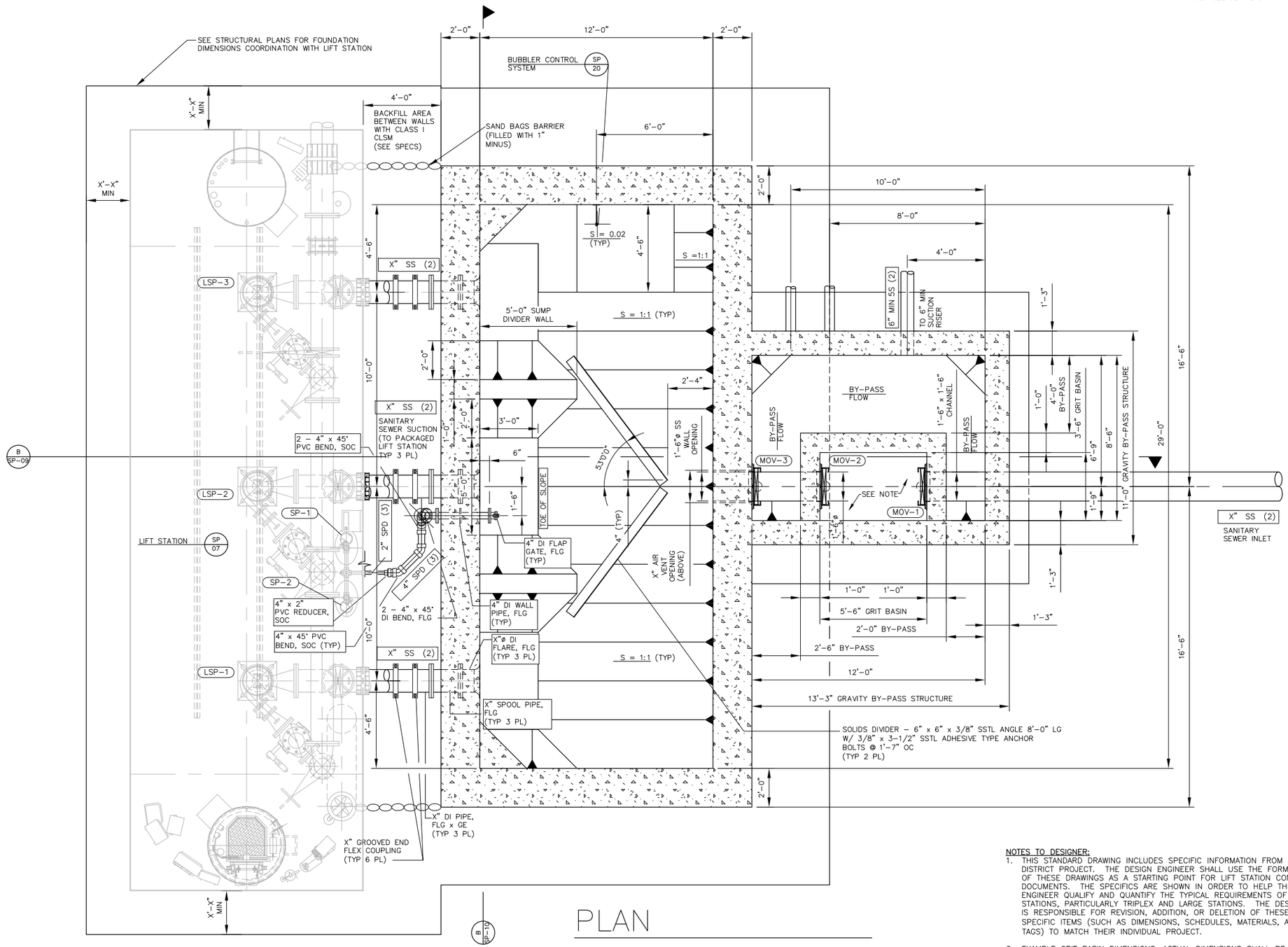
NOTE TO DESIGNER:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.

DRY WELL PLAN AND SECTION - TRIPLEX, LARGE (SAMPLE DWG)

NUMBER: SP-07

ISSUED: -

NOTE:
FLOWMETER SHALL BE LOCATED IN A VAULT SEE DETAIL SP-16



NOTES TO DESIGNER:

1. THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.

2. EXAMPLE GRIT BASIN DIMENSIONS, ACTUAL DIMENSIONS SHALL BE BASED ON HYDRAULIC CALCULATIONS BY DESIGN ENGINEER, SEE NOTE

WET WELL - TRIPLEX LARGE

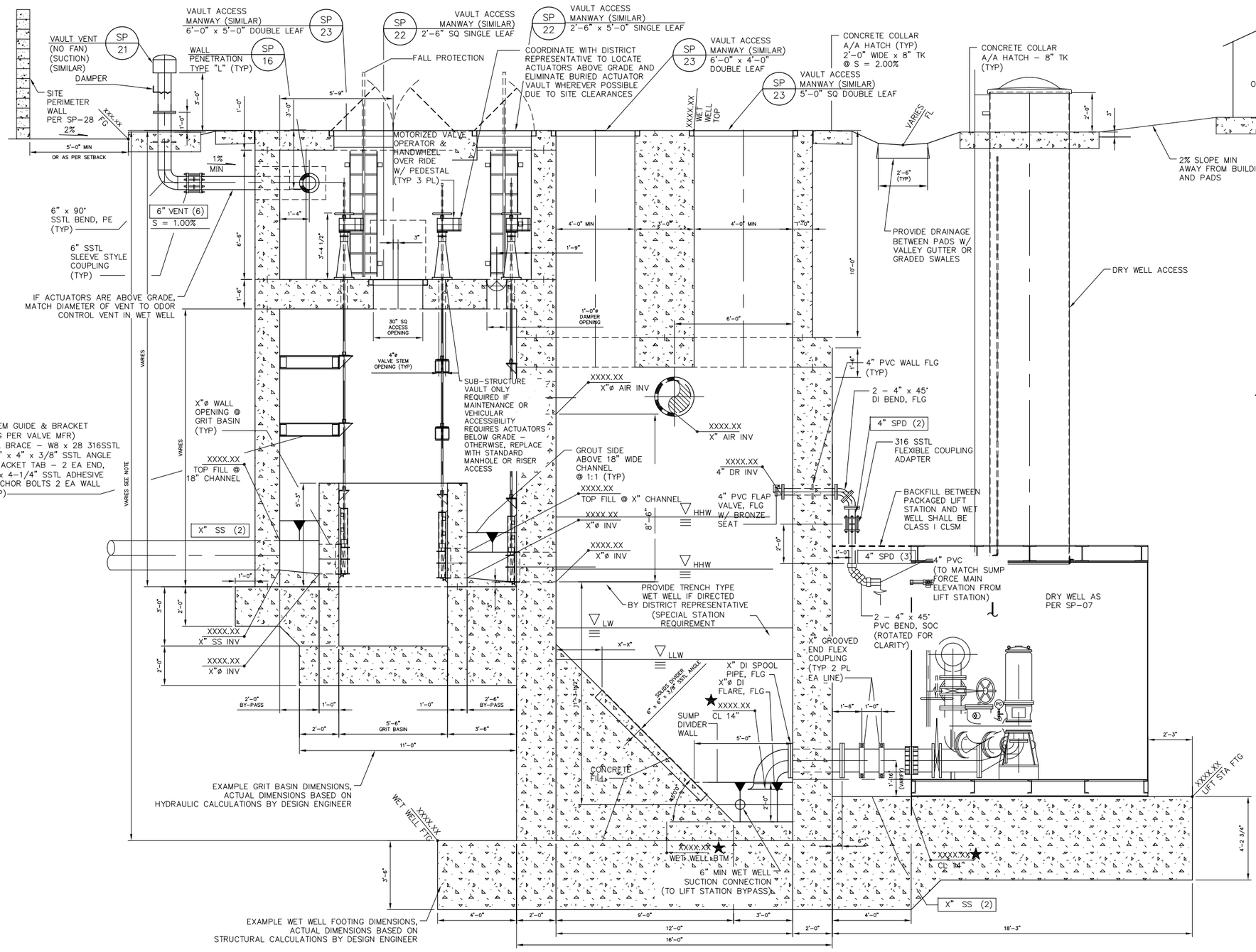
NUMBER: SP-08

ISSUED: -

SITE SECTION A (SAMPLE DWG)

NUMBER: SP-09

ISSUED:-



NOTES:

★ 1. WHEN A PACKAGED LIFT STATION DRY WELL IS USED THE SUCTION PIPE PENETRATIONS AND WET WELL BOTTOM ELEVATIONS SHALL BE COORDINATED WITH THE PACKAGED LIFT STATION MANUFACTURER. THE ELEVATIONS GIVEN ARE APPROXIMATE BASED ON SIMILAR PACKAGED DESIGNS.

2. GRIT BASIN CAN BE AN INDEPENDENT STRUCTURE OFF THE LIFT STATION.

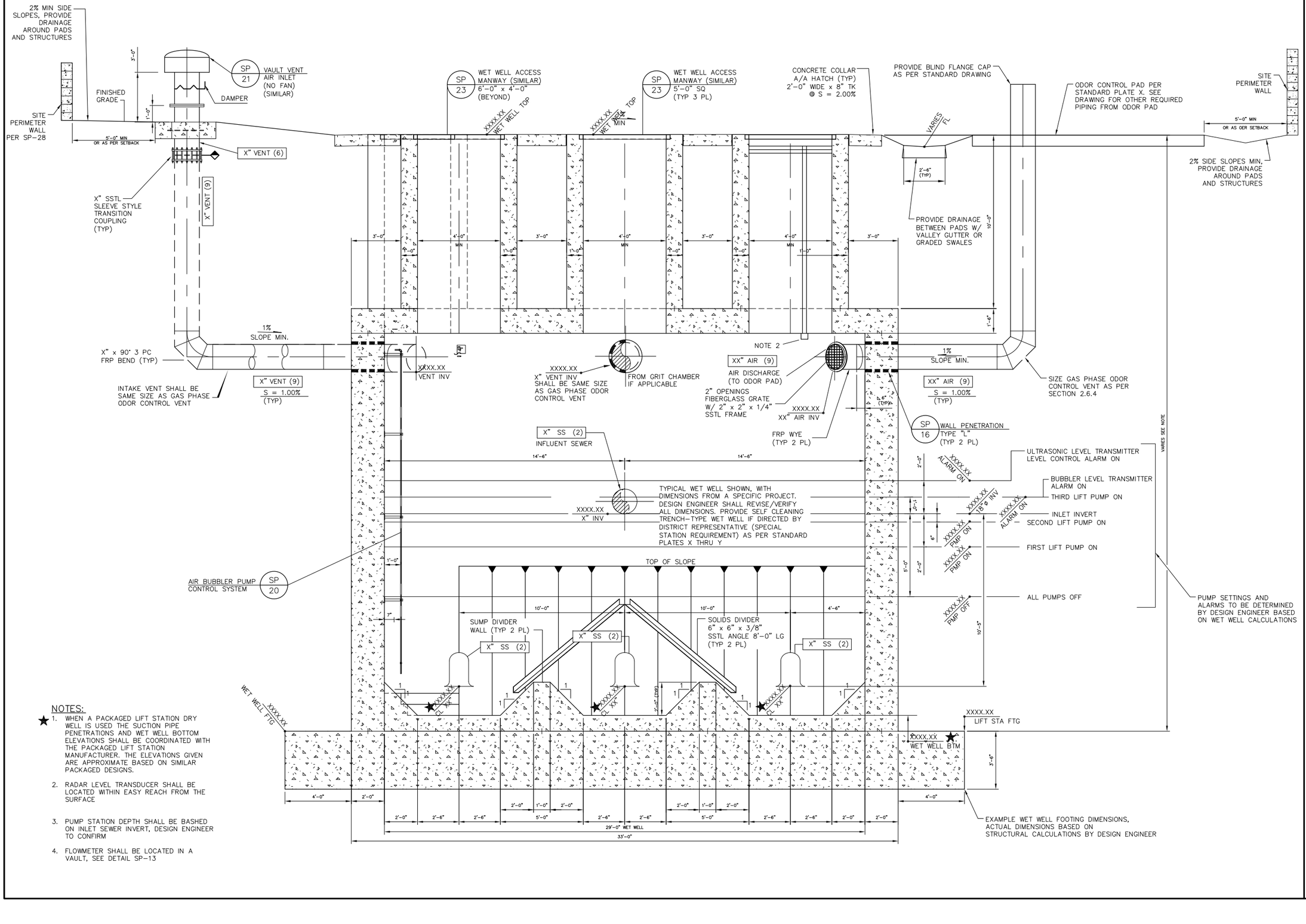
3. LIFT STATION DESIGN SHALL CONFIRM TO HYDRAULIC INSTATUTE STANDARDS AND RECOMMENDATIONS.

4. PUMP STATION DEPTH SHALL BE BASED ON INLET SEWER INVERT, DESIGN ENGINEER TO CONFIRM.

SITE SECTION B (SAMPLE DWG)

NUMBER: SP-10

ISSUED:-



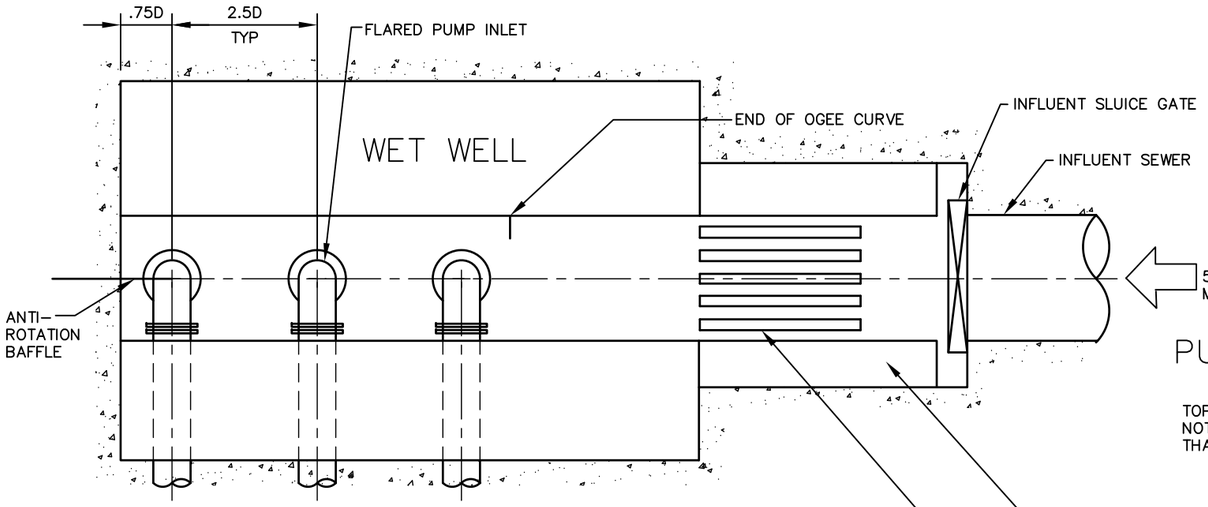
NOTES:

★ 1. WHEN A PACKAGED LIFT STATION DRY WELL IS USED THE SUCTION PIPE PENETRATIONS AND WET WELL BOTTOM ELEVATIONS SHALL BE COORDINATED WITH THE PACKAGED LIFT STATION MANUFACTURER. THE ELEVATIONS GIVEN ARE APPROXIMATE BASED ON SIMILAR PACKAGED DESIGNS.

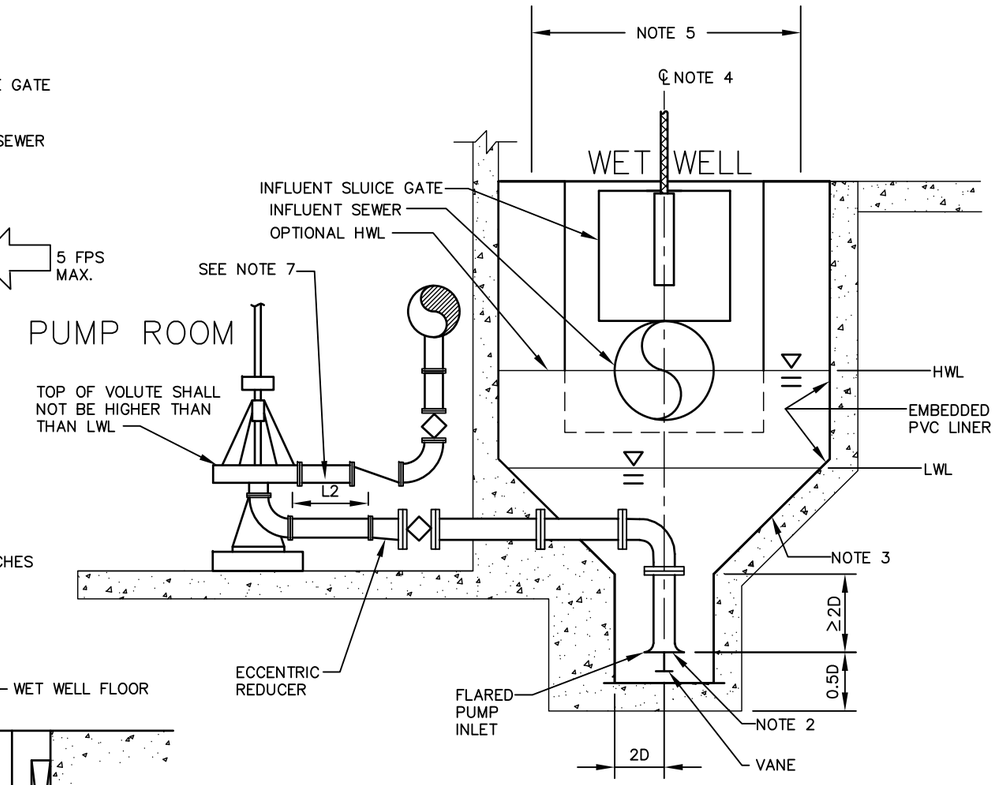
2. RADAR LEVEL TRANSDUCER SHALL BE LOCATED WITHIN EASY REACH FROM THE SURFACE

3. PUMP STATION DEPTH SHALL BE BASHED ON INLET SEWER INVERT, DESIGN ENGINEER TO CONFIRM

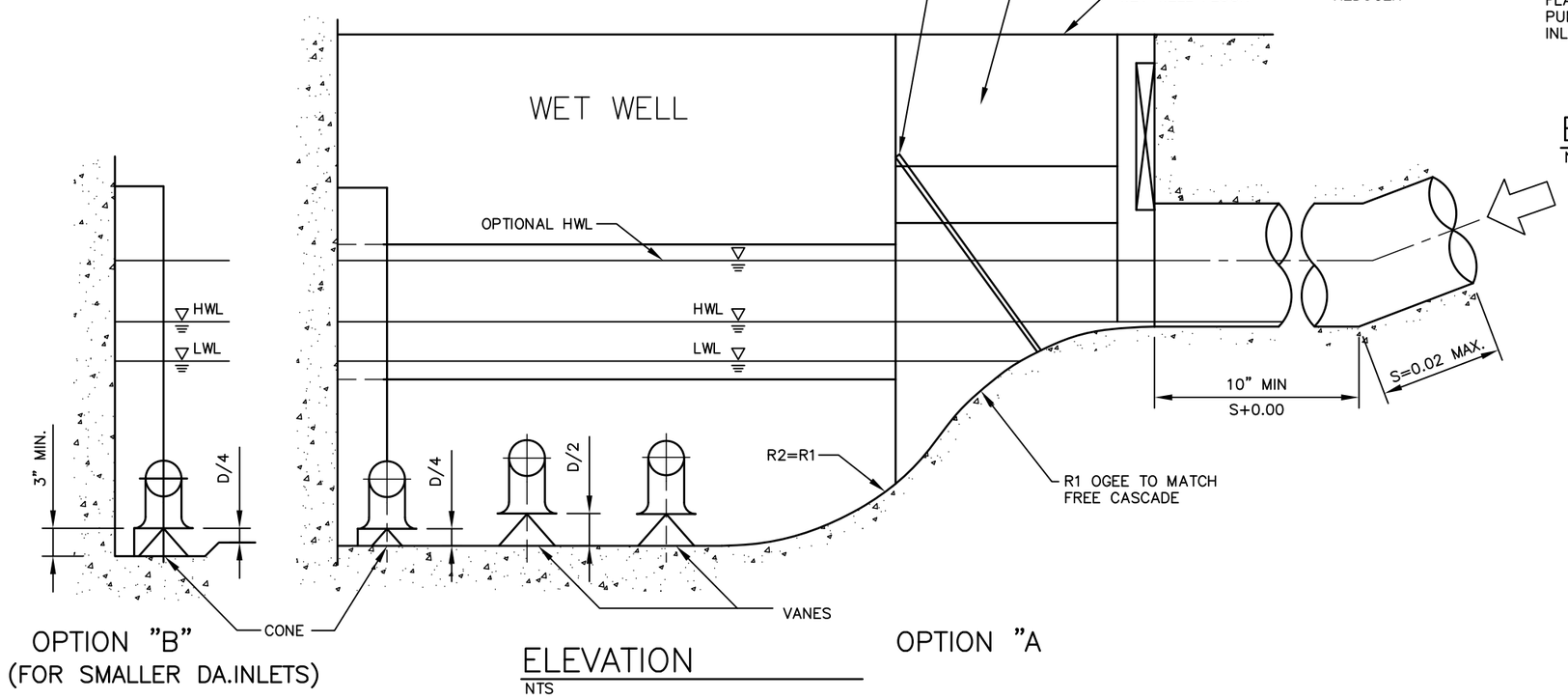
4. FLOWMETER SHALL BE LOCATED IN A VAULT, SEE DETAIL SP-13



PLAN
NTS



ELEVATION
NTS



OPTION "B"
(FOR SMALLER DA.INLETS)

ELEVATION
NTS

OPTION "A

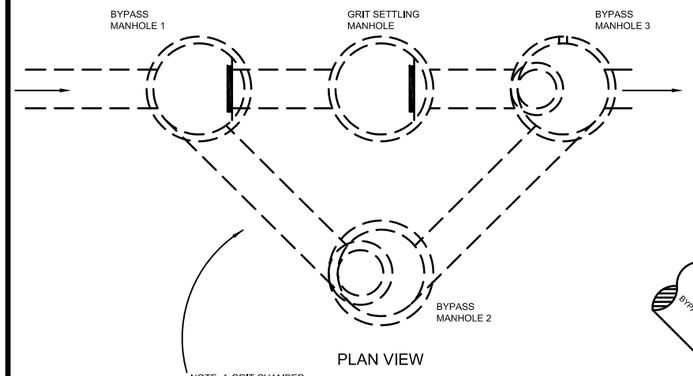
NOTES:

1. D IS BELL RIM OUTSIDE DIA.
2. D IS DETERMINED BASED ON 3.5 PPS MAX INLET VELOCITY AT SUCTION FLARE AT PUMP FULL SPEED.
3. SLOPE OF WALL SHALL BE 60° PREFFERED, 45° MINIMUM
4. INLET SEWER SHALL BE CENTERED TO TRENCH
5. PROVIDE JUST SUFFICIENT ROOM FOR INSTALLATION OF SLICE GATE
6. DESIGN SHALL CONFIRM TO HYDRAULIC INSTITUTE STANDARDS.
7. L2 PER HI TABLE 9.6.6.3.2.

SELF CLEANING WET WELLS

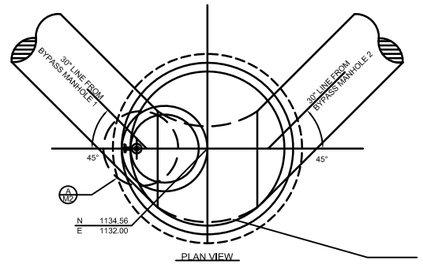
NUMBER: SP-11

ISSUED:-

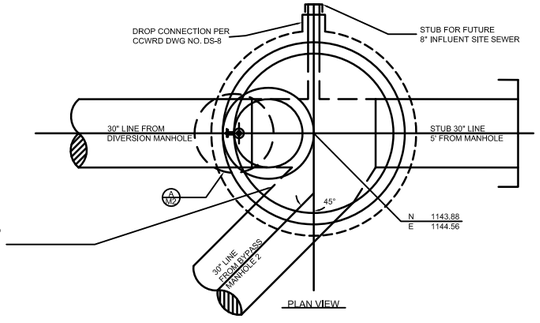


PLAN VIEW

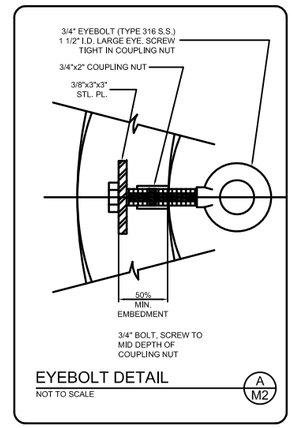
NOTES:
1. A GRIT SETTLING MANHOLE MAY BE REQUIRED AT SELECTED LIFT STATION LOCATIONS.
2. DRAWING SHOWN IS A SAMPLE. PIPE AND STRUCTURE SIZES TO BE SIZED FOR EACH UNIQUE LOCATION.



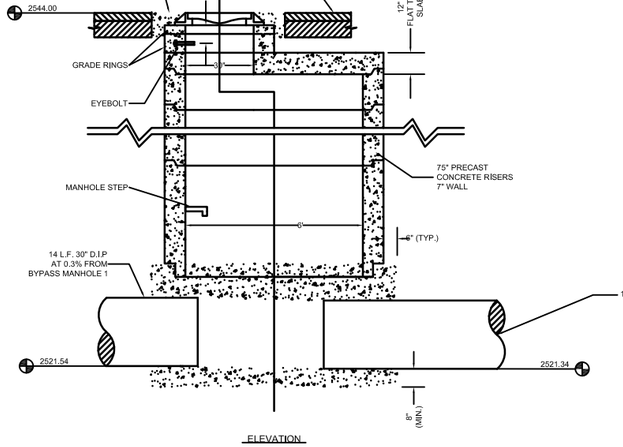
PLAN VIEW



PLAN VIEW

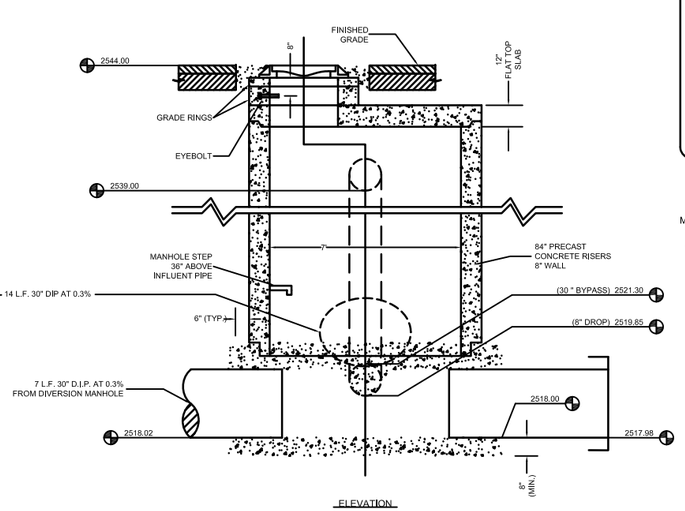


EYEBOLT DETAIL
NOT TO SCALE
A M2



ELEVATION

BYPASS MANHOLE 2
SCALE: 3/8" = 1'-0"
1 M2



ELEVATION

BYPASS MANHOLE 3
SCALE: 3/8" = 1'-0"
2 M2

MANHOLE NOTES:
1. MANHOLE TO BE T-LOCK LINED
2. BASE MAY BE PRECAST AT CONTRACTORS OPTION

GRIT SETTLING MANHOLE AND BYPASS DETAIL

SAMPLE GRIT SETTLING MANHOLE AND BYPASS
(SHEET 1 OF 2)

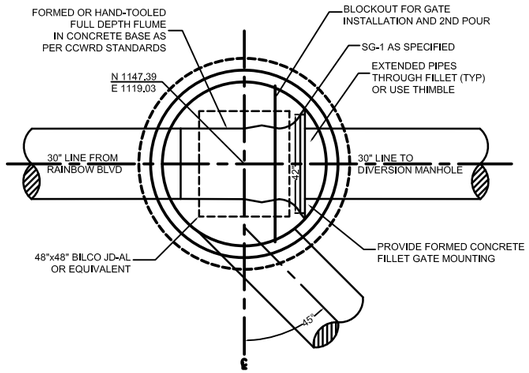
NUMBER: SP-12

ISSUED: -

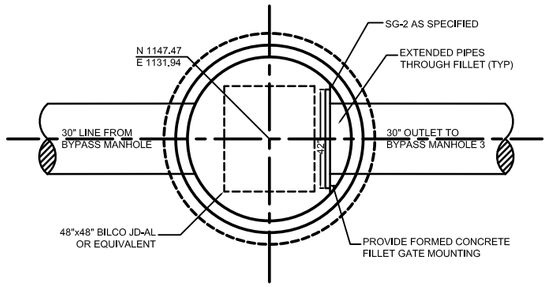
SLIDE GATE SCHEDULE

GATE	PIPE DIA. ACCOMODATED	SEATING HEAD	UNSEATING HEAD
SG-1	30" DIA.*	25-FEET	10-FEET
SG-2	30" DIA.*	25-FEET	10-FEET

*EACH GATE SIZE DETERMINED BY MANUFACTURER TO ACOMODATE THIS DIAMETER

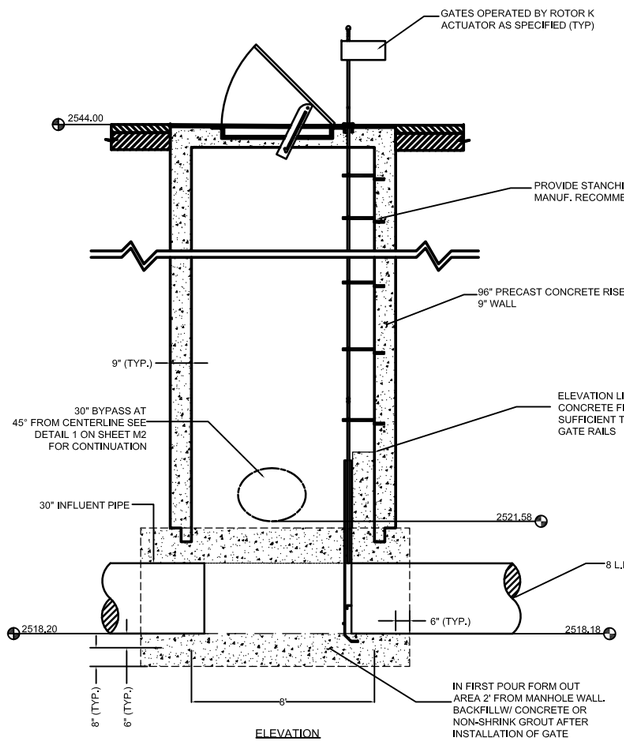


PLAN VIEW



PLAN VIEW

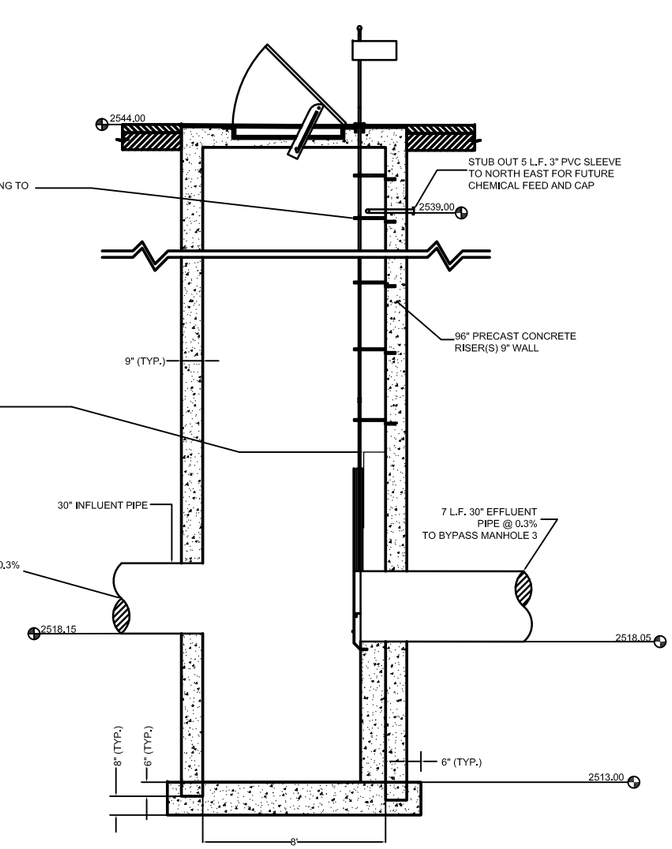
NOTES:
1. A GRIT SETTLING MANHOLE MAY BE REQUIRED AT SELECTED LIFT STATION LOCATIONS.
2. DRAWING SHOWN IS A SAMPLE. PIPE AND STRUCTURE SIZES TO BE SIZED FOR EACH UNIQUE LOCATION.



ELEVATION

NOTES:
1. MANHOLE TO BE T-LOCK LINED
2. BASE MAYBE PRECAST AT CONTRACTORS OPTION

BYPASS MANHOLE 1
SCALE: 3/8" = 1'-0"
1 M1



ELEVATION

NOTES:
1. MANHOLE TO BE T-LOCK LINED
2. BASE MAYBE PRECAST AT CONTRACTORS OPTION

GRIT SETTLING MANHOLE
SCALE: 3/8" = 1'-0"
2 M1

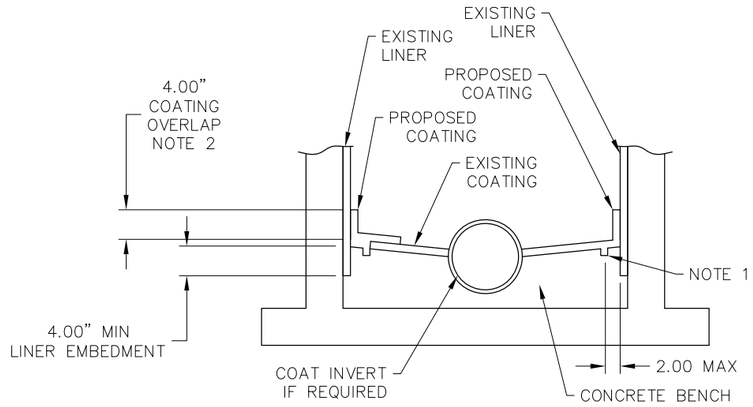
SAMPLE GRIT SETTLING MANHOLE AND BYPASS (SHEET 2 OF 2)

NUMBER: SP-13

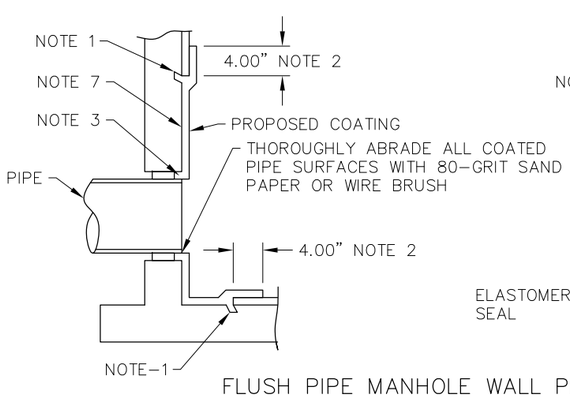
ISSUED: -

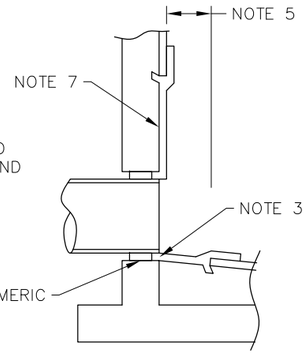
NOTE:

1. PROVIDE $\frac{1}{4}$" X $\frac{1}{4}$" ANGLED KEY WAY FOR PROPOSED COATING AT ALL TERMINATION POINTS, DETAIL 1. DO NOT DAMAGE ADJACENT LINER/COATING.
2. ABRASIVE MEDIA BLAST EXISTING COATING / LINER AND OVERLAP PROPOSED COATING, TAPE TO AVOID OVER-SPRAY. SEE DETAIL 2 FOR EXISTING PLASTIC LINER OR INCOMPATIBLE COATING REHABILITATION.
3. WHERE APPLICABLE, FILL IN JOINT BETWEEN PIPE AND MANHOLE WALL.
4. ENGINEER TO LOCATE LIMITS OF COATING / LINER REHABILITATION, PROPOSED COATING TERMINATION POINT.
5. CONTRACTOR TO DETERMINE LIMITS OF COATING APPLICATION AND RESPECTIVE TERMINATION POINTS.
6. PROTECT ELASTOMERIC SEAL AND ABRASIVE MEDIA BLAST SURFACES TO BE COATED.
7. ALL COATED SURFACES SHALL BE PREPARED TO SPECIFICATION, CLEANED THOROUGHLY AND INSPECTED PRIOR TO COATING.

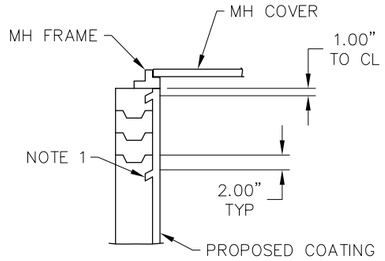


NEW/REHAB MH BENCH COATING

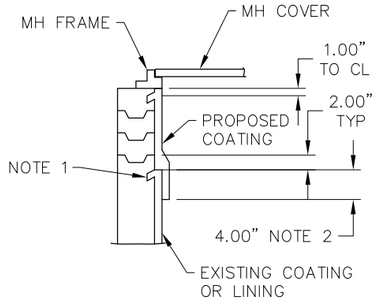




FLUSH PIPE MANHOLE WALL PENETRATION

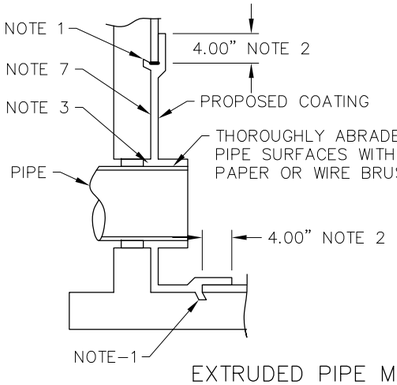


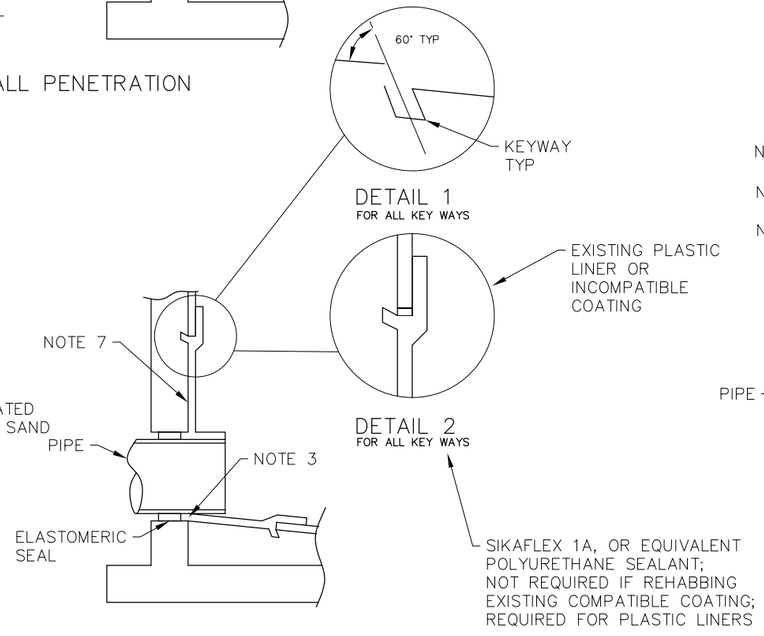
NEW MH COATING



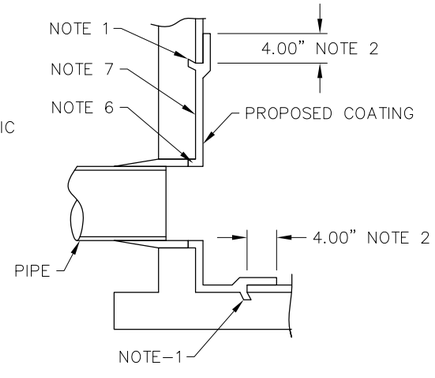
REHAB MH COATING

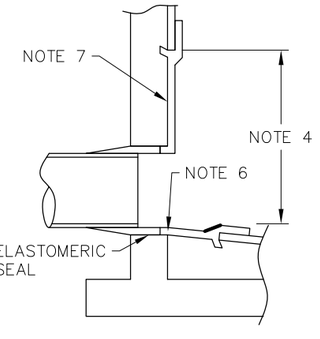
MANHOLE GRADE RING ASSEMBLIES





EXTRUDED PIPE MANHOLE WALL PENETRATION





RECESSED PIPE MANHOLE WALL PENETRATION

LINING KEYWAY DETAILS

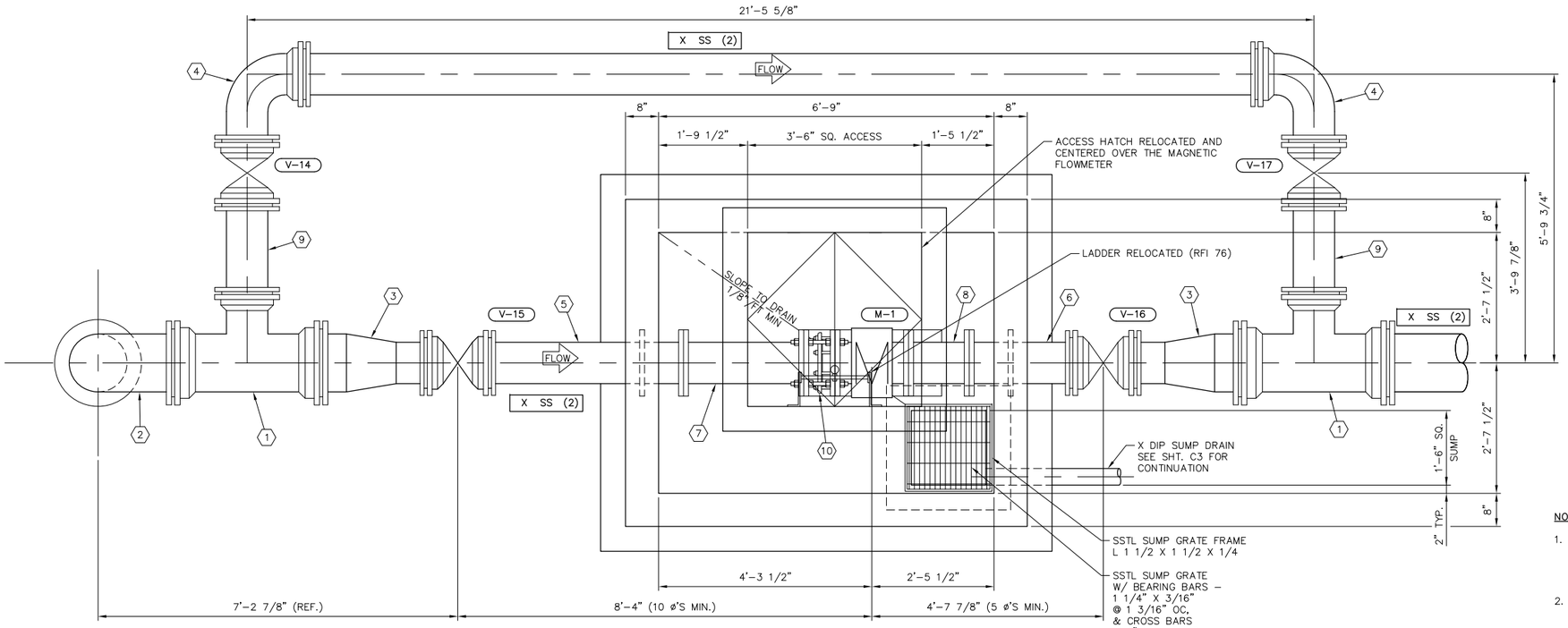
NUMBER: SP-14

ISSUED: -

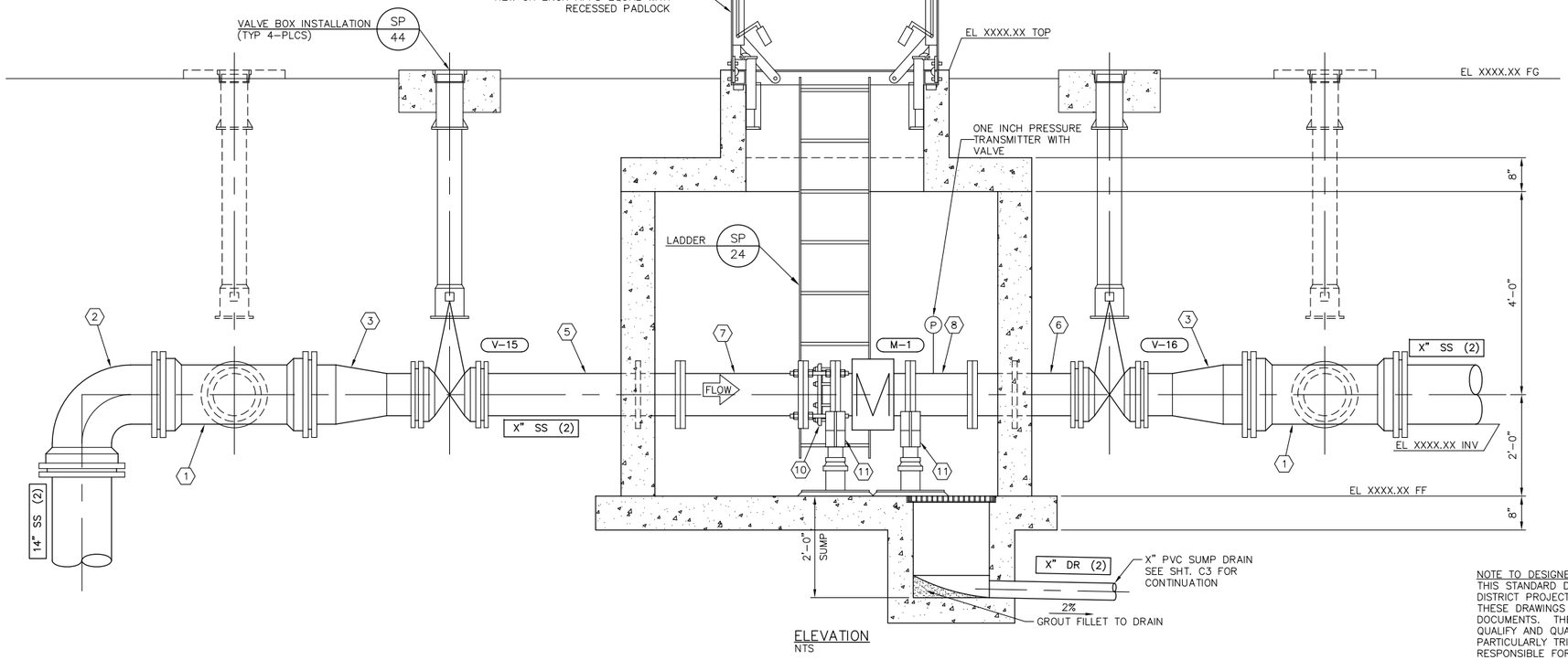
TYPICAL METER VAULT (SAMPLE DWG)

NUMBER: SP-15

ISSUED: -



PLAN
NTS



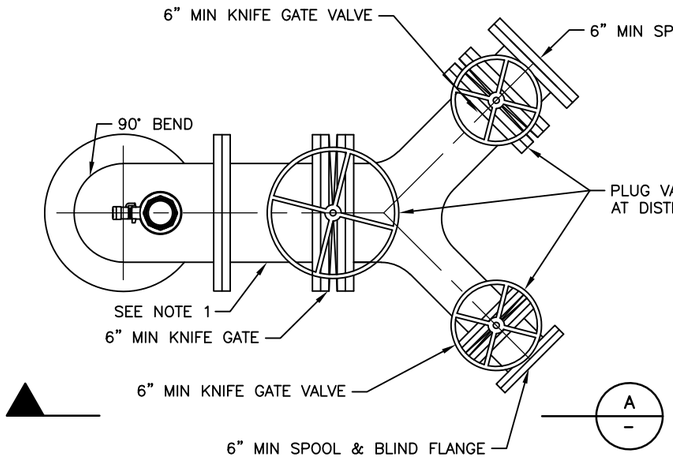
ELEVATION
NTS

NOTES:

1. VAULT FLOOR, WALL AND TOP THICKNESSES ARE BASED ON CAST-IN-PLACE CONSTRUCTION. FOR CONCRETE AND REINFORCING STEEL REQUIREMENTS, SEE UDACS DRAWING C-475.
2. ALTERNATIVELY, PRECAST CONCRETE VAULT SECTIONS ("JENSEN PRECAST" OR ENGINEER APPROVED EQUAL) MAY BE USED.
3. RESTRAIN ALL PVC PIPE JOINTS.
4. FLOWMETER DISPLAY SHALL NOT BE LOCATED INSIDE THE ELECTRICAL ROOM

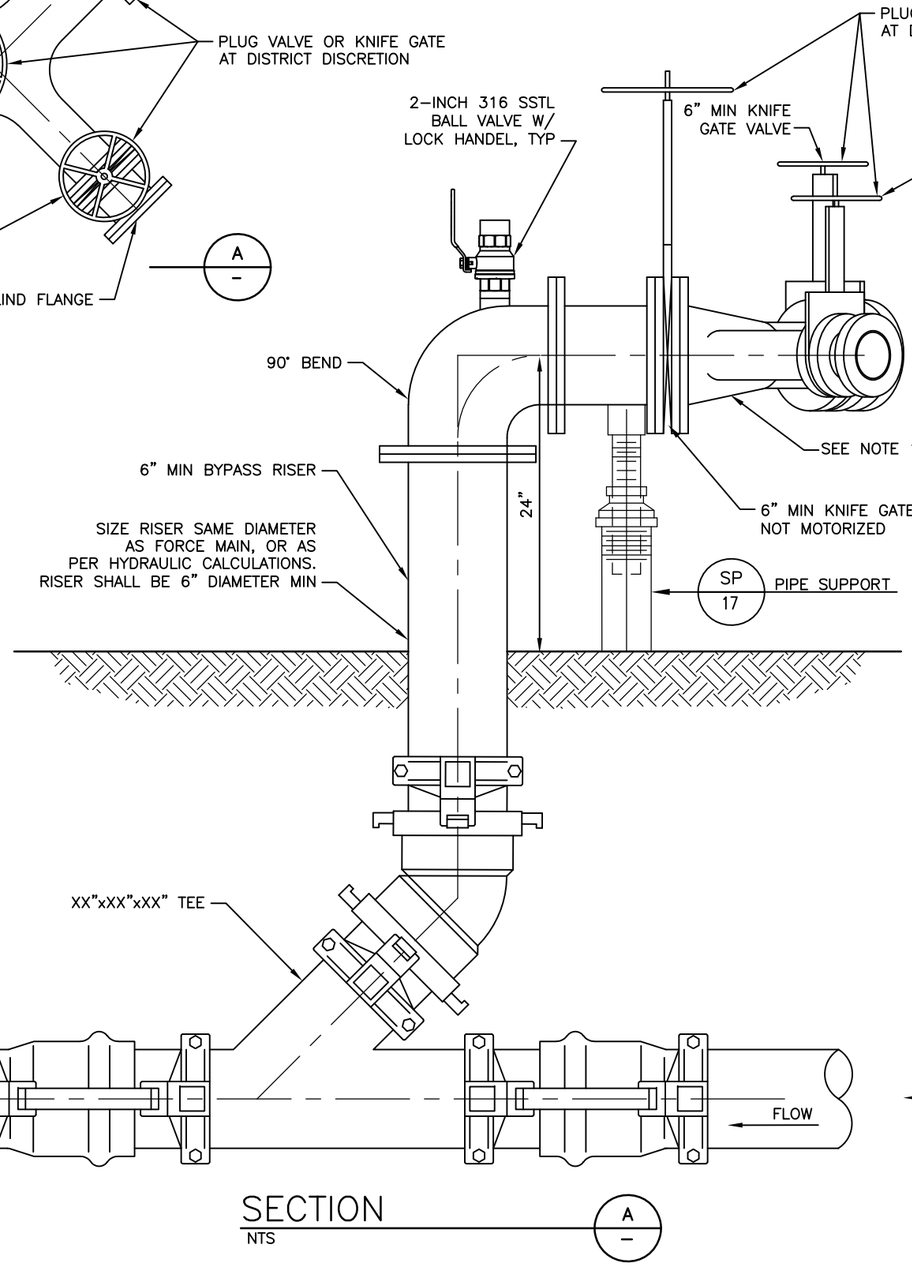
PIPING SCHEDULE	
MARK	DESCRIPTION
1	X" X X" X X" PVC TEE, MJ
2	X", 90° PVC BEND, MJ X PE
3	X" X X" PVC REDUCER, MJ X MJ (RFI 52)
4	X", 90° PVC BEND, MJ X PE
5	X" PVC WALL PIPE X 4'-1 5/8", FL X PE
6	X" PVC WALL PIPE X 2'-3 1/2", FL X PE
7	X" PVC SPOOL X 2'-5"*, FL
8	X PVC SPOOL X 1'-2 5/8"*, FL
9	X" PVC SPOOL X 2'-3", PE
10	X" DISMANTLING JOINT
X/XX	11 ADJUSTABLE PIPE SUPPORT

NOTE TO DESIGNER:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.



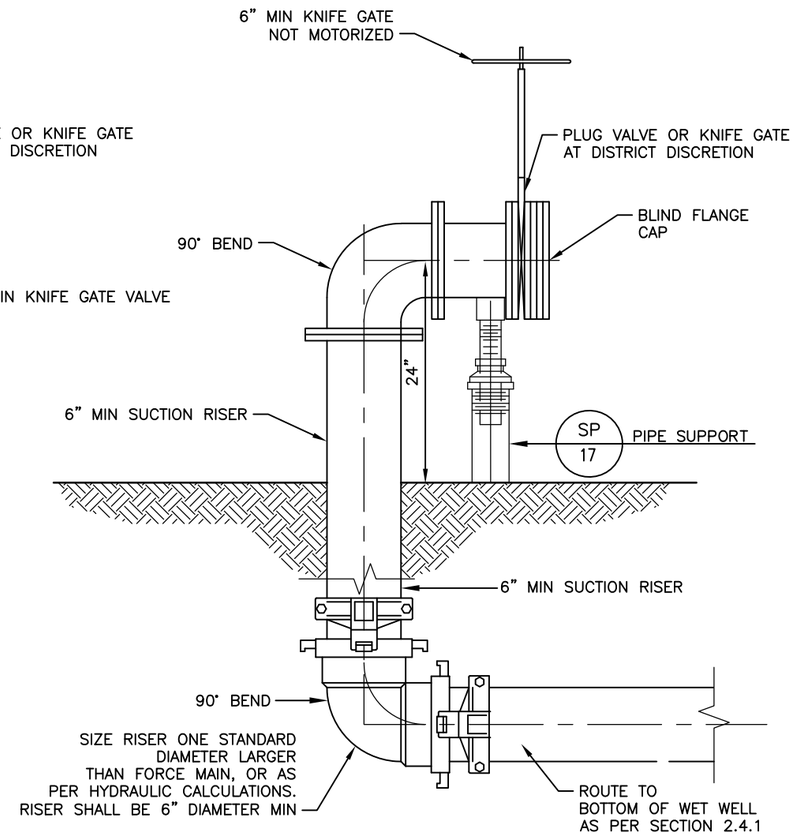
PLAN
NTS

NOTE:
1. FORCE MAINS 10" AND LARGER MAY REQUIRE MORE THAN 1 VALVED QUICK CONNECT POINT (EXAMPLE SHOWN). COORDINATE WITH DISTRICT REPRESENTATIVE ON VALVED CONNECTION PROVISIONS FOR CONNECTION OF DISTRICT MOBILE PUMPING UNITS



SECTION
NTS

PORTABLE PUMP BYPASS RISER



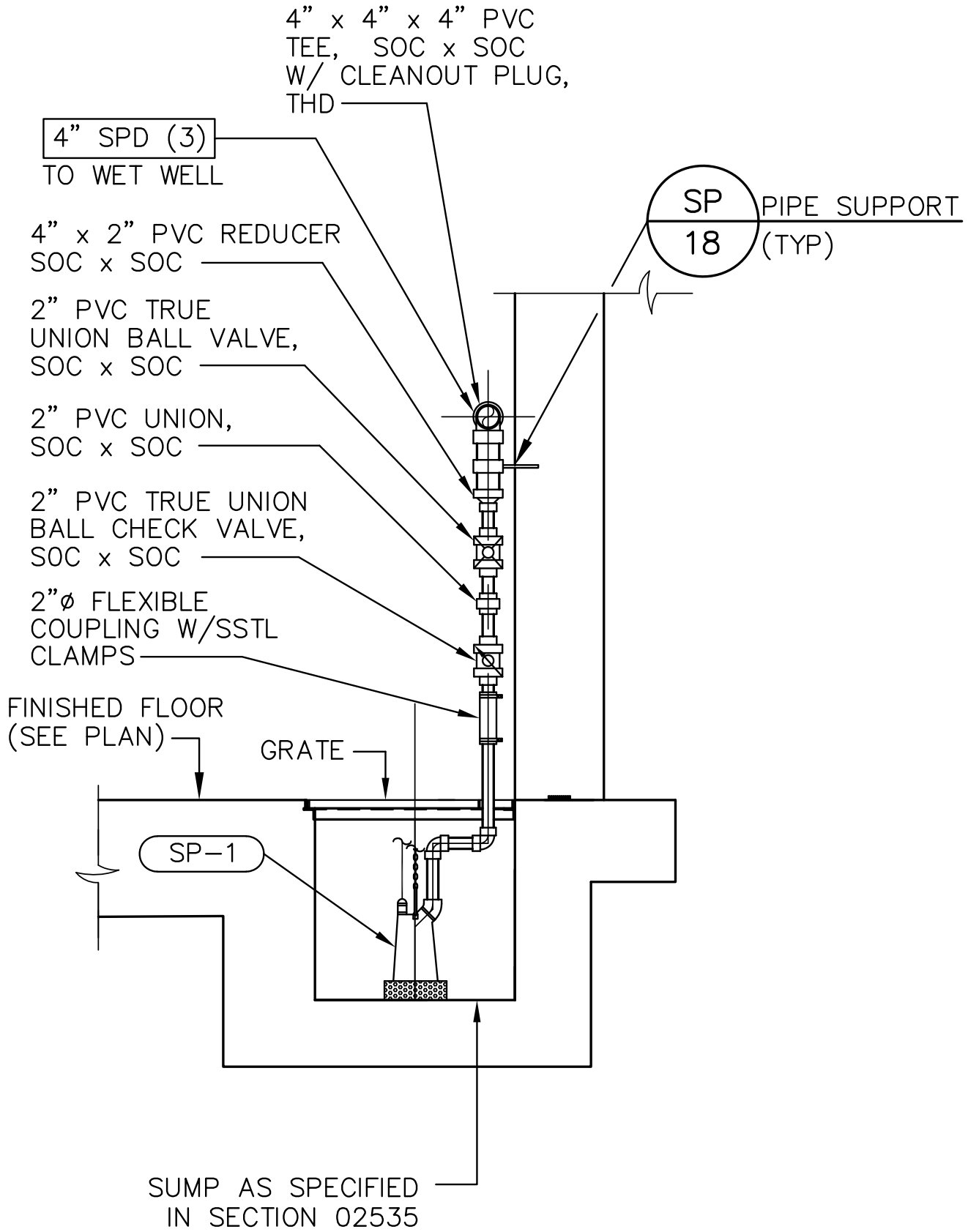
PORTABLE PUMP SUCTION RISER
NTS

GENERAL NOTE:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.

LIFT STATION BYPASS

NUMBER: SP-16

ISSUED: -

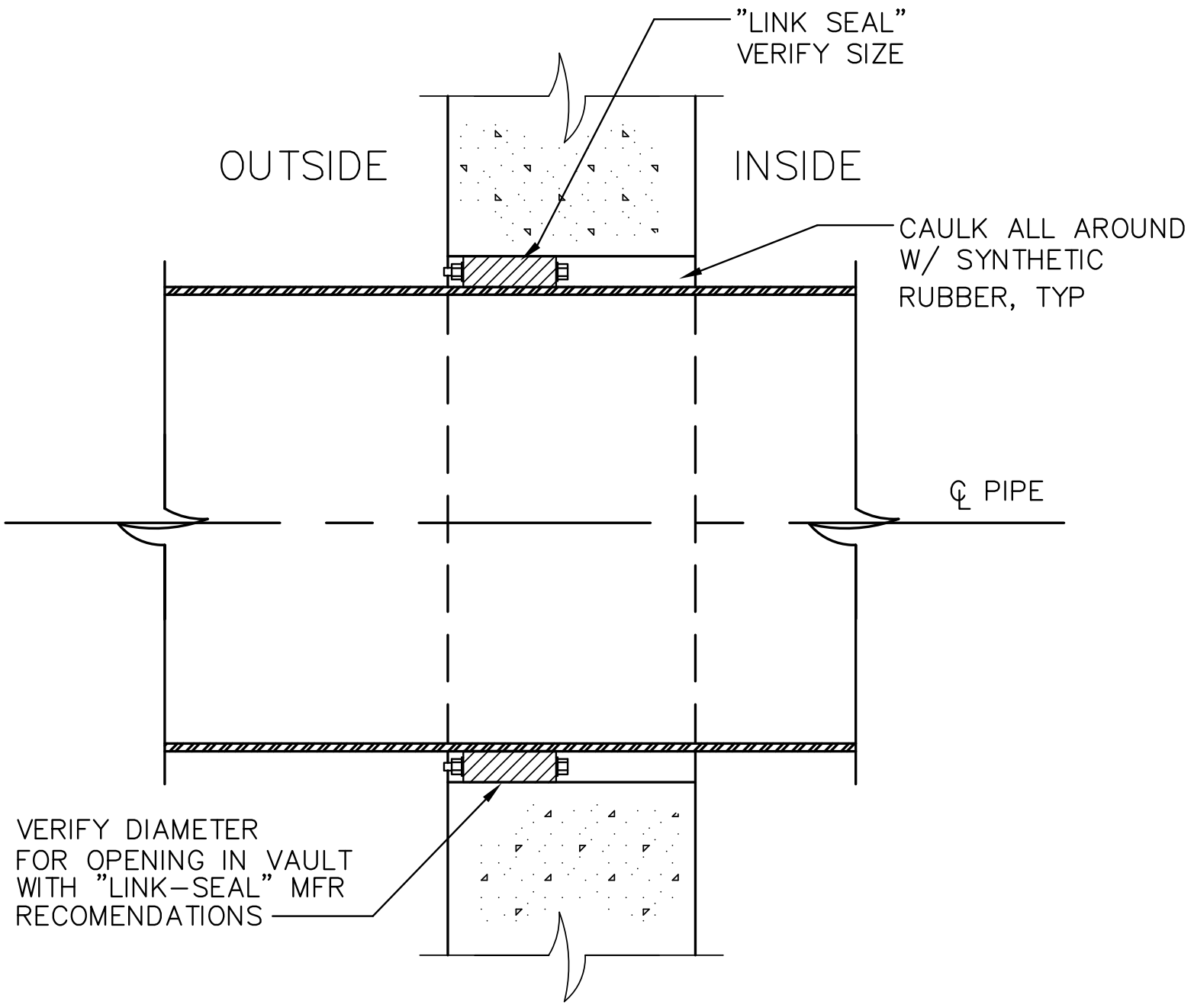


SECTION

NTS

SUMP PUMP PIPING

ISSUED: -	NUMBER: SP-17

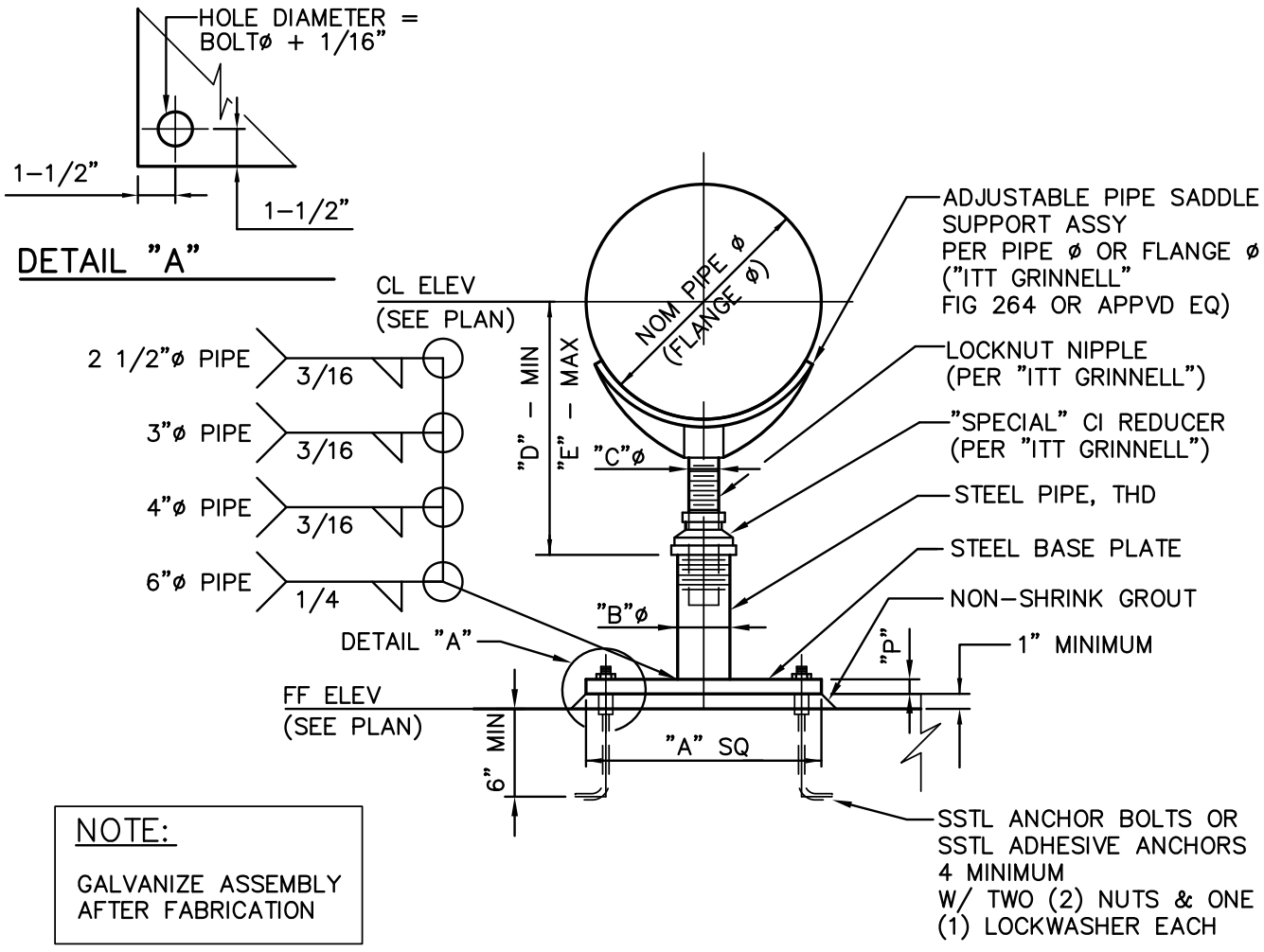


SECTION

NTS

PIPE PENETRATION WALL DETAIL

ISSUED: -	NUMBER: SP-18



NOTE:

GALVANIZE ASSEMBLY
AFTER FABRICATION

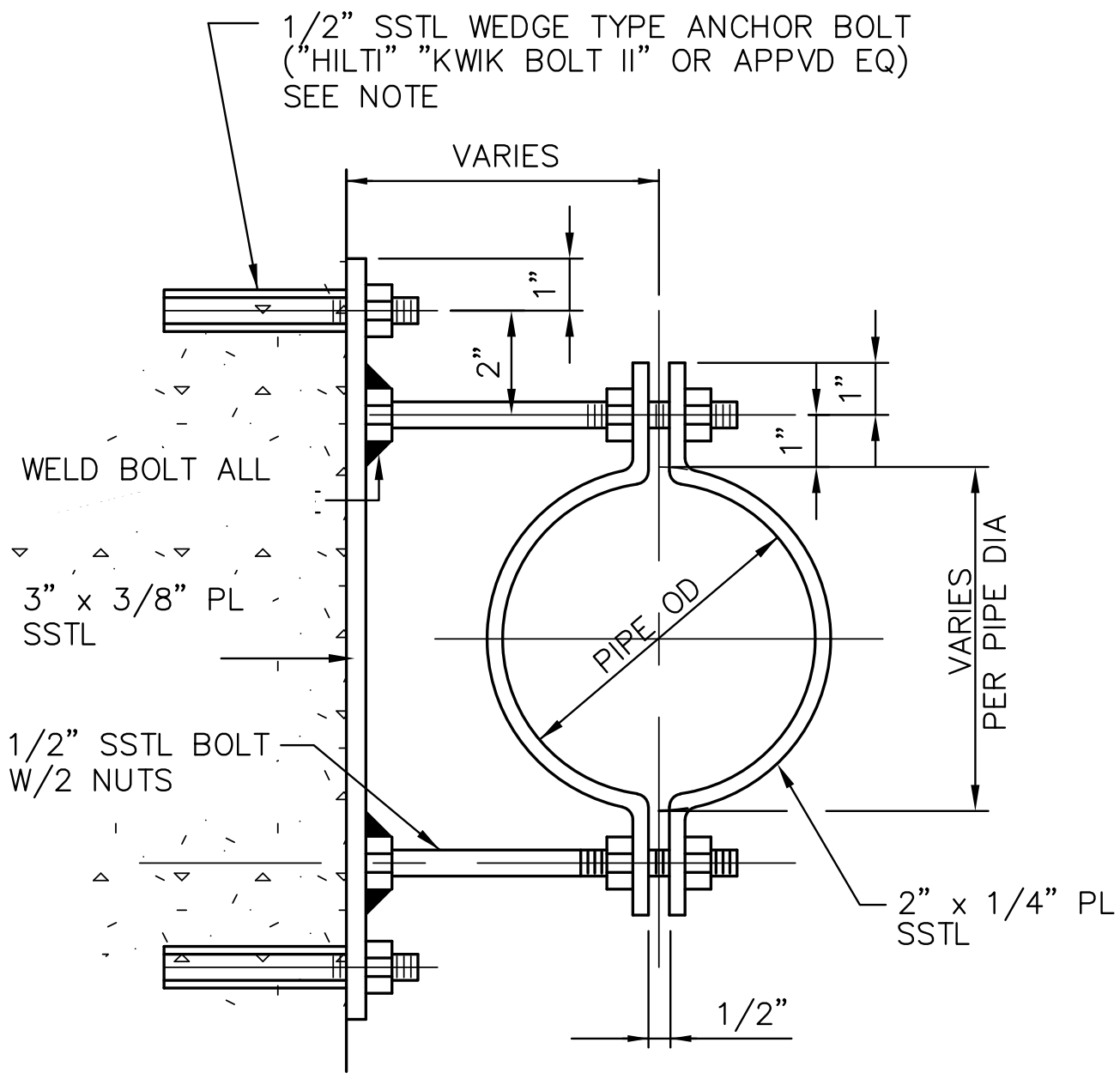
PIPE SUPPORT TABLE – "A" TYPE (ADJUSTABLE SADDLE)

NOMINAL PIPE SIZE	PIPE FLANGE SIZE	SUPPORTING PIPE OR FLANGE							
		A	B	C (PER MFR)	D	E	P	BOLT SIZE	BOLT NO
2–1/2"	N/A	9"	2–1/2"	1–1/2"	8"	13"	1/4"	5/8"	4
3"	N/A	9"	2–1/2"	1–1/2"	8–1/4"	13–1/4"	1/4"	5/8"	4
3–1/2"	N/A	9"	2–1/2"	1–1/2"	8–1/2"	13–1/2"	1/4"	5/8"	4
4"	N/A	9"	3"	2–1/2"	9–1/4"	14"	1/4"	5/8"	4
5"	(SEE NEXT)	9"	3"	2–1/2"	10"	14–3/4"	1/4"	5/8"	4
5"	10"	10"	3"	2–1/2"	13–1/2"	18–1/4"	1/4"	5/8"	4
6"	N/A	9"	3"	2–1/2"	10–1/2"	15–1/4"	1/4"	5/8"	4
8"	(SEE NEXT)	9"	3"	2–1/2"	11–3/4"	16–1/2"	1/4"	5/8"	4
8"	13 1/2"	14"	4"	3"	16–1/4"	20–3/4"	3/8"	3/4"	4
10"	(SEE NEXT)	10"	3"	2–1/2"	13–1/2"	18–1/4"	1/4"	5/8"	4
10"	16"	16"	4"	3"	17–3/4"	22–1/4"	3/8"	3/4"	4
12"	N/A	12"	3"	2–1/2"	15"	19–3/4"	3/8"	5/8"	4
14"	N/A	14"	4"	3"	16–1/4"	20–3/4"	3/8"	3/4"	4
16"	(SEE NEXT)	16"	4"	3"	17–3/4"	22–1/4"	3/8"	3/4"	4
16"	23 1/2"	24"	6"	4"	23–3/4"	28–1/4"	1/2"	3/4"	4
18"	N/A	18"	6"	3–1/2"	19–1/2"	24"	3/8"	3/4"	4
20"	N/A	20"	6"	3–1/2"	21"	25–1/2"	1/2"	3/4"	4
24"	(SEE NEXT)	24"	6"	4"	23–3/4"	28–1/4"	1/2"	3/4"	4
24"	32"	32"	6"	4"	28–1/4"	32–3/4"	1/2"	3/4"	4
30"	N/A	30"	6"	4"	27"	31–1/2"	1/2"	3/4"	4
32"	N/A	32"	6"	4"	28–1/4"	32–3/4"	1/2"	3/4"	4
36"	N/A	36"	6"	4"	30–1/4"	34–3/4"	1/2"	3/4"	4

PIPE SUPPORT - ADJUSTABLE FLOOR SUPPORT

ISSUED: -

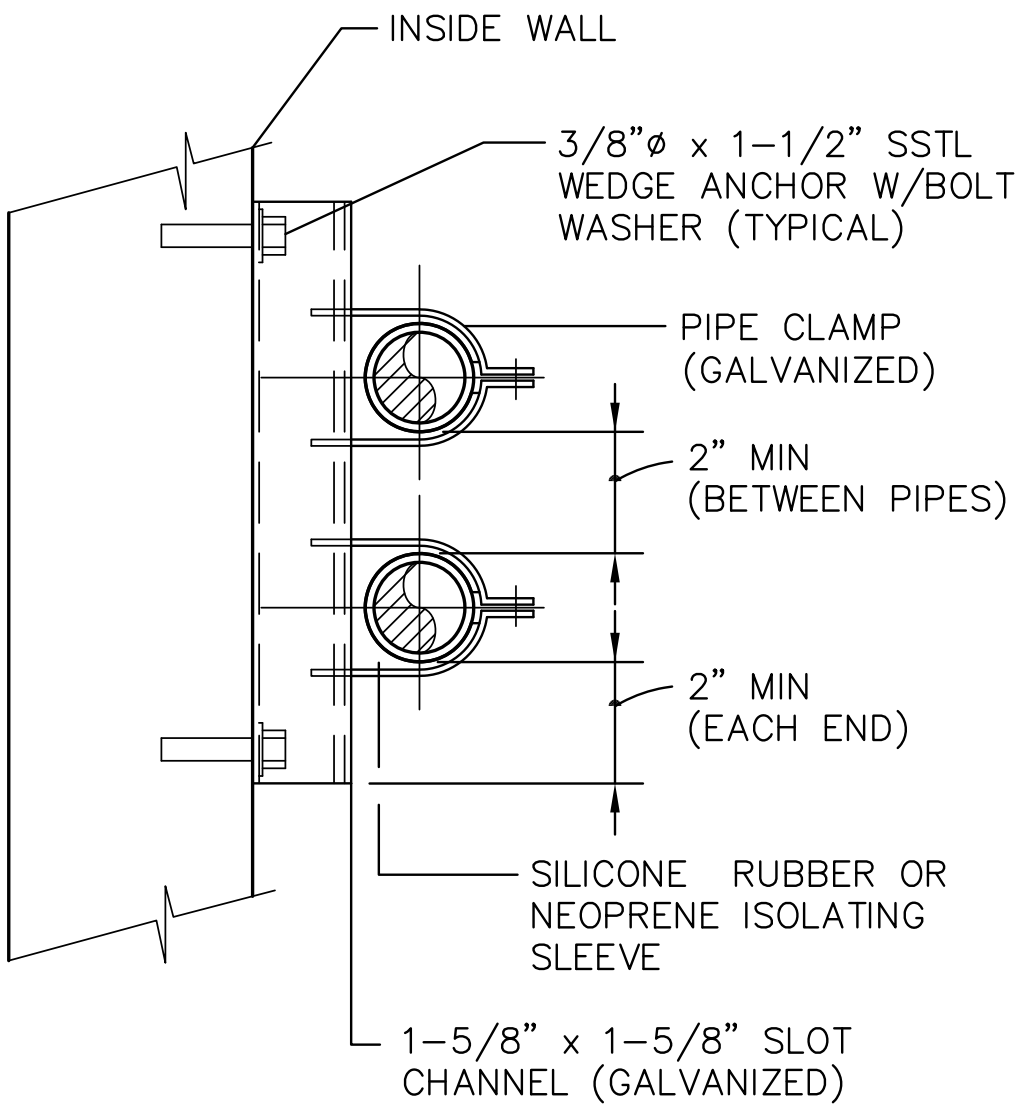
NUMBER: SP-19



NOTE:
ALL ANCHORS SHALL BE APPROVED BY NV PE FOR SEISMIC APPLICATION

PIPE SUPPORT - WALL MOUNTING PIPING

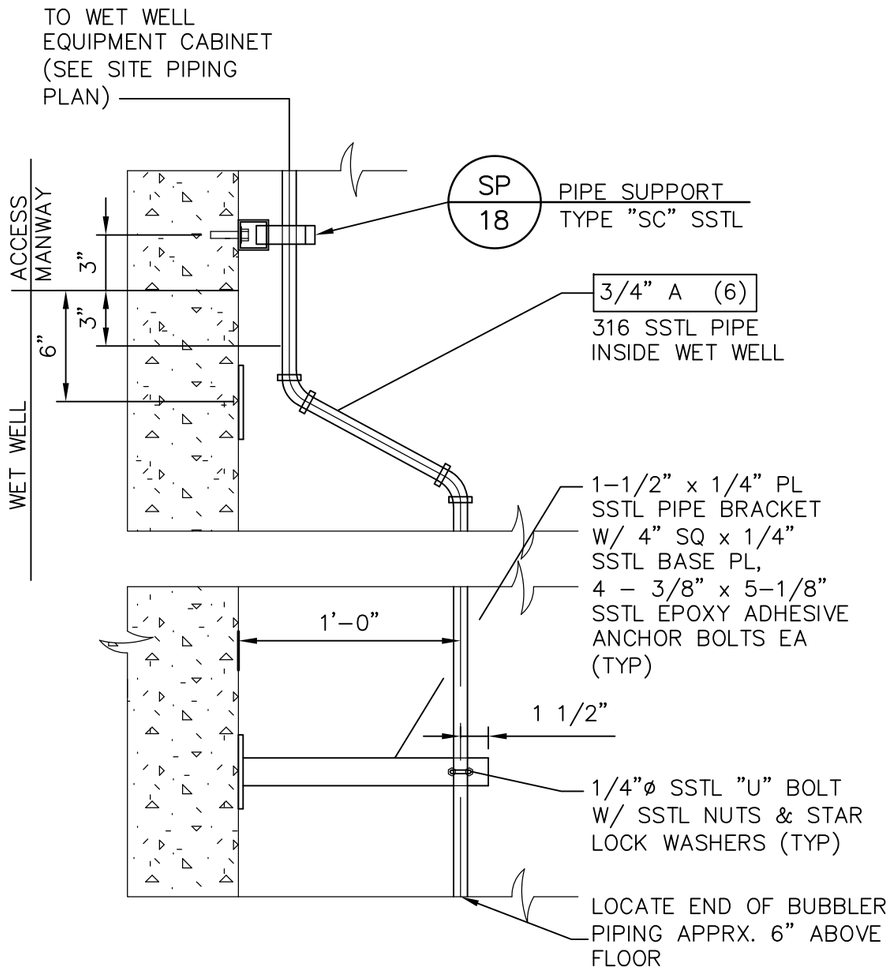
ISSUED: -	NUMBER: SP-20



NOTE:
ALL MATERIALS IN CORROSIVE AREAS TO BE STAINLESS STEEL 316.

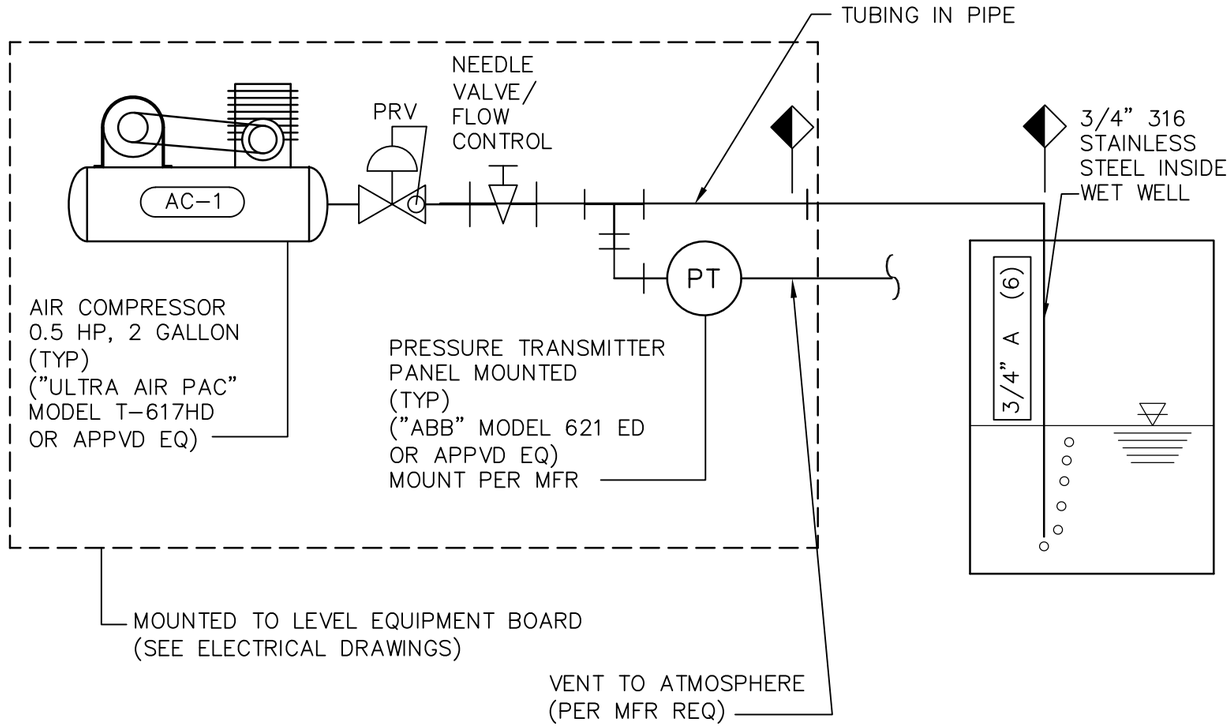
PIPE SUPPORT - WALL MOUNT CONDUIT

ISSUED: -	NUMBER: SP-21



WET WELL BUBBLER CONTROL AIR PIPING DETAIL

NTS



AIR BUBBLER PIPING DIAGRAM

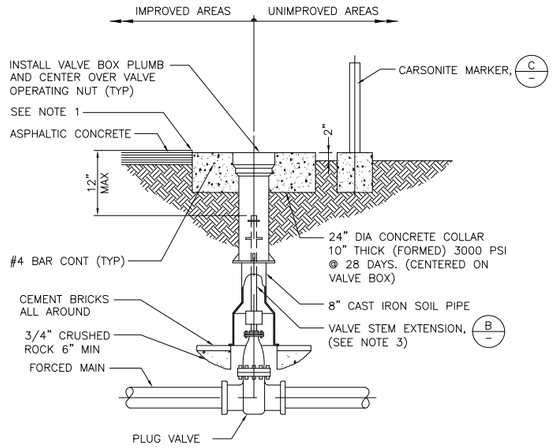
NTS

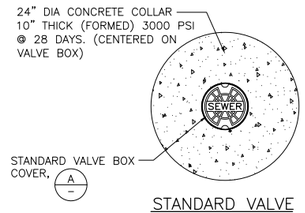
EXPOSED CONDUIT SHALL BE PVC COATED GRS
UNDERGROUND CONDUIT SHALL BE PVC
CONDUIT IN WETWELL SHALL BE STAINLESS STEEL
PIPING USED FOR THE BUBBLER SYSTEM TO HOLD TUBING SHALL BE SIMILAR TO CONDUIT

WET WELL BUBBLER MOUNTING AND PIPING DIAGRAM

NUMBER: SP-22

ISSUED: -





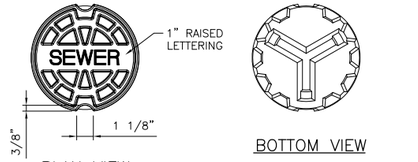
STANDARD VALVE

DESIGNER NOTE:
USE ONLY THE VALVE BOX DETAILS PER PROJECT REQUIREMENTS. UNUSED PORTIONS OF THE DETAIL ARE TO BE REMOVED.

NOTES:

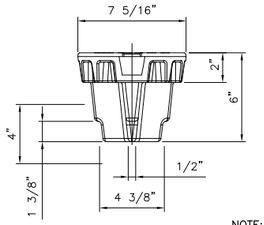
1. FINAL RIM ELEVATION TO BE 1/8" TO 1/4" BELOW FINAL STREET GRADE.
2. MORE STRINGENT INSTALLATION REQUIREMENTS MAY BE IMPOSED BY THE ENTITY HAVING THE JURISDICTION OVER THE VALVE BOX INSTALLATION LOCATION.
3. A VALVE STEM EXTENSION SHALL BE PROVIDED WHERE THE DEPTH TO THE OPERATING NUT EXCEEDS TWO (2) FEET.
4. CONTRACTOR TO FORM CONCRETE COLLAR IN UNIMPROVED AREAS WITH SONOTUBE AND REMOVE PRIOR TO BACKFILL INSTALLATION (TYP).
5. SEE SPECIFICATIONS FOR ALL APPROVED PRODUCTS.
6. FOR LUBRICATED PLUG VALVE, EXTEND LUBRICATION LINE TO GRADE PER MANUFACTURER'S INSTRUCTIONS.

VALVE BOX INSTALLATION SP -
NTS



PLAN VIEW

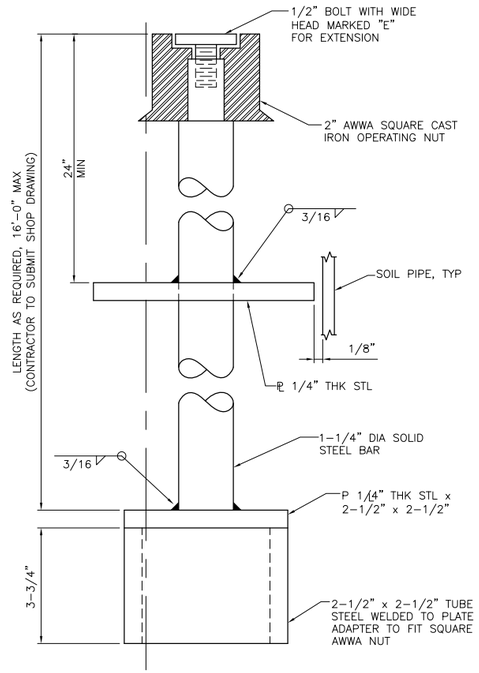
BOTTOM VIEW



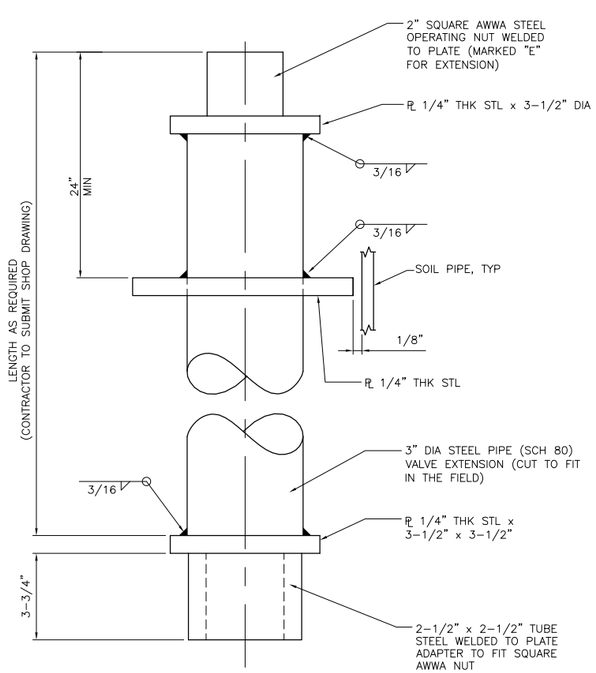
SIDE VIEW

NOTE:
H20 TRAFFIC RATED COVER AND FRAME

STANDARD VALVE BOX COVER A -
NTS

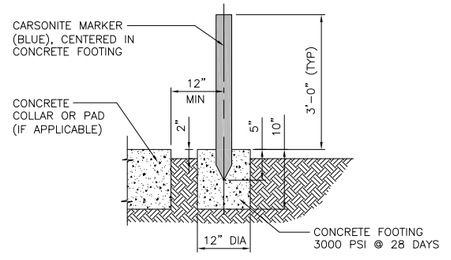


STEM EXTENSIONS 16' AND LESS



STEM EXTENSIONS GREATER THAN 16'

VALVE STEM EXTENSION B -
NTS



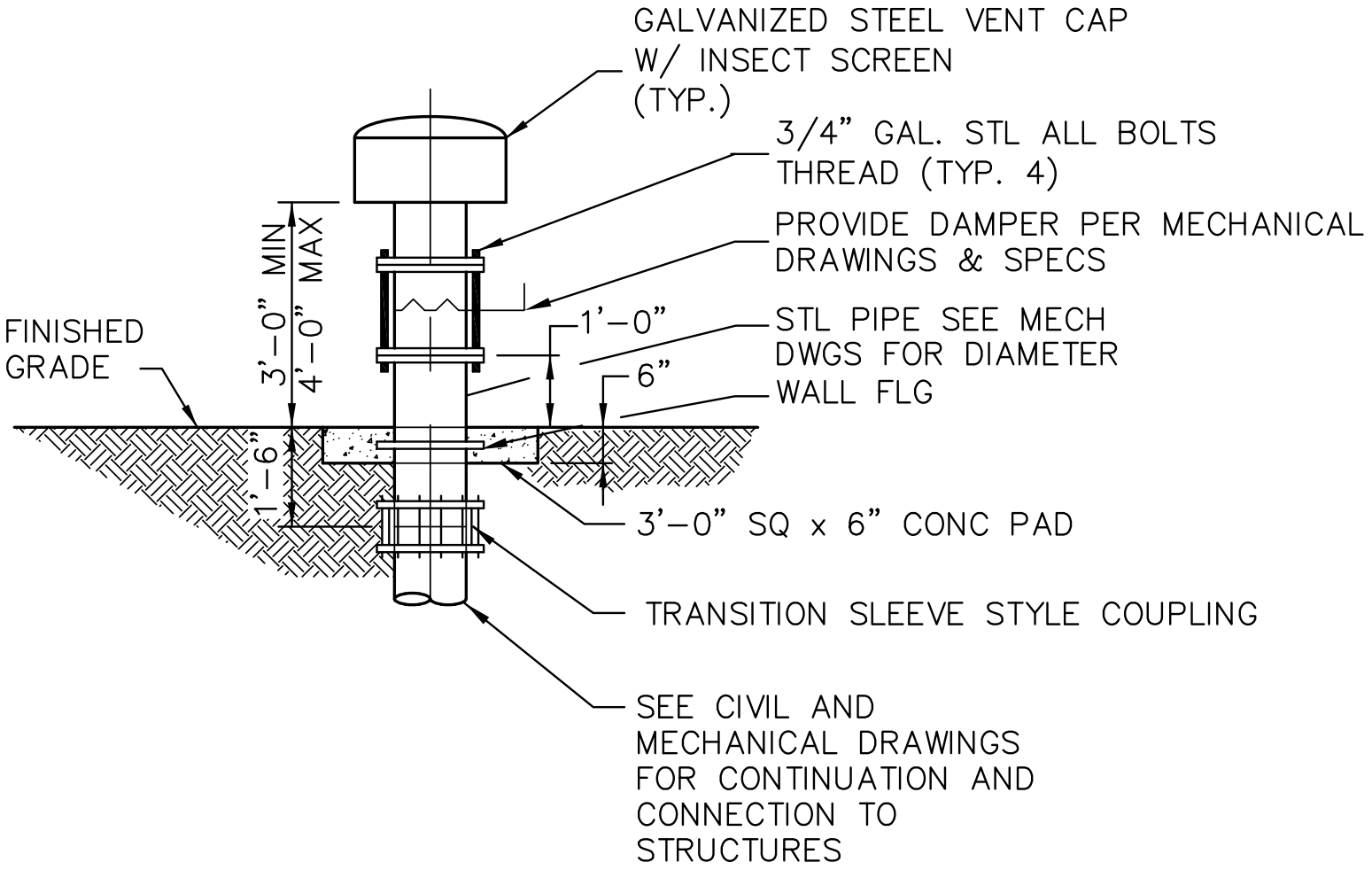
NOTE:
SEE SPECIFICATIONS FOR ALL APPROVED PRODUCTS.

CARSONITE MARKER INSTALLATION C -
NTS

VALVE BOX INSTALLATION

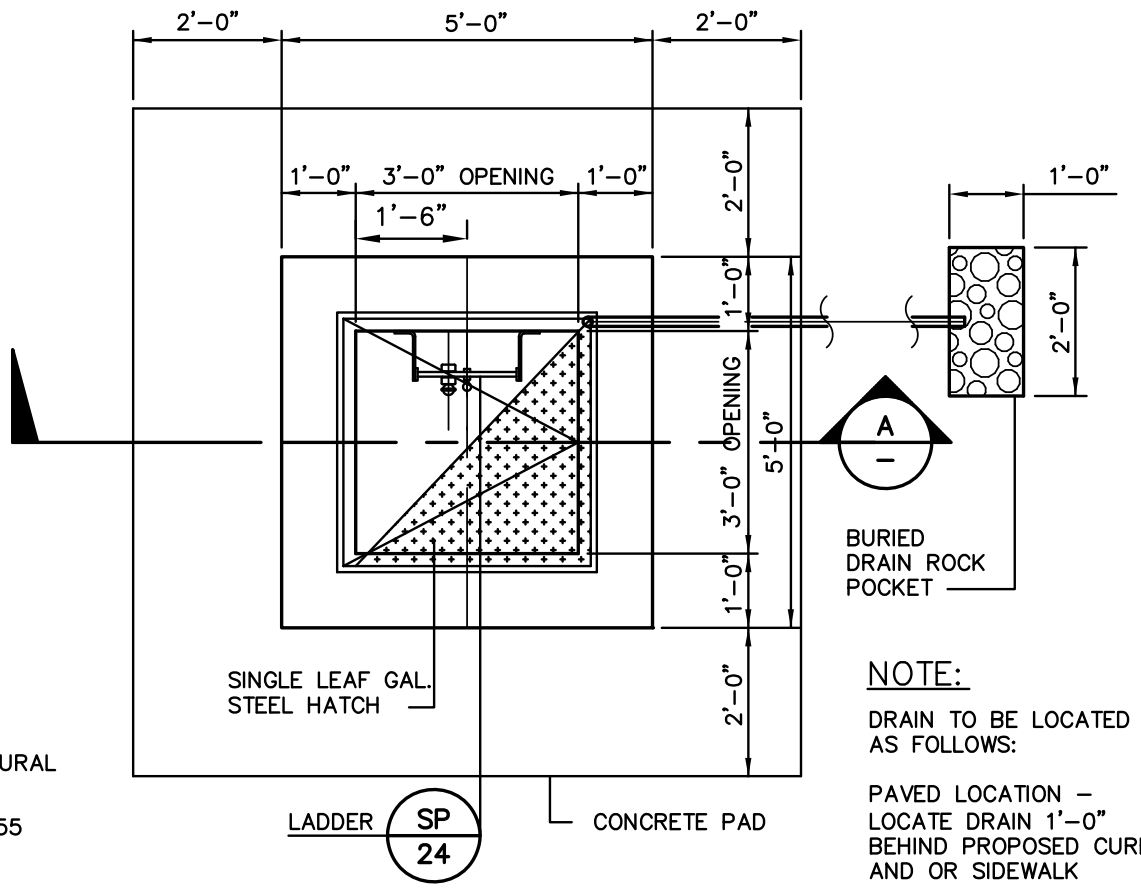
NUMBER: SP-23

ISSUED: -



VENTILATION PIPING CAP DETAIL

ISSUED: -	NUMBER: SP-24



PLAN
NTS

NOTES:

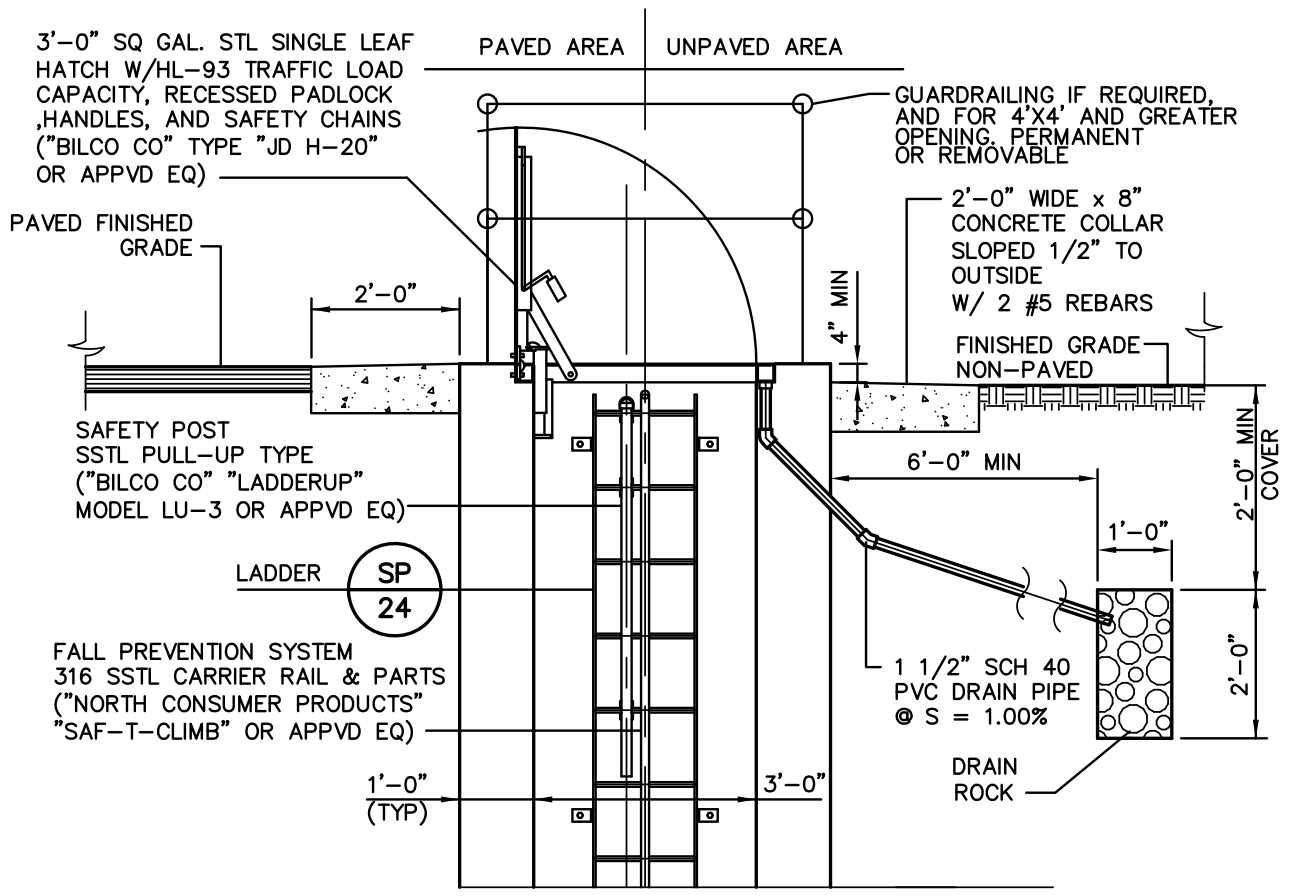
1. LADDER & HATCH HINGE ORIENTATION (SEE STRUCTURAL PLANS)
2. HARDWARE SHALL BE 31655

NOTE:

DRAIN TO BE LOCATED AS FOLLOWS:

PAVED LOCATION – LOCATE DRAIN 1'–0" BEHIND PROPOSED CURB AND OR SIDEWALK

UNPAVED LOCATION – 6'–0" FROM VAULT ACCESS WALL OR VAULT WALL

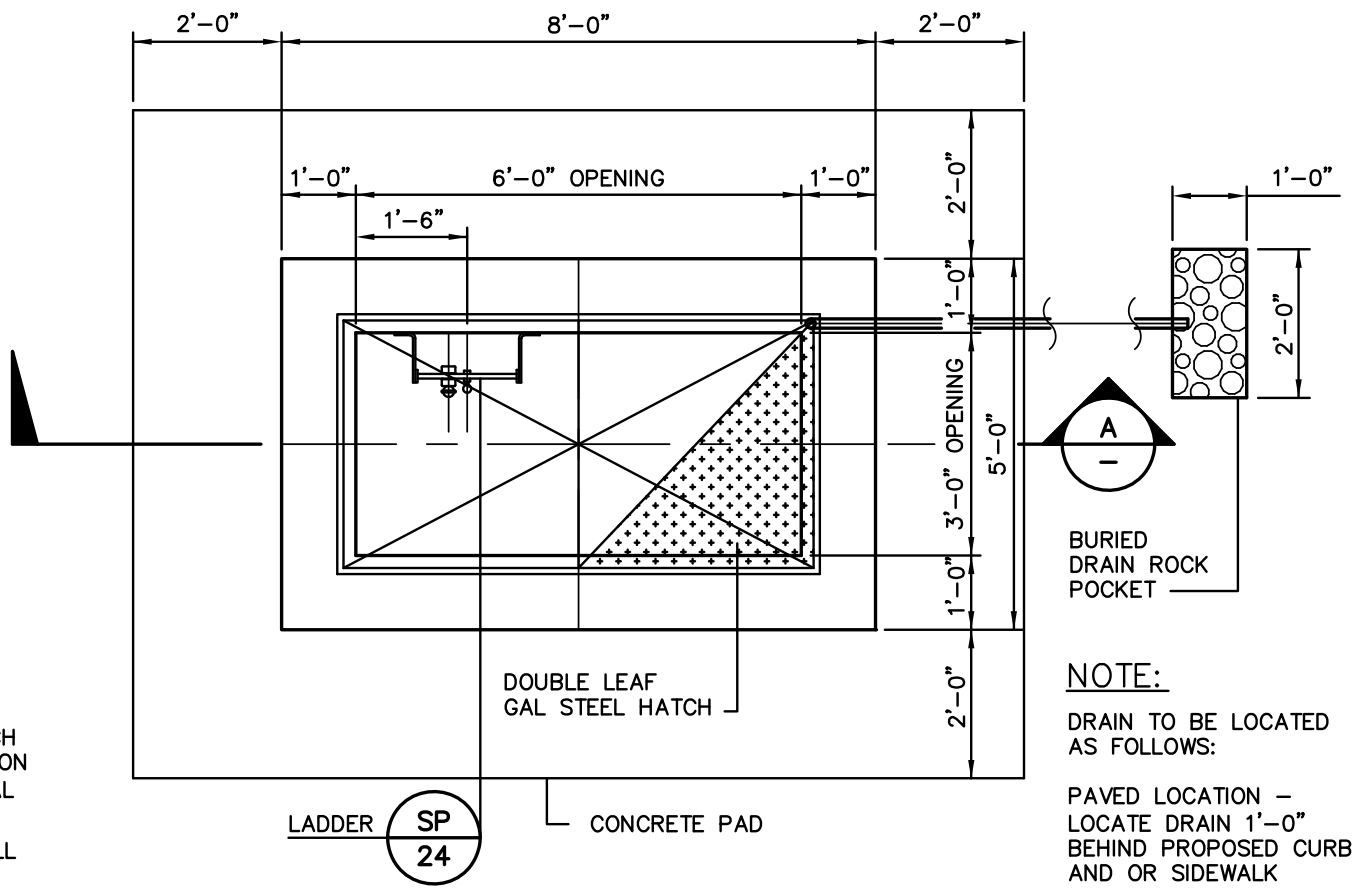


SECTION A
NTS

A
–

VAULT ACCESS - SINGLE LEAF

ISSUED: -	NUMBER: SP-25



NOTES:

1. LADDER & HATCH HINGE ORIENTATION (SEE STRUCTURAL PLANS)
1. HARDWARE SHALL BE 31655

NOTE:

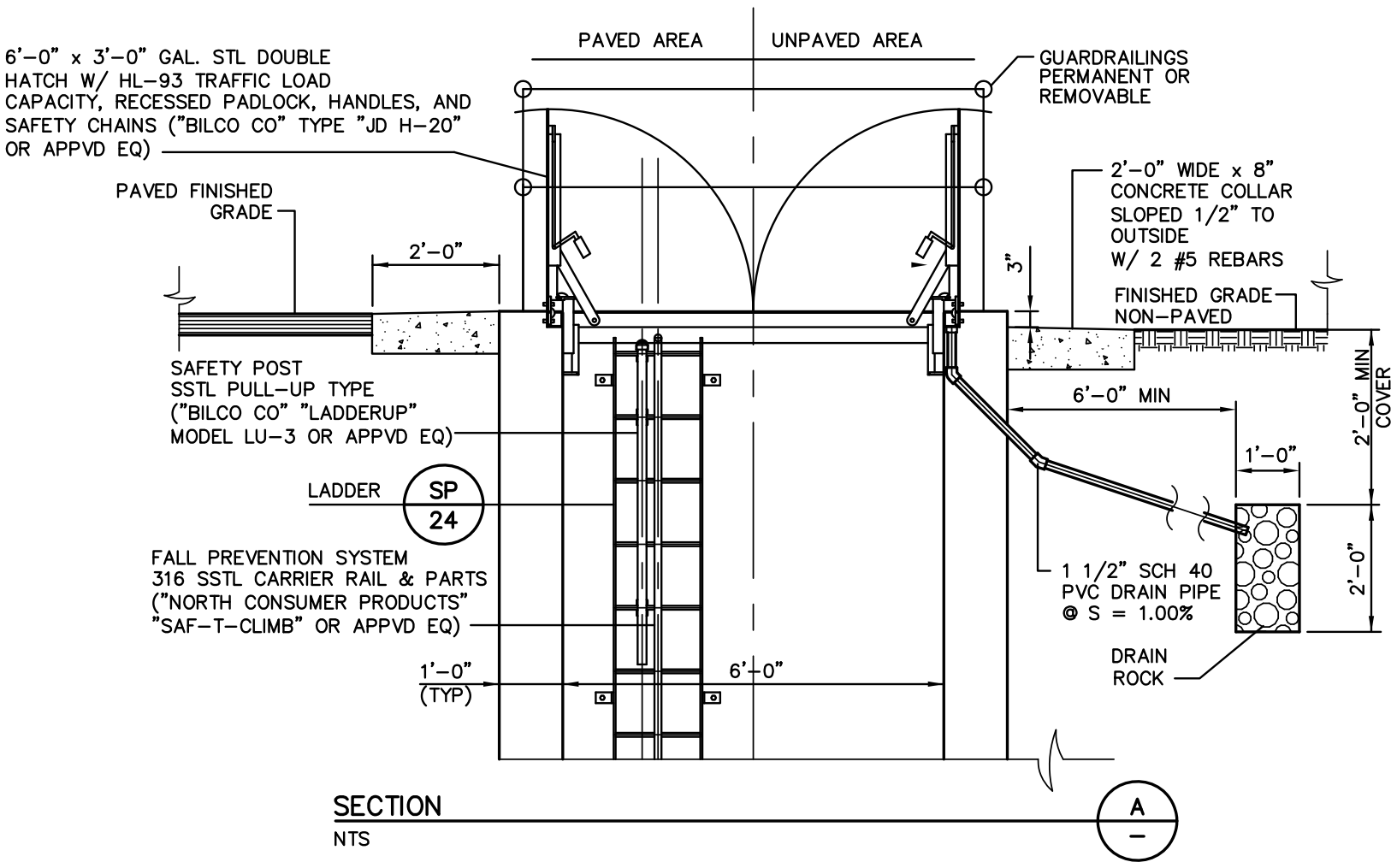
DRAIN TO BE LOCATED AS FOLLOWS:

PAVED LOCATION – LOCATE DRAIN 1'–0" BEHIND PROPOSED CURB AND OR SIDEWALK

UNPAVED LOCATION – 6'–0" FROM VAULT ACCESS WALL OR VAULT WALL

PLAN

NTS



SECTION

NTS

VAULT ACCESS - DOUBLE LEAF

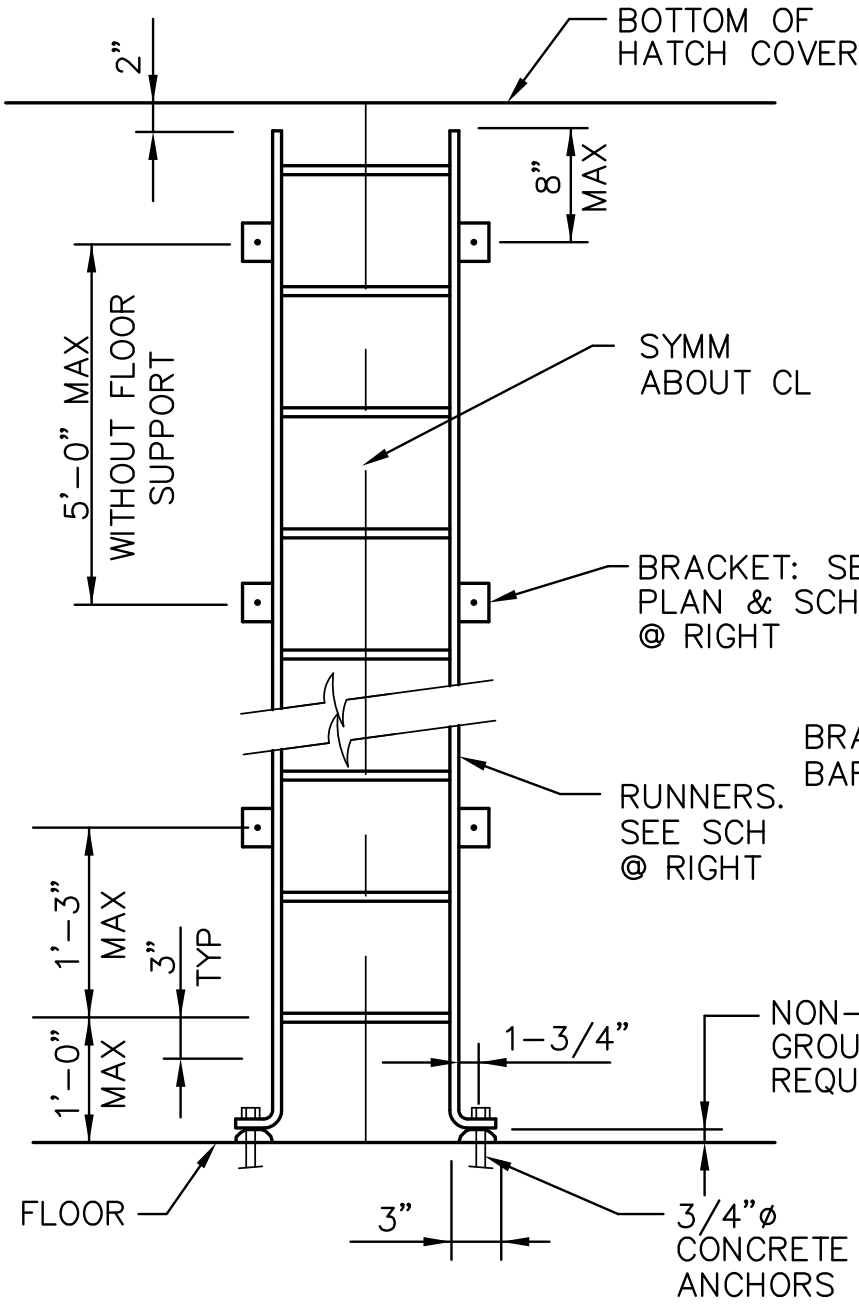
ISSUED: -

NUMBER: SP-26

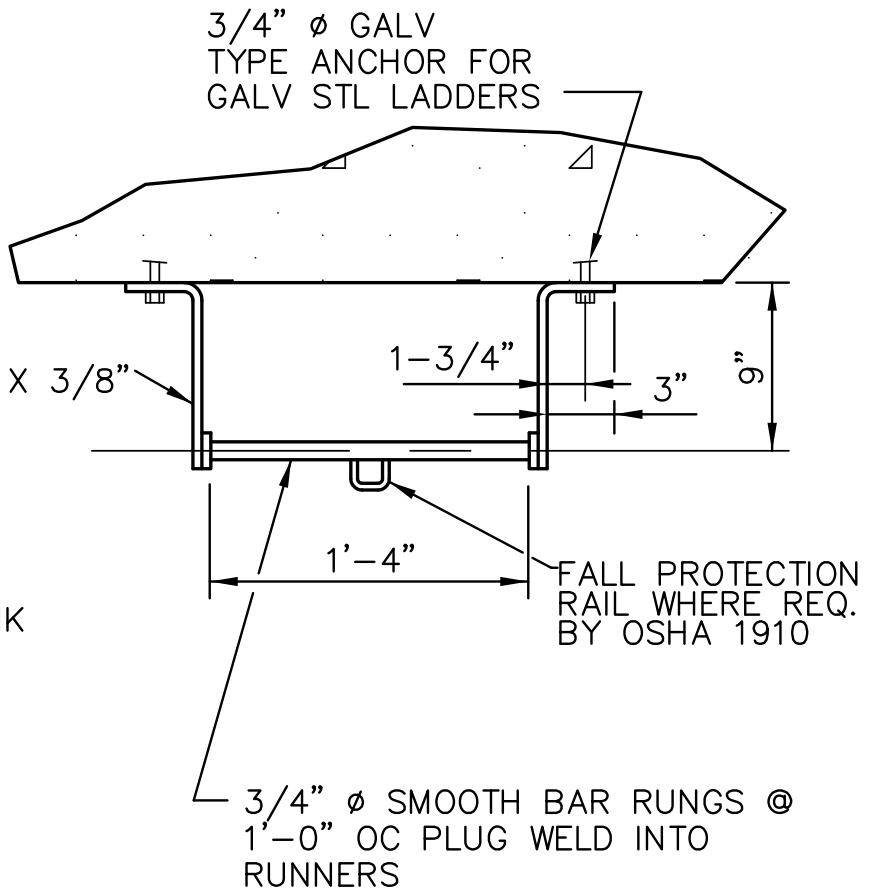
NOTES:

1. LADDER LOCATIONS AS SHOWN ON DRAWINGS.
2. LADDERS SHALL BE 316 STAINLESS STEEL
3. HARDWARE SHALL BE 316 SS.

LADDER & BRACKET SCHEDULE	
BRACKET SPACING W/FLR SUPPORT	LADDER RUNNER SIZE
5'–0" O.C. MAX.	2" X 3/8"
5'–0" TO 10'–0"	3" X 3/8"
10'–0" TO 20'–0"	3" X 1/2"
OVER 20'–0"	4" X 1/2"



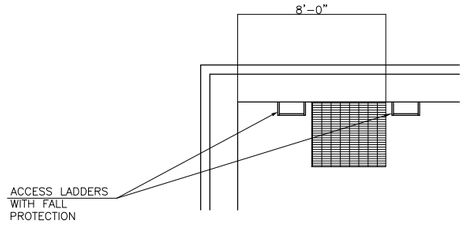
ELEVATION
NTS



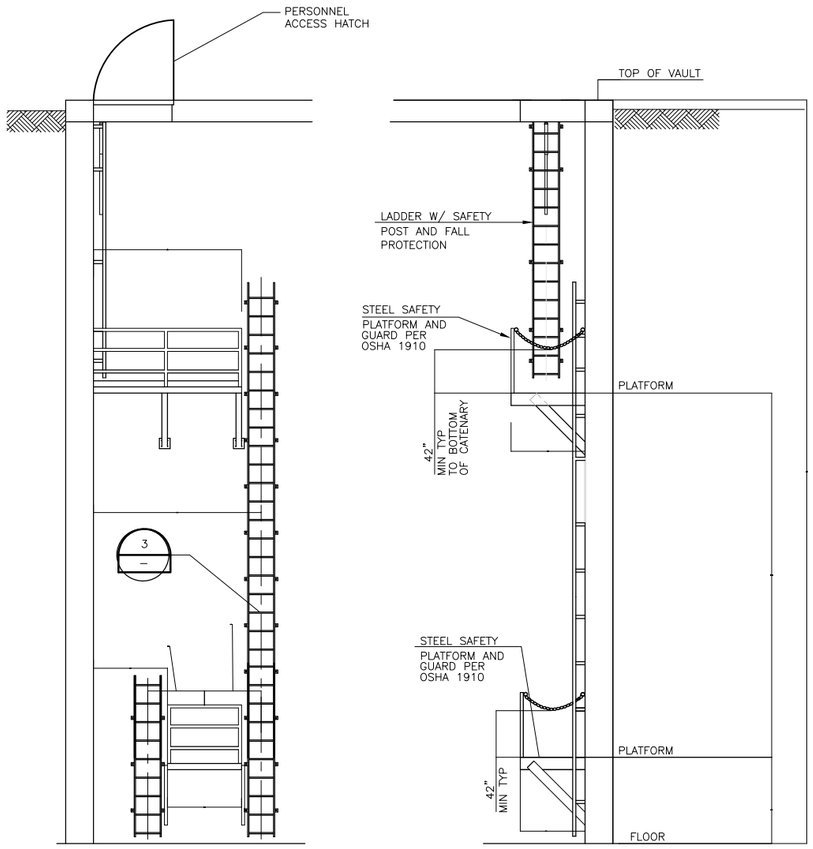
PLAN
NTS

LADDER DETAIL

ISSUED: -	NUMBER: SP-27

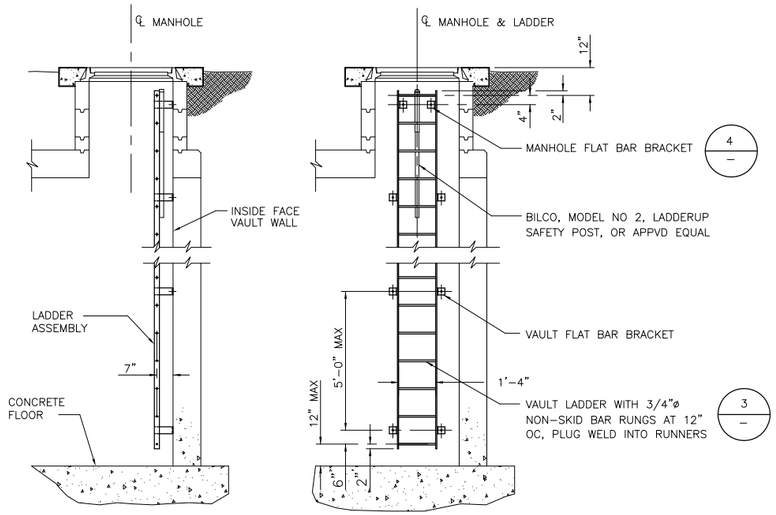


PLAN



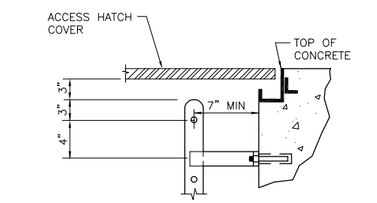
SECTION SECTION

LADDER AND LANDING 1/–
SCALE: 1/4" = 1'-0"

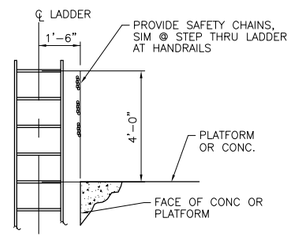


SIDE VIEW FRONT VIEW

LADDER DETAILS 2/–
NTS

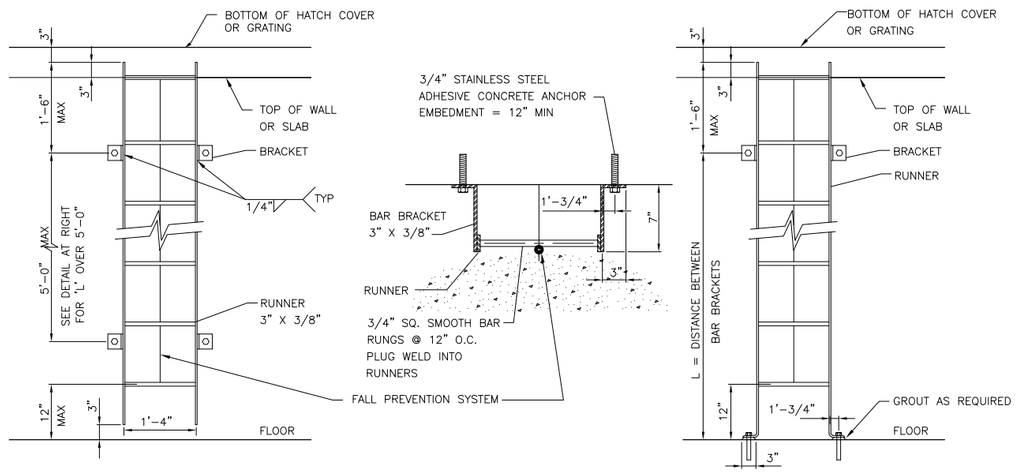


CONNECTION DETAIL WITH ACCESS HATCH



SIDE STEP LADDER

LADDER DETAILS 4/–
NTS



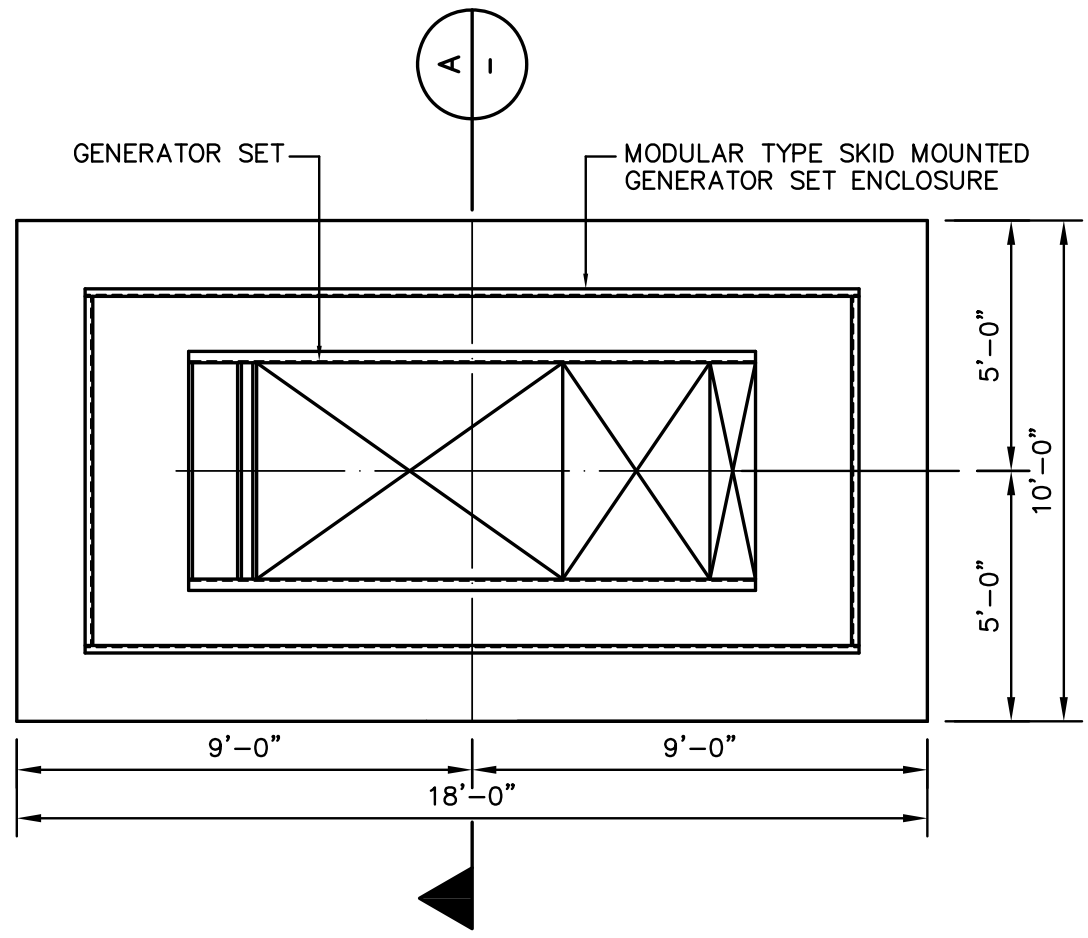
LADDER DETAILS 3/–
NTS

NOTES:
1. LADDERS AND LANDINGS SHALL CONFORM TO OSHA REGULATION STANDARD 910.27
2. ALL HARDWARE SHALL BE 316 STAINLESS STEEL
3. NO LADDERS IN LIQUID CONTAINING ENVIRONMENTS

LADDERS AND LANDINGS DETAILS

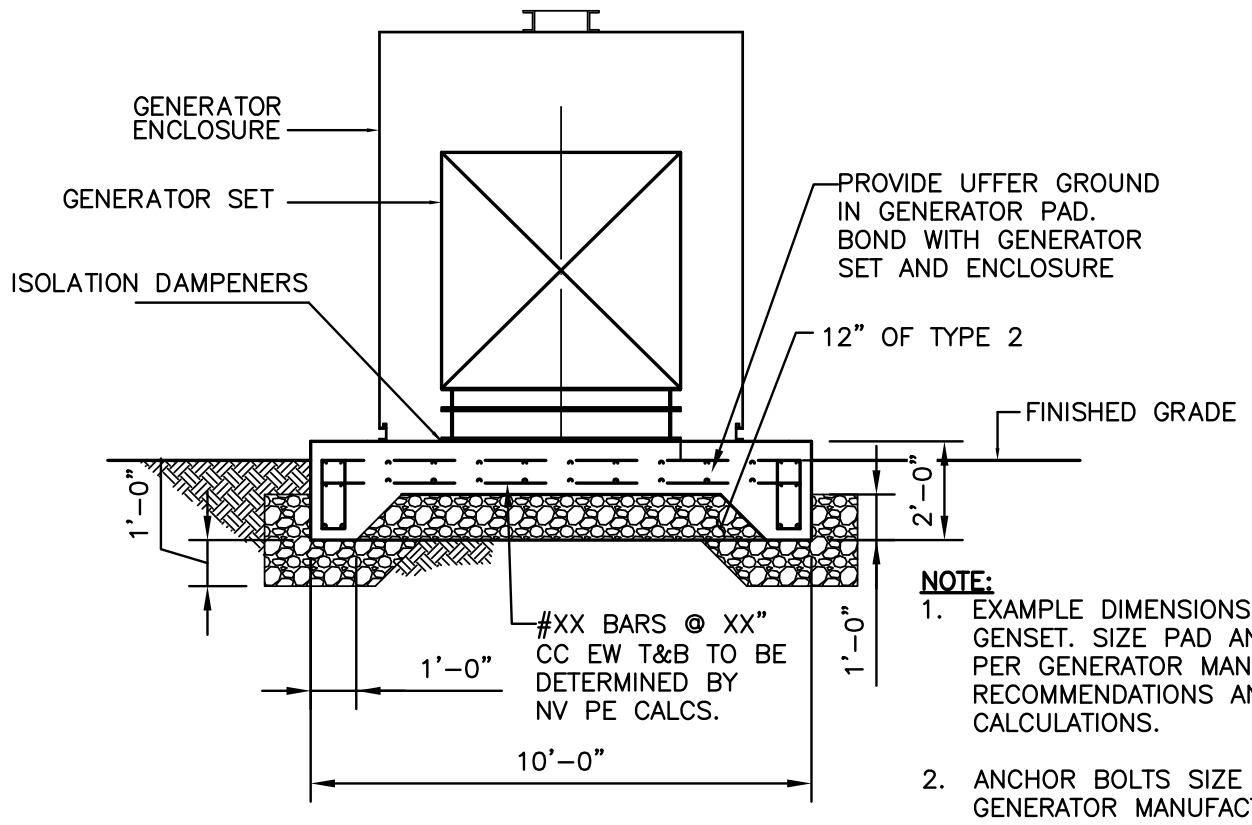
NUMBER: SP-28

ISSUED: -



PLAN

NTS



NOTE:

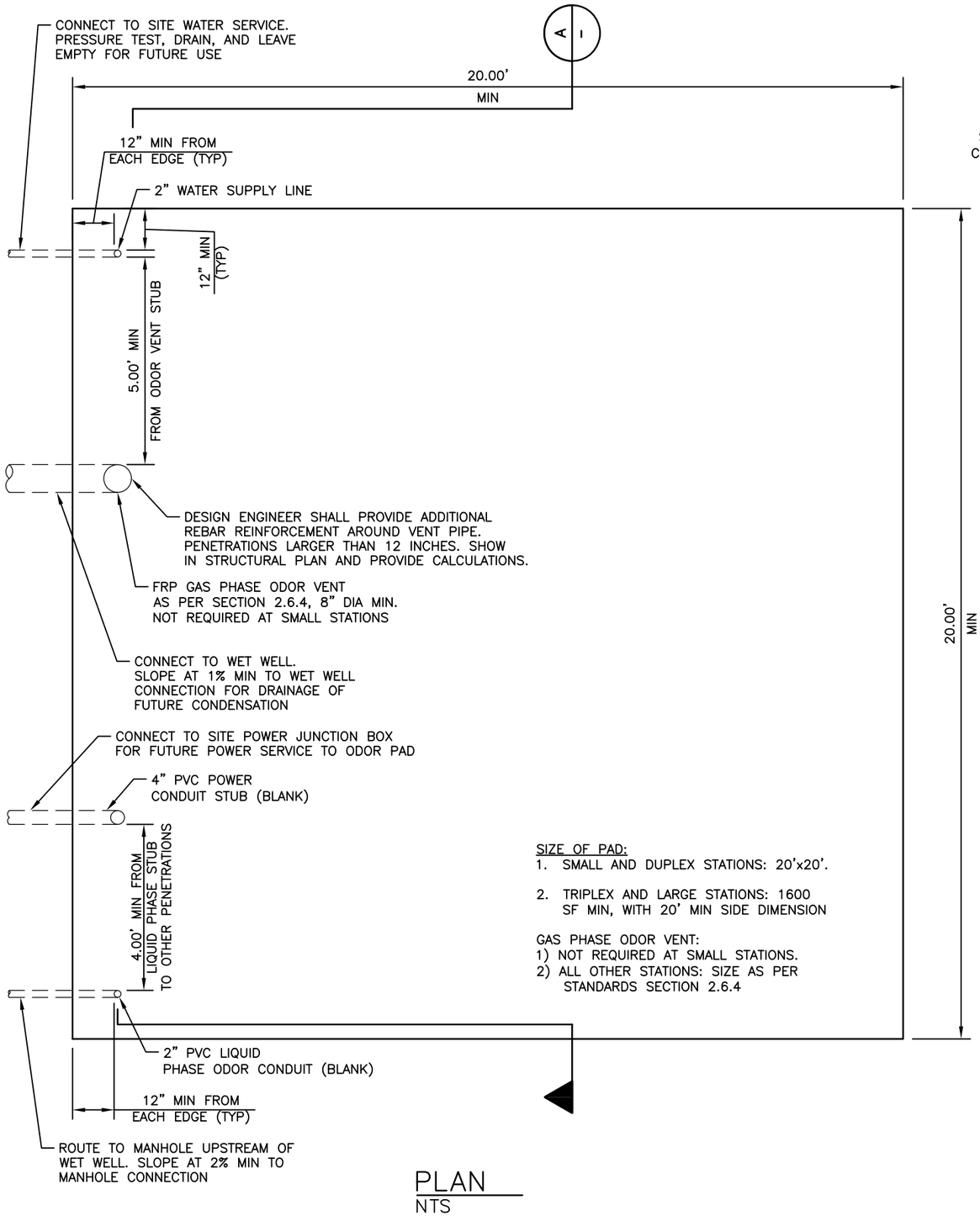
1. EXAMPLE DIMENSIONS SHOWN FOR LARGE GENSET. SIZE PAD AND REINFORCING AS PER GENERATOR MANUFACTURER RECOMMENDATIONS AND STRUCTURAL CALCULATIONS.
2. ANCHOR BOLTS SIZE & LOCATION PER GENERATOR MANUFACTURER
3. FOOTING SHALL BE APPROVED BY NV PE.

SECTION

NTS

GENERATOR PAD

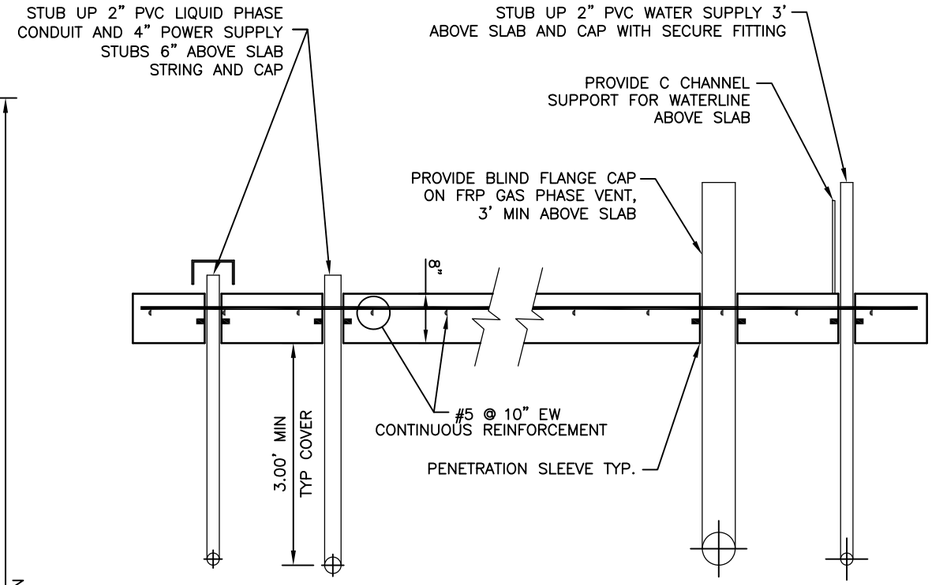
ISSUED: -	NUMBER: **SP-29**



SIZE OF PAD:
1. SMALL AND DUPLEX STATIONS: 20'x20'.
2. TRIPLEX AND LARGE STATIONS: 1600 SF MIN, WITH 20' MIN SIDE DIMENSION

GAS PHASE ODOR VENT:
1) NOT REQUIRED AT SMALL STATIONS.
2) ALL OTHER STATIONS: SIZE AS PER STANDARDS SECTION 2.6.4

PLAN
NTS



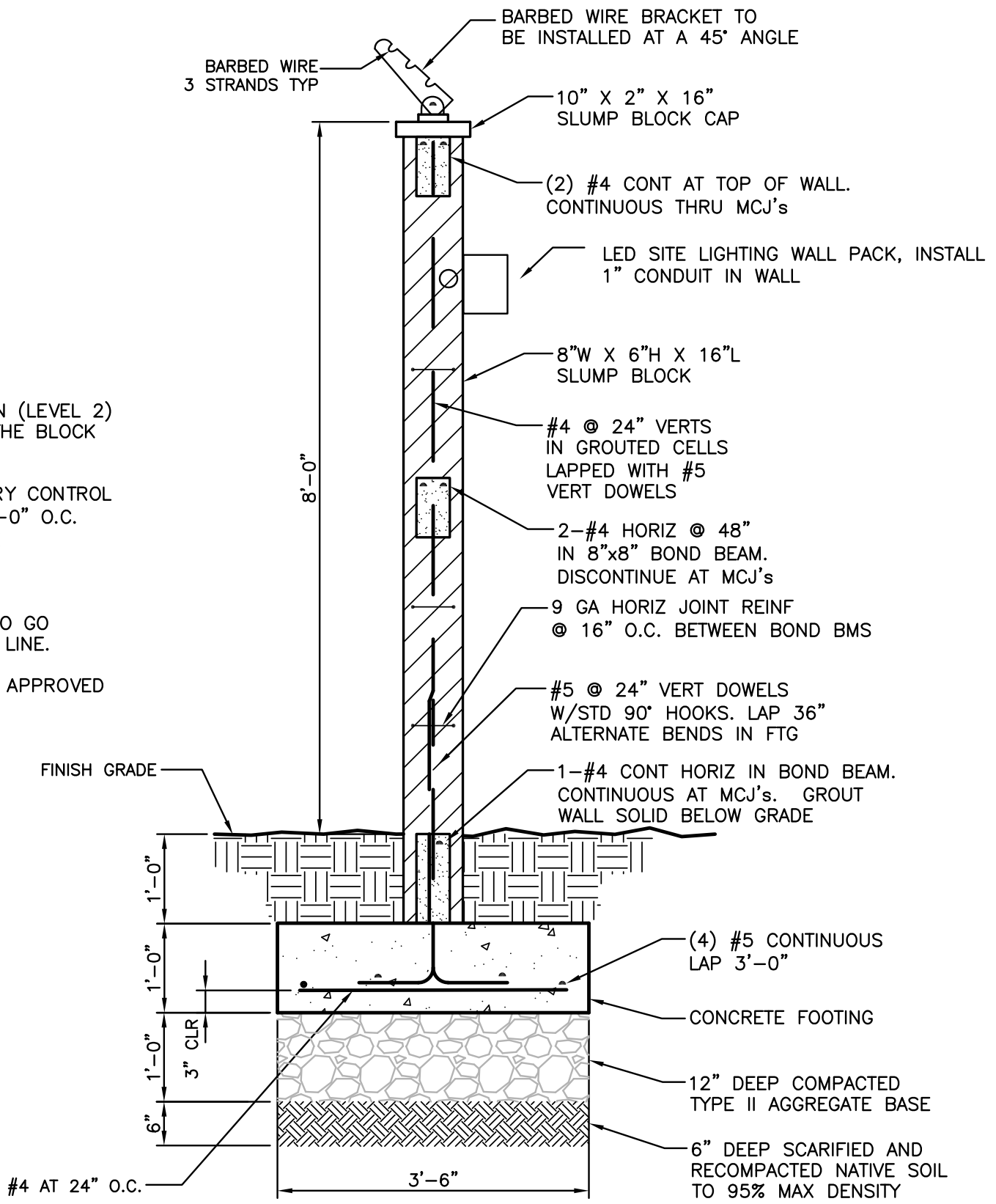
SECTION
NTS
A
–

GENERAL NOTE:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.

ODOR CONTROL PAD PLAN AND SECTION

NUMBER: SP-30

ISSUED:



NOTES:

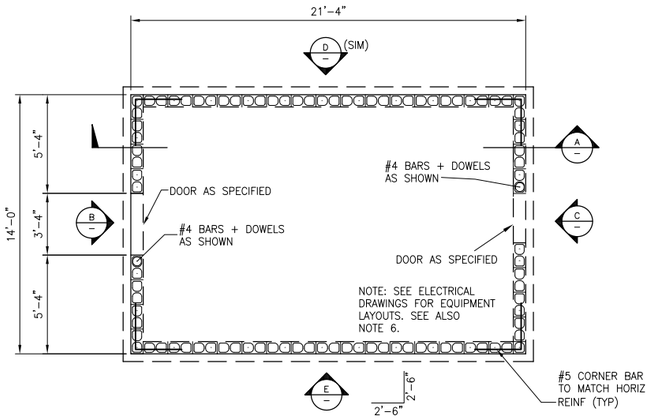
1. SPECIAL INSPECTION (LEVEL 2) IS REQUIRED FOR THE BLOCK WALL.
2. PROVIDE A MASONRY CONTROL JOINT (MCJ) @ 24'-0" O.C. (FULL HEIGHT). SEE STRUCTURAL
3. EXTENTS OF CONC FOUNDATION NOT TO GO BEYOND PROPERTY LINE.
4. FOOTING SHALL BE APPROVED BY NV PE.

SECTION
NTS

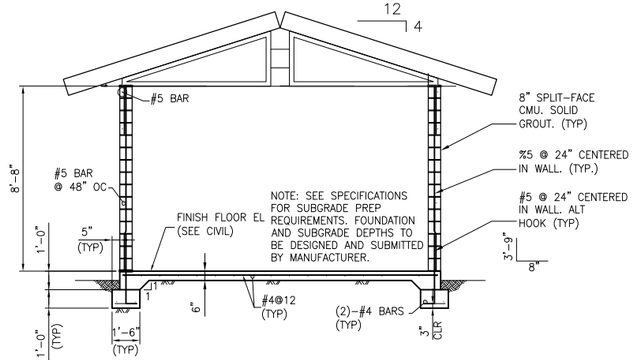
WALL DETAILS

ISSUED: -

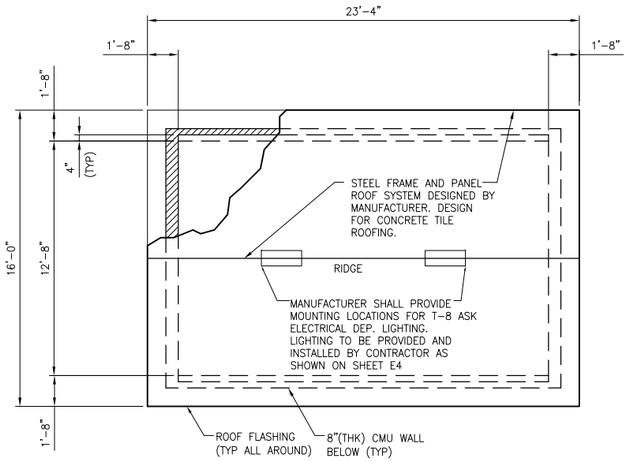
NUMBER: SP-31



PRE-FAB EQUIPMENT BUILDING PLAN
1/4"=1'-0"



SECTION A
1/4"=1'-0"

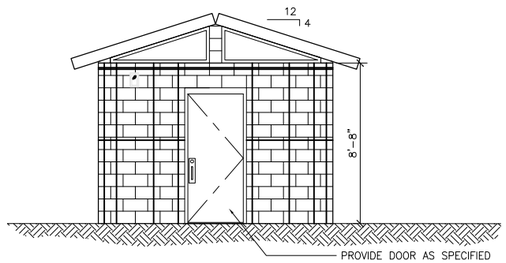


PRE-FAB ROOF PLAN
1/4"=1'-0"

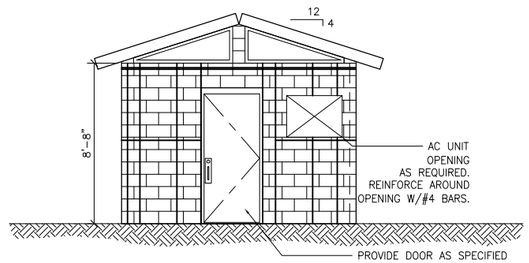
NOTES:

1. SHOP DRAWING & DESIGN CALCULATIONS SIGNED & SEALED BY A NEVADA LICENSED ENGINEER ARE REQUIRED.
2. TILE ROOFING & FLASHING REQUIRED PER SPECIFICATIONS.
3. DESIGN CRITERIA/LOADS – SEE SPECIFICATIONS
4. PRE-FABRICATED BUILDING BY ROMTEC INC. SHOWN AND SPECIFIED. SUBSTITUTIONS MUST CONFORM TO INTENT OF SPECIFICATIONS AND DRAWINGS AS SHOWN. CONTRACTOR SHALL COORDINATE ANY RQ'D CHANGES

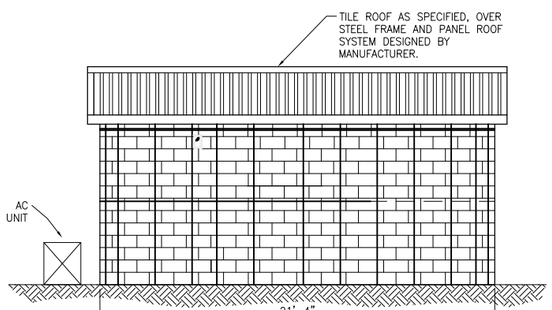
   SO THAT ALL PROJECT REQUIREMENTS ARE FULFILLED AT NO ADD'TL COST.
5. SEE SPECS FOR CONTRACTOR RESPONSIBILITIES IN CONSTRUCTING PACKED BUILDING SYSTEM.
6. SEE CIVIL AND ELECTRICAL SHEETS FOR CONDUIT PENETRATIONS THROUGH WALLS AND FLOOR SLAB. CONDUITS SHALL NOT BE INSTALLED WITHIN SLAB, ONLY THROUGH PERPENDICULAR PENETRATIONS
7. REINFORCEMENT & DIMENSIONS ARE MINIMUM REQUIRED FOR THE SAMPLE BLDG. SHOWN; FINAL DESIGN SHALL ACCOMMODATE REQUIREMENTS PARTICULAR TO THE PROJECT
8. BUILDING TO HAVE TWO ENTRY AND EXITS SIZED TO ACCOMMODATE INSTALLATION AND REMOVAL OF EQUIPMENT.
9. ROOFING SHALL BE DESIGNED TO ALLOW FOR SOLAR PANEL ATTACHMENT.



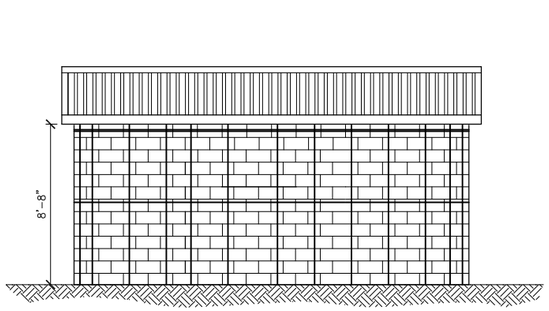
WEST ELEVATION B



EAST ELEVATION C



NORTH ELEVATION D



SOUTH ELEVATION E

ELECTRICAL BUILDING TYPICAL ARCHITECTURAL (SAMPLE DWG)

NUMBER: SP-32

ISSUED: -

ELECTRICAL ABBREVIATIONS

A	AMPERE
AA	AIR COILS, AIR COOLED
AC	ALTERNATING CURRENT
A/C	AIR CONDITIONING
AF	AMPERE FRAME, CKT. BKR. RATING
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AL	ALUMINUM
AM	AMMETER
ANN	ANNUNCIATOR
AMP	AMPERES, AMPERAGE
APPD	APPROVED
AS	AMMETER SWITCH
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
BATT	BATTERY
BC	BARE COPPER
BKR	BREAKER
BLDG	BUILDING
C	CONDUIT
CAB	CABINET
CB	CIRCUIT BREAKER
CKT	CIRCUIT
CO	CONDUIT ONLY
COM	COMMON
COMPT	COMPARTMENT
COMPR	COMPRESSOR
COND	CONDUIT
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CR	CONTROL RELAY
CT	CURRENT TRANSFORMER
CU	COPPER
DC	DIRECT CURRENT
DH	DATA HIGHWAY
DISC	DISCONNECT
DISTR	DISTRIBUTION
DPDT	DOUBLE POLE DOUBLE THROW
DWG	DRAWING
E	EMPTY
EF	EXHAUST FAN
ELEV	ELEVATION
EMERG	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
EP	EXPLOSION PROOF
EQPT	EQUIPMENT
ER	CONDUCTANCE RELAY
ETM	ELAPSED TIME METER
EHU	ELECTRIC HEATING UNIT
EXH	EXHAUST
EXIST	EXISTING
E/W	EACH WAY
FA	FORCED AIR COOLED (FAN)
FDR	FEEDER
FFA	FUTURE FORCED AIR (FAN)
FLEX	FLEXIBLE
FLUOR	FLUORESCENT
FTS	FANNING TERMINAL STRIP
FUT	FUTURE
FVR	FULL VOLTAGE REVERSING
FVNR	FULL VOLTAGE NON-REVERSING
FWD	FORWARD
GALV	GALVANIZED
GEN	GENERATOR
GND	GROUND
HH	HAND HOLE
HID	HIGH INTENSITY DISCHARGE
HG	MERCURY
HOA	HAND-OFF-AUTOMATIC
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HTR	HEATER
HT TR	HEAT TRACED
HVAC	HEATING, VENTILATING, A/C
HZ	HERTZ - CYCLES PER SECOND
IMC	INTERMEDIATE METAL CONDUIT
INCAND	INCANDESCENT
IND	INDICATION, INDICATING
I/O	INPUT/OUTPUT
INST	INSTANTANEOUS
INSTR	INSTRUMENT
I_{SC}	SHORT CIRCUIT CURRENT
INVT	INVERT
JB	JUNCTION BOX
J BOX	JUNCTION BOX
KVA	KILO VOLT AMPERES
KW	KILOWATTS
KWH	KILOWATT HOUR
KCMIL	1,000 CIRCULAR MILS
LC	LIGHTING CONTACTOR
LCB	LOCAL CONTROL BOARD
LCP	LOCAL CONTROL PANEL
LOC	LOCAL
LO	LOCKOUT
LOS	LOCKOUT STOP
LS	LEVEL SWITCH
LT	LIGHT
LTG	LIGHTING
LTS	LIGHTS
M	MOTOR CONTACTOR COIL
MA	MILLIAMPS
MAN	MANUAL
MAG	MAGNETIC
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MCB	MAIN CONTROL BOARD
MCP	MOTOR CIRCUIT PROTECTOR
MD	MOTORIZED DAMPER
MH	MANHOLE
MH	MOUNTING HEIGHT
MIN	MINIMUM, MINUTES
MLO	MAIN LUGS ONLY
MOV	MOTOR OPERATED VALVE
MPC	MINI POWER CENTER
MS	MOTOR STARTER
MT	MOUNTING
MMS	MANUAL MOTOR STARTER
MTD	MOUNTED
MTR	MOTOR
MUX	MULTIPLEXING PANEL
N	NEUTRAL
NA	NON-AUTOMATIC
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NO	NUMBER
NOS	NUMBERS
NP	NAMEPLATE
N.P.CO.	NEVADA POWER COMPANY
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
O	OPEN
OA	OIL FILLED, AIR COOLED
OC	ON CENTER
CC	CENTER TO CENTER
OL	OVERLOAD RELAY
OSC	OSCILLATION
P	POLE
PB	PUSH BUTTON
PCM	PROCESS CONTROL MODULE
PCP	PROCESS CONTROL PANEL
PF	POWER FACTOR
PH, Ø	PHASE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PNL	PANEL
PNLBD	PANELBOARD
POS	POSITION
POT	POTENTIOMETER
PRI	PRIMARY
PS	PRESSURE SWITCH
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PW	PART WINDING
PWR	POWER FACTOR
REC	RECEPTACLE
RECEPT	RECEPTACLE
RECPTS	RECEPTACLES
REQ'D	REQUIRED
REV	REVERSE
RGS	RIGID GALVANIZED STEEL
RMC	RIGID METAL CONDUIT
RTU	REMOTE TERMINAL UNIT
RVAT	REDUCED VOLTAGE AUTOTRANSFORMER
RVNR	REDUCED VOLTAGE NON-REVERSING
RVSS	REDUCED VOLTAGE SOLID STATE
SCH	SCHEDULE
SEC	SECONDARY, SECONDS
SECT	SECTION
SEL SW	SELECTOR SWITCH
SEQ	SEQUENCE
SH, Sh	SHIELD
SHLD	SHIELDED
SHT	SHEET
SIG	SIGNAL
S1, S2	START CONTACTOR COILS
SP	SPARE
SPDT	SINGLE POLE DOUBLE THROW
SPECS	SPECIFICATIONS
SP HTR	SPACE HEATER
SPST	SINGLE POLE SINGLE THROW
SQ	SQUARE
SS	SOLID STATE
SSTL	STAINLESS STEEL
ST	SHUNT TRIP
STA	STATION
STD	STANDARD
STL	STEEL
STR	STARTER
SOV	SOLENOID OPERATED VALVE
SW	SWITCH
SYS	SYSTEM
TACH	TACHOMETER
TB	TERMINAL BOX
TC	TIME CLOCK
TD	TIME DELAY
TDON	TIME DELAY - ON
TDOFF	TIME DELAY - OFF
TEMP	TEMPERATURE
TERM	TERMINAL
TP	TWISTED PAIR
TR	TIMING RELAY
TS	TEMPERATURE SWITCH
T'STAT	THERMOSTAT
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
US	UNIT SUBSTATION
V	VOLTAGE, VOLTS
VAC	VOLTS ALTERNATING CURRENT
VAR	VAR METER
VDC	VOLTS DIRECT CURRENT
VFD	VARIABLE FREQUENCY DRIVE
VP	VAPOR PROOF
VS	VOLTMETER SWITCH, VARIABLE SPEED
W	WATTS, WIRE
WHD	WATTHOUR DEMAND METER
WHM	WATTHOUR METER
WP	WEATHERPROOF
XD	TRANSDUCER
XFMR	TRANSFORMER
XFER	TRANSFER
XMTR	TRANSMITTER
XPDR	TRANSPONDER
2#10	2 CONDUCTORS AT #10 AWG
3/C	3 CONDUCTORS PER CABLE
#18Sh	#18 AWG, SHIELDED CABLE
#18TSP	#18 AWG, TWISTED PAIR, SHIELDED
(4)3"C	4 EACH 3 INCH CONDUITS

PROJECT NOTES:

THIS FACILITY IS THE NEW PEBBLE #2 SEWER LIFT STATION, WHICH REPLACES THE ORIGINAL PEBBLE #1 LIFT STATION, LOCATED NEARBY.

PEBBLE #2 LIFT STATION ELECTRICAL COMPONENTS INCLUDE: THREE CONSTANT SPEED LIFT PUMPS EACH AT 50HP, MAIN METERED SWITCHBOARD, AUTOMATIC TRANSFER SWITCH, BACKUP GENERATOR, MCC, BUILDING POWER AND LIGHTING DISTRIBUTION, CONTROL PANEL, ODOR CONTROL, PLC, RADIO TELEMETRY AND ANTENNA.

THE PLC CONTROLS THE LIFT PUMPS BASED ON WETWELL LEVELS, WITH PROVISION FOR ALTERNATING STARTING. MAJOR ELECTRTICAL EQUIPMENT IS MOUNTED INDOORS IN NEMA 12 ENCLOSURES.

REFER TO SPECIFICATIONS FOR ADDITIONAL SYSTEM DESCRIPTION AND REQUIREMENTS.

PEEBLE #1 LIFT STATION IS TO BE DEMOLISHED AS PART OF THIS CONTRACT AFTER PEBBLE #2 LIFT STATION IS FULLY OPERATIONAL. RETURN ALL SALVAGED ELECTRICAL COMPONENTS TO CCWRD AT 5857 E FLAMINGO ROAD. COORDINATE DEMOLITIONS ACTIVITIES WITH CCWRD OPERATING STAFF.

GENERAL NOTES

1. THE COMPLETED INSTALLATION SHALL COMPLY WITH LATEST REVISION OF APPLICABLE FEDERAL, STATE, AND LOCAL CODES, ORDINANCES, AND REGULATIONS. THE CONTRACTOR SHALL OBTAIN NECESSARY PERMITS AND INSPECTIONS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION. ALL WORK SHALL BE COMPLETED IN A NEAT, WORKMANLIKE MANNER IN ACCORDANCE WITH THE LATEST NECA STANDARDS OF INSTALLATION UNDER COMPETENT SUPERVISION. INSTALL GROUNDING PER NEC.
2. VISIT THE SITE PRIOR TO BIDDING TO BECOME FAMILIAR WITH EXISTING CONDITIONS AND OTHER FACTORS, WHICH MAY AFFECT THE EXECUTION OF THE WORK. INCLUDE ALL RELATED COSTS IN THE INITIAL BID PROPOSAL.
3. THE CONTRACTOR SHALL COORDINATE WORK WITH THE UTILITIES PROVIDING SERVICES ON THIS PROJECT, AND SHALL COMPLY WITH ALL THEIR INSTALLATION REQUIREMENTS.
4. ALL MATERIALS SHALL BE NEW AND OF THE BEST QUALITY, MANUFACTURED IN ACCORDANCE WITH THE LATEST REVISION OF NEMA, ANSI, UL, OR OTHER APPLICABLE STANDARDS. THE USE OF MANUFACTURERS' NAMES, MODELS, AND NUMBERS IS INTENDED TO ESTABLISH STYLE, QUALITY, APPEARANCE, USEFULNESS, AND BID PRICE.
5. PROTECT ALL ELECTRICAL MATERIAL AND EQUIPMENT INSTALLED AGAINST DAMAGE BY OTHER TRADES, WEATHER CONDITIONS, OR ANY OTHER PREVENTABLE CAUSES. EQUIPMENT DAMAGED DURING SHIPPING OR CONSTRUCTION, PRIOR TO ACCEPTANCE BY THE ENGINEER OR THE OWNER, WILL BE REJECTED AS DEFECTIVE.
6. LEAVE THE SITE CLEAN. REMOVE ALL DEBRIS, EMPTY CARTONS, TOOLS, CONDUIT, WIRE SCRAPS AND ALL MISCELLANEOUS SPARE EQUIPMENT AND MATERIALS USED IN THE WORK DURING CONSTRUCTION. ALL COMPONENTS SHALL BE FREE OF DUST, GRIT AND FOREIGN MATERIALS, LEFT AS NEW BEFORE FINAL ACCEPTANCE OF WORK. DAMAGED PAINT AND FINISHES SHALL BE TOUCHED UP OR REPAINTED WITH MATCHING COLOR PAINT AND FINISH.
7. CIRCUIT CONDUCTORS #6 AWG OR SMALLER SHALL BE XHHW STRANDED COPPER. #4 AWG THROUGH #2 AWG SHALL BE XHHW STRANDED COPPER. #1 AWG OR LARGER SHALL BE XHHW-2 STRANDED COPPER. MINIMUM POWER CONDUCTOR SIZE SHALL BE #12 AWG WITH #12 AWG GROUND.
8. UNDERGROUND CONDUITS SHALL BE SCHEDULE 40 PVC. MINIMUM CONDUIT DEPTH SHALL BE 24 INCHES. MINIMUM UNDERGROUND CONDUIT SIZE SHALL BE 1 INCH.
9. CONDUITS SHALL BE MARKED AT EACH END WITH MATCHING NUMBERED BRASS TAGS. SPARE CONDUITS SHALL HAVE A PULL STRING INSTALLED, SECURED, AND CAPPED.
10. SAFETY SWITCHES, ELECTRICAL DISTRIBUTION EQUIPMENT, CONTROL PANELS, AND OTHER ELECTRICAL DEVICES SHALL BE UL LISTED AND RATED FOR HEAVY DUTY SERVICE.
11. THE CONTRACTOR IS RESPONSIBLE FOR MANAGING, SCHEDULING, DOCUMENTING, AND PERFORMING THE WORK SO THAT A COMPLETE ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEM FOR THE FACILITY IS PROVIDED. ACCURATE SHOP AND RECORD DRAWINGS, AND O&M MANUALS SHALL BE SUBMITTED PRIOR TO FINAL ACCEPTANCE OF THE WORK.
12. TYPICAL DETAILS SHALL APPLY IN ALL CASES, WHETHER SPECIFICALLY REFERRED TO OR NOT.
13. OUTDOOR EXPOSED CONDUIT SHALL BE PVC COATED.
14. ALL CONDUITS SHALL BE WHOLE SIZES.
15. VFD CONTROLLED MOTORS SHALL USE VFD CABLE.

ELECTRICAL LEGEND

SYMBOL	DESCRIPTIONS	REMARKS
A / 3 / e	A = REFERENCE TO LIGHTING FIXTURE SCHEDULE 3 = LIGHTING PANEL CIRCUIT NUMBER e = SWITCH ASSOCIATED WITH FIXTURE CONTROL	
	1' x 4' FLUORESCENT FIXTURE, SURFACE MOUNTED	
	FLUOR FIXTURE, NIGHT LIGHT	
	FLUOR FIXTURE, EMERGENCY LIGHT	
	LUMINAIRE, CEILING MOUNTED (SURFACE)	
	LUMINAIRE, EXTERIOR WALL MOUNTED (SURFACE)	
	LUMINAIRE, CEILING MOUNTED, (RECESSED)	
	FLOODLIGHT, MOUNTING AND WATTAGE AS SPECIFIED	
	LUMINAIRE, POLE MOUNTED, LAMP AS SPECIFIED	
	EMERGENCY LIGHTING	
	EXIT SIGN	
	EMERGENCY/EXIT SIGN	
TV	SINGLE GANG BOX, PREWIRED, W/RG59U COAX COVER	
	TEL RECEPTACLE, 3/4" HOME RUN UON	
	CONDUIT END BELL	
	SPECIAL SINGLE GANG DEVICE BOX	
	DUPLEX RECEPTACLE, MT HEIGHT SHOWN	
GFCI	GFCI DUPLEX RECEPTACLE, MT HEIGHT SHOWN	
WP GFCI	DUPLEX RECEPTACLE, WEATHERPROOF, GROUND FAULT TYPE	
	SPECIAL RECEPTACLE AS NOTED	
$	SINGLE POLE SWITCH	
$3	THREE-WAY SWITCH	
$4	FOUR-WAY SWITCH	
$L	LIGHTED SWITCH	
$DIM	DIMMER SWITCH	
$M	MANUAL MOTOR STARTER	

SYMBOL	DESCRIPTIONS	REMARKS
	CONDUIT SEAL	
T	TRANSFORMER	
PC	PHOTOCELL	
	DISTRIBUTION PANEL	
	LIGHTING AND BRANCH CIRCUIT PANEL	
	TERMINAL CABINET, TYPE AS SPECIFIED	
5	MOTOR, NUMBER INDICATES HORSEPOWER	
1/2	MOTOR, FRACTIONAL HORSEPOWER	
FACP	FIRE/SECURITY ALARM CONTROL PANEL	
T	THERMOSTAT	
J	JUNCTION BOX	
	INTRUSION DETECTOR, INSTRUMENT, DEVICE AS NOTED	
	SHUNT TRIP	
H	HEAT DETECTOR	
HF	FIRE ALARM PULL STATION	
LC	LIGHTING CONTACTOR	
MS	MOTION SWITCH, ADJUSTABLE "ON" TIMER	
A - 1,3	CONDUIT HOMERUN, A= PANEL, 1 & 3 ARE CIRCUIT NUMBERS	
	CONDUIT RUN UNDER FLOOR, OR GROUND	
	FUTURE UNDERGROUND CONDUIT	
	CONDUIT RUN INTERRUPTED	
	CONDUIT, TURNED UP, TOWARD VIEWER	
	CONDUIT, TURNED DOWN, AWAY FROM VIEWER	
	CROSSHATCHING INDICATES COUNTS OF No. 12 CONDUCTORS IF MORE THAN 3. NO CROSSHATCHING INDICATES 2 No. 12 AND 1 No. 12 GROUND. LONG HATCH IS A NEUTRAL AND / IS GROUND CONDUCTOR	
SD	SMOKE DETECTOR	

SINGLE LINE LEGEND

50	COMBINATION MOTOR STARTER, FULL VOLTAGE, NON-REVERSING, WITH THERMAL MAGNETIC CIRCUIT BREAKER.
MCP 15	COMBINATION MOTOR STARTER, FULL VOLTAGE, NON-REVERSING, WITH MAGNETIC CIRCUIT PROTECTOR, MAXIMUM CONTINUOUS RATING AND TRIP SETTING AS INDICATED BY MANUFACTURER.
2	FULL VOLTAGE, NON-REVERSING MOTOR STARTER, SIZE 2 SHOWN, WITH RATINGS AND SIZE AS SPECIFIED OR REQUIRED BY THE APPLICATION.
R	FULL VOLTAGE, REVERSING MOTOR STARTER, SIZES AND RATINGS AS SPECIFIED ON THE DIAGRAM OR BY MOTOR RATINGS.
2	FULL VOLTAGE, 2 - SPEED MOTOR STARTER, SIZE AND RATINGS AS SPECIFIED ON THE DIAGRAM OR BY MOTOR RATINGS.
RV	REDUCED VOLTAGE MOTOR STARTER, NON-REVERSING, TYPE AS SPECIFIED, RATINGS IN ACCORDANCE WITH APPLICATION.
RVSS	REDUCED VOLTAGE MOTOR STARTER, NON-REVERSING, SOLID STATE WITH STARTING CHARACTERISTICS AND RATINGS AS SPECIFIED.
VAR-HZ	SOLID STATE VARIABLE FREQUENCY STARTER, NON-REVERSING, WITH SIZE, RATINGS AND CHARACTERISTICS AS SPECIFIED.
50	THERMAL MAGNETIC CIRCUIT BREAKER, TRIP RATINGS AS INDICATED ON THE DIAGRAM, CHARACTERISTICS AS SPECIFIED.
MCP 15	MAGNETIC CIRCUIT PROTECTOR, MAXIMUM CONTINUOUS RATING AND TRIP SETTINGS AS INDICATED BY MANUFACTURER.
	FULL VOLTAGE CONTACTOR, RATINGS AND SIZE AS INDICATED ON THE DIAGRAM.
	DISCONNECT SWITCH, NUMBER OF POLES AND RATINGS AS SPECIFIED OR REQUIRED BY THE APPLICATION. "F" DENOTES FUSED.
	TRANSFORMER, NUMBER OF PHASES, CONFIGURATION, RATINGS, AND IMPEDANCE AS INDICATED OR SPECIFIED.
	CONTROL DEVICE, LOCATION AS INDICATED ON THE DIAGRAM, STOP-START.
	CONTROL DEVICE, LOCATION AS INDICATED ON THE DIAGRAM, LOCKOUT STOP.
	CONTROL DEVICE, LOCATION AS INDICATED ON THE DIAGRAM, HAND-OFF-AUTO.
	CONTROL DEVICE, LOCATION AND TYPE AS INDICATED ON THE PLANS OR DIAGRAM.
	LOCAL INDICATING PILOT LIGHT, COLOR AND TYPE AS SPECIFIED OR INDICATED ON THE DIAGRAM.
	SPACE HEATER, VOLTAGE AND RATING AS INDICATED ON THE DIAGRAM.
	WINDING TEMPERATURE SENSOR, TYPE AS SUPPLIED BY MOTOR MANUFACTURER.
	FIELD INSTRUMENT, PRESSURE, TEMPERATURE, FLOW, LEVEL SWITCH OR TRANSMITTER AS INDICATED ON THE DIAGRAM OR PLANS.
	INDICATING PILOT LIGHT, COLOR AND TYPE AS SPECIFIED ON THE DIAGRAM.
SS	DENOTES BREAKER SHALL BE SOLID STATE TRIP
GF	DENOTES BREAKER SHALL BE EQUIPPED WITH GROUND FAULT MONITORING AND TRIP.
ST	DENOTES BREAKER SHALL BE EQUIPPED WITH SHUNT TRIP - INCLUDING CONTROL POWER TRANSFORMER AND FIELD WIRING TERMINALS FOR REMOTE PUSHBUTTON.
	OUTLINE OF FUTURE ELECTRICAL AND MECHANICAL EQUIPMENT. EQUIPMENT OUTLINE
	VENDOR PACKAGED EQUIPMENT
2	VOLTAGE TRANSFORMER, INSTRUMENT CLASS, FUSED PRIMARY AND SECONDARY, OPEN DELTA CONFIGURATION.
	VACUUM CONTACTOR, 5kV, 3-POLE, RATINGS AND OPERATING MECHANISM AS DESCRIBED IN SPECIFICATIONS.
	VACUUM CONTACTOR, 5kV, 3-POLE, MECHANICAL LATCH, RATINGS AND OPERATING MECHANISM AS DESCRIBED IN SPECIFICATIONS.
XNN	CONDUIT CALLOUT, SEE SCHEDULE TYPICAL ALL ELECTRICAL DRAWINGS.
15 (21A)	MOTOR. TYPE AS REQUIRED BY THE APPLICATION, HORSEPOWER AND FULL LOAD CURRENT (XXA) AS SHOWN ON THE DIAGRAM.

ELECTRICAL SCHEMATIC LEGEND

	FLOAT SWITCH, LSHH, LSH, LSL NO OR NC AS INDICATED
	FLOW SWITCH, NO OR NC AS INDICATED
	PRESSURE SWITCH, PSL, PSH, NO OR NC AS INDICATED
	TEMPERATURE SWITCH, TSH, TSL, NO OR NC AS INDICATED
	LIMIT SWITCH, NO OR NC AS INDICATED
	RELAY/CONTROL CONTACT, NO OR NC AS INDICATED
	ON TIME DELAY CONTACT, TIMED CLOSE/OPEN AFTER DE-ENERGIZED N.O./N.C. AS INDICATED
	OFF TIME DELAY CONTACT, TIMED CLOSE/OPEN AFTER ENERGIZED N.O./N.C. AS INDICATED
R1 ( )	RELAY COIL, FUNCTION, NUMBER AND CONTACTS ( ) AS SHOWN
	INDICATING LIGHT, LENS COLORS (R) RED, (G) GREEN, (W) WHITE
	PUSHBUTTON, MOMENTARY, NO OR NC, LO = LOCKOUT
	PUSHBUTTON, MAINTAINED UNIVERSAL CONTACT
	ON-OFF SELECTOR SWITCH, MAINTAINED, FUNCTION AS SHOWN
H O A	SELECTOR SWITCH, MAINTAINED H-O-A = HAND-OFF-AUTO, OR OTHER FUNCTION AS DESIGNATED
	FUSE, SIZE AS NOTED
	CONTROL POWER TRANSFORMER RATINGS AS INDICATED
	TERMINAL IN RELAY PANEL/J-BOX
	TERMINAL IN RTU
	FANNING TERMINAL STRIP
	TERMINAL IN PLC
	TERMINAL IN MOTOR CONTROL CENTER
	TERMINAL AT FIELD DEVICE
	TERMINAL - EQUIPMENT OR DEVICE
	GROUND CONNECTION
	CIRCUIT BREAKER
	OVERLOAD ELEMENT
	AUTOTRANSFORMER WITH MULTIPLE TAPS SHOWN
	PREWIRED - BY OEM / INTEGRATOR
	FIELD WIRING
XXX - X - NNN	CONDUCTOR CALLOUT SEE SCHEDULE TYPICAL ALL ELECTRICAL DRAWINGS
	LED LAMPS
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
50/5 GSCT	GROUND SENSING CURRENT TRANSFORMER, INSTRUMENT CLASS
300/5 CT (3)	PHASE CURRENT TRANSFORMER, INSTRUMENT CLASS, ONE PER PH PROVIDE WITH GROUND SHORTING TERMINAL STRIP
S R N	REDUCED VOLTAGE, NON-REVERSING AUTOTRANSFORMER TYPE STARTER WITH VACUUM CONTACTOR, OPEN-TRANSITION CONFIGURATION, AND FACTORY PREWIRED AT 65% TAP, FURNISH HEAVY DUTY STARTER WITH HIGH WINDING TEMPERATURE THERMISTOR AND ALARM RELAY

ELECTRICAL LEGEND & ABBREVIATIONS

NUMBER: SP-33

ISSUED: -

CONDUIT AND WIRE SCHEDULE

CONDUIT NO.	FROM	TO	FILL	QTY	SIZE (IN)	REMARKS	SHEET NO.
P01	NPCO TRANSFORMER	METER/DISCONNECT	XXXXXX	X	X	480V INCOMING FROM UTILITY	
P02	PB1	ATS	XXXXXX	X	X	480V INCOMING FROM UTILITY	SP-36
P03	GENERATOR	PB1	XXXXXX	X	X	480V INCOMING FROM GENERATOR	
P04	PB1	ATS	XXXXXX	X	X	480V INCOMING FROM GENERATOR	SP-36
P05	PB1	GENERATOR	XXXXXX	X	X	120V TO GENERATOR	
P06	PB1	GRIT SUMP	XXXXXX	X	X	480V TO MOVs 1 & 2	
P07	PB1	LIFT STATION	XXXXXX	X	X	480V TO MOVs 3, 4, 5, 6	
P08	MCC (LP1)	PB1	XXXXXX	X	X	480V TO LP1 120V TO LP1 SPACE HEATER	SP-36
P09	PB1	LIFT STATION (LP1)	XXXXXX	X	X	480V TO LP1	
P10	MCC (LP2)	PB1	XXXXXX	X	X	480V TO LP2 120V TO LP2 SPACE HEATER	SP-36
P11	PB1	LIFT STATION (LP2)	XXXXXX	X	X	480V TO LP2	
P12	MCC (LP3)	PB1	XXXXXX	X	X	480V TO LP3 120V TO LP3 SPACE HEATER	SP-36
P13	PB1	LIFT STATION (LP3)	XXXXXX	X	X	480V TO LP3	
P14	PB1	METER VAULT	XXXXXX	X	X	120V TO DISCHARGE METER	
P15	PB1	LIFT STATION DISCONNECT	XXXXXX	X	X	240/120V TO LIFT STATION PANEL L3 STROBE WARNING LIGHT	
P16	PB1	BIOFILTER	XXXXXX	X	X	480V TO BIOFILTER	
P17	PANEL H1	PB1	XXXXXX	X	X	480V TO MOVs 1, 2, 3, 4, 5, 6, BIOFILTER JIB CRANE, LIFT STATION A/C UNIT	SP-32
P18	PANEL L1	PB1	XXXXXX	X	X	120V TO GENERATOR CHARGER, HEATER, CONTROLS 120V TO DISCHARGE METER 120V TO LIFT STATION ALARMS & STROBE	SP-32
P19	MCC (T-L)	TRANSFORMER	XXXXXX	X	X	480V TO TRANSFORMER PRIMARY	SP-32, SP-36
P20	TRANSFORMER	PANEL L1	XXXXXX	X	X	PANEL L1 FEEDER	SP-32
P21	MCC (PANEL H1)	PANEL H1	XXXXXX	X	X	PANEL H1 FEEDER	SP-32, SP-36
P22	PANEL L1	PLC	XXXXXX	X	X	120V TO PLC CABINET	SP-32
P23	PANEL L1	LIGHTING CONTACTOR	XXXXXX	X	X	240V AND 120V TO LIGHTING CONTACTOR	SP-32
P24	LIGHTING CONTACTOR	PB1	XXXXXX	X	X	240V TO AREA LIGHTING	SP-32
P25	PB1	AREA LIGHT	XXXXXX	X	X	240V TO AREA LIGHT NEAR BIOFILTER	
P26	PB1	AREA LIGHT	XXXXXX	X	X	240V TO AREA LIGHT NEAR FUTURE BIOXIDE STORAGE	
P27	PB1	BIOXIDE SYSTEM DISCONNECT	XXXXXX	X	X	FUTURE 120V POWER FOR BIOXIDE SYSTEM	
P28	PB1	AREA LIGHT	XXXXXX	X	X	240V TO AREA LIGHT NEAR GENERATOR	
P29	MCC (BIOFILTER)	PB1	XXXXXX	X	X	480V TO BIOFILTER	SP-36
P30	PANEL L1	LEVEL EQUIP. BOARD REC.	XXXXXX	X	X	120V TO LEVEL EQUIP.	SP-32, SP-37
P31	LIGHTING CONTACTOR	PHOTOCELL	XXXXXX	X	X	120V CONTROL TO/FROM PHOTOCELL	SP-32
P32	PANEL L1	A/C UNIT PUMP DISCONNECT	XXXXXX	X	X	240V TO ELECTRICAL BUILDING A/C UNIT	SP-32
P33	PANEL L1	ELEC. ROOM EMERG. LIGHT	XXXXXX	X	X	ELECTRICAL ROOM EMERGENCY LIGHTING	SP-32
P34	PANEL L1	ELEC. ROOM LIGHT	XXXXXX	X	X	ELECTRICAL BUILDING INDOOR & OUTDOOR LIGHTING	SP-32
P35	ELEC. ROOM LIGHT	ELEC. ROOM LIGHT SWITCH	XXXXXX	X	X	ELECTRICAL ROOM LIGHTING	SP-37
P36	ELEC. ROOM LIGHT	ELEC. BLDG. OUTDOOR LIGHT	XXXXXX	X	X	ELECTRICAL BUILDING OUTDOOR LIGHTING	
P37	ELEC. BLDG. OUTDOOR LIGHT	MOTION SENSOR	XXXXXX	X	X	ELECTRICAL BUILDING OUTDOOR LIGHTING	
P38	PB1	A/C UNIT DISCONNECT	XXXXXX	X	X	480V TO LIFT STATION A/C UNIT	
P39	PANEL L1	ELEC. ROOM RECEPTACLE	XXXXXX	X	X	ELECTRICAL ROOM RECEPTACLE	SP-32
P40	PANEL L1	MCC (MULTILIN)	XXXXXX	X	X	120VAC TO MULTILIN	SP-32, SP-36
P41	PANEL L1	MCC (EMER. FLOAT CONTROL)	XXXXXX	X	X	120V TO EMERGENCY FLOAT CONTROL	SP-32, SP-36
P42	LIFT STATION DISCONNECT	LIFT STATION	XXXXXX	X	X	240/120V TO LIFT STATION PANEL L3	
P43	A/C UNIT DISCONNECT	ELEC. BLDG. A/C UNIT	XXXXXX	X	X	240V TO ELECTRICAL BUILDING A/C UNIT	
P44	LIGHTING CONTACTOR	HOA SWITCH	XXXXXX	X	X	HOA SWITCH FOR AREA LIGHTING	SP-32, SP-37
P45	A/C UNIT DISCONNECT	LIFT STATION A/C UNIT	XXXXXX	X	X	480V TO LIFT STATION AC UNIT	
P46	ELEC. ROOM LIGHT	ELEC. ROOM LIGHT	XXXXXX	X	X	ELEC. BUILDING INDOOR AND OUTDOOR LIGHTING	
P47	BIOFILTER DISCONNECT	BIOFILTER	XXXXXX	X	X	480V TO BIOFILTER	
P48	BIOXIDE DISCONNET	FUTURE BIOXIDE SYSTEM	XXXXXX	X	X	FUTURE 120V POWER FOR BIOXIDE SYSTEM	
P49	METER VAULT	METER	XXXXXX	X	X	120V TO DISCHARGE METER (LT FLEX) (BOND #10 GND TO METER GROUND RINGS)	
P50	PANEL L1	ANALYZER CABINET	XXXXXX	X	X	120VAC TO GAS MONITORS	SP-32
P51	PB1	JIB CRANE DISCONNECT	XXXXXX	X	X	480VAC TO JIB CRANE	
P52	ANALYZER CABINET	STROBE LIGHT	XXXXXX	X	X	120VAC TO STROBE LIGHT	SP-32, SP-37
P53	JIB CRANE DISCONNECT	JIB CRANE	XXXXXX	X	X	480VAC TO JIB CRANE	
P54	TRANSFORMER	PANEL L2	XXXXXX	X	X	PANEL L2 FEEDER	SP-32
P55	NPC METER & DISCONNECT	PB1	XXXXXX	X	X	480V INCOMING FROM UTILITY	
P56	LIFT STATION DISCONNECT	L.S. DIGITAL JUNCTION BOX	XXXXXX	X	X	LIFT STATION STROBE ALARM	
P57	L.S. DIGITAL JUNCTION BOX	LIFT STATION STROBE ALARM	XXXXXX	X	X	LIFT STATION STROBE ALARM	
P58	PANEL L2	PB1	XXXXXX	X	X	240/120V TO LIFT STATION PANEL L3	SP-37

S01	GENERATOR	PB2	XXXXXX	X	X	GENERATOR TO/FROM PLC (DIGITAL)	
S02	GRIT SUMP	PB2	XXXXXX	X	X	MOVs 1& 2 TO/FROM PLC (DIGITAL)	
S03	WET WELL	PB2	XXXXXX	X	X	FLOAT SWITCH (DIGITAL)	
S04	PB2	LEVEL EQUIP. BOARD	XXXXXX	X	X	SONIC LEVEL TRANSDUCER (ANALOG)	

CIRCUIT NAME	APPROXIMATE LENGTH
(ADD THIS TO YOUR DRAWING)	(ADD THIS TO YOUR DRAWING)

NOTE TO DESIGNER:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.

CABLE AND CONDUIT SCHEDULES

NUMBER: SP-34

ISSUED: -

LIGHTING FIXTURE SCHEDULE, TYP

TYPE	DESCRIPTION	LAMP(S)	WATTS	MANUFACTURER	BALLAST	REMARKS	SYMBOL
1	AREA LUMINAIRE, POLE MOUNTED, IES TYPE III, SHORT CUTOFF DISTRIBUTION, BRONZE FINISH, WITH MATCHING NON-TAPERED 20' SQUARE STEEL POLE RATED FOR 100 MPH SUSTAINED WIND LOAD	400W MH	480W	KIM ARCHETYPE, AR SERIES: CATALOG NUMBER 1A/AR3/400PMH240/DB-P POLE CATALOG NUMBER KSS20-41*0/A/DB-P	240V MAGNETIC REGULATOR	AREA LIGHTING	
2	COMPACT WALL MOUNT LUMINARE, 120V, CONTROLLED BY MOTION SENSOR	(2) 28W COMPACT FLUORESCENT	68W	COOPER-LUMARK MPMICRO-PAK PLMP-PC-56-120V-F1PELL	120V MAGNETIC	WALL MOUNT AREA LIGHT	
	MOTION SENSOR	N/A	N/A	COOPER-LUMARK MS-240	N/A		
3	FLUORESCENT FIXTURE, 2-LAMP, 4'x1', MOUNT FROM CEILING/TRUSSES USING MANUFACTURER'S RECOMMENDED METHOD	(2)FO32T8/31K	80W	COOPER-METALUX: IA-232-120V-LEOC8	120V MAGNETIC ENERGY SAVING	ELEC ROOM LIGHTING	
4	EMERGENCY LIGHT, TWIN LAMP, SELF-CONTAINED MAINTENANCE FREE BATTERY, BROWNOUT PROTECTION, 120VAC, SURFACE MOUNT	PER MFG	11W	HOLOPHANE, CORTEZ A42		EMERGENCY LIGHTING	
5	STROBE WARNING LIGHT, 120VAC, RED DOME LENS	STROBE	40W	FEDERAL SIGNAL CORPORATION FIREBALL 2 MODEL FB2PST	N/A	GAS WARNING	

PANEL L1

VOLTS:	120/240		SERVICE ENTRANCE	X	SLIP-ON CIRCUIT BREAKERS
PANEL AMP RATING:	200		METER		BOLT-ON CIRCUIT BREAKERS
MAIN BREAKER AMP RATING:	200	X	NEMA 1		ALUMINUM BUS
MINIMUM KAIC:	14		NEMA 3R	X	COPPER BUS
PHASE:	1	X	SURFACE MOUNT		
WIRE:	3		FLUSH MOUNT		
NEUTRAL:	FULL	X	HINGE DOOR		
GROUND:	SOLID		DOOR IN DOOR	PANEL LOCATION	ELECTRICAL BUILDING
		X	LATCH/LOCK DOOR		

COND NO.	CKT NO.	SPC NO.	CIRCUIT DESCRIPTION	BKR SIZE	LOAD TYPE	LOADS (VA) A	LOADS (VA) B	LOADS (VA) A	LOADS (VA) B	LOAD TYPE	BKR SIZE	CIRCUIT DESCRIPTION	SPC NO.	CKT NO.	COND NO.
	1	1	* OUTDOOR AREA LIGHTING	2/15	L	625	//////	510	//////	L	1/15	ELEC. BLDG. LIGHTING	2	2	P34
		3			L	//////	625	//////	360	L	1/20	ELEC. BLDG. EMERGENCY LTG.	4	4	P33
P31	3	5	PHOTOCELL	1/15	F	300	//////	11	//////	R	1/20	ELEC. BLDG. RECEPTACLES	6	6	P34
P22	5	7	PLC CABINET RECEPTACLE	1/20	F	//////	3000	//////	0			SPACE	8	8	
P40	7	9	MULTILIN	1/15	F	100	//////	2000	//////	ML	2/50	ELECTRICAL BUILDING AC UNIT	10	10	P32
	9	11	SPACE			//////	0	//////	2000	ML			12		
P41	11	13	EMERGENCY FLOAT CONTROL	1/15	F	180	//////	50	//////	F	1/15	ANALYZER CABINET	14	12	P50
	13	15	SPACE			//////	0	//////	0				16	14	
	15	17	GEN. BATT. CHG., WTR. JKT. HTR.	1/20	F	1500	//////	50	//////	F	1/15	LIFT STATION ALARMS & STROBE	18	16	P35
P18	17	19	GENERATOR CONTROLS	1/20	F	//////	200	//////	0			SPACE	20		
	19	21	SITE RECEPTACLES	1/20	R	540	//////	0	//////			SPACE	22		
	21	23	POWER FAIL MONITOR			//////	0	//////	0			SPACE	24		
						3245	3825	2621	2360						
			TOTAL LOAD PER PHASE			5866	6185	95%	BALANCE			TOTAL PANEL DEMAND AMPS = 113			
			TOTAL PANEL LOAD (W/O DEMAND)				12051								

ABBREVIATIONS:
F=FIXED EQUIPMENT, L=LIGHTING LOAD, M=MOTOR LOAD, ML=LARGEST MOTOR LOAD, R=RECEPTACLE LOAD

SPECIAL PROVISIONS:
* CONTROLLED BY PHOTOCELL

PANEL H1

VOLTS:	480/277		SERVICE ENTRANCE	X	SLIP-ON CIRCUIT BREAKERS
PANEL AMP RATING:	200		METER		BOLT-ON CIRCUIT BREAKERS
MAIN BREAKER AMP RATING:	200	X	NEMA 1		ALUMINUM BUS
MINIMUM KAIC:	20		NEMA 3R	X	COPPER BUS
PHASE:	3	X	SURFACE MOUNT		
WIRE:	3		FLUSH MOUNT		
NEUTRAL:	NONE	X	HINGE DOOR		
GROUND:	SOLID		DOOR IN DOOR	PANEL LOCATION	ELECTRICAL BUILDING
		X	LATCH/LOCK DOOR		

CKT NO.	SPC NO.	CIRCUIT DESCRIPTION	BKR SIZE	LOAD TYPE	LOADS (VA) A	LOADS (VA) B	LOADS (VA) C	LOADS (VA) A	LOADS (VA) B	LOADS (VA) C	LOAD TYPE	BKR SIZE	CIRCUIT DESCRIPTION	SPC NO.	CKT NO.
1	1	MOV1	3/15	ML	650	//////	//////	650	//////	//////	M	3/15	MOV2	2	2
	3	GRIT CHAMBER		ML	//////	650	//////	//////	650	//////	M		GRIT CHAMBER	4	
	5	INCOMING		ML	//////	//////	650	//////	//////	650	M		OUTGOING 1ST	6	
3	7	MOV3	3/15	M	650	//////	//////	650	//////	//////	M	3/15	MOV4	8	4
	9	GRIT CHAMBER		M	//////	650	//////	//////	650	//////	M		LIFT PUMP 1 SUCTION	10	
	11	OUTGOING 2ND		M	//////	//////	650	//////	//////	650	M			12	
5	13	MOV5	3/15	M	650	//////	//////	650	//////	//////	M	3/15	MOV6	14	6
	15	LIFT PUMP 2 SUCTION		M	//////	650	//////	//////	650	//////	M		LIFT PUMP 3 SUCTION	16	
	17			M	//////	//////	650	//////	//////	650	M			18	
7	19	MOV7	3/15	M	650	//////	//////	1500	//////	//////	M	3/15	LIFT STATION A/C UNIT	20	8
	21	MAIN DISCHARGE		M	//////	650	//////	//////	1500	//////	M			22	
	23			M	//////	//////	650	//////	//////	1500	M			24	
9	25	JIB CRANE	3/15	M	310	//////	//////	0	//////	//////			SPACE	26	
	27			M	//////	310	//////	//////	0	//////			SPACE	28	
	29			M	//////	//////	310	//////	//////	0			SPACE	30	
	31	SPACE			0	//////	//////	0	//////	//////			SPACE	32	
	33	SPACE			//////	0	//////	//////	0	//////			SPACE	34	
	35	SPACE			//////	//////	0	//////	//////	0			SPACE	36	
	37	SPACE			0	//////	//////	0	//////	//////			SPACE	38	
	39	SPACE			//////	0	//////	//////	0	//////			SPACE	40	
	41	SPACE			//////	//////	0	//////	//////	0			SPACE	42	
					2910	2910	2910	3450	3450	3450					
		TOTAL PER PHASE CONNECTED LOAD (VA)			6360	6360	6360								
		TOTAL PER PHASE DEMAND LOAD (VA)			6523	6523	6523								
		TOTAL PER PHASE DEMAND AMPS			7.8	7.8	7.8	100%	BALANCE						
		TOTAL 3 PHASE PANEL DEMAND (VA)				19568									
		TOTAL 3 PHASE DEMAND AMPS				23.5		0.00	NEUTRAL CURRENT AMPS						

ABBREVIATIONS:
F=FIXED EQUIPMENT, L=LIGHTING LOAD, M=MOTOR LOAD, ML=LARGEST MOTOR LOAD, P=PANEL, R=RECEPTACLE LOAD

SPECIAL PROVISIONS:

PANEL L2

VOLTS:	120/240		SERVICE ENTRANCE	X	SLIP-ON CIRCUIT BREAKERS
PANEL AMP RATING:	100		METER		BOLT-ON CIRCUIT BREAKERS
MAIN BREAKER AMP RATING:	100	X	NEMA 1		ALUMINUM BUS
MINIMUM KAIC:	14		NEMA 3R	X	COPPER BUS
PHASE:	1	X	SURFACE MOUNT		
WIRE:	3		FLUSH MOUNT		
NEUTRAL:	FULL	X	HINGE DOOR		
GROUND:	SOLID		DOOR IN DOOR	PANEL LOCATION	ELECTRICAL BUILDING
		X	LATCH/LOCK DOOR		

CKT NO.	SPC NO.	CIRCUIT DESCRIPTION	BKR SIZE	LOAD TYPE	LOADS (VA) A	LOADS (VA) B	LOADS (VA) A	LOADS (VA) B	LOAD TYPE	BKR SIZE	CIRCUIT DESCRIPTION	SPC NO.	CKT NO.
1	1	* LIFT STATION MISCELLANEOUS	2/50	F	1400	//////	5	//////	F	1/5	POWER FAIL MONITOR	2	2
	3	DISTRIBUTION PANEL "L3"		F	//////	1400	//////	0			SPACE	4	
	5	SPACE			0	//////	0	//////			SPACE	6	
	7	SPACE			//////	0	//////	0			SPACE	8	
	9	SPACE			0	//////	0	//////			SPACE	10	
	11	SPACE			//////	0	//////	0			SPACE	12	
	13	SPACE			0	//////	0	//////			SPACE	14	
	15	SPACE			//////	0	//////	0			SPACE	16	
	17	SPACE			0	//////	0	//////			SPACE	18	
	19	SPACE			//////	0	//////	0			SPACE	20	
	21	SPACE			0	//////	0	//////			SPACE	22	
	23	SPACE			//////	0	//////	0			SPACE	24	
					1400	1400	5	0					
		TOTAL LOAD PER PHASE			1405	1400	100%	BALANCE			TOTAL PANEL DEMAND AMPS = 23.4		
		TOTAL PANEL LOAD (W/O DEMAND)				2805							

ABBREVIATIONS:
F=FIXED EQUIPMENT, L=LIGHTING LOAD, M=MOTOR LOAD, ML=LARGEST MOTOR LOAD, R=RECEPTACLE LOAD

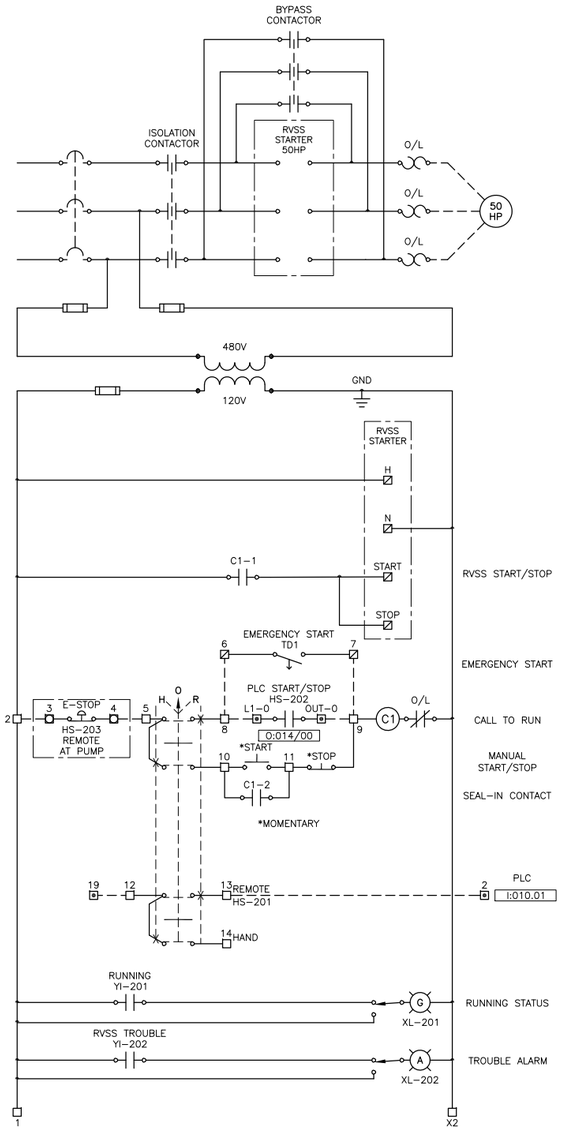
SPECIAL PROVISIONS:
* PANEL "L3" IS LOCATED INSIDE THE PACKAGED LIFT STATION AND IS PROVIDED BY THE MANUFACTURER OF THE PACKAGED LIFT STATION.

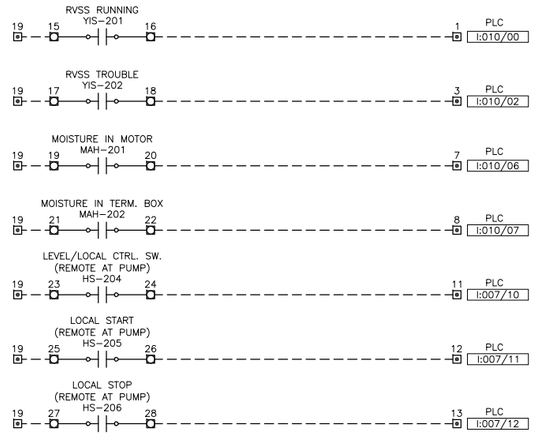
NOTE TO DESIGNER:

THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.

LIGHTING FIXTURE & PANEL SCHEDULE

NOTE TO DESIGNER:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT. REFER TO 2.5.5 MOTOR STARTER DESIGN.





CONTROL BUTTON DESCRIPTIONS:
- HS-203 EMERGENCY STOP: WATERTIGHT MUSHROOM STYLE PUSH BUTTON, NORMALLY CLOSED CONTACT WITH PADLOCKING ATTACHMENT, RED; SIMILAR TO ALLEN BRADLEY CATALOG NUMBER 800T-D6QD1 OR 800T-D6LQD1.
- HS-204 LEVEL/LOCAL CONTROL SWITCH: WATERTIGHT 2 POSITION, MAINTAINED ROTARY SWITCH, 1 NORMALLY OPEN CONTACT; SIMILAR TO ALLEN BRADLEY CATALOG NUMBER 800T-H2D1.
- HS-205 LOCAL START: WATERTIGHT MOMENTARY CONTACT PUSH BUTTON, 1 NORMALLY OPEN CONTACT, GREEN; SIMILAR TO ALLEN BRADLEY CATALOG NUMBER 800T-A1D1.
- HS-206 LOCAL STOP: SAME AS HS-205 LOCAL START, EXCEPT RED; SIMILAR TO ALLEN BRADLEY CATALOG NUMBER 800T-A6D1.

(SEE LOGIC DESCRIPTION IN P&IDs, DWG i4)
THIS SCHEMATIC IS ALSO REPRESENTATIVE OF LIFT PUMPS LP2 AND LP3. TAG NAMES SHOWN ARE FOR LP1. REFER TO P&IDs FOR CORRESPONDING TAG NAMES. ADJUST RVSS OVERLOAD PROTECTION FOR 50HP MOTORS.

LIFT PUMP LP1

UPON ACTIVATION OF THE EMERGENCY FLOAT SWITCH THE FOLLOWING SEQUENCE WILL BEGIN (ASSUMING LP1, LP2 AND LP3 ARE LEAD, LAG AND LAG2, RESPECTIVELY):

0 SEC:
- FLOAT SWITCH CONTACTS CLOSE.
- R1, TDA AND TDB RELAYS ARE ENERGIZED.
- TRIPLEX CONTROLLER RECEIVES LEAD SIGNAL.
- TD1 (LEAD) RELAY IS ENERGIZED.
- TD1 CONTACTS CLOSE.
- LP1 (LEAD PUMP) STARTS.

15 SEC (IF FLOAT REMAINS ACTIVATED):
- TDA RELAY CONTACTS CLOSE.
- TRIPLEX CONTROLLER RECEIVES LAG SIGNAL.
- TD2 (LAG) RELAY IS ENERGIZED.
- TD2 CONTACTS CLOSE.
- LP2 (LAG PUMP) STARTS.

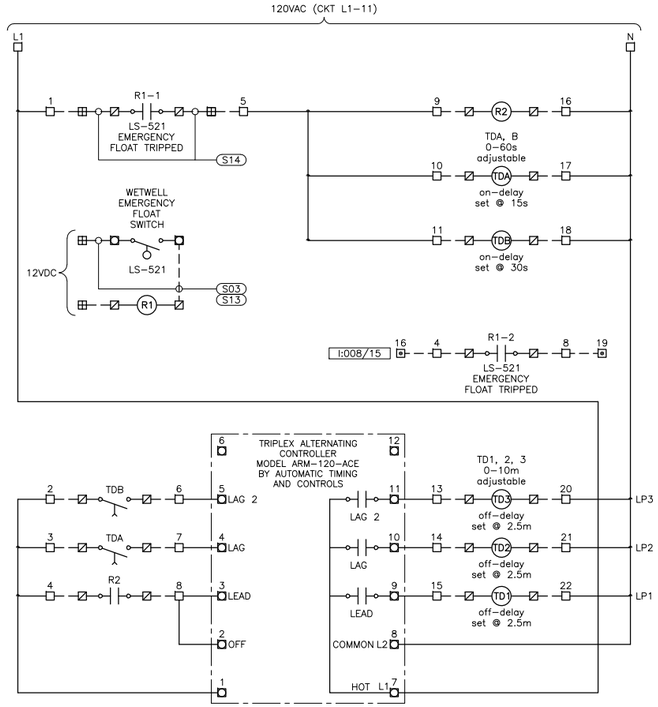
30 SEC (IF FLOAT REMAINS ACTIVATED):
- TDB RELAY CONTACTS CLOSE.
- TRIPLEX CONTROLLER RECEIVES LAG2 SIGNAL.
- TD3 (LAG2) RELAY IS ENERGIZED.
- TD3 CONTACTS CLOSE.
- LP3 (LAG2 PUMP) STARTS.

UPON DE-ACTIVATION OF THE EMERGENCY FLOAT SWITCH THE FOLLOWING SEQUENCE WILL BEGIN (ASSUMING LP1, LP2 AND LP3 ARE LEAD, LAG AND LAG2, RESPECTIVELY):

0 SEC:
- FLOAT SWITCH CONTACTS OPEN.
- R1, TDA AND TDB RELAYS ARE DE-ENERGIZED.
- TRIPLEX CONTROLLER LOSES LEAD, LAG AND LAG2 SIGNALS.
- TD1, TD2 AND TD3 RELAYS ARE DE-ENERGIZED.

2.5 MIN (IF FLOAT REMAINS DE-ACTIVATED):
- TD1, TD2 AND TD3 RELAY CONTACTS OPEN.
- LP1, LP2 AND LP3 STOP.

FUNCTIONAL NOTE:
THE FLOAT SWITCH IS TO PROVIDE BACKUP OPERATION OF LIFT PUMPS IN THE EVENT LEVEL TRANSMITTERS OR PLC FAIL. CONTRACTOR SHALL MODIFY THIS CONTROL SCHEMATIC AS NEEDED BASED ON PRODUCTS SELECTED IN ORDER TO ACHIEVE FUNCTION AS DESCRIBED.
FIELD ADJUST INITIAL TIME DELAYS BASED ON ACTUAL FIELD CONDITIONS.



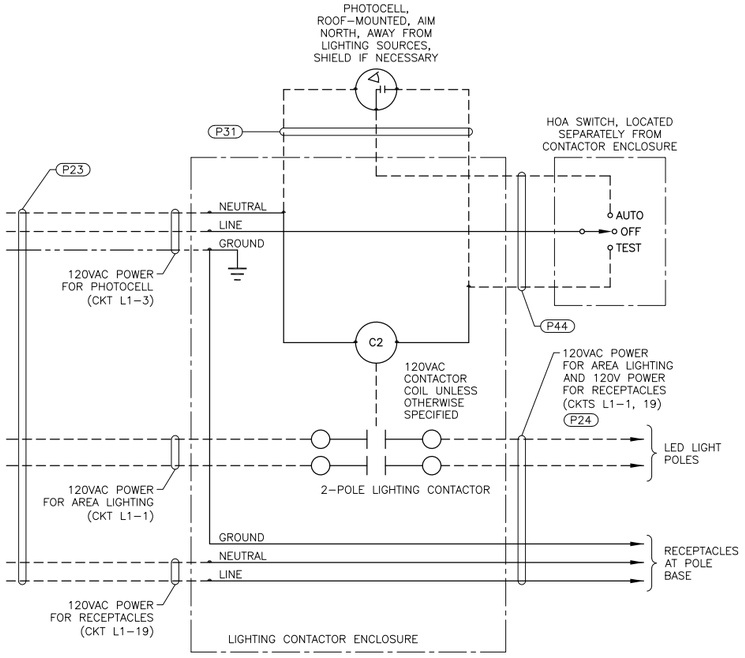
(SEE LOGIC DESCRIPTION IN P&IDs, DWG i2 AND i4)

EMERGENCY FLOAT CONTROL FOR TRIPLEX PUMP CONTROL

EXAMPLE LIFT PUMP SCHEMATIC SOLID STATE SOFT STARTER

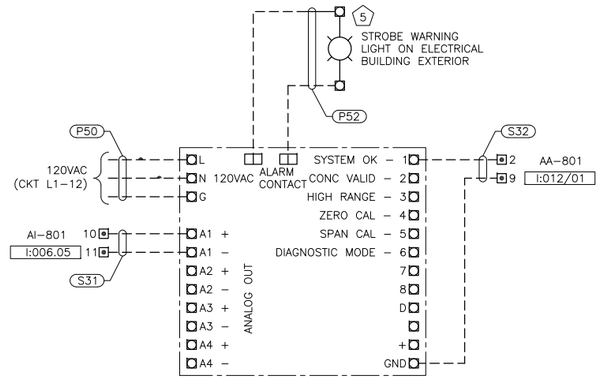
NUMBER: SD-36

ISSUED: -



LIGHTING CONTACTOR ENCLOSURE

NOTE:
WET H2S GAS MONITOR SHALL BE ATI MODEL Q45S OR EQUAL

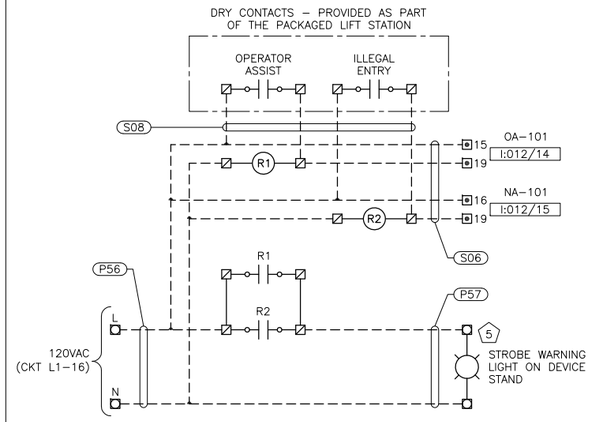


NOTE: ACTUAL SENSOR ELEMENT IS LOCATED WITHIN MANUFACTURED ANALYZER ENCLOSURE. BIOFILTER ANALYZER AND SITE ANALYZER ARE BOTH LOCATED INSIDE ANALYZER CABINET AS SHOWN IN DETAIL 5 DRAWING E4. TEFLON TUBING FROM DESIRED SOURCE DELIVERS SAMPLE GASES TO SUCTION CONNECTION. ANOTHER TEFLON TUBE CARRIES DISCHARGE GASES AWAY FROM ANALYZER. REFER TO DRAWING i5 FOR TUBING DESCRIPTION AND TO MANUFACTURER'S DOCUMENTATION FOR INSTALLATION INSTRUCTIONS.

SCHEMATIC IS SHOWN FOR BIOFILTER GAS MONITOR; SITE GAS MONITOR SHALL BE SIMILAR (SEE LOGIC DESCRIPTION IN P&IDs, DWG i5)

H2S ANALYZER

NOTE TO DESIGNER:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.



LIFT STATION ALARMS

BASIC WIRING DIAGRAMS

NUMBER: SP-37

ISSUED: -

VALVE SYMBOLS

NO NC

GATE VALVE

SWING CHECK VALVE

GLOBE VALVE

BUTTERFLY VALVE (W/HAND WHEEL)

BALL VALVE

PLUG VALVE

ROTARY VALVE

ROTATING DISC VALVE

M — MOTOR OPERATED VALVE

S — SOLENOID VALVE – 2 WAY

S — SOLENOID VALVE – 3 WAY

PRESSURE REGULATING VALVE
EXTERNAL TAP

PRV

PRESSURE REGULATING VALVE
SELF–CONTAINED

CYLINDER OPERATED VALVE
PNEUMATIC/HYDRAULIC, AS SHOWN

PI — PULSATION DAMPENER WITH PRESSURE GAUGE

PI — ISOLATION DIAPHRAGM WITH PRESSURE GAUGE

INSULATING FLANGE

DEVICE WITH ADDITIONAL CONTROL/PROCESSING
FUNCTIONS AS DESCRIBED BELOW:

/

A=ANALOG
B=BINARY
D=DIGITAL
E=VOLTAGE
H=HYDRAULIC
I=CURRENT
O=SONIC, ELECTROMAGNETIC
P=PNEUMATIC
R=RESISTANCE (ELEC.)

Σ	SUMMING	√	ROOT EXTRACT
Σ/n	AVERAGE	>	HIGH SELECT
Δ	DIFFERENCE	<	LOW SELECT
K	PROPORTIONAL	±	BIAS
∫	INTEGRAL	▶|	HIGH LIMIT
d/dt	DERIVATIVE	|◀	LOW LIMIT
X	MULTIPLYING	+	ADDITIVE
÷	DIVIDING	−	SUBTRACTIVE

* — ELECTRICAL CONTROL OR LOGIC FUNCTION AS DESCRIBED:

AND — ALL INPUTS REQUIRED FOR OUTPUT

OR — ANY INPUT CHANGES OUTPUT

NOT — OUTPUT BASED ON CONDITION NON CONCURRENT INPUTS

DIGITAL INPUT — DIGITAL OUTPUT

ANALOG INPUT — ANALOG OUTPUT

RESISTIVE INPUT — RESISTIVE OUTPUT

COMMUNICATIONS INTERFACE

INSTRUMENT AND FUNCTION SYMBOLS

PRIMARY DEVICE/ELEMENT, FIELD MOUNTED

DEVICE/ELEMENT, OPERATOR ACCESS,
INSTALLED NEAR ELEMENT OR ON LOCAL PANEL

DEVICE/ELEMENT, NO OPERATOR ACCESS,
INSTALLED BEHIND LOCAL PANEL

AUXILIARY DEVICE/ELEMENT, OPERATOR ACCESS,
INSTALLED ON AUXILIARY PANEL

AUXILIARY DEVICE/ELEMENT, NO OPERATOR ACCESS,
INSTALLED BEHIND AUXILIARY PANEL

INDICATING LIGHT, OPERATOR ACCESS,
FIELD MOUNTED

ILLUMINATED LIGHT, OPERATOR ACCESS,
INSTALLED NEAR ELEMENT OR ON LOCAL PANEL

ILLUMINATED LIGHT, NO OPERATOR ACCESS,
INSTALLED BEHIND LOCAL PANEL

AUXILIARY ILLUMINATED LIGHT, OPERATOR ACCESS,
INSTALLED BEHIND AUXILIARY PANEL

DUAL DISPLAY/CONTROL FUNCTION, OPERATOR ACCESS,
FIELD MOUNTED

DUAL DISPLAY/CONTROL FUNCTION, OPERATOR ACCESS,
INSTALLED NEAR ELEMENT OR ON LOCAL PANEL

DUAL DISPLAY/CONTROL FUNCTION, NO OPERATOR ACCESS,
INSTALLED BEHIND LOCAL PANEL

AUXILIARY, DUAL DISPLAY/CONTROL FUNCTION, OPERATOR
ACCESS, INSTALLED ON AUXILIARY PANEL

AUXILIARY, DUAL DISPLAY/CONTROL FUNCTION, NO OPERATOR
ACCESS, INSTALLED BEHIND AUXILIARY PANEL

PLC, PRIMARY LOGIC ELEMENT,
FIELD INPUT/OUTPUT

PLC, PRIMARY LOGIC ELEMENT, OPERATOR ACCESS,
PRIMARY/MAIN INPUT/OUTPUT

PLC, PRIMARY LOGIC ELEMENT, NO OPERATOR ACCESS,
PRIMARY/MAIN INPUT/OUTPUT, VIRTUAL SOFTWARE

PLC, AUXILIARY/REMOTE LOGIC ELEMENT, OPERATOR ACCESS,
AUXILIARY/REMOTE INPUT/OUTPUT

PLC, AUXILIARY/REMOTE LOGIC ELEMENT, NO OPERATOR
ACCESS, AUXILIARY/REMOTE INPUT/OUTPUT

PCS/COMPUTER PRIMARY LOGIC ELEMENT,
FIELD INPUT/OUTPUT

PCS/COMPUTER PRIMARY LOGIC ELEMENT, OPERATOR ACCESS,
PRIMARY/MAIN INPUT/OUTPUT

PCS/COMPUTER PRIMARY ELEMENT, NO OPERATOR ACCESS,
PRIMARY/MAIN INPUT/OUTPUT

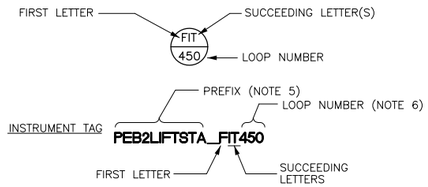
PCS/COMPUTER AUXILIARY ELEMENT, OPERATOR ACCESS,
AUXILIARY/REMOTE INPUT/OUTPUT

PCS/COMPUTER AUXILIARY ELEMENT, NO OPERATOR ACCESS,
AUXILIARY/REMOTE INPUT/OUTPUT

XYZ
INSTRUMENT OR DEVICE CONTROL FUNCTION
DESIGNATIONS

HOA HAND–OFF–AUTO
LOR LOCAL (OFF) REMOTE
HS HAND SWITCH
RSL RAISE–STOP–LOWER
OCA OPEN–CLOSE–AUTO
AM AUTOMATIC–MANUAL
LOS LOCKOUT STOP
SS STOP–START
SEL SELECT
SD SHUTDOWN
HOR HAND–OFF–REMOTE

EXAMPLE - DEVICE IDENTIFICATION



TAG NUMBER/LETTER IDENTIFICATION

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATED VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS (NOTE 1)		ALARM		
B	BURNER FLAME				
C	CONTROL	CLOSE/CONTROL		CLOSED	
D	DENSITY OR SPECIFIC GRAVITY				
E	VOLTAGE		PRIMARY ELEMENT		EAST
F	FLOW	RATIO			
G	NOTE 4		GLASS OR GAUGE		
H	HAND (MANUAL)				HIGH (OPEN)
I	CURRENT		INDICATE, INPUT		
J	POWER	SCAN			
K	TIME OR SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOTOR	MOMENTARY			MOTOR
N		NORMAL		ON	NORTH
O	NOTE 4			OPEN	
P	PRESSURE OR VACUUM				PLC
Q	QUANTITY OR EVENT	TOTALIZE			
R	RADIATION		REMOTE		RTU
S	SOLENOID			SWITCH	SOUTH
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION		
V	VIBRATION			VALVE	
W	WEIGHT WELL/WATER SERVICE				WEST
X	UNCLASSIFIED	NOTE 2	UNCLASSIFIED		
Y	PRESENT STATE OR EVENT			RELAY OR COMPUTE NOTE 3	
Z	POSITION, LIMIT			ACTUATOR, POSITIONER	

NOTES:

1. COVERS ALL ANALYSIS NOT LISTED IN TABLE. TYPE OF ANALYSIS WILL BE DEFINED OUTSIDE TAGGING BALLOON ON DIAGRAM.
2. INTENDED TO COVER UNLISTED MEANINGS THAT WILL BE USED TO A LIMITED EXTENT. MEANINGS WILL BE DEFINED OUTSIDE TAGGING BALLOON ON DIAGRAM.
3. FUNCTION OF COMPUTING DEVICE WILL BE DEFINED OUTSIDE TAGGING BALLOON.
4. USER'S CHOICE.
5. THE INSTRUMENT LOOP NUMBERS SHALL BE PRECEDED BY THE FOLLOWING PREFIXES:

PREFIX	LOCATION
PBLIFTSTA	PEBBLE NO. 2 LIFT STATION

6. DISTRICT STANDARD LOOP NUMBERING CONFORMS TO THE FOLLOWING:

000	MASTER STATION
100	RESERVOIRS, TANKS, BASINS, SUMPS, AIR, SURGE
200	LIFT PUMPS
300	FACILITY, MISC.
400	DISINFECTION
500	LEVEL
600	FIELD COMPUTER
700	ISOLATION VALVES
800	ODOR CONTROL
900	POWER, GENERATOR, MULTILIN
1000	WASHDOWN SOLENOID

7. THE CONTRACTOR SHALL UTILIZE THE DISTRICT'S INSTRUMENT TAG NUMBERING CRITERIA FOR ALL INSTRUMENTATION AND ELECTRICAL COMPONENTS INCLUDING:
   A. WIRING (WIRE LABELS, TERMINALS, WIRE LISTS, ETC.)
   B. FLOW INSTRUMENTATION
   C. FIELD DISPLAYS
   D. SOLENOID VALVES
   E. LEVEL SWITCHES

LINE SYMBOLS

PROCESS INTERCONNECTIONS

PROPOSED PROCESS INTERCONNECTIONS

FUTURE PROCESS INTERCONNECTIONS

ELECTRICAL/LOGIC INTERCONNECTIONS

PNEUMATIC, INSTRUMENT AIR

CAPILLARY LINE

HYDRAULIC LINE

ELECTRIC TRACED LINE

DIRECTIONAL ARROW

INSTRUMENT SIGNAL LINE

PROCESS OR EQUIPMENT CONTROL
PANEL/ENCLOSURE

I/I — SIGNAL ISOLATOR

FLOW INDICATOR

SONIC FLOW METER

PILOT TUBE

VORTEX SENSOR

AVERAGING PILOT TUBE

TURBINE / FLOW METER

M — MAGNETIC FLOW METER

VENTURI TUBE

FLUME

FLOW NOZZLE

LEVEL INDICATOR/TRANSMITTER

CONCENTRIC REDUCER

ECCENTRIC REDUCER

LINE STRAINER

CAPPED END

HOSE CONNECTION

ELBOW – AWAY FROM VIEWER

P — PRESSURE GAUGE

EQUIPMENT/DEVICE SYMBOLS

CENTRIFUGAL PUMP

CHEMICAL FEED PUMP

POSITIVE DISPLACEMENT PUMP

PUMP – AS DEFINED

SUBMERSIBLE SUMP PUMP

PUMP – VERTICAL TURBINE

M — MIXER – PROPELLER TYPE

MOTOR – AS DEFINED FOR APPLICATION

TANK – AS DEFINED

TANK – ABOVE GROUND STORAGE

INJECTION TAP

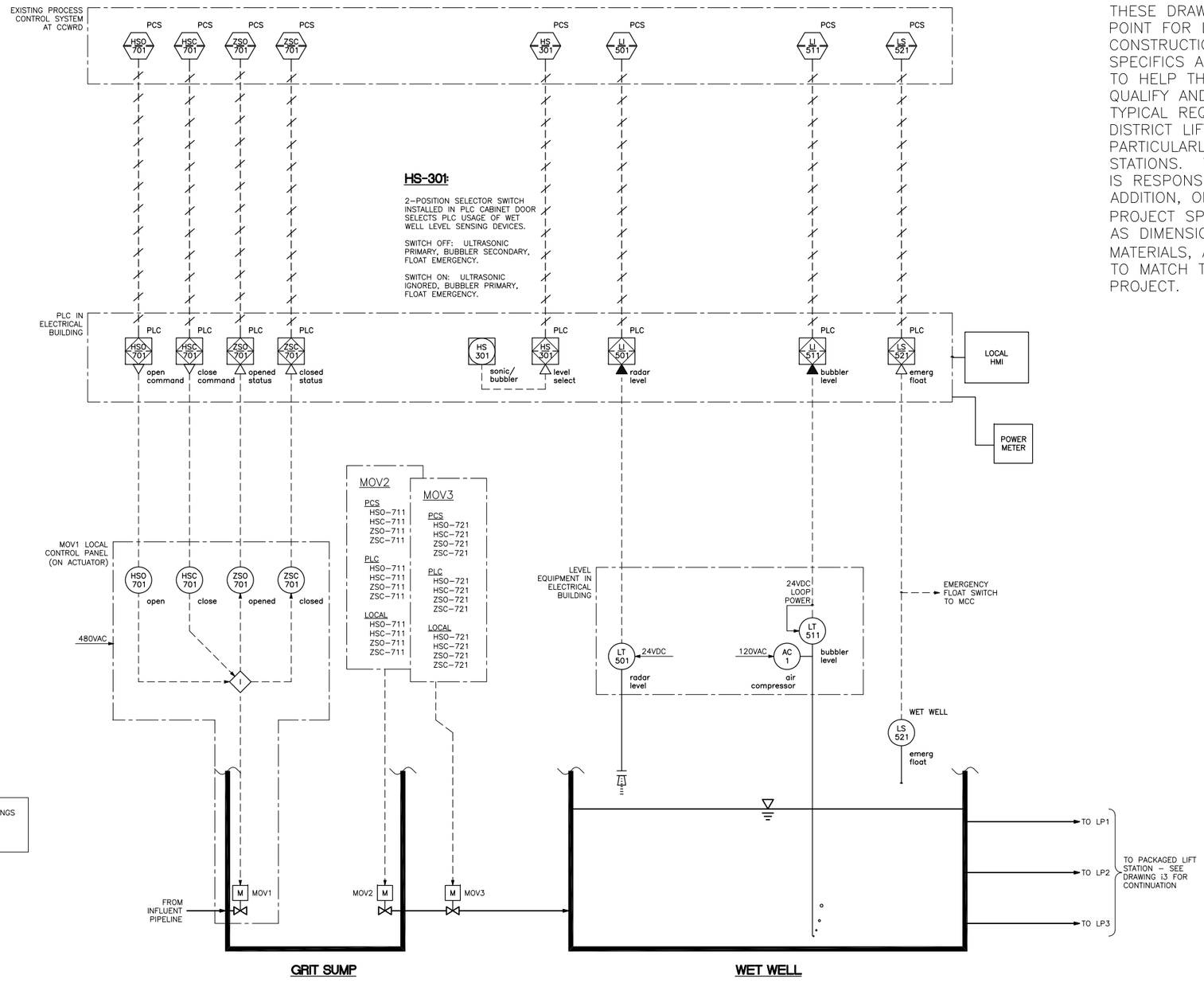
AIR FILTER

P&ID ABBREVIATIONS AND LEGENDS

NUMBER: SP-38

ISSUED: -

NOTE TO DESIGNER:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.

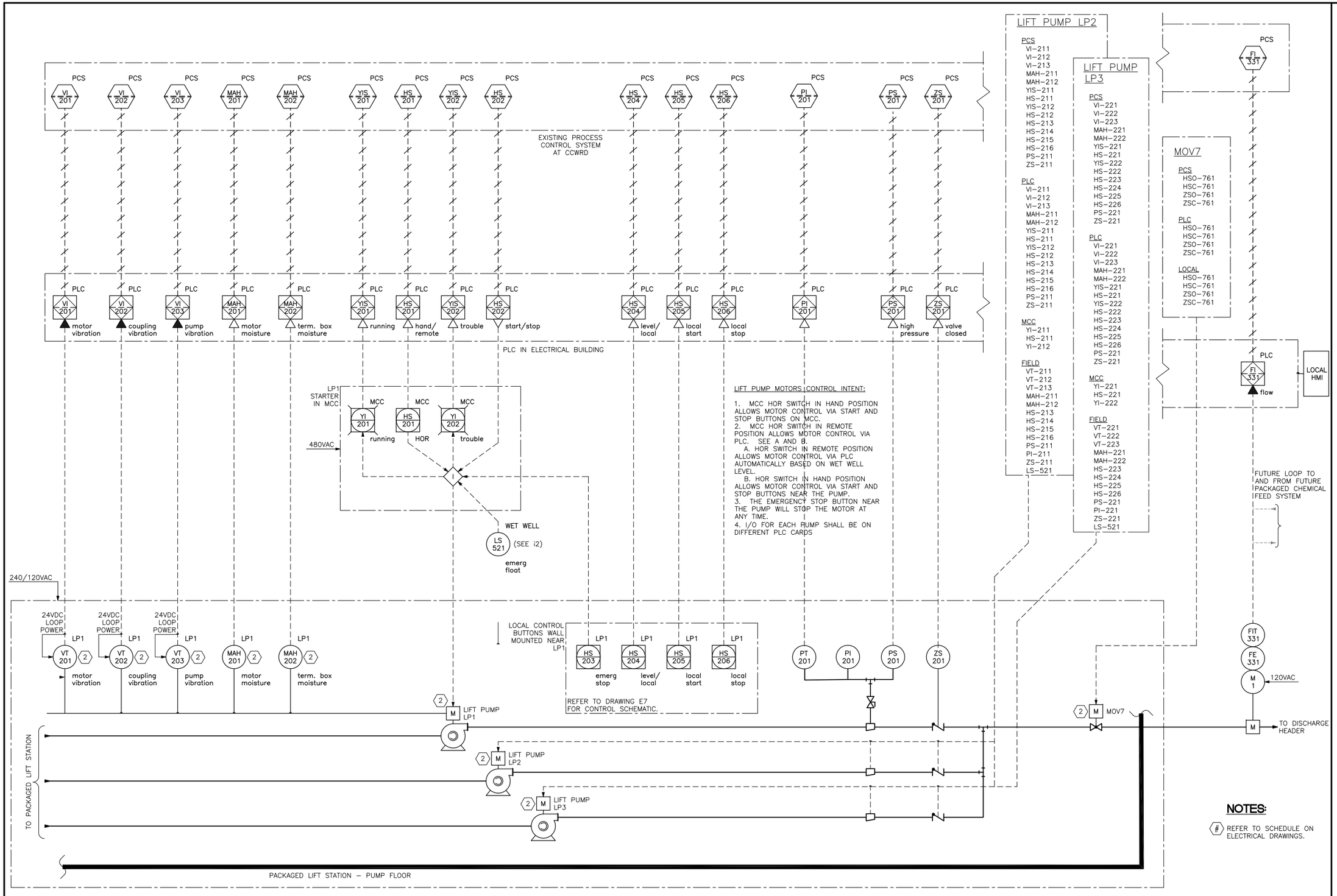


REFER TO MECHANICAL DRAWINGS FOR CROSS REFERENCE BETWEEN MOV NUMBERS AND VALVE NUMBERS

P&ID GRIT SUMP & WET WELL (FOR 3 OR MORE PUMPS)

NUMBER: SP-39

ISSUED: -



PACKAGED LIFT STATION

LIFT STATION (FOR 3 OR MORE PUMPS)

NUMBER: SP-40

ISSUED: -

PACKAGED LIFT STATION

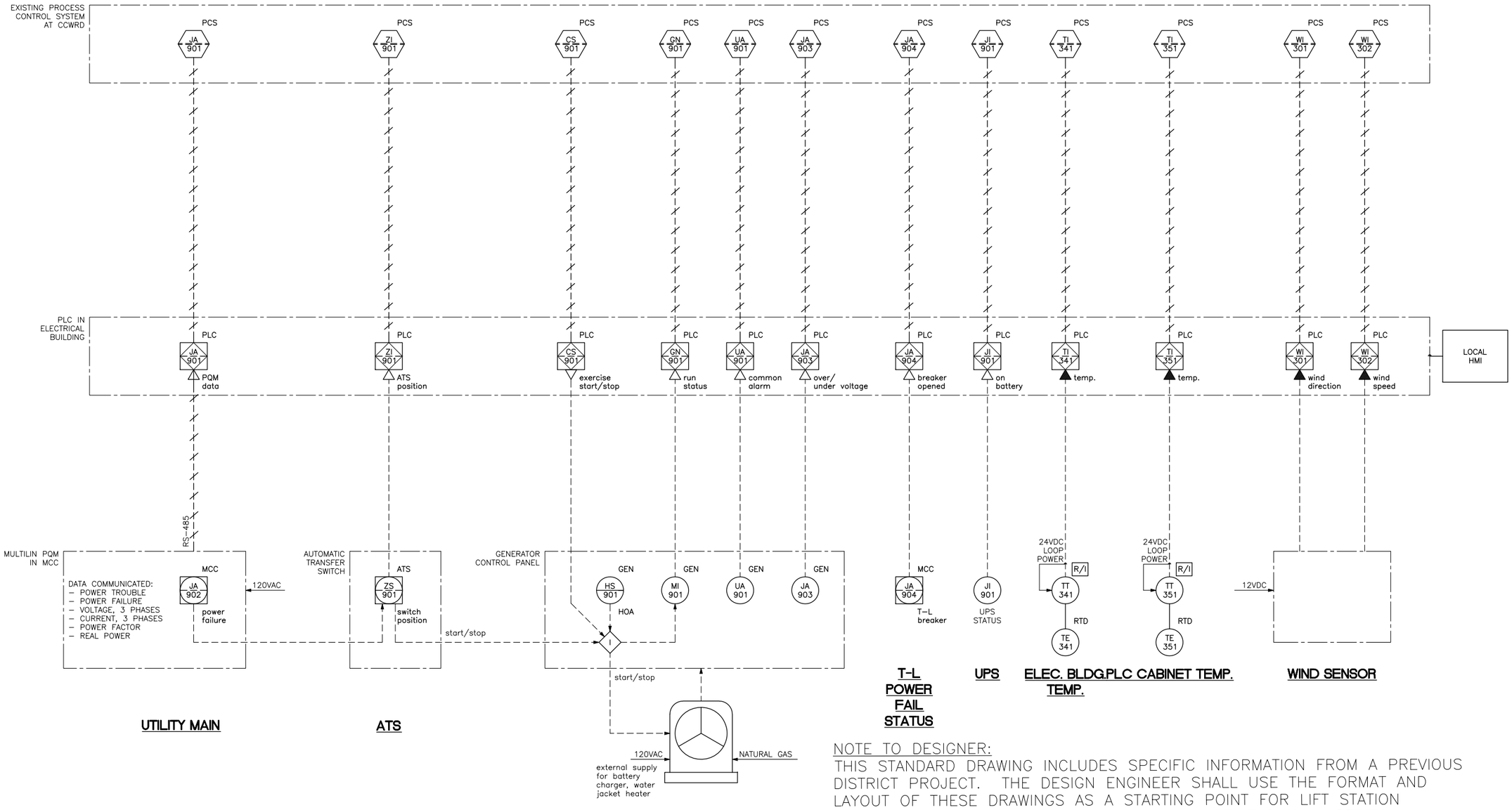
NOTES FOR PACKAGED LIFT STATION:

1. THIS IS A COMPONENT OF THE PACKAGED LIFT STATION. IT WILL BE PROVIDED CONTAINED WITHIN THE PACKAGE. IT IS SHOWN IN THIS P&ID FOR GENERAL INFORMATION ONLY. IT'S CONTROL AND INTEGRATION IS THE RESPONSIBILITY OF THE SUPPLIER OF THE PACKAGE. THESE DRAWINGS DO NOT INCLUDE ALL COMPONENTS OF THE PACKAGE. REFER TO SPECIFICATIONS FOR REQUIREMENTS.
2. THIS COMPONENT WILL BE PROVIDED CONTAINED WITHIN THE PACKAGED LIFT STATION. IT WILL BE POWERED, CONTROLLED AND MONITORED EXTERNALLY FROM THE PACKAGE AS SHOWN. THE SUPPLIER OF THE PACKAGE SHALL PROVIDE ELECTRICAL CONNECTIONS FROM THESE DEVICES TO THE TOP OF THE EQUIPMENT TUBE AS SHOWN MECHANICAL DRAWINGS.

DRY WELL (FOR 3 OR MORE PUMPS)

NUMBER: SP-41

ISSUED: -



NOTE TO DESIGNER:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.

P&ID ELECTRICAL BUILDING AND GENERATOR (FOR 3 OR MORE PUMPS)

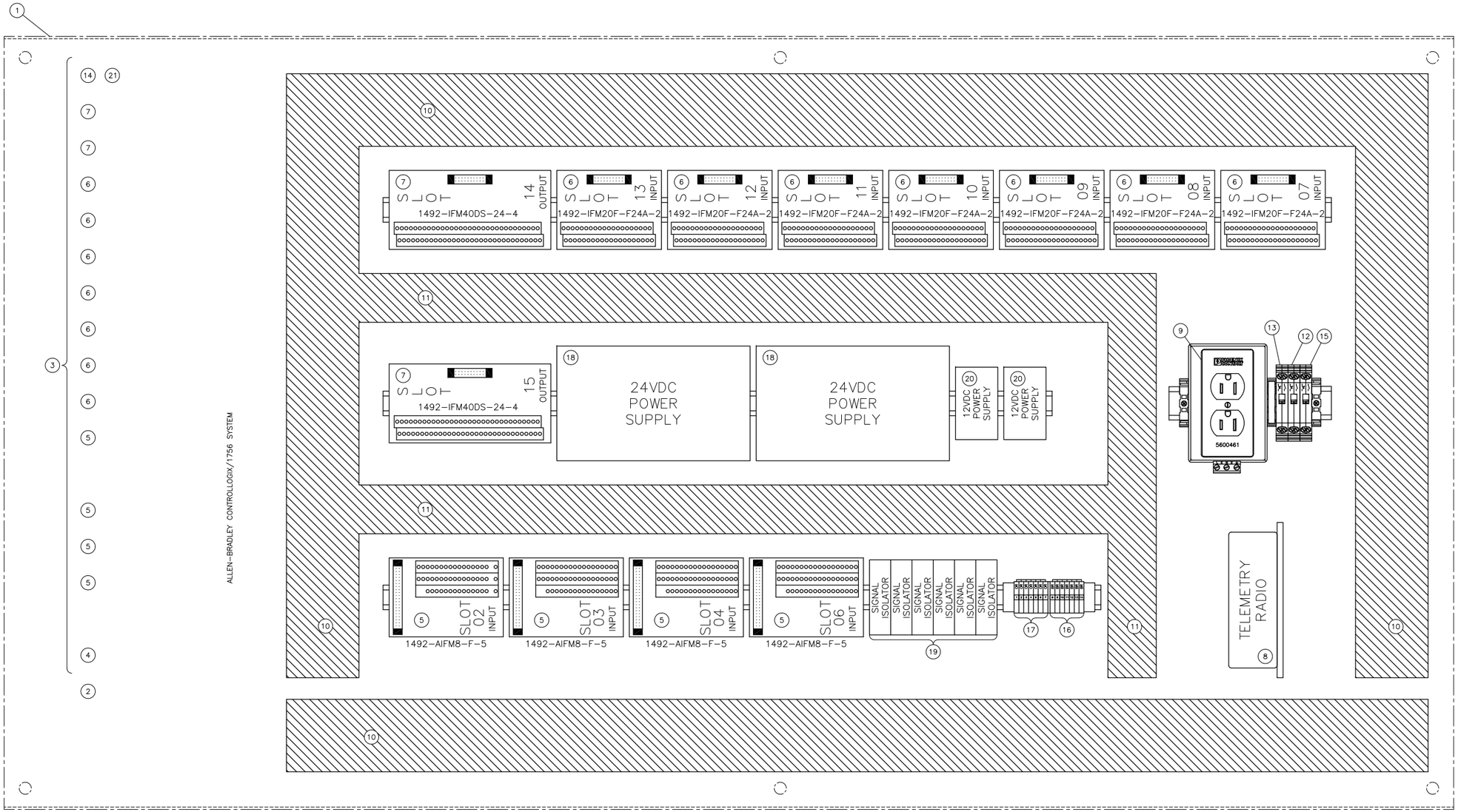
NUMBER: SP-42

ISSUED: -

SHEET NOTES:

1. MOUNTING PANEL: HOFFMAN A-72P36F1 (DIM. 60"L X 32"W), MOUNT IN HOFFMAN SINGLE-DOOR SINGLE ACCESS FREE-STANDING TYPE 12 ENCLOSURE A-723624FS (DIM. 72"L X 36"W X 24"D) OR ACCEPTED SUBSTITUTION.
2. POWER SUPPLY: ALLEN-BRADLEY (A-B) 1756-PA75.
3. PLC CHASSIS: (A-B) 1756-A17 SERIES B, 17 SLOT.
4. PLC PROCESSOR: (A-B) 1756-L7 SERIES.
5. PLC ANALOG INPUT MODULE: (A-B), 16 SINGLE ENDED INPUTS. REQUIRES REMOVABLE TERMINAL BLOCK, CABLE, AND INTERFACE MODULE.
6. PLC DIGITAL INPUT MODULE: (A-B), 16 POINT INPUT MODULE. REQUIRES REMOVABLE TERMINAL BLOCK, CABLE, AND INTERFACE MODULE.
7. PLC DIGITAL OUTPUT MODULE: (A-B), 16 POINT OUTPUT MODULE. REQUIRES REMOVABLE TERMINAL BLOCK, CABLE, AND INTERFACE MODULE.
8. RADIO TRANSCEIVER. 800-900 MHz REMOTE DATA TRANSCEIVER.
9. RECEPTACLE: PHOENIX DIGITAL 5600461.
10. 3" WIDE X 2" HIGH WIREWAY WITH COVER.
11. 2" WIDE X 2" HIGH WIREWAY WITH COVER.
12. 120V 60HZ 1POLE 5AMP CIRCUIT BREAKER TO PLC.
13. 120V 60HZ 1POLE 10AMP CIRCUIT BREAKER TO RECEPTACLE.
14. COMMUNICATION MODULE: (PROSOFT TECHNOLOGY) MODBUS MASTER/SLAVE MODULE MVI56-MCM.
15. 120V, 60HZ, 1 POLE, 5 AMP CIRCUIT BREAKER TO DC POWER SUPPLIES.
16. TERMINAL BLOCK, BROWN, -24VDC DISTRIBUTION, QUANTITY AS NEEDED.
17. TERMINAL BLOCK, ORANGE, +24VDC DISTRIBUTION, QUANTITY AS NEEDED.
18. 120VAC TO 24VDC POWER SUPPLY.
19. 4-20mA SIGNAL ISOLATORS.
20. 120VAC TO 12VDC POWER SUPPLY.
21. A-B 1756-EN2T COMMUNICATION MODULE.

NOTE TO DESIGNER:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.



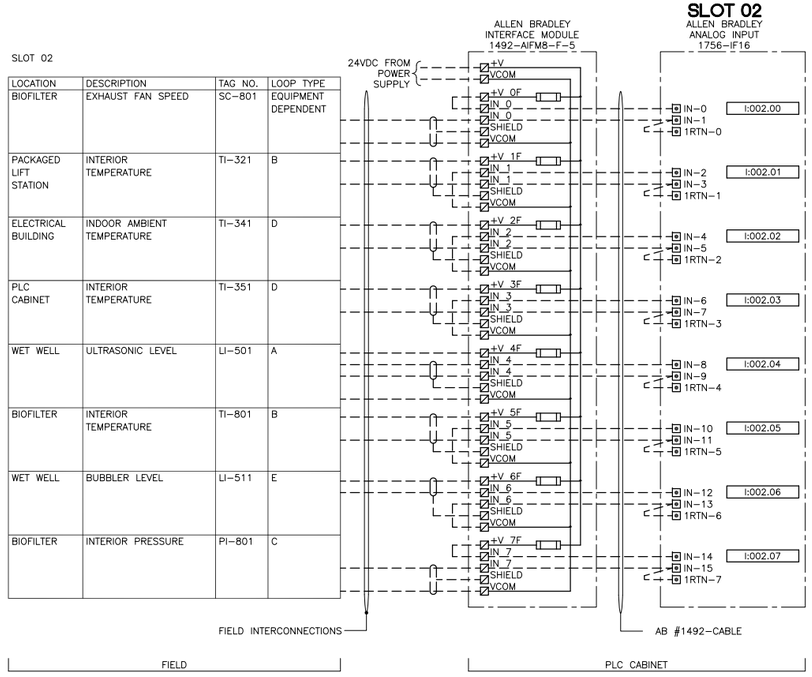
TYPICAL PLC CABINET INTERIOR PANEL (FOR 3 OR MORE PUMPS)

ISSUED: -

NUMBER: SP-43

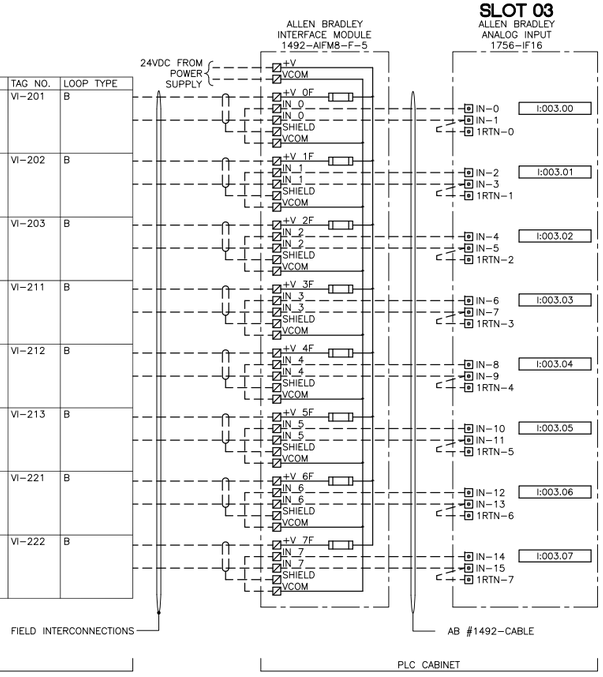
SLOT 02

LOCATION	DESCRIPTION	TAG NO.	LOOP TYPE
BIOFILTER	EXHAUST FAN SPEED	SC-801	EQUIPMENT DEPENDENT
PACKAGED LIFT STATION	INTERIOR TEMPERATURE	TI-321	B
ELECTRICAL BUILDING	INDOOR AMBIENT TEMPERATURE	TI-341	D
PLC CABINET	INTERIOR TEMPERATURE	TI-351	D
WET WELL	ULTRASONIC LEVEL	LI-501	A
BIOFILTER	INTERIOR TEMPERATURE	TI-801	B
WET WELL	BUBBLER LEVEL	LI-511	E
BIOFILTER	INTERIOR PRESSURE	PI-801	C



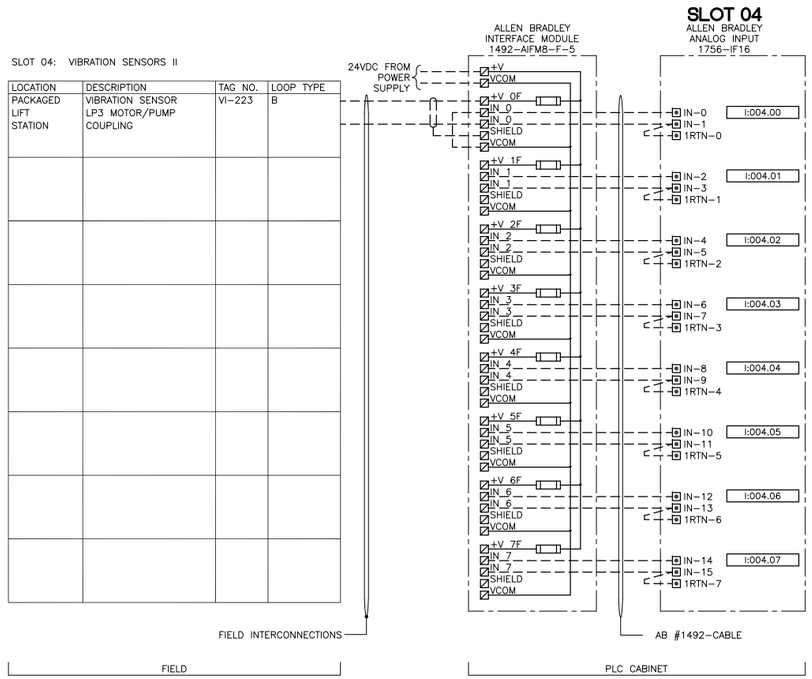
SLOT 03: VIBRATION SENSORS I

LOCATION	DESCRIPTION	TAG NO.	LOOP TYPE
PACKAGED LIFT STATION	VIBRATION SENSOR LP1 MOTOR OUTBOARD SHAFT	VI-201	B
PACKAGED LIFT STATION	VIBRATION SENSOR LP1 MOTOR/PUMP COUPLING	VI-202	B
PACKAGED LIFT STATION	VIBRATION SENSOR LP1 PUMP OUTBOARD SHAFT	VI-203	B
PACKAGED LIFT STATION	VIBRATION SENSOR LP2 MOTOR OUTBOARD SHAFT	VI-211	B
PACKAGED LIFT STATION	VIBRATION SENSOR LP2 MOTOR/PUMP COUPLING	VI-212	B
PACKAGED LIFT STATION	VIBRATION SENSOR LP2 PUMP OUTBOARD SHAFT	VI-213	B
PACKAGED LIFT STATION	VIBRATION SENSOR LP3 MOTOR OUTBOARD SHAFT	VI-221	B
PACKAGED LIFT STATION	VIBRATION SENSOR LP3 MOTOR/PUMP COUPLING	VI-222	B



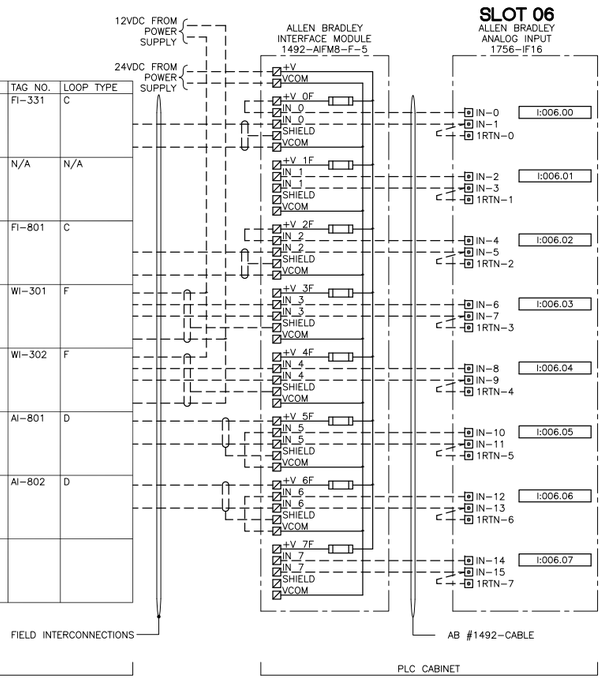
SLOT 04: VIBRATION SENSORS II

LOCATION	DESCRIPTION	TAG NO.	LOOP TYPE
PACKAGED LIFT STATION	VIBRATION SENSOR LP3 MOTOR/PUMP COUPLING	VI-223	B



SLOT 06

LOCATION	DESCRIPTION	TAG NO.	LOOP TYPE
MAIN DISCHARGE	FLOW RATE	FI-331	C
FUTURE BIOXIDE SYSTEM	TANK LEVEL	N/A	N/A
BIOFILTER	INLET AIR FLOW RATE	FI-801	C
WIND SENSOR	WIND DIRECTION	WI-301	F
WIND SENSOR	WIND SPEED	WI-302	F
BIOFILTER	ANALYZER H2S LEVEL	AI-801	D
SITE	ANALYZER H2S LEVEL	AI-802	D



ANALOG		DIGITAL
AI:XXX.YY	INPUT	DI:XXX/YY
AO:XXX.YY	OUTPUT	DO:XXX/YY

XXX = CARD/SLOT
YY = CHANNEL

NOTE TO DESIGNER:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.

PLC RACK LOCATOR

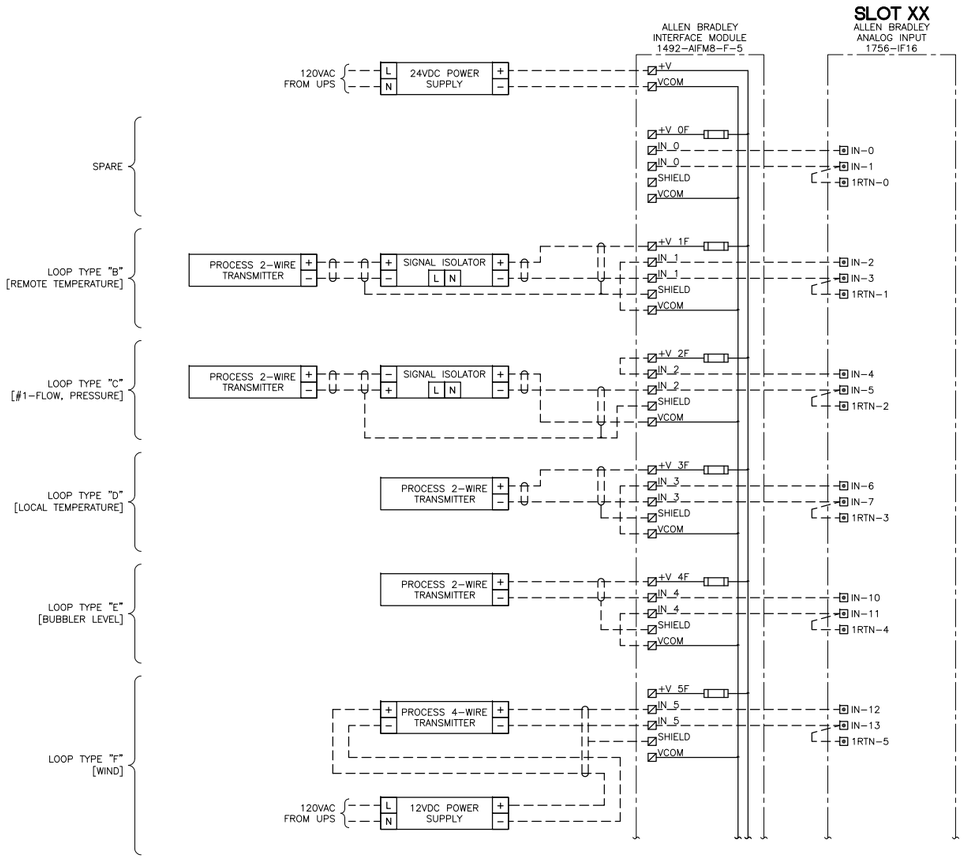
NOTE: REFER TO DETAIL 2, DRAWING E10 FOR LOOP TYPE DEFINITIONS.

PLC INTERFACE DIAGRAMS EXAMPLES (FOR 3 OR MORE PUMPS)

NUMBER: SP-44

ISSUED: -

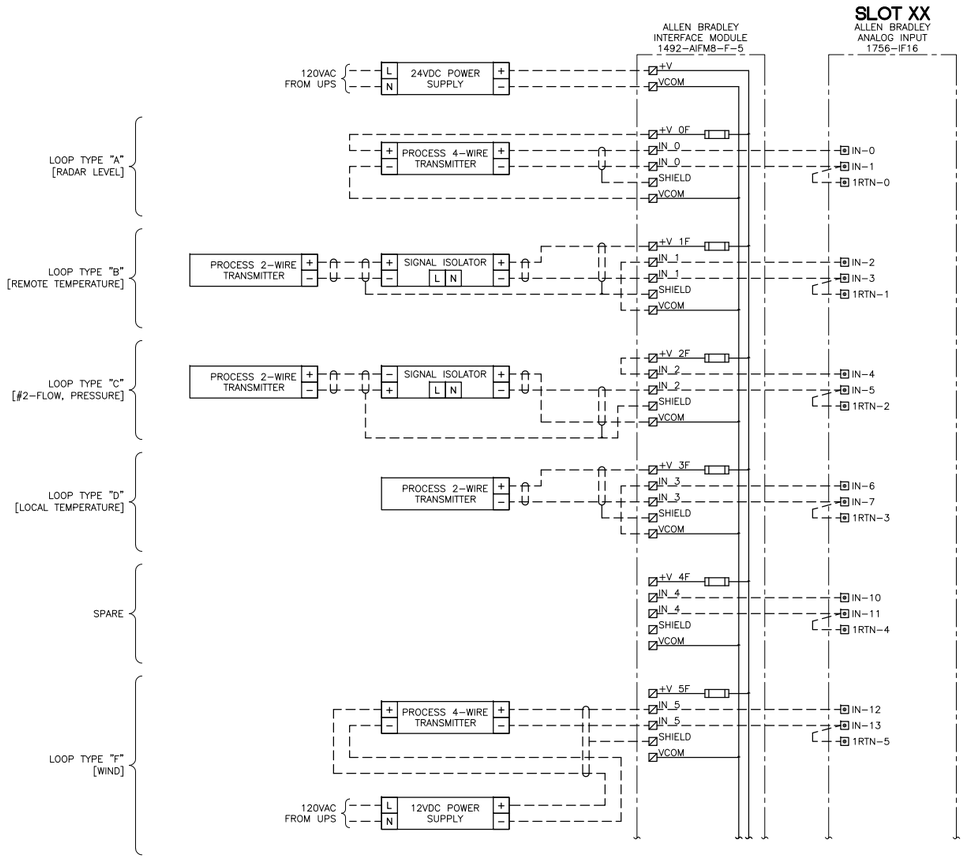
NOTE TO DESIGNER:
THIS STANDARD DRAWING INCLUDES SPECIFIC INFORMATION FROM A PREVIOUS DISTRICT PROJECT. THE DESIGN ENGINEER SHALL USE THE FORMAT AND LAYOUT OF THESE DRAWINGS AS A STARTING POINT FOR LIFT STATION CONSTRUCTION DOCUMENTS. THE SPECIFICS ARE SHOWN IN ORDER TO HELP THE DESIGN ENGINEER QUALIFY AND QUANTIFY THE TYPICAL REQUIREMENTS OF DISTRICT LIFT STATIONS, PARTICULARLY TRIPLEX AND LARGE STATIONS. THE DESIGN ENGINEER IS RESPONSIBLE FOR REVISION, ADDITION, OR DELETION OF THESE PROJECT SPECIFIC ITEMS (SUCH AS DIMENSIONS, SCHEDULES, MATERIALS, AND IDENTIFYING TAGS) TO MATCH THEIR INDIVIDUAL PROJECT.



NOTE: ACTUAL WIRING WILL BE DEPENDENT UPON ACTUAL TRANSMITTERS AND ISOLATORS USED. CONTROLS INTEGRATOR TO PROVIDE WIRING DIAGRAMS.

TYPICAL ANALOG LOOP INDICATOR

SCALE: NOT TO SCALE



NOTE: ACTUAL WIRING WILL BE DEPENDENT UPON ACTUAL TRANSMITTERS AND ISOLATORS USED. CONTROLS INTEGRATOR TO PROVIDE WIRING DIAGRAMS.

TYPICAL ANALOG LOOP INDICATOR

SCALE: NOT TO SCALE

PLC INTERFACE DIAGRAMS -EXAMPLES (FOR 3 OR MORE PUMPS)

NUMBER: SP-45

ISSUED: -

STANDARDIZE CCWRD CONTROL SYSTEM

Ultrasonic level
- Siemens Milltronics
- Endress & Hauser
- Pulsar

Magnetic Flow meters
- Endress & Hauser
- Krohne
- Badger

Actuators
- Rotork
- Rexa

VFDs
- Toshiba
- Rockwell / Allen Bradley

PLCS
- Allen Bradley MicroLogix 1100
- Allen Bradley Controllogix L72

Telemetry Radios
- G.E. MDS-SD9 or I-net2
- Sierra Wireless LS300

Typical duplex pump station control system description, indicators & instrumentation:
- Primary wetwell level system -- bubbler level system with adjustable auto-purge and remote manual purge controls
- Secondary wetwell level monitoring system -- ultrasonic
- Magmeter flowmeter for real-time and flow totalization
- Micrologix 1100 PLC
- GE- MDS -- SD9, Inet II or Sierra Wireless cell modem/radio (based on location)
- High-level float-- used to run the pumps directly from the MCC if the PLC faults; provides discrete alarm to PLC input for monitoring
- Intrusion alarm -- monitors hatches, doors, etc.; provides discrete alarm input to PLC for monitoring
- Drywell flooding alarm float
- Phase failure relay -- monitors incoming power; provides discrete alarm input to PLC for monitoring
- UPS with external failure / bypass detection circuitry with discrete alarm input to PLC for monitoring UPS
- failure
- Pump motor overload trip monitoring
- Pump seal minders
- Power Monitor -- typically GE PQM II
- Generator run status and alarm monitoring
- Check valve position switches and pump "airlock" monitoring
- Outlet manifold pressure indicating transmitter
- Pump run status monitoring
- Pump on and off cycle time monitoring
- Ventilation Blower Run Status monitoring
- Ventilation Air Flow Switch monitoring
- Telemetry success percentage display
- PLC heartbeat and clock display status
- Compressor low-pressure alarm switch
- Force main pressure transmitter
- Intrusion alarms on all hatches, doors, equipment with indication to SCADA
- Control cabinet internal analog temperature indication
- Properly sized PLC cabinet cooler if needed based on environment

Each individual lift station control system is designed to run independently of the Districts other lift stations and main telemetry system to assure continuity of operations in the event of telemetry outages.

Under normal circumstances, full station remote monitoring and control shall be available from District SCADA computer workstations / clients via telemetry.

This includes the ability to remotely:
- place pumps into manual control mode
- start and stop pumps remotely
- bypass check valve limit switches to clear detected airlock conditions
- modify lead, lag and stop level setpoints
- modify alarm setpoints
- control and place a particular pump in a manual lead condition and disable automatic alternation
- remotely purge the bubbler system and change purge timing and parameters

Other aspects Of the system:
- The PLC shall alternate the pumps every fill / pump-down cycle
- PLC flow totalization of flow for present day and previous day will be done in the PLC and available for SCADA system retrieval.
- The PLC will additionally calculate flow based on level start / stop set points. wet-well diameter and pump run /lapse times to estimate station flow during outages of the magnetic flow meter.
- All alarm conditions shall be available on the remote SCADA telemetry for staff notification.
- All system status shall be available on remote SCADA telemetry for monitoring and historization.

DISTRICT OPERATION PHILOSOPHY FOR WET WELL LEVEL INDICATION AND CONTROL

Standard two pump lift stations use a bubbler system connected to the PLC for primary level indication and control. A high level float serves as the activation for the emergency backup system. The float sits in water so it connects to an intrinsically-safe barrier relay that activates a timer relay that pulls in both pump contactors for a preset interval that will bring the wet well level down without causing a low wet well condition. An alarm indication is also sent to the PLC.

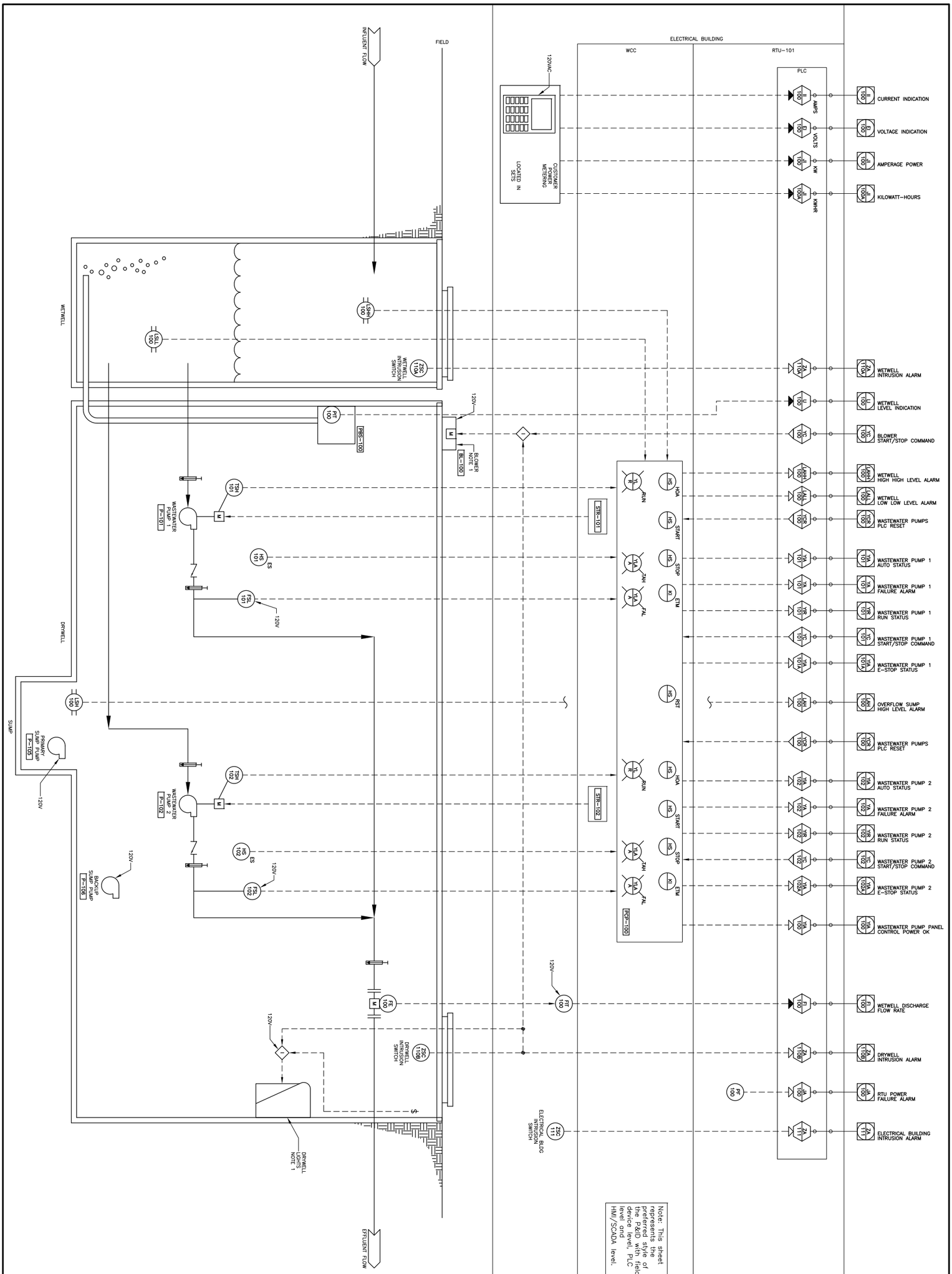
There are several lift stations where we have an alternative analog level system in addition to the bubbler level systems. If a new lift station were to have a secondary analog level system, the preference would be radar since it does not suffer the transducer condensation problems that can occur with ultrasonic level systems in a high-humidity environment. This double level system is on a case by case basis and usually is applied to high-flow stations or remote service area sites.

As long as stations are designed / retrofitted to handle present and future flows, a bubbler level system as primary level indication and a high level float as emergency backup system is sufficient.

CONTROL SYSTEM DESCRIPTIONS

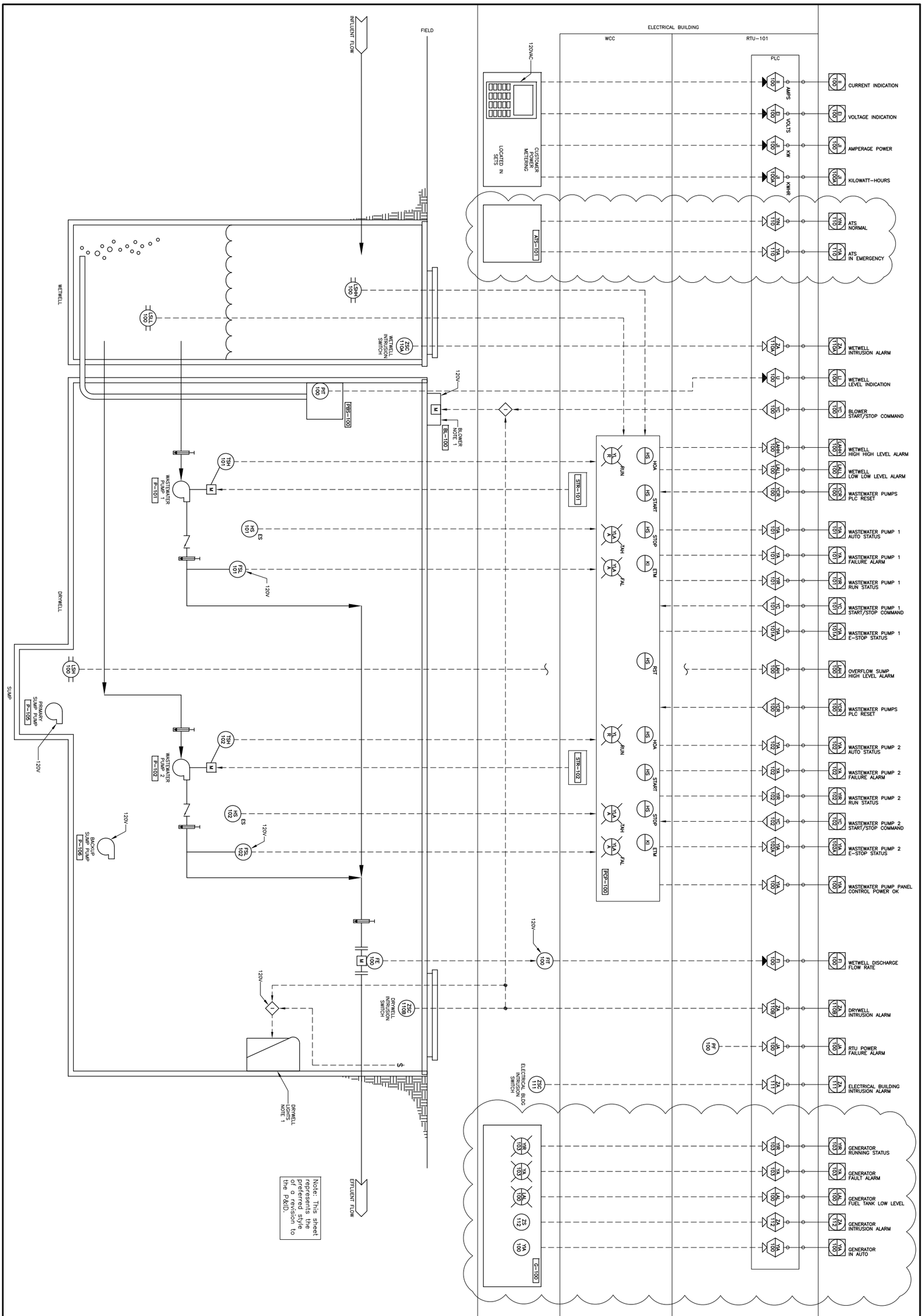
NUMBER: SP-46

ISSUED: -



SAMPLE PROCESS AND INSTRUMENTATION (P&ID) DIAGRAM - WITHOUT REVISION (SAMPLE IS SHOWN FOR A 2 PUMP STATION)

ISSUED: -	NUMBER: SP-47



SAMPLE PROCESS AND INSTRUMENTATION (P&ID) DIAGRAM- WITH REVISION (SAMPLE IS SHOWN FOR A 2 PUMP STATION)

ISSUED: -	NUMBER: SP-48

QTY	PART NUMBER	DESCRIPTION
1	1763-L16DWD	Allen Bradley MicroLogix 1100
1	1762-IF4	Allen Bradley 4 CH Analog input module
1	1762-IQ16	Allen Bradley 16 PT. 24VDC Sink/Sourse input
2	1606-XLE120EC	Allen Bradley 120Watt 24VDC power supply
1		Redundancy module for power supply
5		Double Pole Double throw Relays 24VDC coil
8		Double Pole Double throw Relay 120VAC coil
2		NEMA Motor Starter and Electronic overload
1		Bubbler purge actuator
1		Endress and Hauser Pressure transmitter
1		Intrinsically Safe Relay
1		N.O. Push Button Nema4 30 MM
2		3 Position maintained NEMA4 30mm switch
4		Din Rail mountable fuse assembly
4		Din rail mountable 15Amp Circuit breaker
1		2 wire Temperature sensor
1	MS-142ACX	Whitey Bubbler Purge Actuator(3-way ball valve)
1		Current monitor
1		Pressure Switch
1		Flow Meter

SAMPLE LIFT STATION CONTROL SCHEMATIC/PLC WIRING (SAMPLE SHOWN IS FOR A 2 PUMP STATION) (SHEET 1 OF 4)

NUMBER: SP-49

ISSUED: -

460 / 3 / 60

L1 L2 L3

15A

CPT 120VAC

CB1

POWER UTILITY MONITOR

HAND OFF AUTO X00

CR1 CR5 M1 OL1 ETM CR8

To PLC (I:0/2)

HAND OFF AUTO X00

CR2 CR5 M2 OL2 ETM CR9

To PLC (I:0/6)

VOLTAGE MONITOR CR12 PLC REMOTE RESET CR6

To PLC (I:2/0)

120VAC UPS

CR6 CR6

CB2

Power Supply 1

Power Supply 2

24VDC+ 24VDC-

IN OUT

FU1 Processor 24VDC-

FU2 Slot 1 24VDC-

FU3 Slot 2 24VDC-

FU4 Instrumentation and Devices

L1 N UPS N

M1 OL1 M2 OL2

PUMP # 1 PUMP # 2

120 (UPS) +24VDC L1 N (UPS) N

ISR OL NO 01 20

Wet Well High Float ISR-1 ISR-2 To PLC (I:0/9)

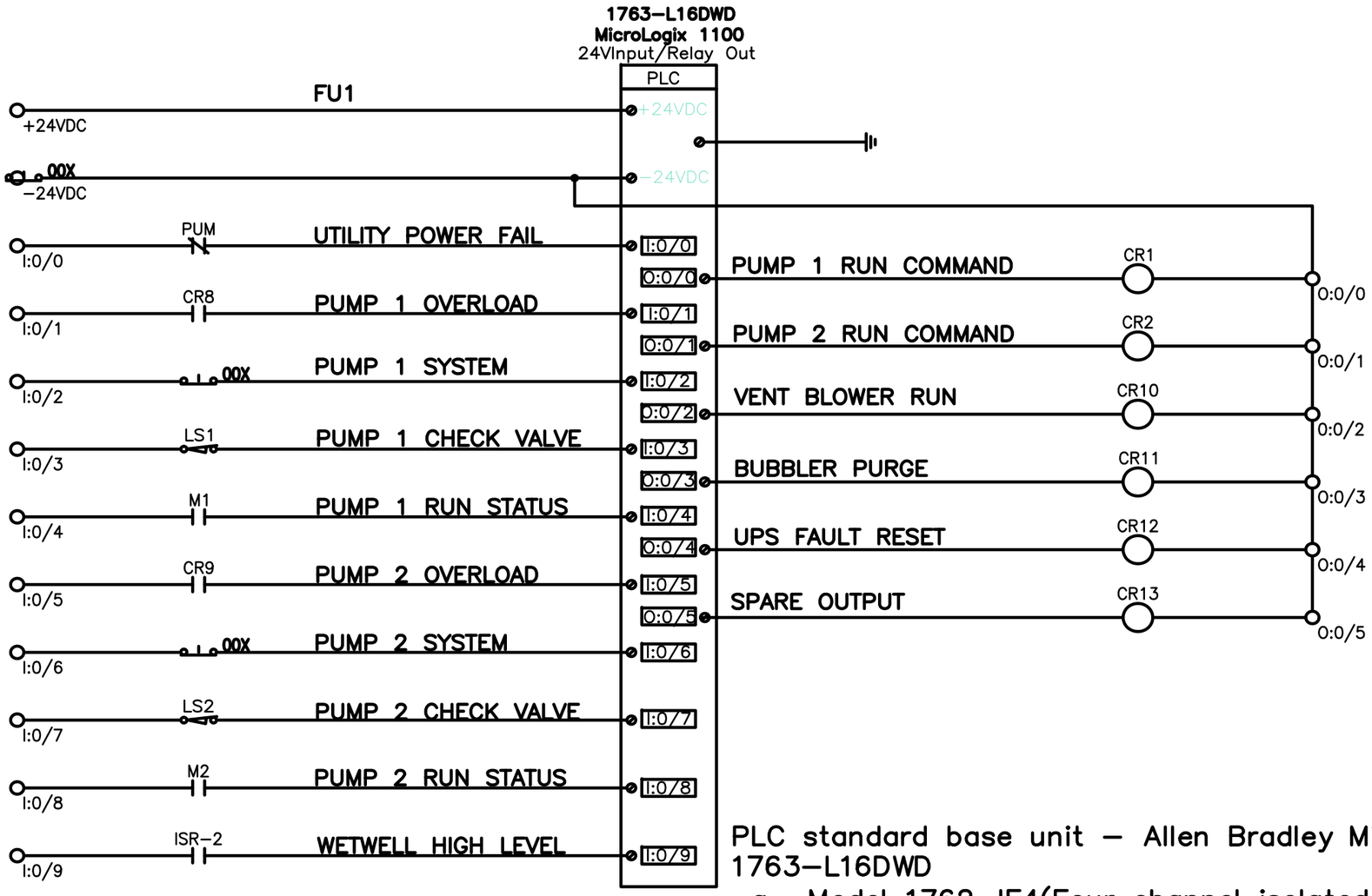
TD1 OFF DELAY CR5

Purge Push Button CR11 CR7

CB3 CR7 CR7

CB4

CB5



PLC standard base unit – Allen Bradley MicroLogix 1100 – model 1763–L16DWD

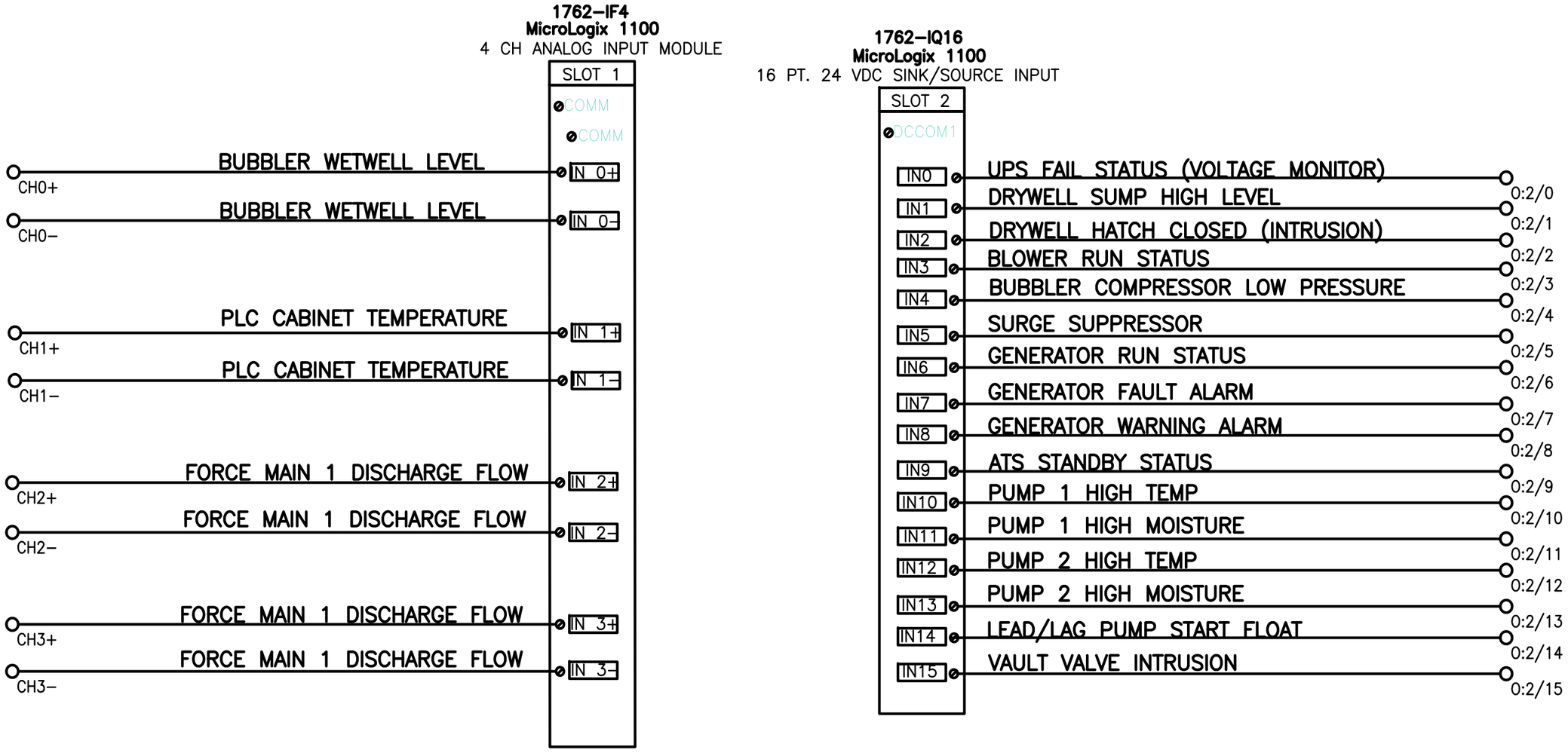
a. Model 1762–IF4(Four channel isolated analog input module– one or tow as required based on instrumentation provided.)
b. Model 1762–IQ16 (sixteen channel discrete input module– one or two as required based on monitored points.)

ALLEN BRADLEY MICROLOGIX 1100

SAMPLE LIFT STATION CONTROL SCHEMATIC/PLC WIRING
(SAMPLE SHOWN IS FOR A 2 PUMP STATION) (SHEET 2 OF 4)

NUMBER: SP-50

ISSUED: -

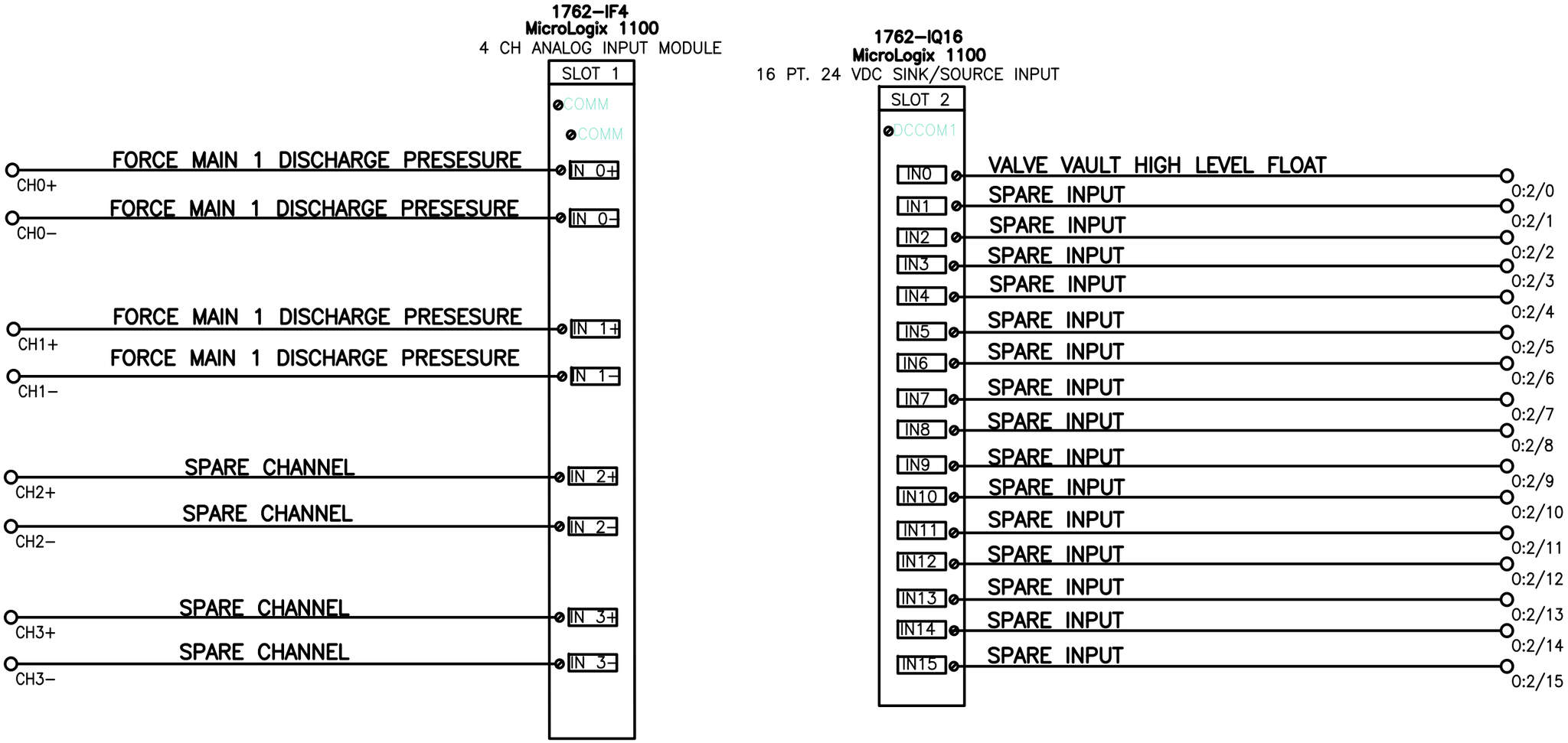


ALLEN BRADLEY MICROLOGIX 1100

SAMPLE LIFT STATION CONTROL SCHEMATIC/PLC WIRING
(SAMPLE SHOWN IS FOR A 2 PUMP STATION) (SHEET 3 OF 4)

NUMBER: SP-51

ISSUED: -

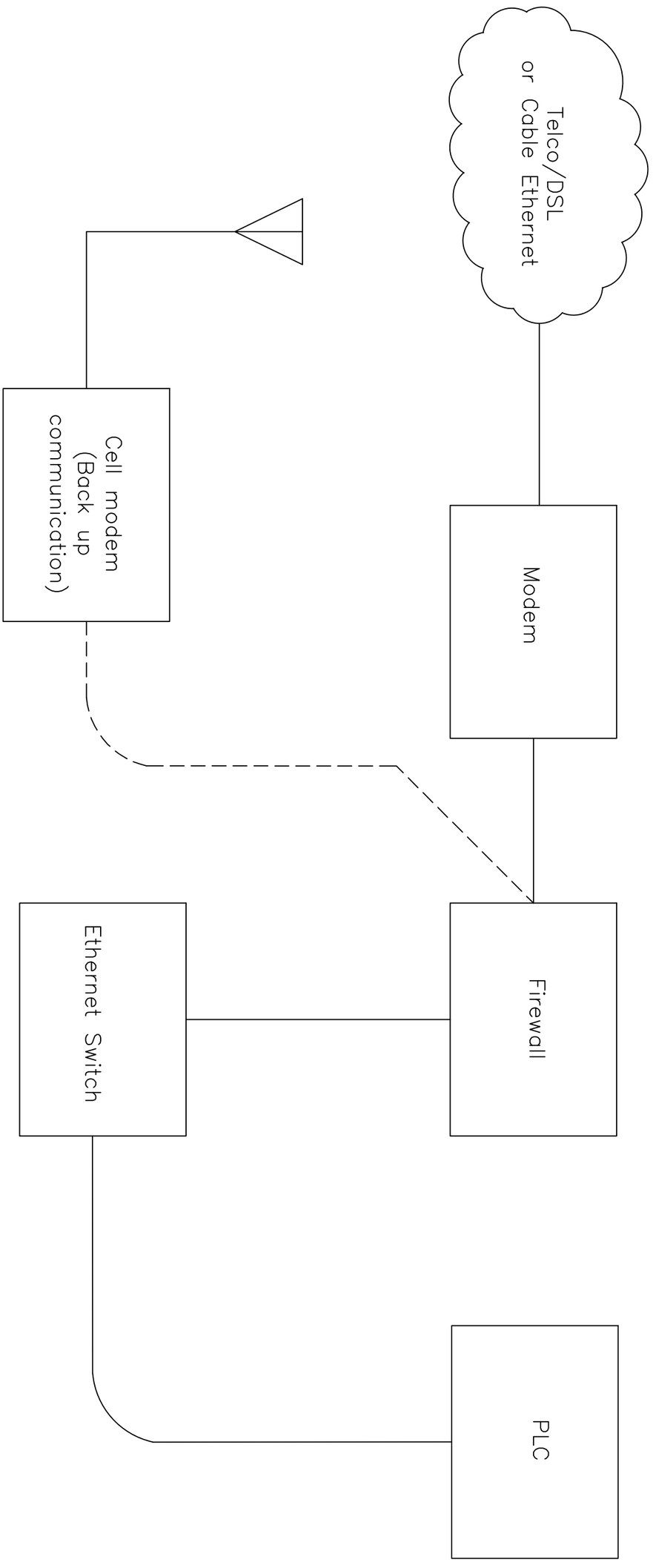


ALLEN BRADLEY MICROLOGIX 1100

SAMPLE LIFT STATION CONTROL SCHEMATIC/PLC WIRING
(SAMPLE SHOWN IS FOR A 2 PUMP STATION) (SHEET 4 OF 4)

NUMBER: SP-52

ISSUED: -



TELEMETRY EXAMPLES
(FOR DUPLEX PUMPS)

ISSUED: -	NUMBER: SP-53

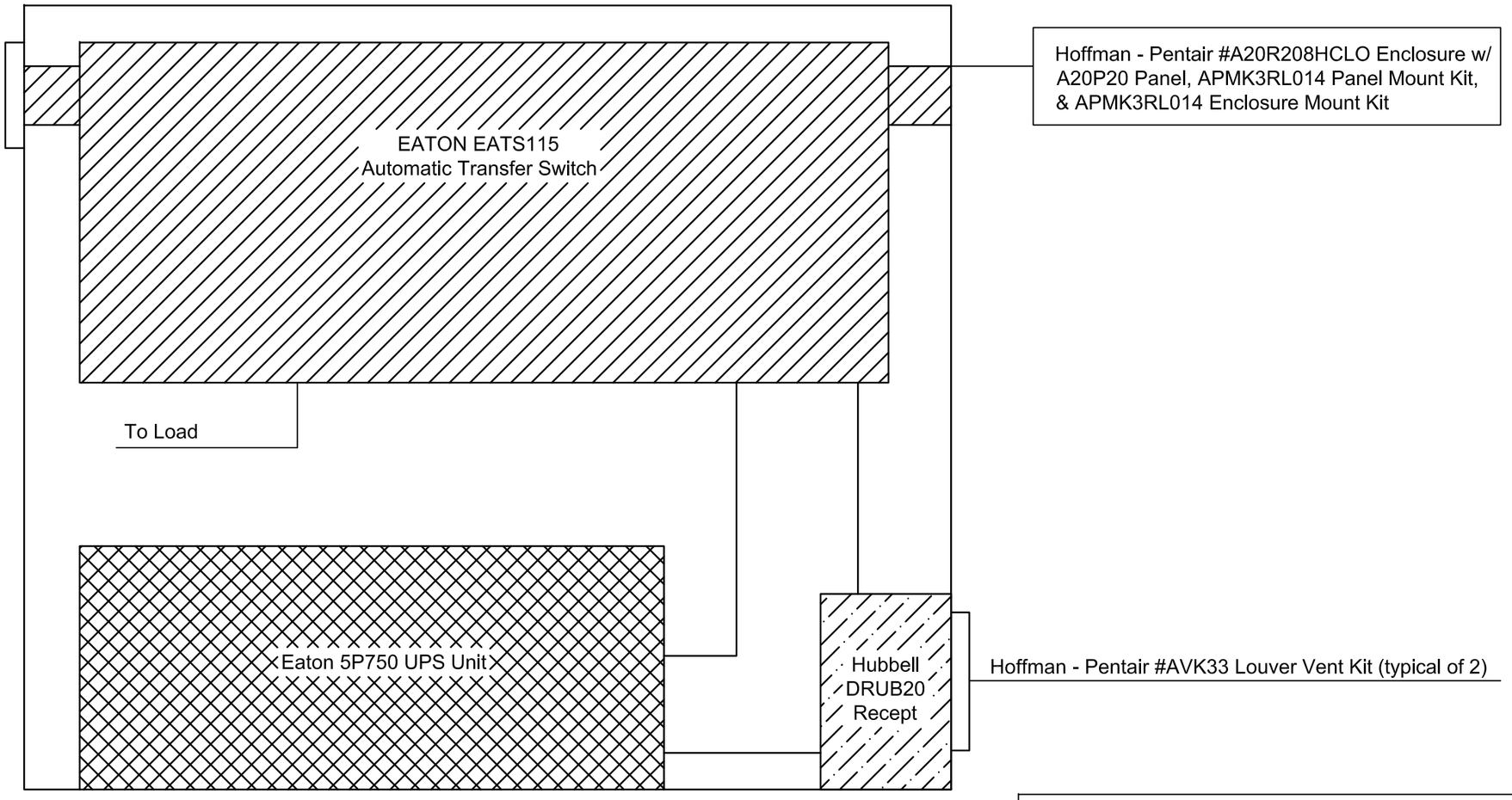
Liftstation I/O

Type	I/O Point	Tag	Description	Scale
1763-L16DWD				
DI	I:0/0	JA_0102	Lift Station Phase status	0=Failed
DI	I:0/1	MLA_0210	Pump 1 overload status	1=Overload
DI	I:0/2	MLK_0210	Pump 1 system status	1=System
DI	I:0/3	ZSL_0210	Pump 1 check valve status	1=Closed
DI	I:0/4	MLN_0210	Pump 1 Run status	1=running
DI	I:0/5	MLA_0220	Pump 2 overload status	1=Overload
DI	I:0/6	MLK_0220	Pump 2 system status	1=System
DI	I:0/7	ZSL_0220	Pump 2 check valve status	1=Closed
DI	I:0/8	MLN_0220	Pump 2 Run status	1=running
DI	I:0/9	LSHH_0040	Wetwell high level status	1=High level
DO	O:0/0	MD_0210	Pump 1 run command	1=Start
DO	O:0/1	MD_0220	Pump 2 run command	1=Start
DO	O:0/2	MD_BLOWER	Blower run command	1=Start
DO	O:0/3	MD_0001	Bubbler Purge command	1= purge
DO	O:0/4	MD_0040	UPS Fault Reset	1=Reset
DO	O:0/5			
1762-IF4				
AI	I:1.0	LIT_0040	Bubbler wetwell level	0-160 Inches
AI	I:1.1	TIT_0001	PLC cabinet temperature	0-200 F
AI	I:1.2	FIT_0306	Force Main 1 Discharge Flow	
AI	I:1.3	FIT_0307	Force Main 2 Discharge Flow	
1762-IQ16				
DI	I:2/0	HS_0001P	UPS Bypass Status	1=Bypassed
DI	I:2/1	LSHH_0001D	Drywell sump high level status	1=Alarm
DI	I:2/2	HS_0001H	Drywell intrusion status	1=Intrusion
DI	I:2/3	MLN_0204	Scrubber blower run status	1=Running
DI	I:2/4	PSL0001	Bubblerlow pressure status	1=low
DI	I:2/5	XS_0001	Surge suppressor status	0=Failed
DI	I:2/6	MLN_0101	Generator run status	1=running
DI	I:2/7	MA_0101	Generator fault alarm	1=fault
DI	I:2/8	YA_0101	Generator warning alarm	1=running
DI	I:2/9	YA_0501	ATS standby status	1=standby
DI	I:2/10	TAH_0210	Pump 1 high temp	1=High
DI	I:2/11	MAH_0210	Pump 1 high moisture	1=high
DI	I:2/12	TAH_0220	Pump 2 high temp	1=high
DI	I:2/13	MAH_0220	Pump 2 high moisture	1=high
DI	I:2/14	LAH_0040	Lead/Lag pump start float	1= float start
DI	I:2/15	HS_0301	Valve vault intrusion	1= intrusion
1762-IQ16				
DI	I:3/0	LAH_0308	Valve vault high level float	1=high
DI	I:3/1			
DI	I:3/2			
DI	I:3/3			
DI	I:3/4			
DI	I:3/5			
DI	I:3/6			
DI	I:3/7			
DI	I:3/8			
DI	I:3/9			
DI	I:3/10			
DI	I:3/11			
DI	I:3/12			
DI	I:3/13			
DI	I:3/14			
DI	I:3/15			
1762-IF4				
AI	I:4.0	PIT_0302	Force Main 1 discharge pressure	
AI	I:4.1	PIT_0303	Force Main 2 discharge pressure	
AI	I:4.2			
AI	I:4.3			

SAMPLE LIFT STATION I/O POINTS AND TAGS
(SAMPLE IS SHOWN FOR A 2 PUMP STATION)

NUMBER: SP-54

ISSUED: -



NOTE: UPS SHOULD NOT BE IN PLC CABINET BUT LOCATED NEARBY IN AN ENCLOSURE WITH VENTILATION SIMILAR TO THE UPS CABINET

SAMPLE UPS CABINET LAYOUT

SAMPLE LIFT STATION
UPS CABINET

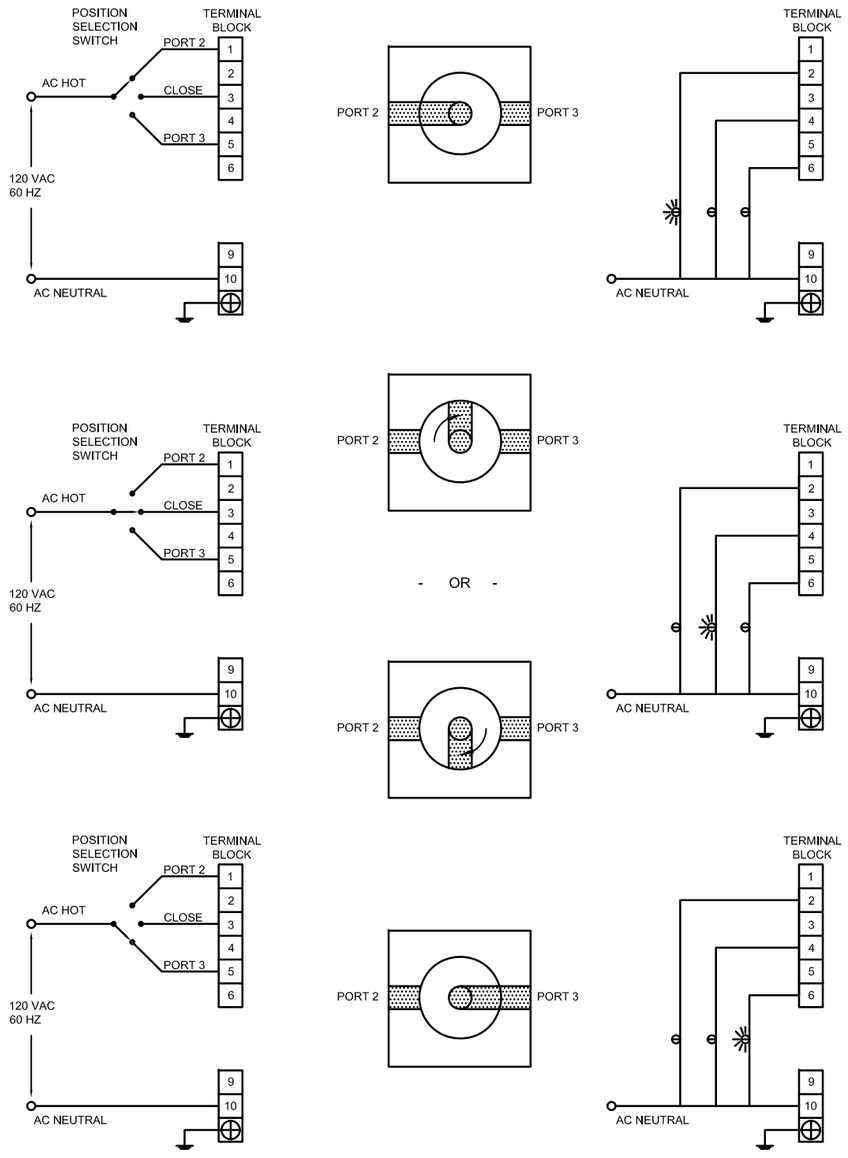
NUMBER: SP-55

ISSUED: -

Valve Stern Position vs. Applied Control Signal

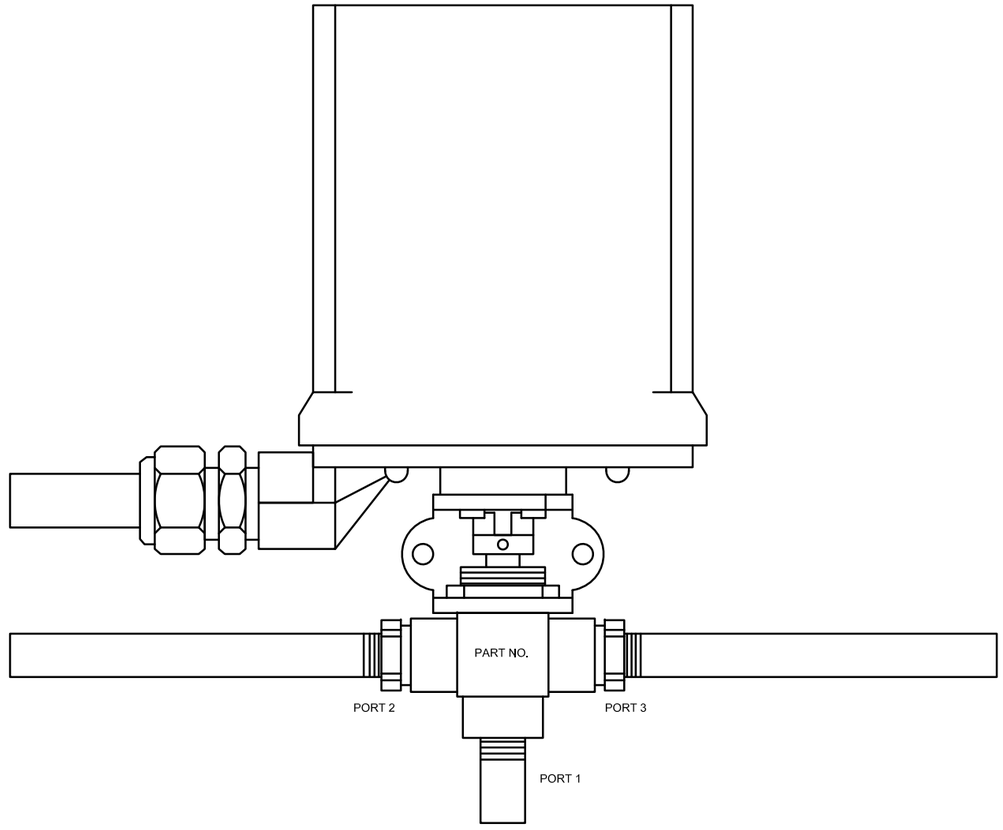
3-Way Ball Valves

CONTROL SIGNAL CONFIGURATION | RESULTING VALVE STEM POSITION | RESULTING LAMP STATUS



MS-INS-142ACX-(REV. D)

Whitey 142 Series Type ACX Electric Ball Valve Actuators



MS-142ACX

FOR USE ON 3-WAY BALL VALVES

SAMPLE BUBBLER SYSTEM FOR WET WELL MONITORING (SHEET 1 OF 5)

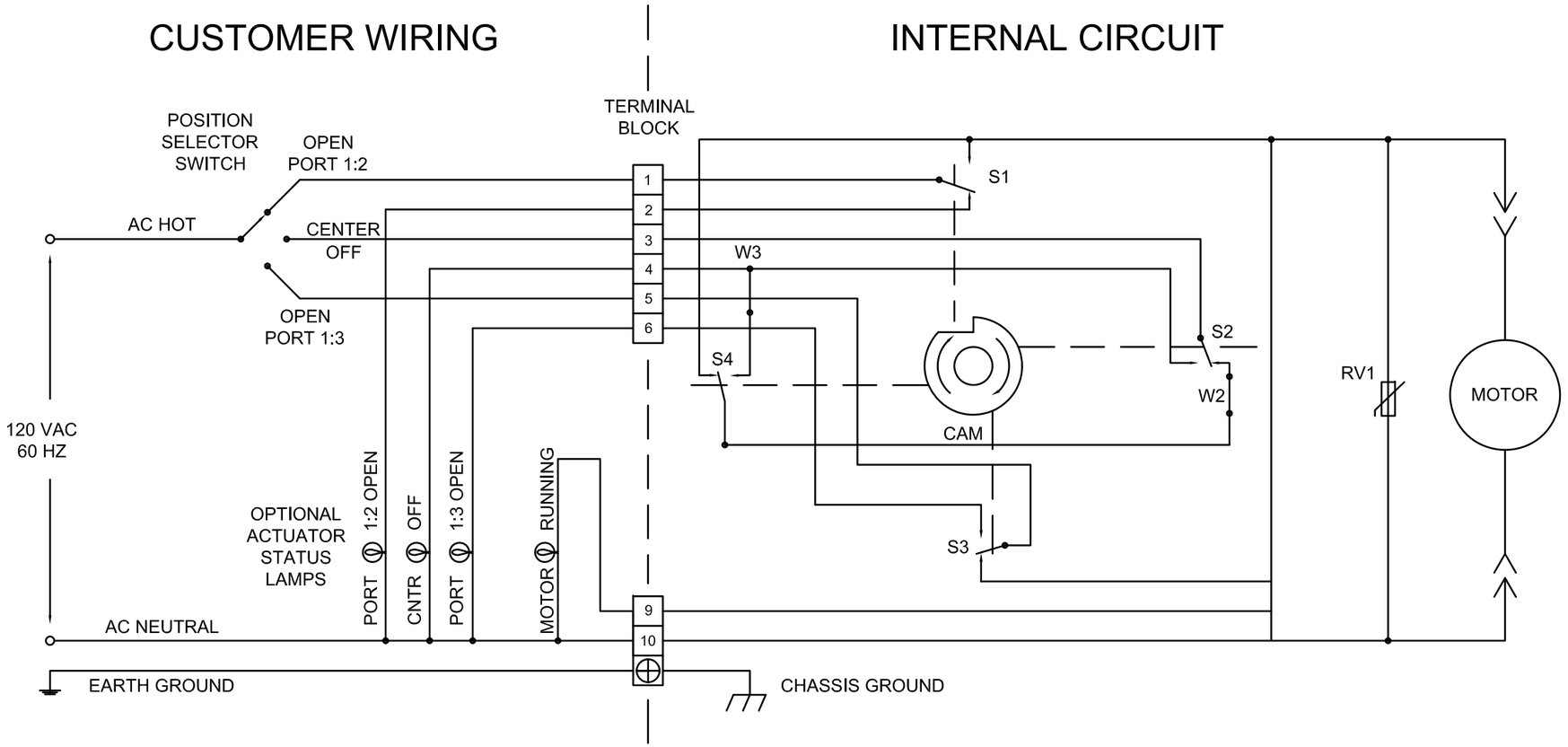
NUMBER: SP-56

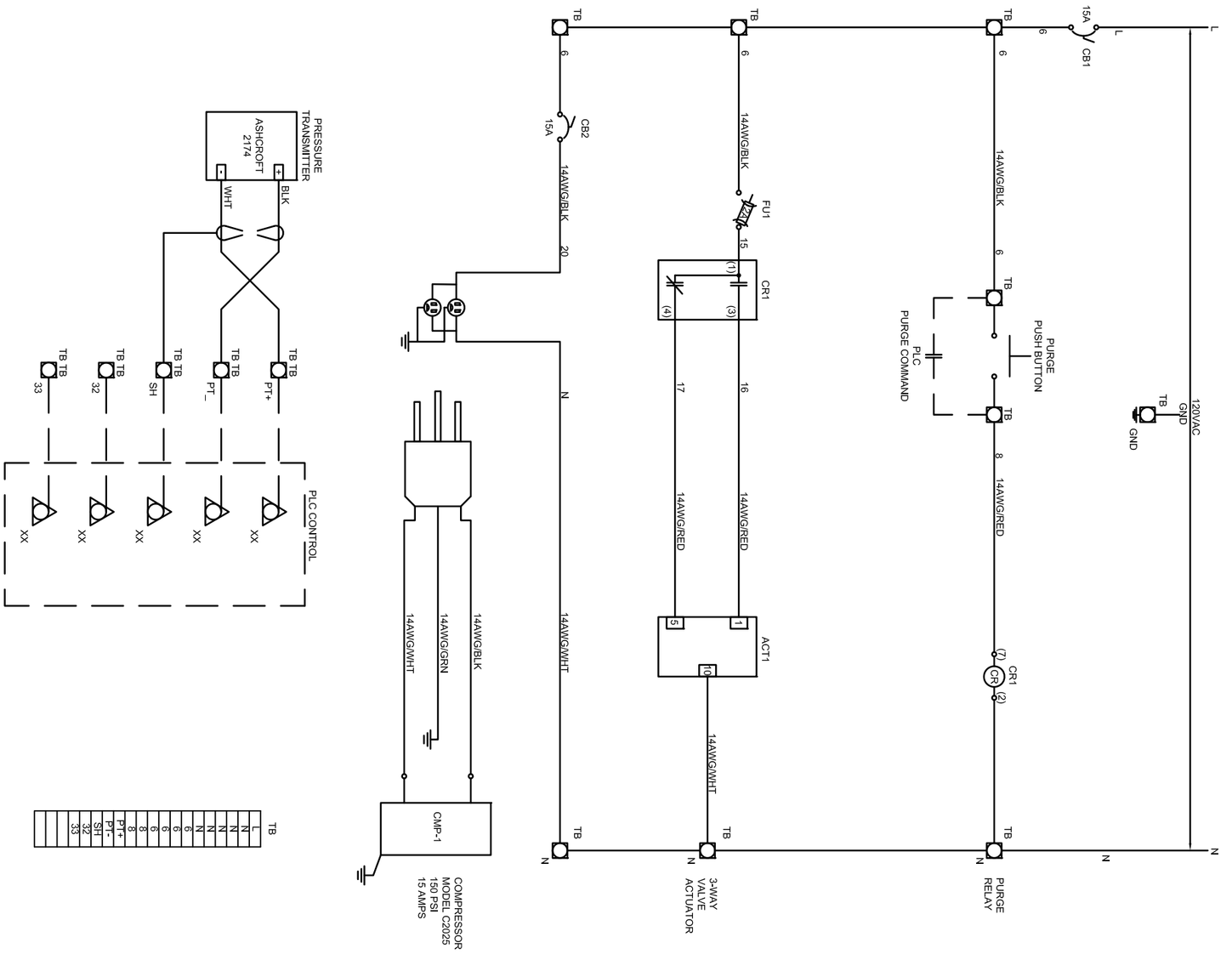
ISSUED: -

SAMPLE BUBBLER SYSTEM FOR WET WELL LEVEL MONITORING (SHEET 2 OF 5)

NUMBER: SP-57

ISSUED: -

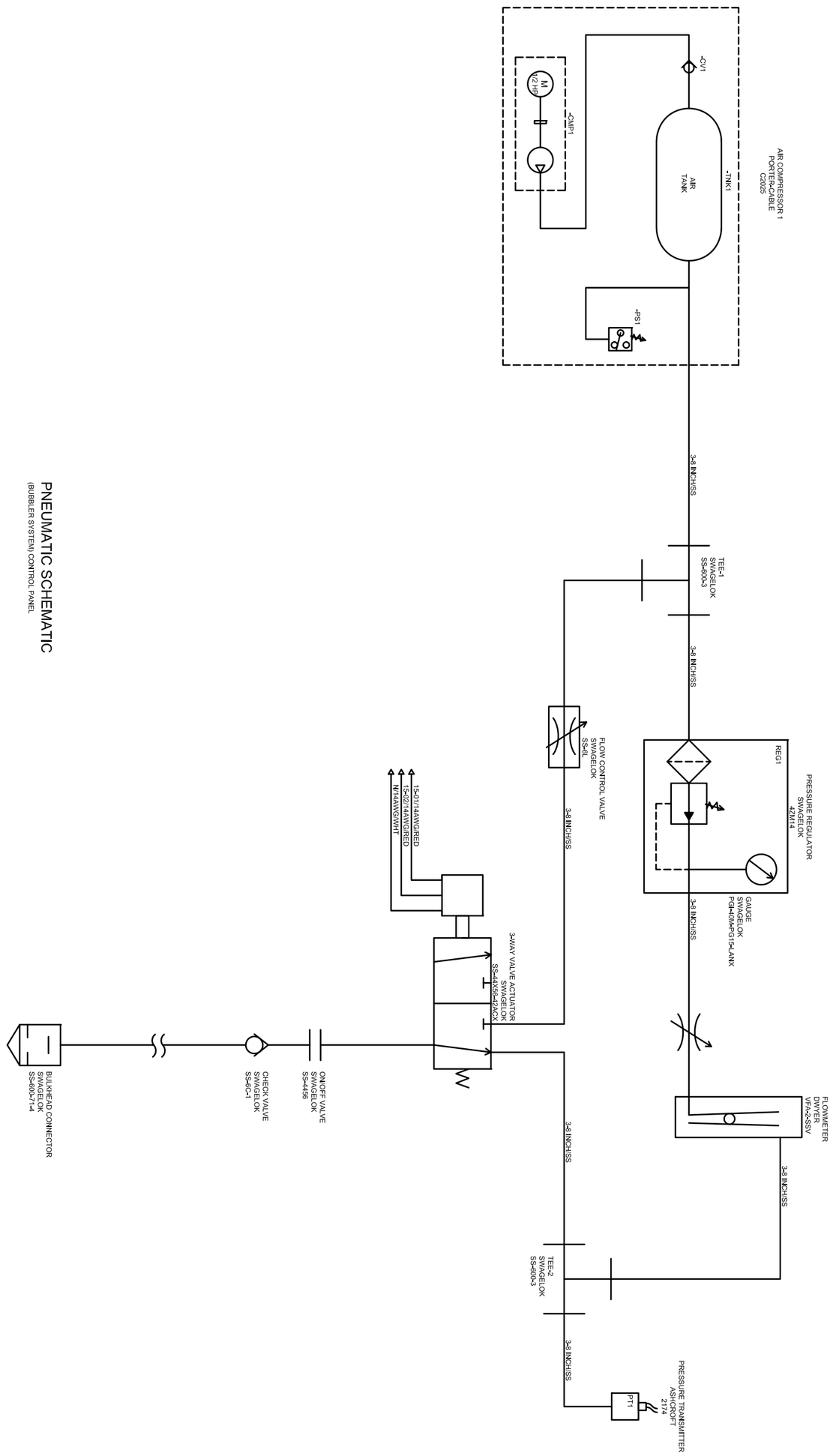




SAMPLE BUBBLER SYSTEM FOR WET WELL LEVEL MONITORING (SHEET 3 OF 5)

ISSUED: -

NUMBER: SP-58



SAMPLE BUBBLER SYSTEM FOR WET WELL LEVEL MONITORING
(SHEET 4 OF 5)

ISSUED: -

NUMBER: SP-59

SAMPLE BUBBLER SYSTEM FOR WET WELL LEVEL MONITORING
(SHEET 5 OF 5) PROCESS AND INSTRUMENTATION AIR SUPPLY

NUMBER: SP-60

ISSUED: -

NOTES:
1. CONTROL/MOISTURE DRAIN LINES ARE ¼" TUBING EXCEPT AS NOTED

ITEM NO.	DESCRIPTION
1	FILTER, AIR 9" PLASTIC
2	INDICATOR, RESTRICTION
3	INLET
4	COMPRESSOR UNIT
5	MOTOR
6	FILTER, CORELESS 1-1/16 SAE
7	COOLER, AIR/OIL 50 HP
7	COOLER, AIR/OIL 60 HP
8	VALVE, THERMAL 195DEG 1-1/2"-18
8	VALVE, THERMAL 210DEG 1-1/2"-18
9	ORIFICE, 1/8 X 1/32
10	GLS, SIGHT/ORF SAE
11	FILTER, ASSY GENISIS
12	PLUG, SIGHTGLASS 1-5/16" SAE
13	PROBE, THERMISTER 3000 OHM
14	VALVE, RELIEF 1/2"
15	XDUCR, 1-250# RADIOMETRIC
16	VALVE, SHUTTLE 1/4" DOUBLE CHK
17	VLV, MIN PRESSURE 1-7/8 SAE
18	VALVE, BLOWDOWN 1/2" 1.8:1
19	SEP,WTR SCWS-235N 1 1/2" L/AD
20	ELEM, SEP ROUND 5.5D X 14.3LNG
21	VALVE, BALL 1/4"
22	STRAINER, V-TYPE 300 PSI X 1/4
23	VLV,SOL 3WNO 1/4 250# 24VDC
24	VALVE, PRESSURE REG
25	TANK, SEPARATOR
26	ORIFICE,. 140 X 1/4M X 1/4F
27	VLV, SOL 2WNC 1/4 200# 24VDC
28	VLV, CHK 1/4"NPTF BRASS VITON
29	VALVE, SOLENOID EES
30	VLV, BALL/STNR COMB 1/2F X 1/2M
31	DRN, ELECTRIC CONDENSATE-SCD400
32	VENT, ENCL PROT 1/2" SIDE MTG Z-PRG
33	GA, DIFF PRESS Z- PURGE ASY REGU

TUBING COLOR	PURPOSE
BLUE	TANK PRESSURE
YELLOW	REG PRESSURE
RED	UNLOAD PRESS
CLEAR	WATER DRAIN

- CUSTOMER FURNISHED LINE
- WATER LINE ⚠⚠
- CONTROL LINE ⚠⚠
- FLUID LINE
- AIR/FLUID LINE
- TEMP, CONTROL PROBE
- AIR LINE

COMPONENT	DESCRIPTION
P1	WET SUMP PRESSURE
P2	LINE PRESSURE
SOL1	LOAD/UNLOAD SOLENOID VALVE
SOL4	MEC/SEQUENCING/FULL LOAD SOLENOID VALVE
SOL5	ELECTRIC DRAIN/SCD DRAIN SOLENOID VALVE
SOL7	EES SOLENPOID VALVE (OPTIONAL)
T1	WET DISCHARGE TEMPERATURE

SCD DRAIN OPTION

SEQUENCING SOLENOID

EES OPTION

A TO OPEN INSIDE DAMPER (WINTER)
B TO OPEN OUTSIDE DAMPER (SUMMER)

Z-PURGE OPTION