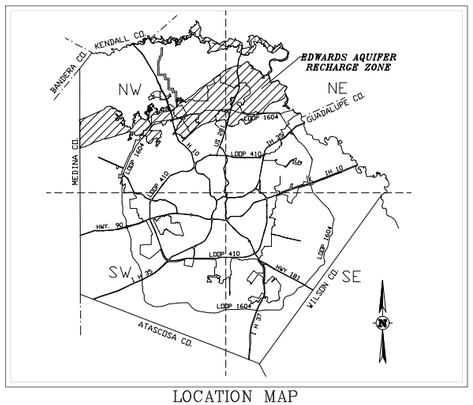
SAN ANTONIO WATER SYSTEM

LIFT STATION DESIGN AND CONSTRUCTION STANDARD DRAWINGS

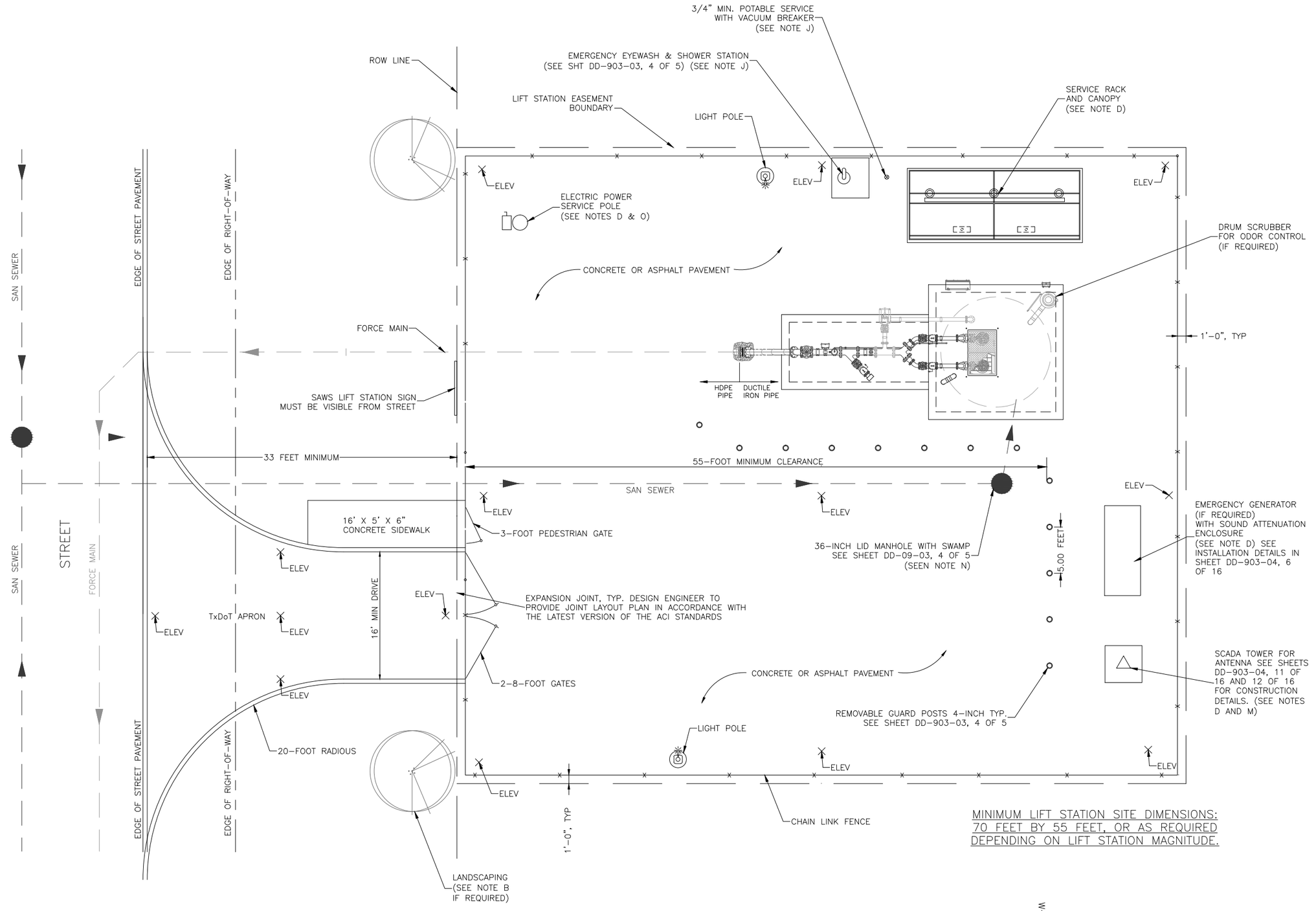


LOCATION MAP
N.T.S.

ADDRESS: 2800 US HWY 281 NORTH
SAN ANTONIO TEXAS 78212

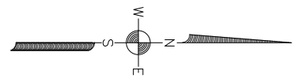
JANUARY, 2012

OPERATIONS & MAINTENANCE ENGINEERING
LIFT STATION MAINTENANCE
INSTRUMENTATION AND CONTROLS



MINIMUM LIFT STATION SITE DIMENSIONS:
70 FEET BY 55 FEET, OR AS REQUIRED
DEPENDING ON LIFT STATION MAGNITUDE.

THIS DRAWING IS AN EXAMPLE OF A LIFT STATION WITH SUBMERSIBLE PUMPS
AND
IS NOT TO BE INCLUDED IN A PROJECT DRAWING PACKAGE
NTS



DESIGN ENGINEER SHALL ORIENT NORTH ARROW ACCORDING TO SPACIFIC SITE PLAN

NOTES TO DESIGN ENGINEER:

A. THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF SAN ANTONIO WATER SYSTEM SUBMERSIBLE PUMP LIFT STATIONS. THEIR INTENDED USE IS AS A FRAMEWORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS.
IT IS THE RESPONSIBILITY OF THE CONTRACTED DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION HEREIN CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC SITE REQUIREMENTS.

B. SPECIFY NATIVE, LOW MAINTENANCE LANDSCAPING OUTSIDE OF FENCED AREA IN ACCORDANCE WITH THE CURRENT CITY OF SAN ANTONIO ORDINANCE. PROVIDE LANDSCAPING ON SIDES AND IN REAR OF SITES AS REQUIRED FOR NEIGHBORHOOD. DESIGN ENGINEER TO SPECIFY IRRIGATION SYSTEM FOR LANDSCAPING INCLUDING ELECTRIC VALVES AND IRRIGATION CONTROLLERS.

C. DESIGN ENGINEER SHALL ADOPT THE GENERAL SITE LAYOUT AS SHOWN TO HIS/HER SPECIFIC PROJECT. DO NOT ROTATE LIFT STATION UNLESS SPECIFIC SITE CONSTRAINS REQUIRE.

D. MAINTAIN A MINIMUM OF 4-FOOT CLEARANCE AROUND SERVICE POLE, SERVICE RACK, GENERATOR, TOWER AND OTHER EQUIPMENT.

E. THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT CONTRACT DOCUMENTATION PACKAGE, AND SHALL ADJUST PAGE NUMBERS AND CROSS REFERENCE ACCORDINGLY.

F. THE DESIGN ENGINEER SHALL CONSULT THE SAN ANTONIO WATER SYSTEM DESIGN GUIDELINES REGULATIONS MANUAL AND THE UTILITY SERVICE REGULATIONS MANUAL FOR FURTHER INSTRUCTIONS AND INFORMATION PERTINENT TO THESE STANDARD DRAWINGS.

G. THE DESIGN ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THIS NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE LIFT STATION DESIGN.

H. PROVIDE PERMANENT PROTECTION AGAINST EROSION, STORM RUNOFFS AND PONDING TO PREVENT COLLECTION OF SEDIMENTATION WITHIN THE LIFT STATION SITE AND ACCESS ROAD.

I. ELEVATION OF ALL CONCRETE SLABS SHALL BE LEVELED AT 4" TO 6" ABOVE FINISH PAVED SURFACE.

J. PROVIDE FREEZE PROTECTION TO HOSE BIB AND EMERGENCY EYEWASH & SHOWER STATION, AS WELL AS PRESSURE TRANSMITTER.

K. PROPOSED ELEVATIONS SHALL BE SHOWN AT THE SPECIFIED POINTS MARKED IN THIS LAYOUT.

L. A MINIMUM OF 4 FOOT CLEARANCE ALL AROUND TOWER FOUNDATION SHALL BE MAINTAINED. TOWER STRUCTURE SHALL BE LOCATED MINIMUM 50-FOOT AWAY FROM EXISTING UTILITY OVERHEAD LINES.

M. OVERHEAD LINES INCLUDING, BUT NOT LIMITED ELECTRIC, CABLE AND TELEPHONE ARE NOT ALLOWED WITHIN LIFT STATION SITE.

N. LOCATE MANHOLE NEXT TO WET WELL AND WITHIN VEHICULAR ACCESS AREA.

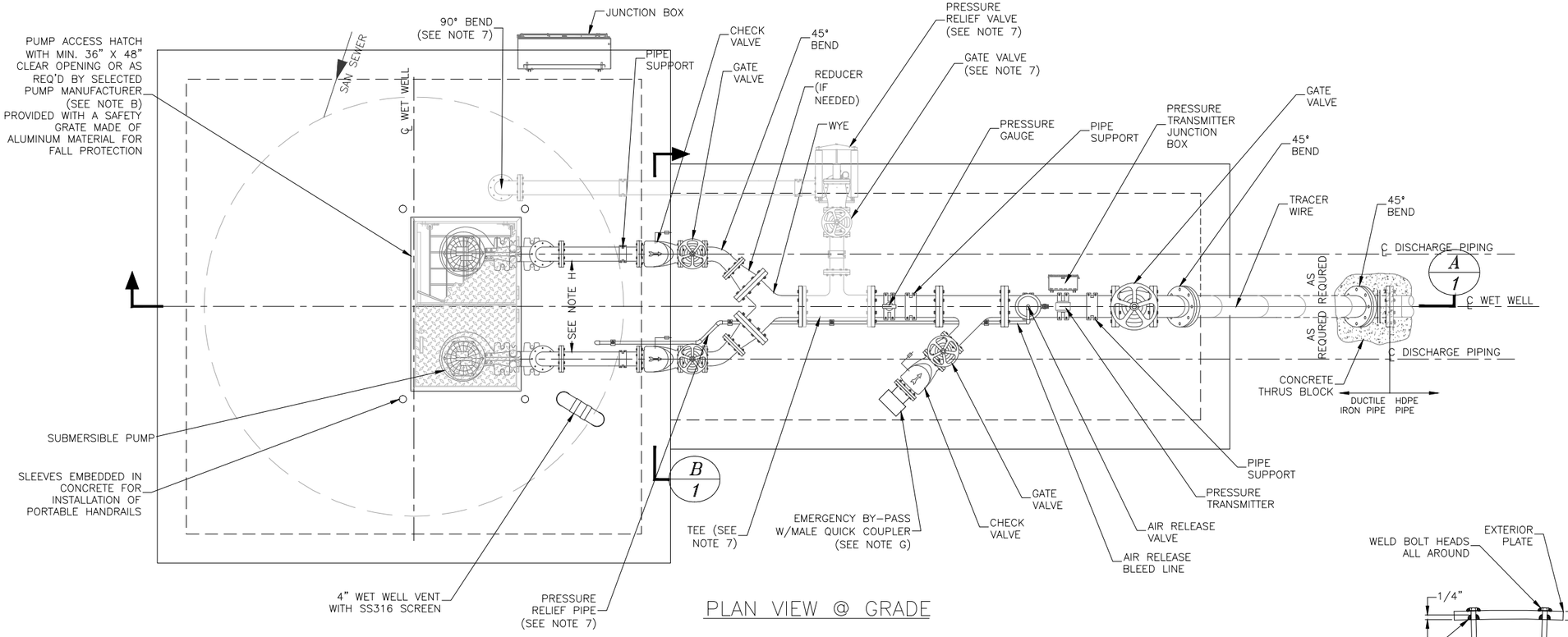
O. WIRING BETWEEN SERVICE POLE AND SERVICE RACK SHALL BE BURIED. AERIAL WIRING IS PROHIBITED.

SUBMERSIBLE PUMP LIFT STATION TYPICAL SITE LAYOUT

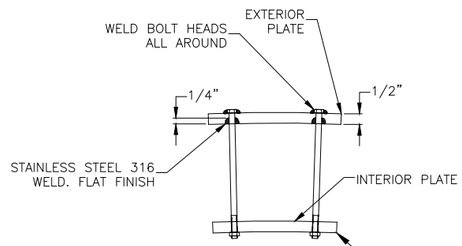
REVISION	OPERATIONS & MAINTENANCE ENGINEERING
JAN 2012	

PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

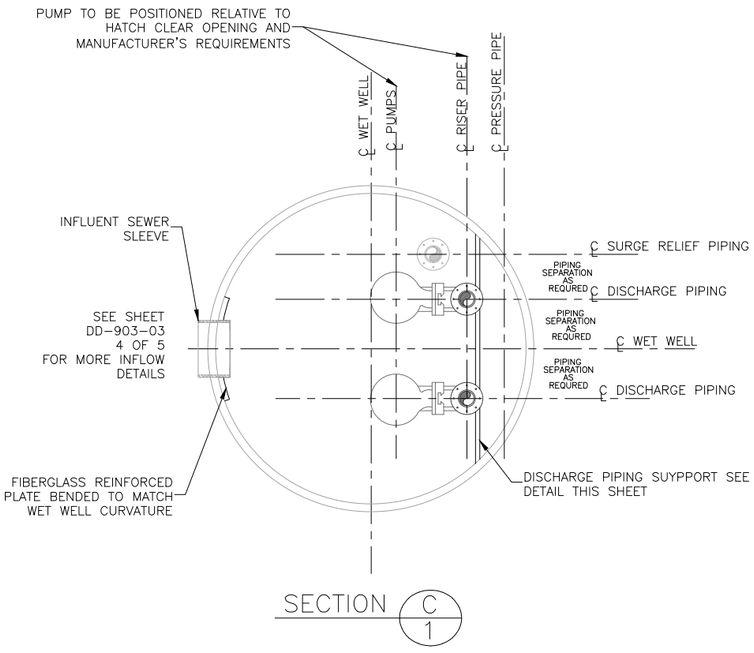
DD-903-01



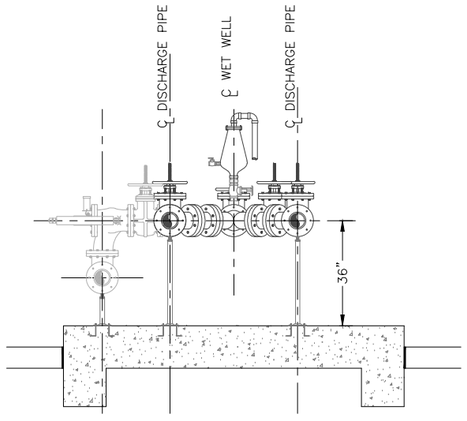
PLAN VIEW @ GRADE



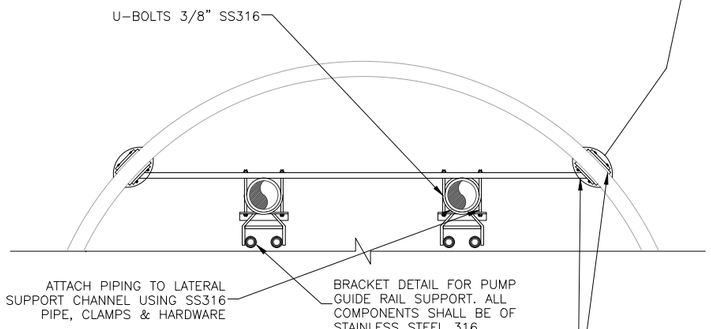
PLATES DETAIL



SECTION C 1



SECTION B 1



LATERAL SUPPORT UNISTRUT 316SS CHANNEL WELDED TO 6" X 6" X 1/2" SS316 PLATES. BEND PLATES TO MATCH WET WELL CURVATURE. MOUNT TO WET WELL WALL USING 2 – 3/8" X 6" LONG TYPE SS316 BOLTS. SET 1/2" NEOPRENE GASKET ON WET WELL WALL SURFACES IN SIKA 1A (OR EQUAL) SEALANT, BOTH INTERIOR AND EXTERIOR WET WELL WALLS. SEE NOTE #7 FOR PROPER SIZING OF THE STRUT, PLATES AND BOLTS

NOTE: ALL NUTS SHALL BE LOCK-NUTS

WET WELL PIPING SUPPORT DETAIL

NOTES TO DESIGN ENGINEER:

A. THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF SAN ANTONIO WATER SYSTEM SUBMERSIBLE PUMP LIFT STATIONS. THEIR INTENDED USE IS AS A FRAMEWORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS. IT IS THE RESPONSIBILITY OF THE CONTRACTED DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION HEREIN CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC SITE REQUIREMENTS.

B. DESIGN ENGINEER SHALL VERIFY THE SIZE AND LOCATION OF WET WELL HATCHES ACCORDING TO THE SELECTED PUMP AND HATCH MANUFACTURERS' REQUIREMENTS. MINIMUM CLEAR OPENING AREA TO BE 36" X 48". SAFERY GRATE SHALL NOT HAVE OPENINGS GREATER THAN 4" X 4". SAFETY GRATE SHALL BE FLUSHED WITH WET WELL TOP SLAB.

C. ELEVATIONS AND INFORMATION OMITED ARE DETERMINED BY DESIGN ENGINEER FOR SPECIFIC SITE REQUIREMENTS.

D. THE DESIGN ENGINEER SHALL SHALL INCORPORATE ONLY THE NECESARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT CONTRACT DOCUMENTATION PACKAGE, AND SHALL ADJUST PAGE NUMBERS AND CROSS REFERENCE ACCORDINGLY.

E. THE DESIGN ENGINEER SHALL CONSULT THE SAN ANTONIO WATER SYSTEM DESIGN GUIDELINES MANUAL, THE UTILITY SERVICE REGULATIONS AND THE LATEST TCEQ RULES FOR FURTHER INSTRUCTIONS AND INFORMATION PERTINENT TO THESE STANDARD DESIGN GUIDELINE DRAWINGS.

F. THE DESING ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPIATE INFORMATION NECESSARY TO COMPLETE HIS LIFT STATION DESIGN.

G. REQUIRED FOR ALL STATIONS.

H. DESIGN ENGINEER MUST EVALUATE THE PUMP SEPARATION TO PROVIDE SUFFICIENT SPACE BETWEEN PUMPS, AND TO ALLOW CONDUIT RUNS BETWEEN DISCHARGE PIPES. SEE SHEET DD-903-04 SHEET 7 OF 14, DETAIL B FOR REFERENCE.

KEY NOTES:

1. ENGINEER TO CONFIRM SIZE AND LOCATION OF WET WELL HATCHES PER SELECTED HATCH AND PUMP MANUFACTURERS' REQUIREMENTS (36" X 48" MIN.)
2. INSTALL RESELENT WEDGE, FLANGED JOINT GATE VALVES.
3. INSTALL SWING TYPE CHECK VALVE WITH EXTERNAL LEVER AND WEIGHT.
4. ALL PUMP DISCHARGE PIPE AND FITTINGS WITHIN WET WELL, EXCEPT SS316 AND PVC, SHALL RECEIVE AFTER INSTALLATION A 100% SOLIDS COAL TAR EPOXY COATING SYSTEM IN ACCORDANCE WITH MANUFACTURER INSTRUCTIONS.
5. ALL PUMP DISCHARGE PIPE, VALVES AND FITTINGS OUTSIDE THE WET WELL, EXCEPT SS316 AND PVC, SHALL RECEIVE AFTER INSTALLATION A 100% SOLIDS EPOXY COATING SYSTEM WITH A TOP COAT OF URETHANE IN ACCORDANCE WITH MANUFACTURERS' INSTRUCTIONS. COLOR SHALL BE GREY PANTONE #431-U.
6. LATERAL SUPPORT UNISTRUT CHANNEL SIZING TABLE:

PIPE SIZE	STRUT SIZE	PLATE SIZE	BOLT SIZE
4" & 6"	2.5" X 2.5"	6" X 6"	3/8"
8" & 10"	4" X 4"	8" X 8"	3/8"
12" & 14"	6" X 6"	10" X 10"	5/8"
16" & 18"	8" X 8"	12" X 12"	5/8"
20" & 24"	12" X 12"	18" X 18"	3/4"

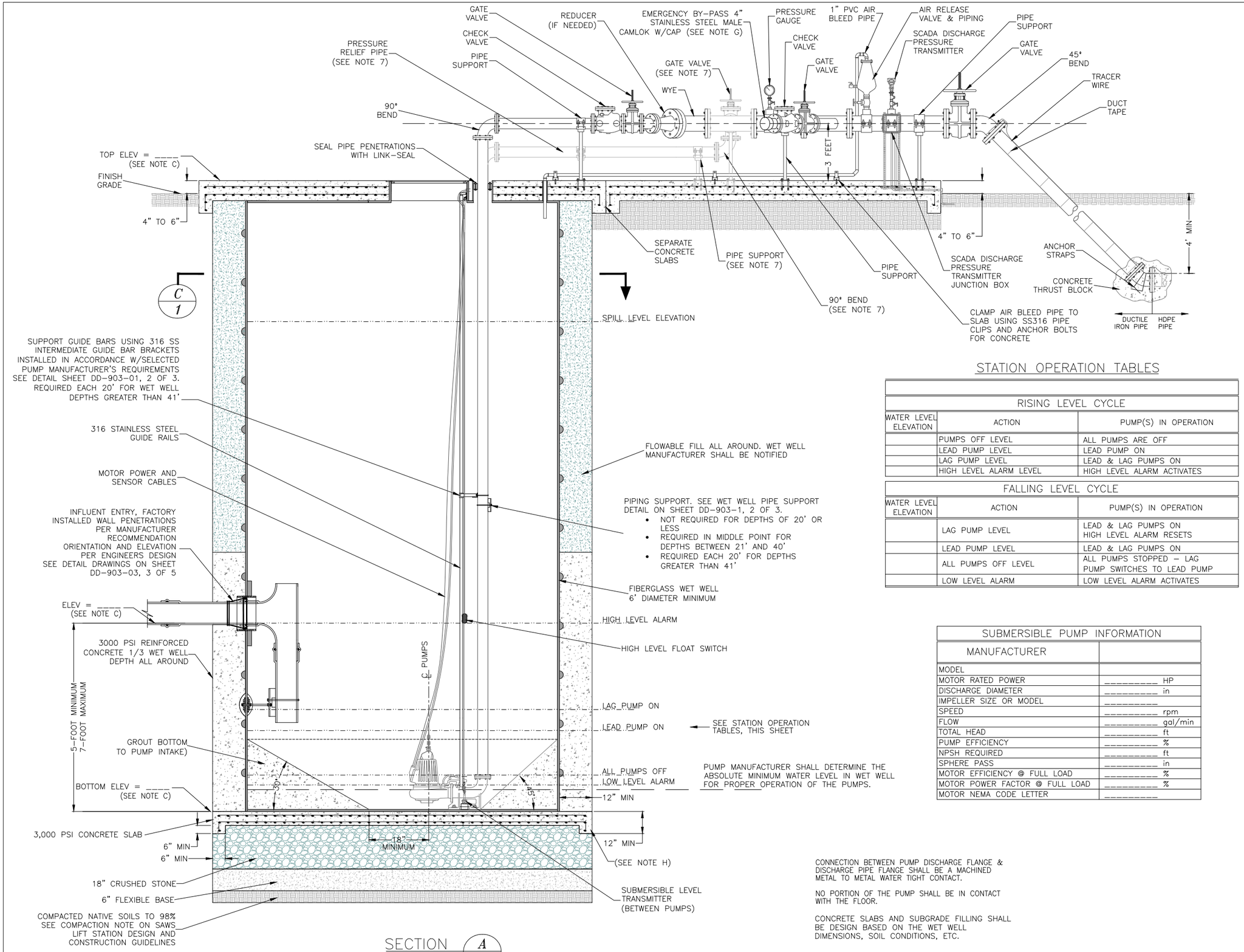
7. INCLUDE ONLY IF A SURGE RELIEF VALVE IS REQUIRED.

SUBMERSIBLE LIFT STATION CONFIGURATION PLAN VIEW

REVISION	OPERATIONS & MAINTENANCE ENGINEERING
JAN 2012	

PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

DD-903-01



SECTION A/1
ALL WET WELL FILLETS NOT SHOWN FOR CLARITY

STATION OPERATION TABLES

RISING LEVEL CYCLE		
WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
	PUMPS OFF LEVEL	ALL PUMPS ARE OFF
	LEAD PUMP LEVEL	LEAD PUMP ON
	LAG PUMP LEVEL	LEAD & LAG PUMPS ON
	HIGH LEVEL ALARM LEVEL	HIGH LEVEL ALARM ACTIVATES

FALLING LEVEL CYCLE		
WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
	LAG PUMP LEVEL	LEAD & LAG PUMPS ON HIGH LEVEL ALARM RESETS
	LEAD PUMP LEVEL	LEAD & LAG PUMPS ON
	ALL PUMPS OFF LEVEL	ALL PUMPS STOPPED – LAG PUMP SWITCHES TO LEAD PUMP
	LOW LEVEL ALARM	LOW LEVEL ALARM ACTIVATES

SUBMERSIBLE PUMP INFORMATION	
MANUFACTURER	
MODEL	
MOTOR RATED POWER	_____ HP
DISCHARGE DIAMETER	_____ in
IMPELLER SIZE OR MODEL	_____
SPEED	_____ rpm
FLOW	_____ gal/min
TOTAL HEAD	_____ ft
PUMP EFFICIENCY	_____ %
NPSH REQUIRED	_____ ft
SPHERE PASS	_____ in
MOTOR EFFICIENCY @ FULL LOAD	_____ %
MOTOR POWER FACTOR @ FULL LOAD	_____ %
MOTOR NEMA CODE LETTER	_____

CONNECTION BETWEEN PUMP DISCHARGE FLANGE & DISCHARGE PIPE FLANGE SHALL BE A MACHINED METAL TO METAL WATER TIGHT CONTACT.

NO PORTION OF THE PUMP SHALL BE IN CONTACT WITH THE FLOOR.

CONCRETE SLABS AND SUBGRADE FILLING SHALL BE DESIGN BASED ON THE WET WELL DIMENSIONS, SOIL CONDITIONS, ETC.

NOTES TO DESIGN ENGINEER

A. THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF SAN ANTONIO WATER SYSTEM WASTEWATER LIFT STATIONS WITH SUBMERSIBLE PUMPS. THEIR INTENDED USE IS AS A FRAME WORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS. IT IS THE RESPONSIBILITY OF THE CONTRACTED DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION HEREIN CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC SITE REQUIREMENTS.

B. DESIGN ENGINEER TO VERIFY THE SIZE AND LOCATION OF THE WET WELL HATCHES ACCORDING TO THE SELECTED PUMP AND HATCH MANUFACTURERS' REQUIREMENTS (36'X48' MINI.).

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G. REQUIRED FOR ALL LIFT STATIONS.

H. DESIGN IN CONCRETE SLAB TO RESIST THE BUOYANCY FORCES WITH A REASONABLE SAFETY FACTOR.

KEY NOTES:

1. CONTRACTOR TO CONFIRM SIZE AND LOCATION OF THE WET WELL HATCHES PER SELECTED HATCH AND PUMP MANUFACTURERS' REQUIREMENTS. (36" X 48" MINIMUM CLEARANCE)
2. INSTALL RESILENT WEDGE, FLANGED JOINT GATE VALVES.
3. INSTALL SWING TYPE CHECK VALVES WITH EXTERNAL LEVER.
4. SLEEVED OR CORED DISCHARGE PIPE SHALL BE SEALED WITH SEAL LINK (OR APPROVED EQUAL). MAY BE SUBSTITUTED FOR POURED IN PLACE WALL PIPES TO ACCOMODATE CONSTRUCTION METHOD.
5. ALL PUMP DISCHARGE PIPE AND FITTINGS WITHIN WET WELL, EXCEPT 316 STAINLESS STEEL, SHALL RECEIVED AFTER INSTALLATION A 100% SOLIDS COAL TAR EPOXY COATING SYSTEM IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
6. ALL PUMP DISCHARGE PIPE, VALVES AND FITTINGS OUTSIDE THE WET WELL, EXCEPT 316 STAINLESS STEEL, SHALL RECEIVE AFTER INSTALLATION A 100% EPOXY COATING SYSTEM WITH A TOP COAT OF URETHANE IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. COLOR SHALL BE GREY PANTONE #431-U.
7. INCLUDE ONLY IF A SURGE RELIEF VALVE IS REQUIRED.

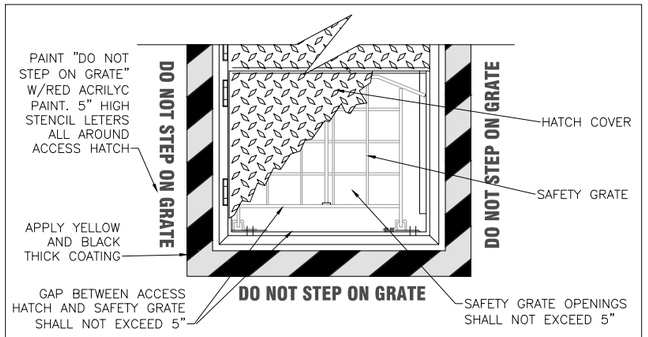
SUBMERSIBLE LIFT STATION CONFIGURATION PROFILE VIEW

REVISION	OPERATIONS & MAINTENANCE ENGINEERING
JAN 2012	

PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

DD-903-01

SHEET 3 OF 3



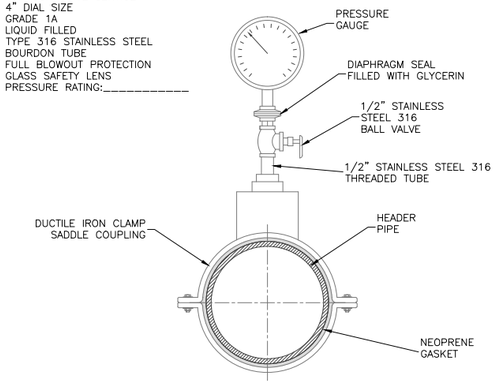
KEY NOTES:

- SAFETY GRATE SHALL BE UP TO ½" BELOW TOP OF CONCRETE SLAB, BUT IN NO CASE THE ½" DISTANCE SHALL BE EXCEEDED.
- ACCESS HATCH COVER SHALL BE PERFECTLY LEVELED WITH TOP OF CONCRETE SLAB.

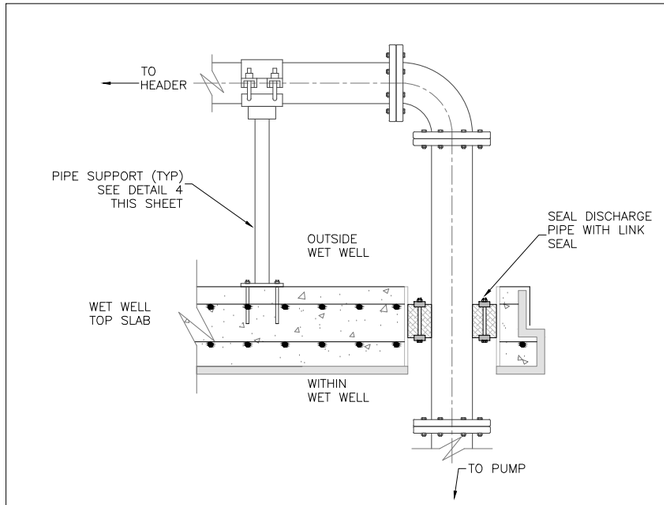
DETAIL 1:
SAFETY GRATE DETAILS

KEY NOTES:

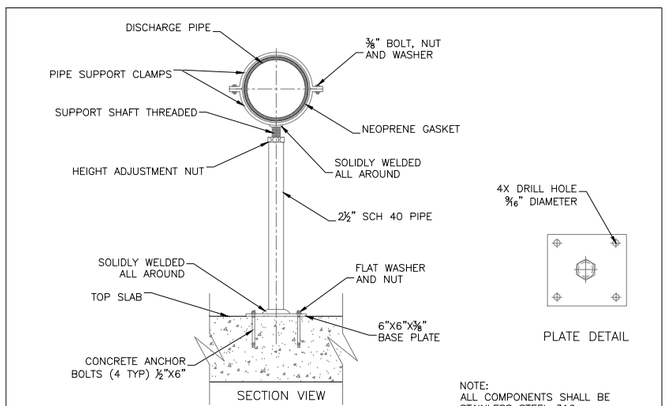
- PRESSURE GAUGE SHALL BE RATED FOR CORROSIVE SERVICE
- 4" DIAL SIZE
- GRADE 1A
- LIQUID FILLED
- TYPE 316 STAINLESS STEEL BOURDON TUBE
- FULL BLOWOUT PROTECTION
- GLASS SAFETY LENS
- PRESSURE RATING:_____



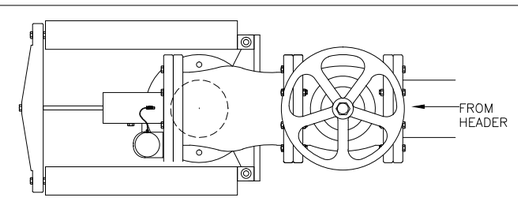
DETAIL 3:
PRESSURE GAUGE INSTALLATION DETAIL



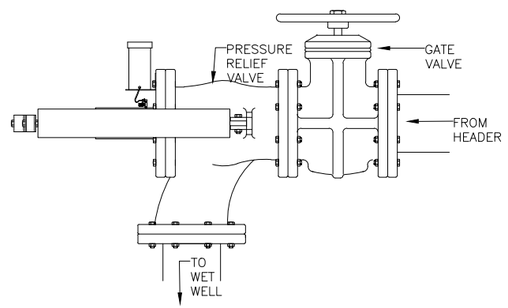
DETAIL 5:
DISCHARGE PIPE PENETRATION DETAIL



DETAIL 2:
PIPE SUPPORT DETAILS



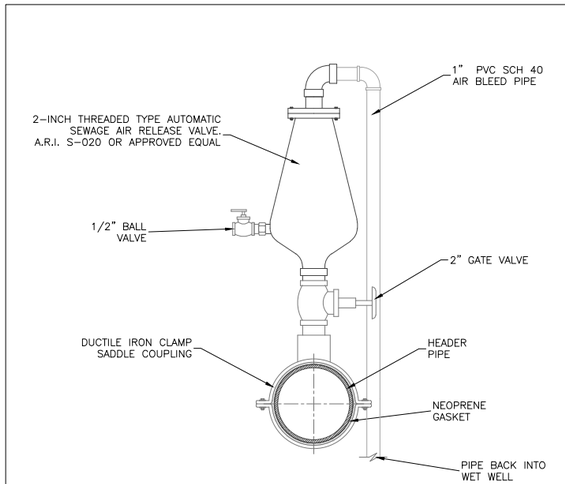
PLAN VIEW



PROFILE VIEW

FIRM PUMPING CAPACITY FLOW (GPM):_____
VALVE SIZE (INCHES):_____
DISCHARGE PRESSURE AT HEADER (PSI):_____
SURGE PRESSURE AT HEADER (PSI):_____
VALVE OPEN SETTING (PSI):_____

DETAIL 4:
PRESSURE RELIEF VALVE MOUNTING DETAIL



DETAIL 6:
AIR RELEASE VALVE INSTALLATION DETAIL AT HEADER

WET WELL AND PIPING DETAILS

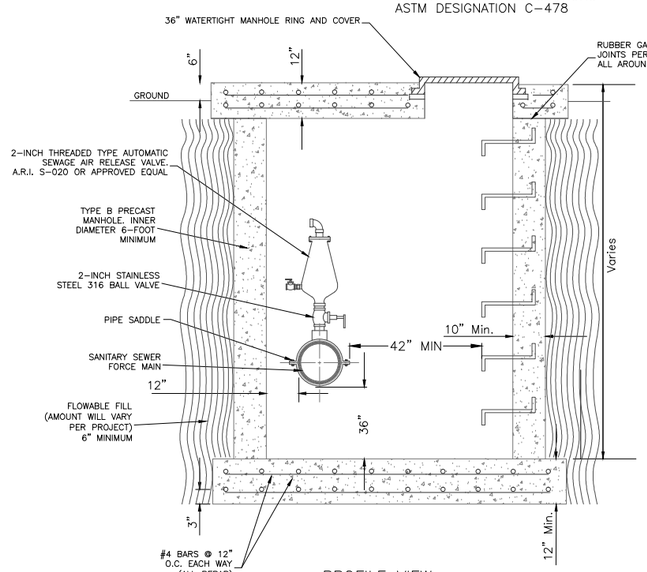
REVISION	OPERATIONS & MAINTENANCE ENGINEERING
JAN 2012	

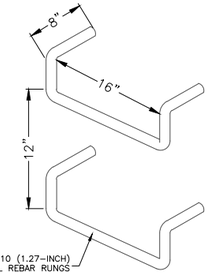
PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

DD-903-03

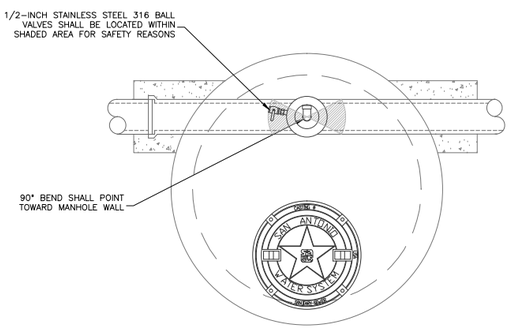
SHEET 1 OF 5

PRECAST REINFORCED
CONCRETE MANHOLE SECTIONS
ASTM DESIGNATION C-478

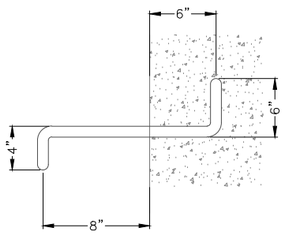




RUNG DESIGN



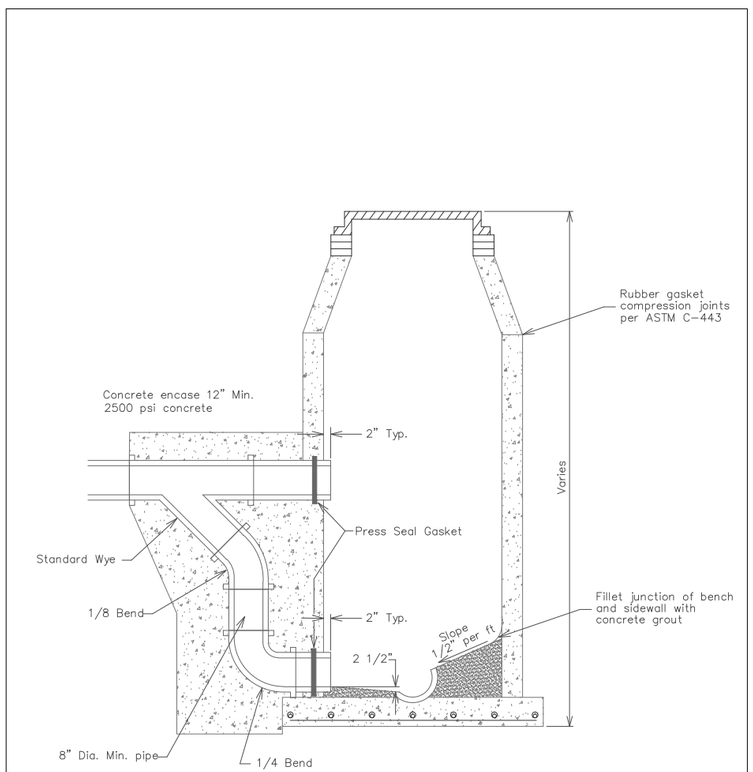
FLOOR PLAN



RUNG DETAILS

GENERAL NOTES:
1. WATERTIGHT MANHOLE RINGS AND COVERS SHALL BE TRANS-TEX A77 "O" RING OR APPROVED EQUAL.
2. MOUNTING HARDWARE SHALL BE OF STAINLESS STEEL 316, UNLESS OTHERWISE NOTED.

DETAIL 7
AIR RELEASE VALVE INSTALLATION DETAIL AT FORCE MAIN

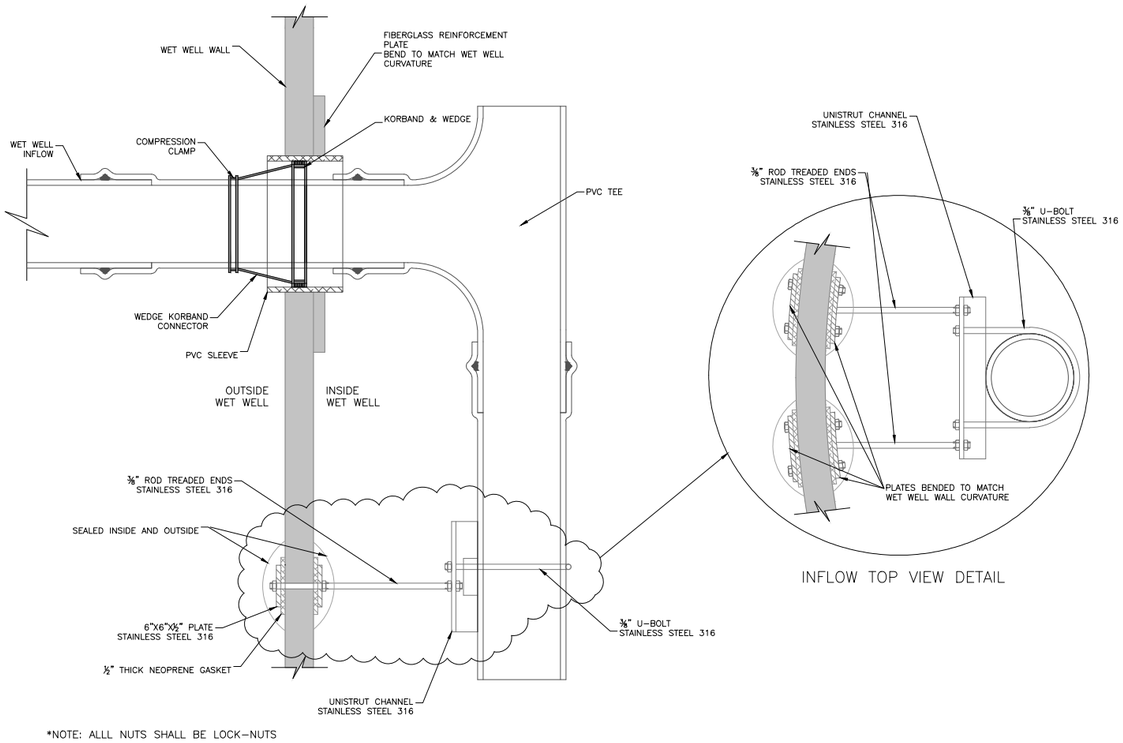


USE DROP MANHOLE STYLE FOR ALL FORCE MAIN OUTFALLS

Note:
Price for drop fittings and encasement to be included with the price of manhole.

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	DROP MANHOLE DETAIL	APPROVED AUGUST 1998	REVISED
		DD-852-08	SHEET 1 OF 1

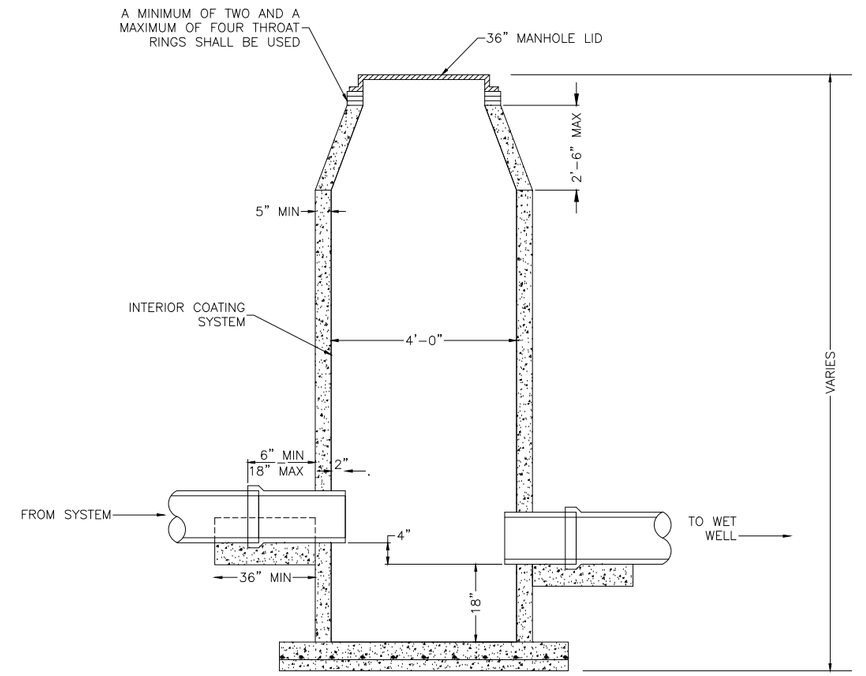
	FORCE MAIN AIR RELEASE VALVES DISCHARGE MANHOLE
REVISION JAN 2012	OPERATIONS & MAINTENANCE ENGINEERING
PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	
DD-903-03	SHEET 2 OF 5



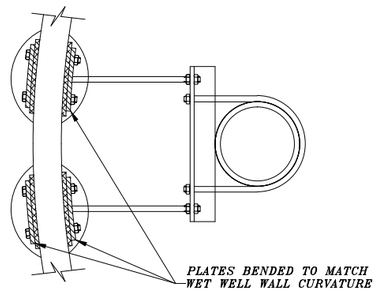
*NOTE: ALLL NUTS SHALL BE LOCK-NUTS

DETAIL 8:
WET WELL INFLOW PENETRATION DETAILS

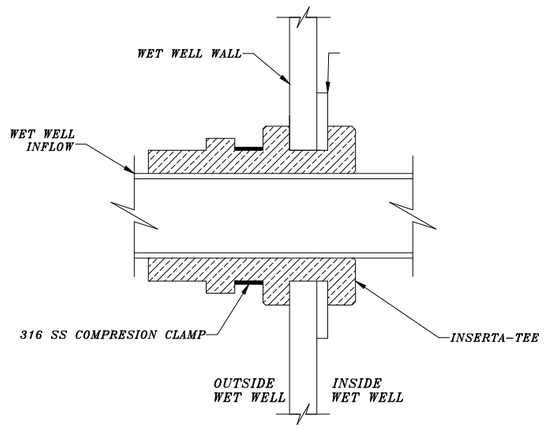
PRECAST REINFORCED CONCRETE MANHOLE SECTIONS ASTM DESIGNATION C-478.
THE TOTAL INTERIOR SURFACE SHALL BE COATED. SEE GUIDELINE TEXT DOCUMENT SECTION B, NUMBER 7 FOR APPROVED COATING SYSTEMS.



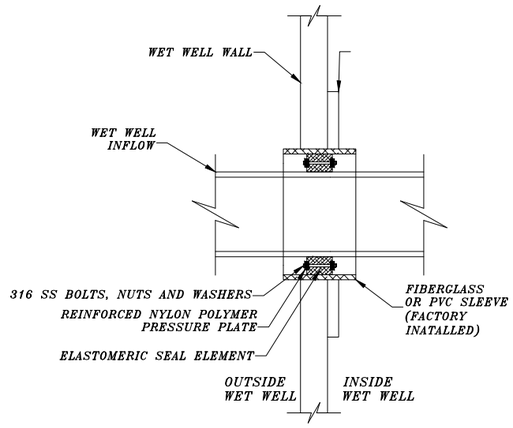
DETAIL 9:
LIFT STATION SITE MANHOLE
ADJACENT TO WET WELL



INFLOW TOP VIEW DETAIL



INSERTA-TEE DETAIL



LINK-SEAL DETAIL

WET WELL INFLOW AND ON-SITE MANHOLE

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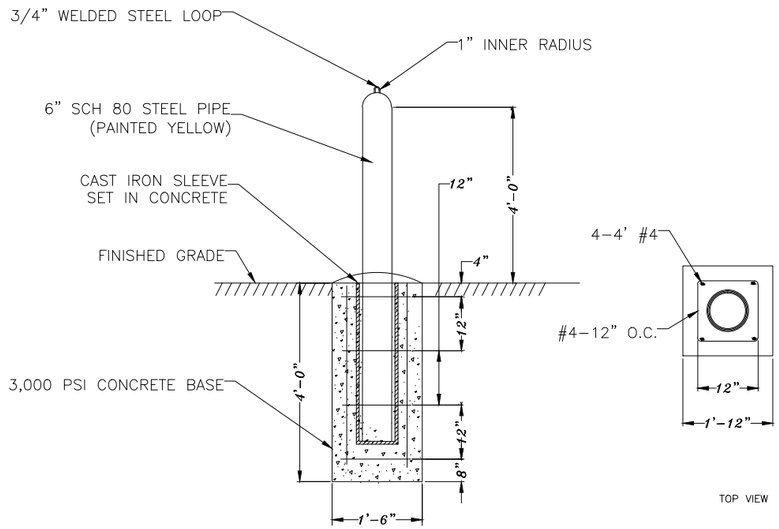
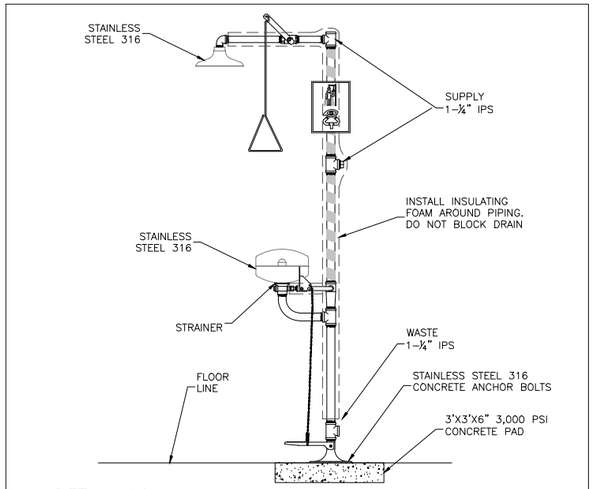
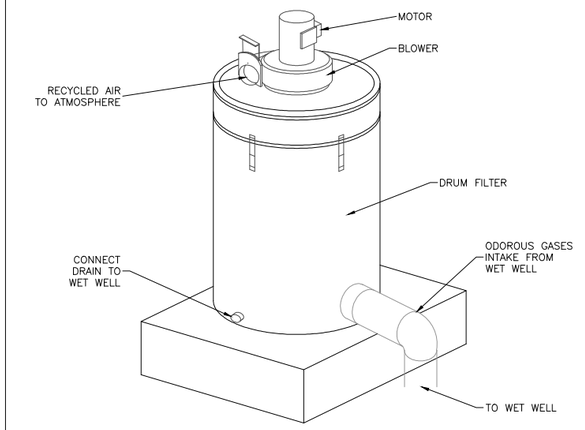


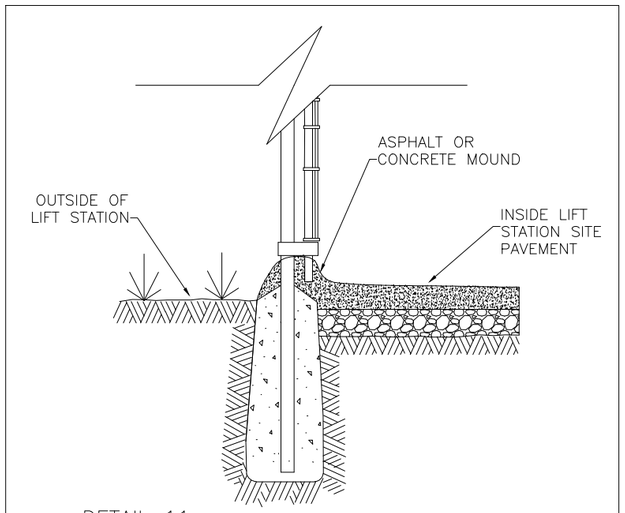
DETAIL 10:
REMOVABLE BOLLARD DETAIL – NTS



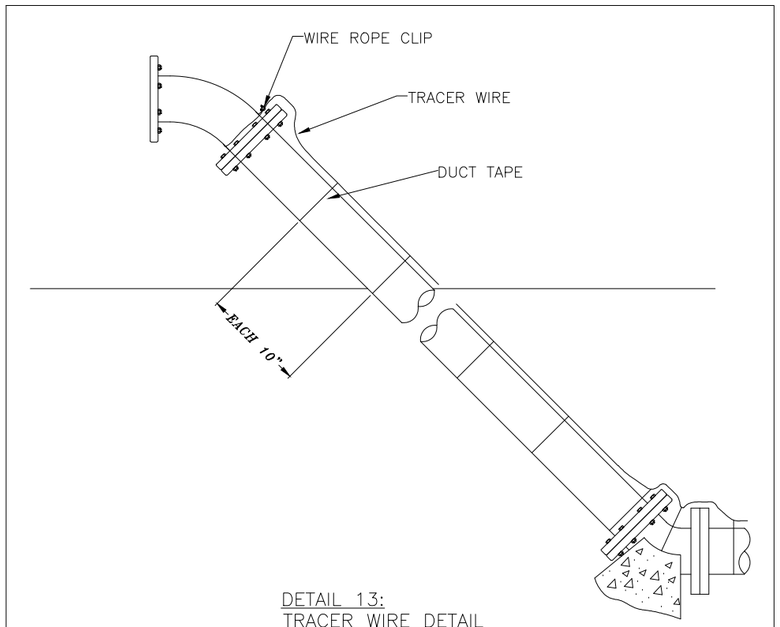
DETAIL 12:
TYPICAL EMERGENCY EYEWASH & SHOWER DETAIL



DETAIL 14:
DRUM SCRUBBER DETAIL



DETAIL 11:
STORM RUNOFF PROTECTION DETAIL



DETAIL 13:
TRACER WIRE DETAIL

MISCELLANEOUS
DETAILS

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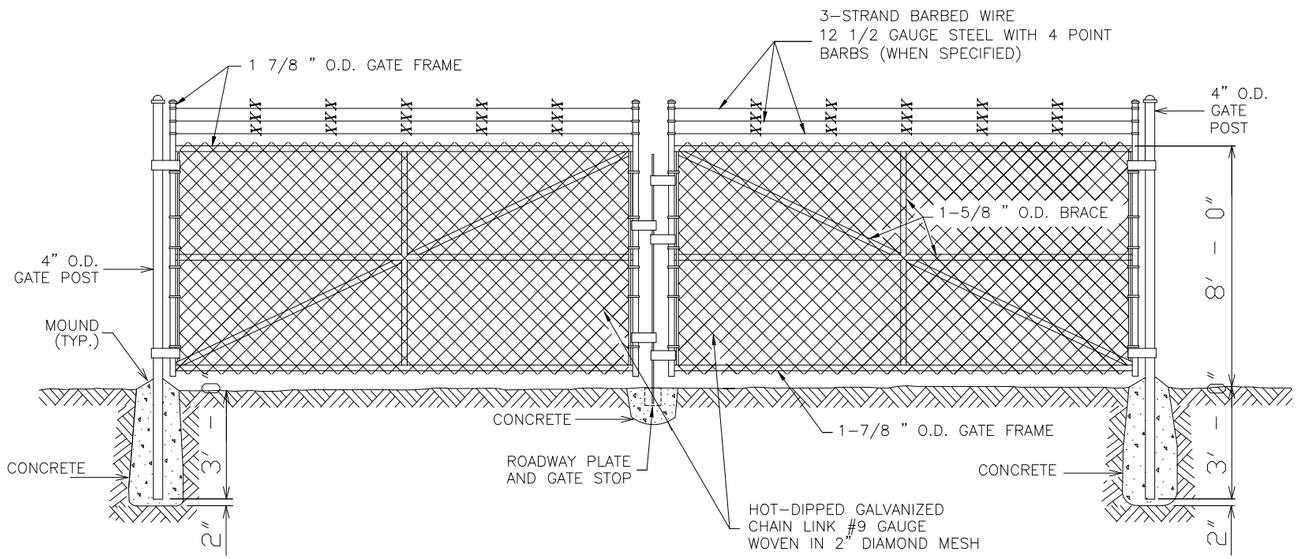

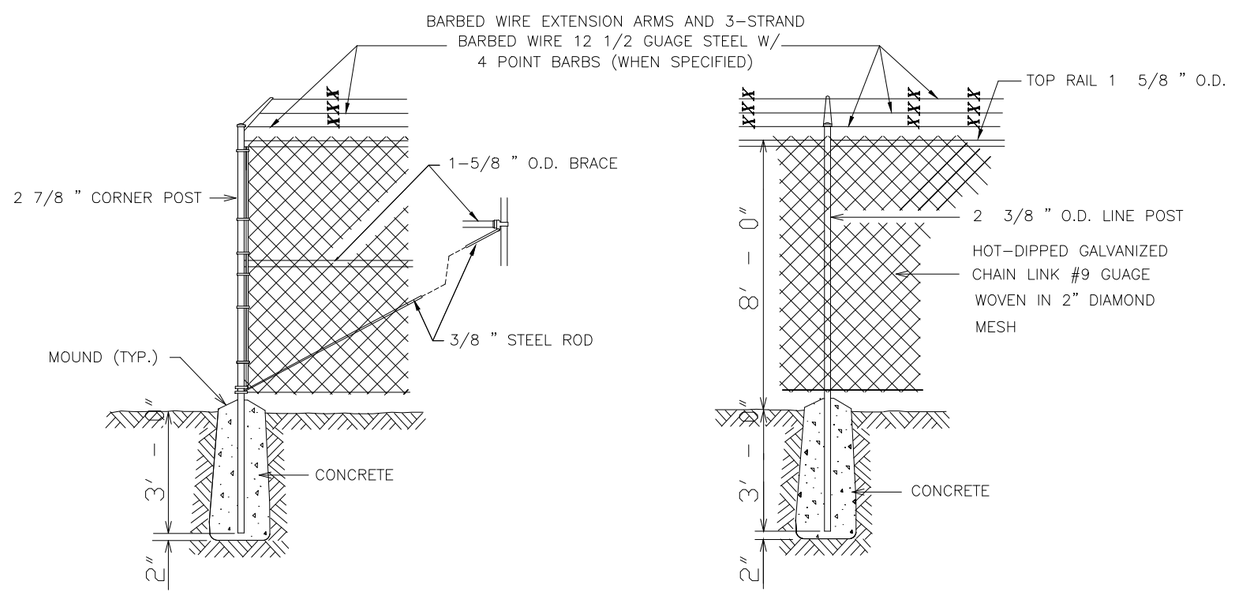

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	STANDARD GATE AND FENCE AROUND SAWS PROPERTY	APPROVED	REVISED
		March 2008	
		DD–845–01	SHEET 1 OF 1

	CHAIN LINK FENCE AND GATES DETAILS
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SYMBOLS

- SWING CHECK VALVE
- GATE VALVE
- PUMP

INSTRUMENT SYMBOLS

FIELD MOUNTED INSTRUMENT

LOCAL CONTROL PANEL MOUNTED INSTRUMENT

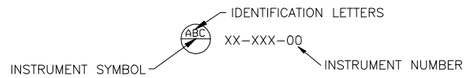
POINT MONITORED BY SCADA

INSTRUMENT IDENTIFICATION

LIC	LEVEL INDICATING CONTROLLER
PIT	PRESSURE INDICATING TRANSMITTER
LIC	LEVEL ALARM HIGH

ABBREVIATION INDEX

CR	CONTROL RELAY
EMT	ELAPSED TIME METER
HOA	HAND–OFF–AUTO SWITCH
HTR	HIGH TEMPERATURE RELAY
ILP	INFLUENT LIFT PUMP
LDR	LEAK DETECTION RELAY
LOC/REM	LOCAL–REMOTE SWITCH
LR	LEVEL RELAY
LS	LIFT STATION
OL	MOTOR OVERLOAD
OT	OVERTEMPERATURE
PFR	PHASE FAILURE RELAY
PR	MOTOR FAILURE RELAY
SL	SEAL LEAK
SS	START–STOP STATION
TFR	TRANSFER FAIL RELAY
TI	TEMPERATURE INDICATOR
TR	TIMING RELAY



INSTRUMENTATION IDENTIFICATION LEGEND

LETTER	PROCESS OR INITIATING VALUE	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS (*)	ALARM		
B	BURNER FLAME	USERS CHOICE (*)	USERS CHOICE (*)	USERS CHOICE (*)
C	CONDUCTIVITY		CONTROL	
D	DENSITY (3.0)			
E	VOLTAGE	PRIMARY ELEMENT		
F	FLOW RATE			
G	GAUGE	GLASS	GATE	
H	HAND (MANUAL)			HIGH
I	CURRENT	INDICATE		
J	POWER			
K	TIME OR SCHEDULE		CONTROL STATION	
L	LEVEL	LIGHT (PILOT)		LOW
M	MOTION			MIDDLE
N	USERS CHOICE (*)	USERS CHOICE (*)	USERS CHOICE (*)	USERS CHOICE (*)
O	USERS CHOICE (*)	ORIFICE		
P	PRESSURE (OR VACUUM)	POINT (TEST CONNECTION)		
Q	QUANTITY OR EVENT	INTEGRATE		
R		RECORD OR PRINT		
S	SPEED OR FREQUENCY		SWITCH	
T	TEMPERATURE		TRANSMIT	
U	MULTIVARIABLE (*)	MULTIFUNCTION (*)	MULTIFUNCTION (*)	MULTIFUNCTION (*)
V	VISCOSITY		VALVE OR DAMPER	
W	WEIGHT OR FORCE	WELL		
X	UNCLASSIFIED (*)	UNCLASSIFIED (*)	UNCLASSIFIED (*)	UNCLASSIFIED (*)
Y	USERS CHOICE (*)		RELAY OR COMPUTE (*)	
Z	POSITION		DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

(*) WHEN USED, EXPLANATION IS SHOWN ADJACENT TO INSTRUMENT SYMBOL. SEE ABBREVIATIONS AND LETTER SYMBOLS.

LIFT STATION P & ID LEGEND

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ELECTRICAL LEGEND

ELECTRICAL SYMBOLS

SYMBOL	DESCRIPTION
	CONVENIENCE RECEPTACLE–DUPLEX UNLESS SPECIFIED OTHERWISE C = CLOCK HANGER CR = CORROSION RESISTANT EWC = WATER COOLER TL = TWIST LOCK WP = WEATHERPROOF GFI = GROUND FAULT INTERRUPTER
	RECEPTACLE – 240V., 1Ø OR 208V., 1Ø
	CONTACT – NORMALLY OPEN
	CONTACT – NORMALLY CLOSED
	THERMAL OVERLOAD HEATER – AMBIENT COMPENSATED
	CIRCUIT BREAKER – THERMAL MAGNETIC 3 POLE UNLESS INDICATED OTHERWISE CONTINUOUS AMP TRIP SETTING INDICATED
	MOMENTARY PUSHBUTTON NORMALLY OPEN
	MOMENTARY PUSHBUTTON NORMALLY CLOSED
150A	FUSED SWITCH – SWITCH AND FUSE CURRENT RATING INDICATED. 3 POLE UNLESS INDICATED OTHERWISE.
100A	SWITCH – CURRENT RATING INDICATED. 3 POLE UNLESS INDICATED OTHERWISE
	FUSED TERMINAL BLOCK
R	ALARM HORN AND BEACON
O H A POLE 1 XOO POLE 2 OOX	SELECTOR SWITCH–MAINTAINED CONTACT. CHART DEFINES OPERATION: POSITION: POLE 1 (HAND X, OFF O, AUTO O); POLE 2 (HAND O, OFF O, AUTO X) X = CLOSED CONTACT O = OPEN CONTACT
	GROUND
	TRANSFORMER
M	MOTOR, SQUIRREL CAGE INDUCTION–HORSEPOWER INDICATED ON ONE LINE.
	LUMINAIRE, TYPE AS NOTED
A PTT	INDICATING LIGHT–PUSH TO TEST (PTT) LETTER INDICATES COLOR. A = AMBER Y = YELLOW G = GREEN B = BLUE R = RED W = WHITE
	MOTOR OR STARTER ENCLOSURE SPACE HEATER
*	BASIC RELAY SYMBOL–SOME RELAY FUNCTIONS: ALT = ALTERNATOR CR = CONTROL RELAY TR = TIMING RELAY M = MOTOR CONTACTOR
	THERMOSTAT
	LEVEL FLOAT
	GROUNDING CONNECTION EXOTHERMIC OR COMPRESSION
	GATE FLEXIBLE GROUNDING STRAP.
	GROUND ROD CONNECTION 5/8" X 8' LONG.
	TEST WELL WITH GROUND ROD CONNECTION 5/8" X 8' LONG.
	ABOVE GRADE TAIL FOR EQUIPMENT CONNECTION. TO BE LOCATED FOR PROPER EQUIPMENT ENTRANCE. PENETRATION THRU CONCRETE TO HAVE SCHEDULE 80 PVC PIPE SEGMENT.
	3–ROD LIGHTNING GROUND

SWITCHGEAR / MCC SYMBOLS

SYMBOL	DESCRIPTION
SSOLR	SOLID STATE OVERLOAD RELAY MOTOR OVERLOAD, PHASE LOSS, AND CURRENT UNBALANCE PROTECTION

ELECTRICAL ABBREVIATIONS

AUTO	AUTOMATIC
AUX	AUXILIARY
CC	CONTROL CABLE
CPT	CONTROL POWER TRANSFORMER
CR	CONTROL RELAY
CS	CONTROL SWITCH
CT	CURRENT TRANSFORMER
EI	ELECTRICAL INTERRUPT
ETM	ELAPSED TIME METER
FLA	FULL LOAD AMPERE
FU	FUSE
FVNR	FULL VOLTAGE NON–REVERSING
HOA	HAND OFF AUTOMATIC SWITCH
ISW	ISOLATION SWITCH
JJB	JUNCTION BOX
KVA	KILOVOLT–AMPERE
KW	KILOWATT
LS,LMS	LIMIT SWITCH
G	GREEN INDICATING LIGHT
M	MAGNETIC CONTACTOR COIL
M	ELECTRIC MOTOR
M	MAIN CONTACTOR AUXILIARY
MIN	MINUTES
MTS	MANUAL TRANSFER SWITCH
N	NEUTRAL GROUNDED CONDUCTOR
OB	OUTBOARD
OC	OVERCURRENT
PH	PHASE
SA	SURGE ARRESTOR
SEC	SECONDS
TR	TIMER
V	VOLT
XFMR	TRANSFORMER

ELECTRICAL LEGEND

LIFT STATION
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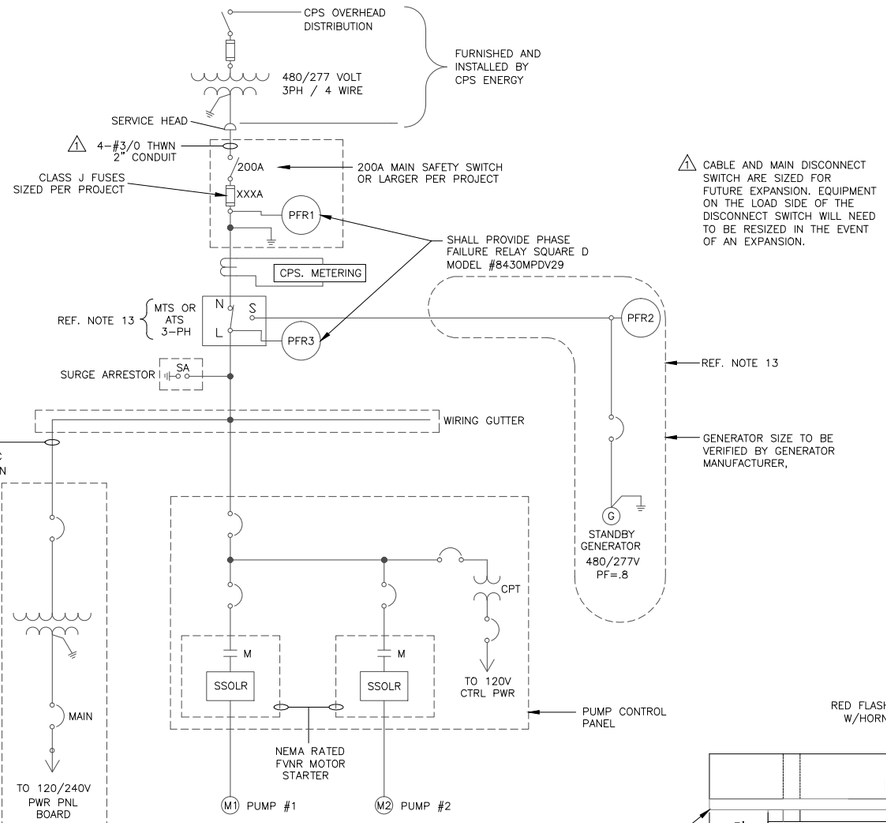


1 CABLE AND MAIN DISCONNECT SWITCH ARE SIZED FOR FUTURE EXPANSION. EQUIPMENT ON THE LOAD SIDE OF THE DISCONNECT SWITCH WILL NEED TO BE RESIZED IN THE EVENT OF AN EXPANSION.

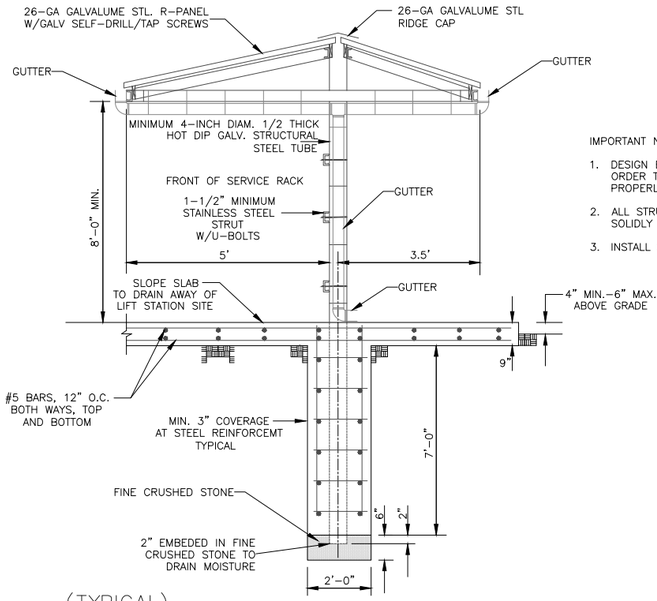
COMBINATION POWER PANEL/TRANSFORMER SHALL BE EATON/CUTLER-HAMMER MINI POWER CENTER MODEL #P48G11S10SS NEMA 3R STAINLESS STEEL OR APPROVED EQUAL.

A ELECTRICAL ONE-LINE DIAGRAM

SCALE: N.T.S.

NOTES:

1. ALL ELECTRIC CONDUIT SHALL BE DIRECT BURIED 24 INCHES.
2. ABOVE GROUND CONDUIT SHALL BE RIGID ALUMINUM.
3. UNDERGROUND CONDUIT SHALL BE RIGID NON-METAL CONDUIT.
4. ALL ENCLOSURES AND DISCONNECTS SHALL BE PAD-LOCKABLE. PUMP CONTROL PANEL SHALL BE TWO DOOR, WALL MOUNTED TYPE WITH 120V EQUIPMENT LOCATED IN THE LEFT SIDE AND 480V IN THE RIGHT SIDE.
5. ALL MOUNTING HARDWARE AND STRUT CHANNEL SHALL BE OF STAINLESS STEEL 304. ALL ENCLOSURES SHALL BE NEMA 4X, STAINLESS STEEL 304.
6. ALL DISCONNECTS SHALL BE NEMA 4X, STAINLESS STEEL 304.
7. SERVICE RACK STRUTS SHALL BE OF STAINLESS STEEL 304 1-1/2 INCH MINIMUM, AND SHALL BE MOUNTED ON 4-INCH X 1/2-INCH THICK STRUCTURAL STEEL TUBE. STRUT CHANNEL ENDS SHALL BE PROTECTED WITH END CAPS.
8. THERE SHALL BE 6" MINIMUM SPACING BETWEEN EQUIPMENT MOUNTED ON THE RACK.
9. ELECTRIC RACK SHALL HAVE SUPPORT COLUMNS EVERY 5 FEET.
10. PROVIDE SEALING FITTING FOR ALL CONDUITS LEAVING THE RACK.
11. PROVIDE A SURGE ARRESTOR IN A SEPARATE ENCLOSURE ATTACHED TO THE INCOMING MAIN SAFETY SWITCH.
12. SPARE CONDUITS ARE NOT SHOWN ON DETAIL A, SEE DETAIL C THIS SHEET FOR SPARE CONDUITS.
13. USE OF STAND-BY GENERATOR WITH AUTOMATIC TRANSFER SWITCH OR CAM-LOK (MALE TYPE) QUICK CONNECTORS WITH MANUAL TRANSFER SWITCH FOR PORTABLE GENERATORS TO BE DETERMINED PER PROJECT DEPENDING UPON LOCATION IN RELATION TO EDWARDS AQUIFER RECHARGE ZONE, AND LIFT STATION CAPACITY AND LOCATION.
14. DISCHARGE PRESSURE TRANSMITTER TO BE INSTALLED IN A LOCATION WHICH MAXIMIZES ACCURACY. MODIFY PIPING AS NEEDED TO MEET THIS REQUIREMENT.
15. ALL ELECTRICAL COMPONENTS SHALL BE NEMA RATED.
16. GROUND RESISTANCE GRID SHALL NOT EXCEED 5 OHMS AT ANY POINT.

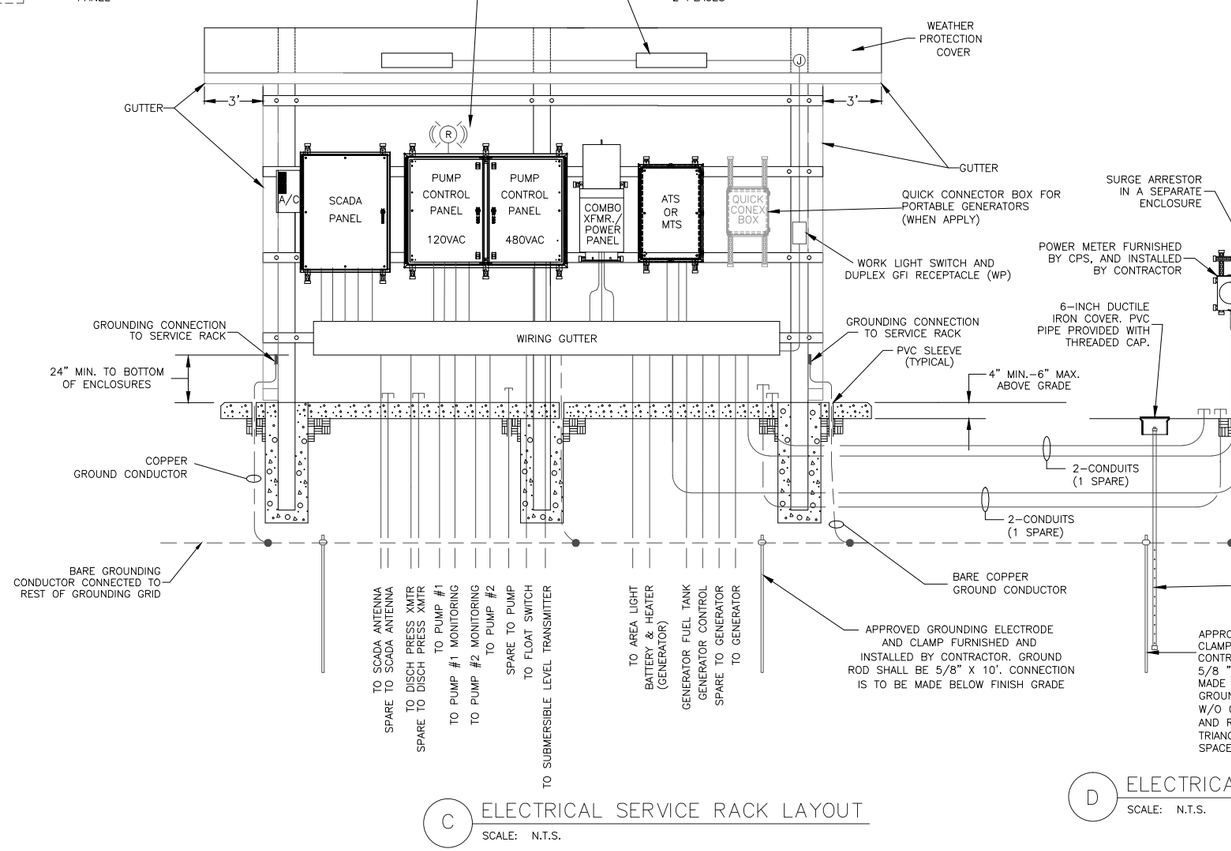


B (TYPICAL) ELECTRICAL SERVICE RACK SIDE VIEW DETAIL

SCALE: N.T.S.

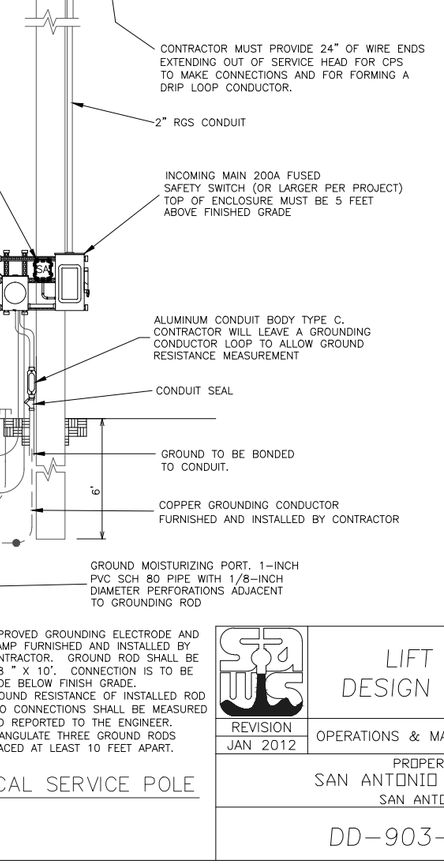
IMPORTANT NOTES:

1. DESIGN ENGINEER TO VERIFY SOIL PROPERTIES IN ORDER TO DESIGN FOUNDATION OF CANOPY PROPERLY.
2. ALL STRUCTURAL MEMBERS OF CANOPY SHALL BE SOLIDLY WELDED.
3. INSTALL GUTTERS TO DRAIN STORM WATER.



C ELECTRICAL SERVICE RACK LAYOUT

SCALE: N.T.S.



D ELECTRICAL SERVICE POLE

SCALE: N.T.S.

ONE-LINE DIAGRAM, SERVICE POLE, SERVICE RACK AND CANOPY DETAILS

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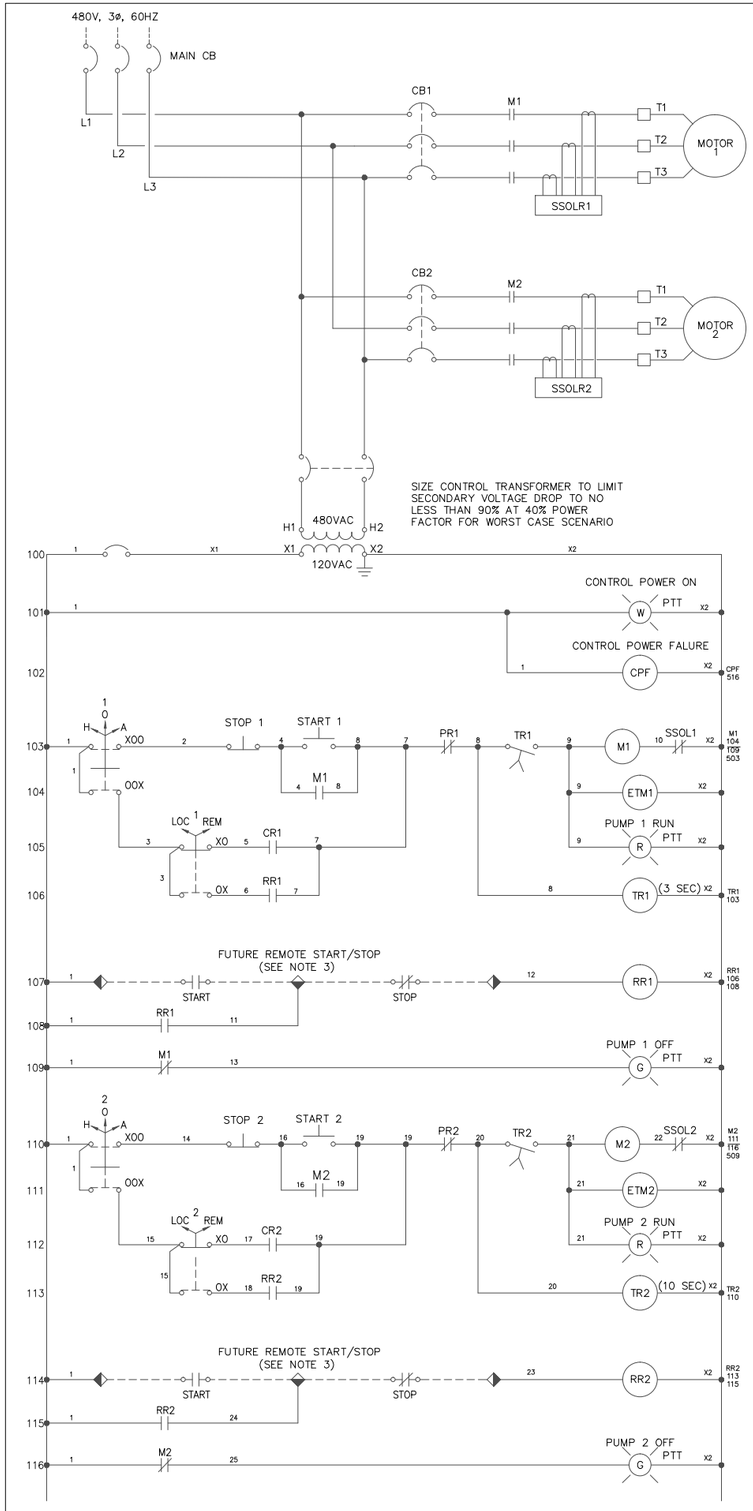
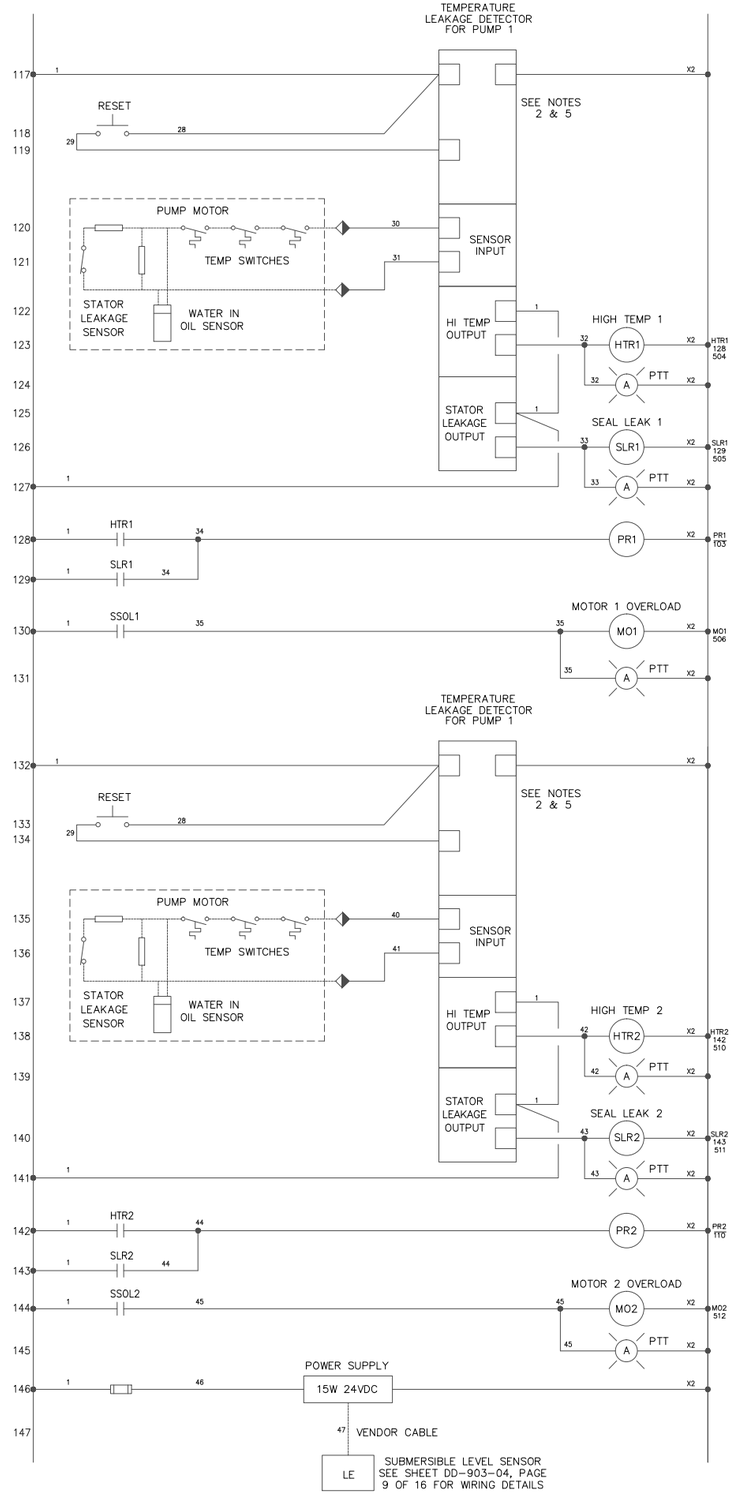
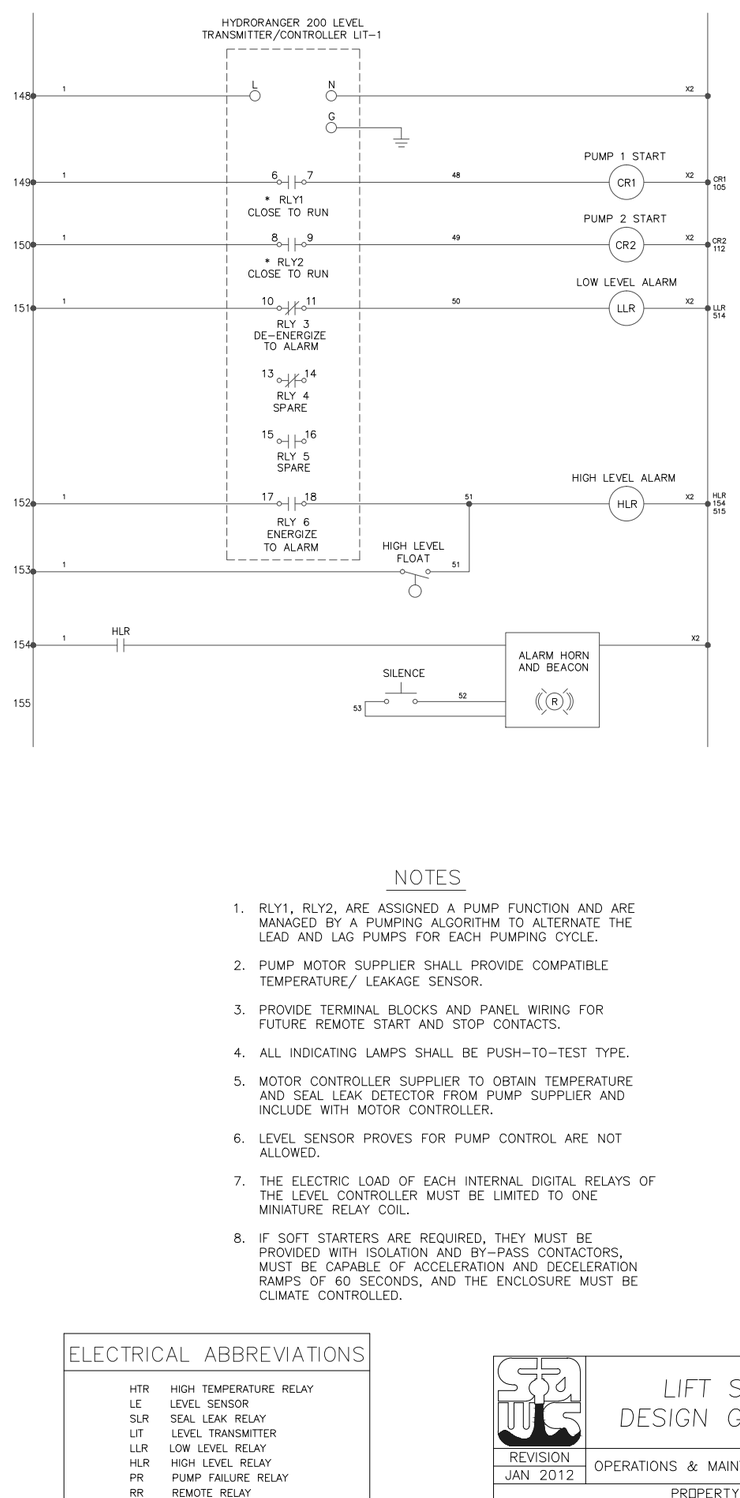


A PUMP CONTROL PANEL SCHEMATIC

SCALE: N.T.S.

THIS SCHEMATIC IS TYPICAL FOR DUPLEX LIFT STATIONS. SAME CONCEPT APPLIES FOR LIFT STATIONS WITH MORE PUMPS





NOTES

1. RLY1, RLY2, ARE ASSIGNED A PUMP FUNCTION AND ARE MANAGED BY A PUMPING ALGORITHM TO ALTERNATE THE LEAD AND LAG PUMPS FOR EACH PUMPING CYCLE.
2. PUMP MOTOR SUPPLIER SHALL PROVIDE COMPATIBLE TEMPERATURE/ LEAKAGE SENSOR.
3. PROVIDE TERMINAL BLOCKS AND PANEL WIRING FOR FUTURE REMOTE START AND STOP CONTACTS.
4. ALL INDICATING LAMPS SHALL BE PUSH-TO-TEST TYPE.
5. MOTOR CONTROLLER SUPPLIER TO OBTAIN TEMPERATURE AND SEAL LEAK DETECTOR FROM PUMP SUPPLIER AND INCLUDE WITH MOTOR CONTROLLER.
6. LEVEL SENSOR PROVES FOR PUMP CONTROL ARE NOT ALLOWED.
7. THE ELECTRIC LOAD OF EACH INTERNAL DIGITAL RELAYS OF THE LEVEL CONTROLLER MUST BE LIMITED TO ONE MINIATURE RELAY COIL.
8. IF SOFT STARTERS ARE REQUIRED, THEY MUST BE PROVIDED WITH ISOLATION AND BY-PASS CONTACTORS, MUST BE CAPABLE OF ACCELERATION AND DECELERATION RAMPS OF 60 SECONDS, AND THE ENCLOSURE MUST BE CLIMATE CONTROLLED.

ELECTRICAL ABBREVIATIONS

HTR	HIGH TEMPERATURE RELAY
LE	LEVEL SENSOR
SLR	SEAL LEAK RELAY
LIT	LEVEL TRANSMITTER
LLR	LOW LEVEL RELAY
HLR	HIGH LEVEL RELAY
PR	PUMP FAILURE RELAY
RR	REMOTE RELAY
SSOL	SOLID STATE OVERLOAD RELAY
MO	MOTOR OVERLOAD
TR	PUMP TIME DELAY

MOTOR CONTROL CIRCUIT DETAILS

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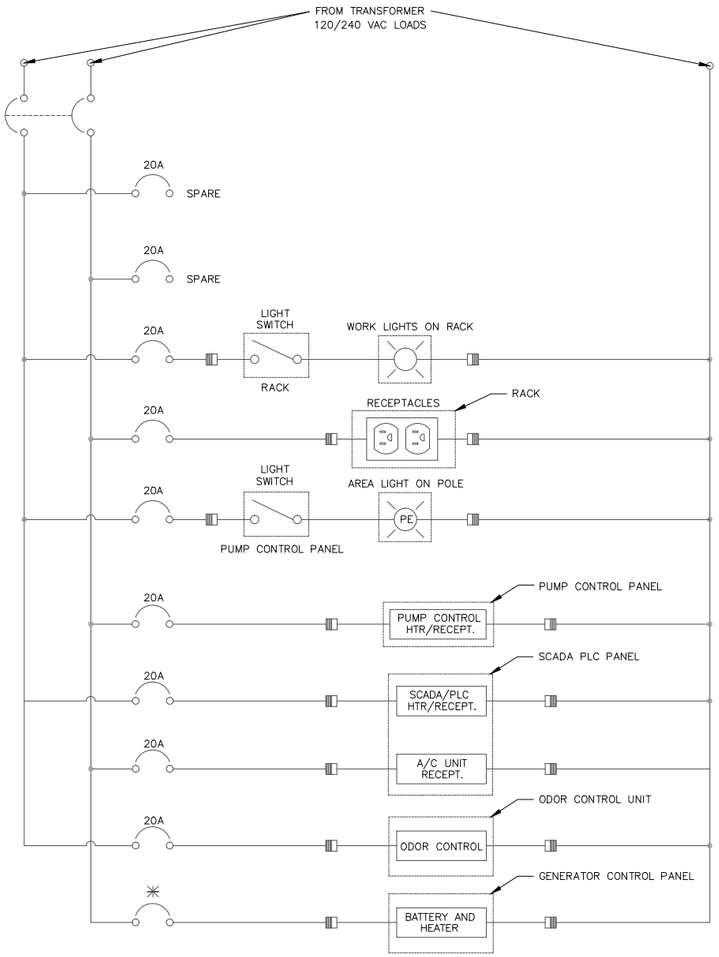
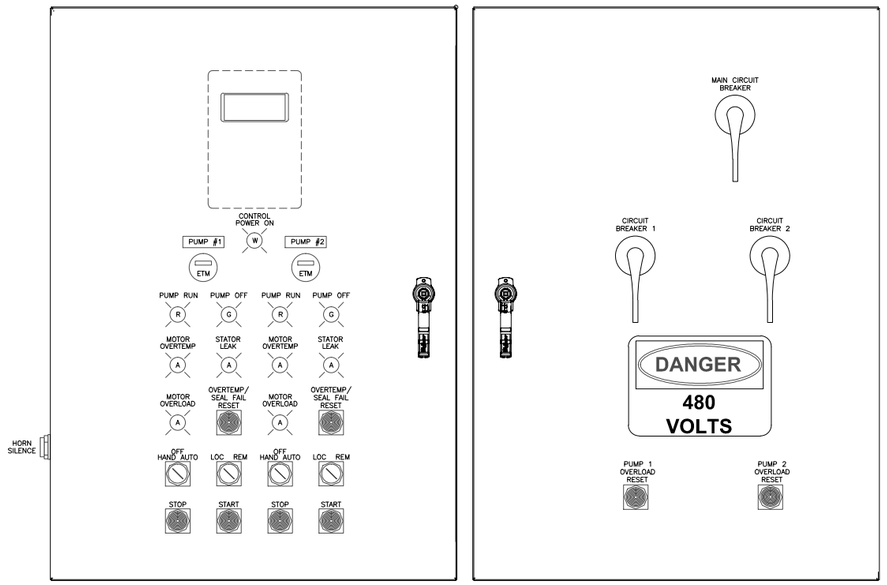


A 120/240V LOAD CENTER

SCALE: N.T.S.
PART OF THE COMBINATION TRANSFORMER PANEL

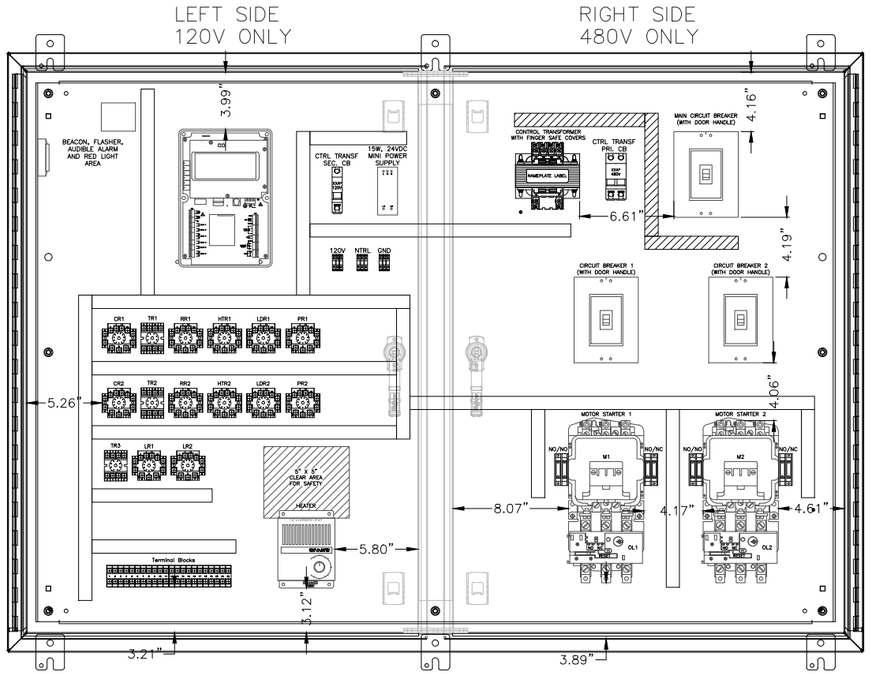
▤ POWER PANEL (DARK SIDE INDICATES CONNECTION INTERNAL TO PANEL)
✳ COORDINATE BREAKER RATING WITH GENERATOR REQUIREMENTS.



B INTERIOR SWING PANELS FOR PUMP CONTROL PANEL

(EXAMPLE FOR DUPLEX LIFT STATIONS)

* DISTANCE BETWEEN INTERIOR PANEL AND ANY COMPONENT SHALL BE AT LEAST 5"
* DISTANCE BETWEEN EXTERIOR PANEL AND INTERIOR PANEL SHALL BE AT LEAST 2"

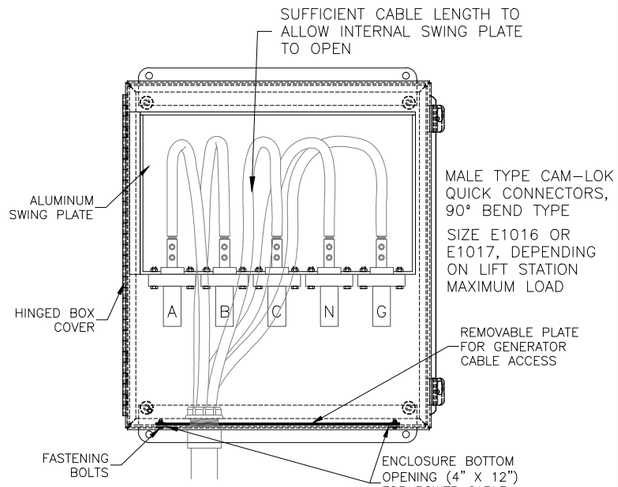


C PUMP CONTROL PANEL INTERIOR DETAILS

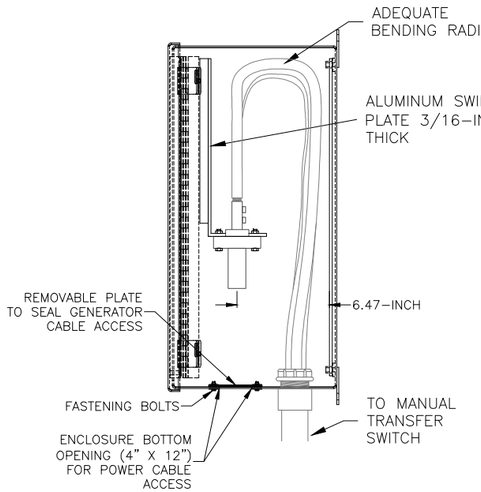
(EXAMPLE FOR DUPLEX LIFT STATIONS)

▨ WIRING DUCT FOR 480 VOLTS ONLY
▭ WIRING DUCT FOR 120 V ONLY

* MINIATURE CIRCUIT BREAKERS TO BE SIZED ACCORDING TO CONTROL TRANSFORMER SIZE
* DESIGN WILL COMPLY WITH MINIMUM SEPARATION DISTANCES AMONG INTERNAL COMPONENTS AS SHOWN



FRONT VIEW



PROFILE VIEW

D BOX WITH QUICK CONNECTORS FOR PORTABLE GENERATORS

SCALE: N.T.S.

IMPORTANT NOTES:

1. BOX MINIMUM DIMENSIONS: 20"H X 16"W X 10"D
2. NEUTRAL AND GROUNDING CONDUCTORS SHALL BE SOLIDLY BONDED.
3. ENCLOSURE BOTTOM MUST BE CUT TO ALLOW ACCESS OF GENERATOR POWER FEEDING CABLES. COVER ENCLOSURE OPENING WITH A PLATE MADE OF THE SAME MATERIAL AS THE ENCLOSURE, AND FASTEN WITH BOLTS OF STAINLESS STEEL 304.

PUMP CONTROL PANEL, LOAD CENTER AND QUICK CONNECTORS DETAILS

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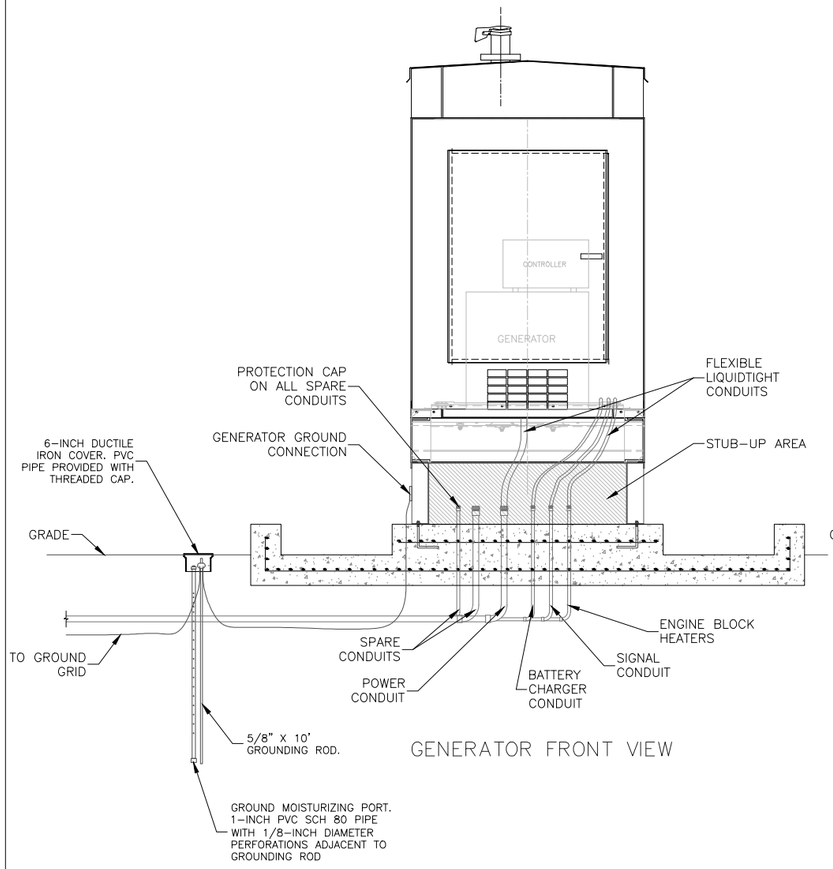
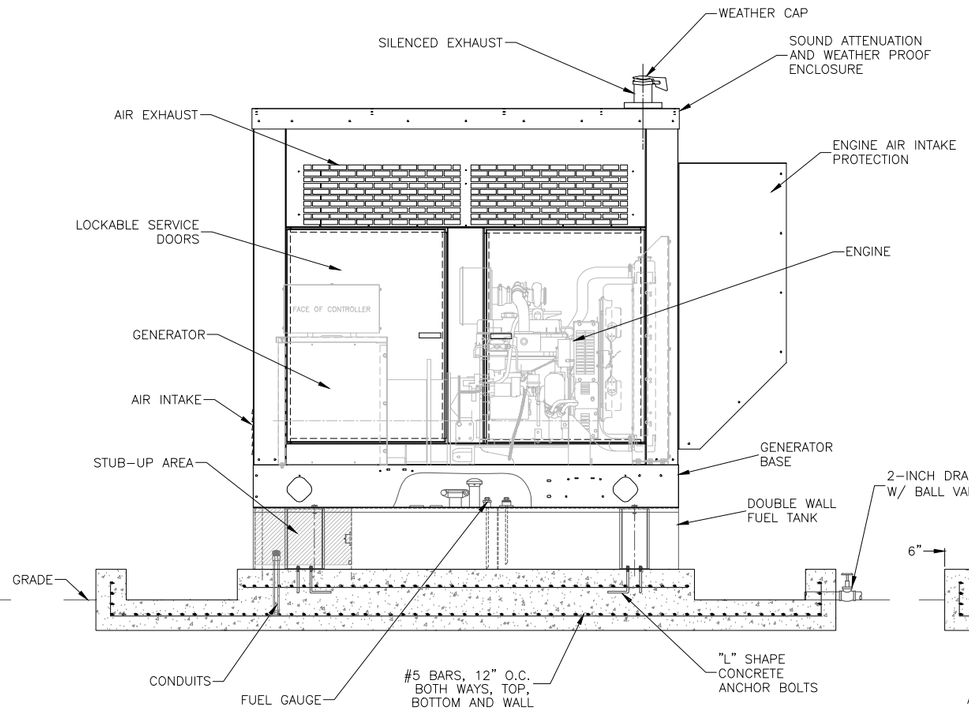
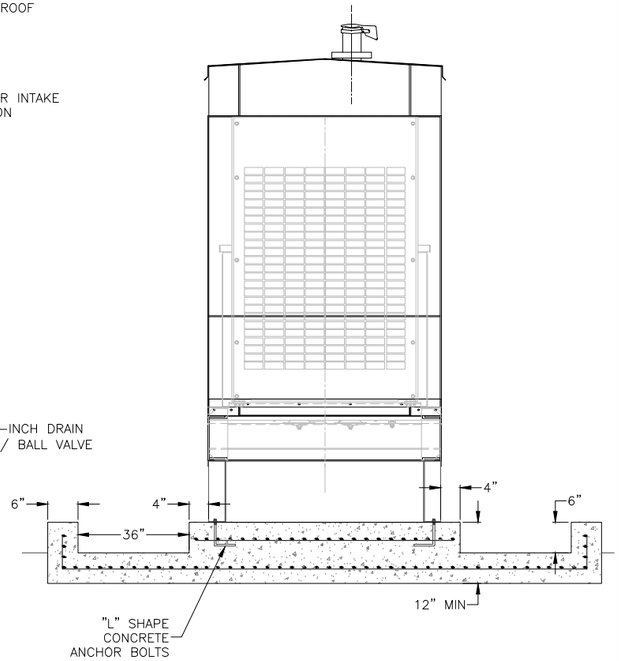


GENERATOR FRONT VIEW



GENERATOR SIDE VIEW



GENERATOR BACK VIEW

A STAND BY GENERATOR INSTALLATION DETAILS

SCALE: N.T.S.

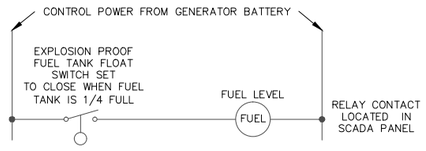
IMPORTANT NOTES:

1. DESIGN ENGINEER SHALL VERIFY GENERATOR INSTALLATION REQUIREMENTS WITH GENERATOR MANUFACTURER.

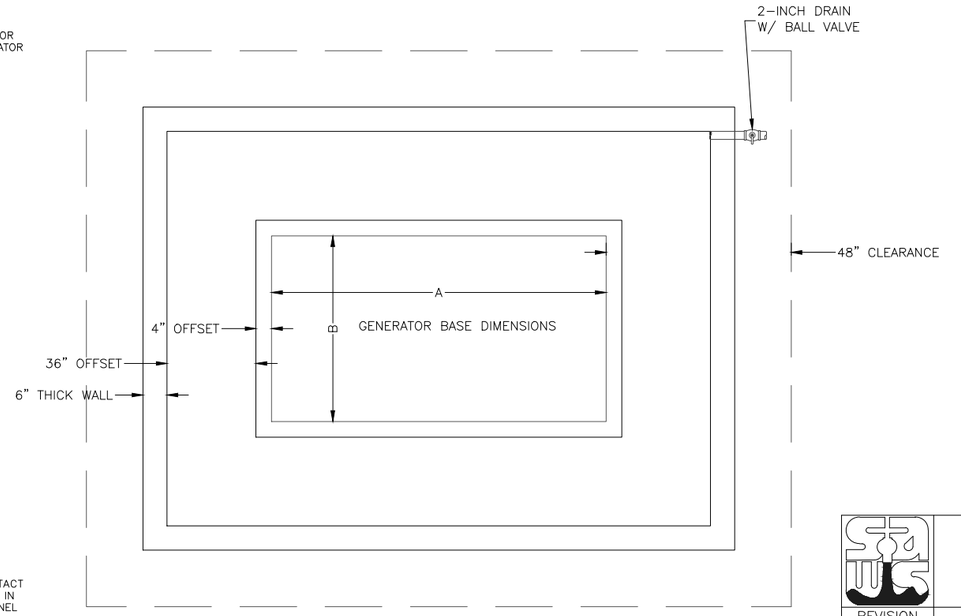
NOTES

1. GENERATOR GROUND, NEUTRAL AND FRAME SHALL BE SOLIDLY BONDED TO THE REST OF THE GROUNDING SYSTEM. GROUND RESISTANCE MEASURED AT THE GENERATOR SHALL HAVE THE SAME MAGNITUDE AS THE REST OF THE GROUNDING SYSTEM, AND IT SHALL NOT EXCEED 5 OHMS.
2. GENERATOR SHALL BE PROVIDED WITH SOUND ATTENUATION ENCLOSURE AND EXHAUST, AND MUST BE WEATHER PROOF. SEE TEXT DOCUMENT FOR OTHER GENERATOR REQUIREMENTS.
3. GENERATOR FRAME SHALL BE SOLIDLY ANCHORED TO CONCRETE SLAB. ALL COMPONENTS USED TO FASTEN THE GENERATOR SHALL BE MADE OF STAINLESS STEEL 304.
4. CONDUITS SHALL INCLUDE AC POWER, BATTERY CHARGER, ENGINE BLOCK HEATER, SIGNAL AND SPARE.
5. FUEL TANK SHALL BE DOUBLE WALL TYPE.
6. CONCRETE SLAB SHALL BE MADE OF CONCRETE MIX WITH A COMPRESSIVE STRENGTH OF 3,000 PSI. CONCRETE SLAB MUST INCLUDE A CONTAINMENT STRUCTURE AS SHOWN IN DETAIL B OF THIS SHEET. A 2-INCH DRAIN PIPE AND BALL VALVE SHALL BE PROVIDED.
7. A 4-FOOT CLEARANCE AROUND GENERATOR IS REQUIRED, EXCLUDING CONTAINMENT STRUCTURE.
8. CONDUIT STUB-UP AREA SHOWN IN THIS DRAWING IS FOR ILLUSTRATION PURPOSES ONLY. DESIGN ENGINEER MUST VERIFY THE LOCATION OF THE STUB-UP AREA WITH THE GENERATOR MANUFACTURER.

GENERATOR INFORMATION	
MANUFACTURER	
MODEL	
STAND-BY POWER CAPACITY	_____ kW
STAND-BY POWER CAPACITY	_____ kVA
RATED VOLTAGE	_____ V
FULL LOAD AMPS	_____ A
MOTOR STARTING CAPACITY	_____ kVA
PERCENT OF VOLTAGE DIP	_____ %



B FUEL TANK LEVEL FLOAT SWITCH WIRING DETAILS



C CONTAINMENT BASE DETAILS

SCALE: N.T.S.

STAND BY GENERATOR INSTALLATION DETAILS

LIFT STATION DESIGN GUIDELINES

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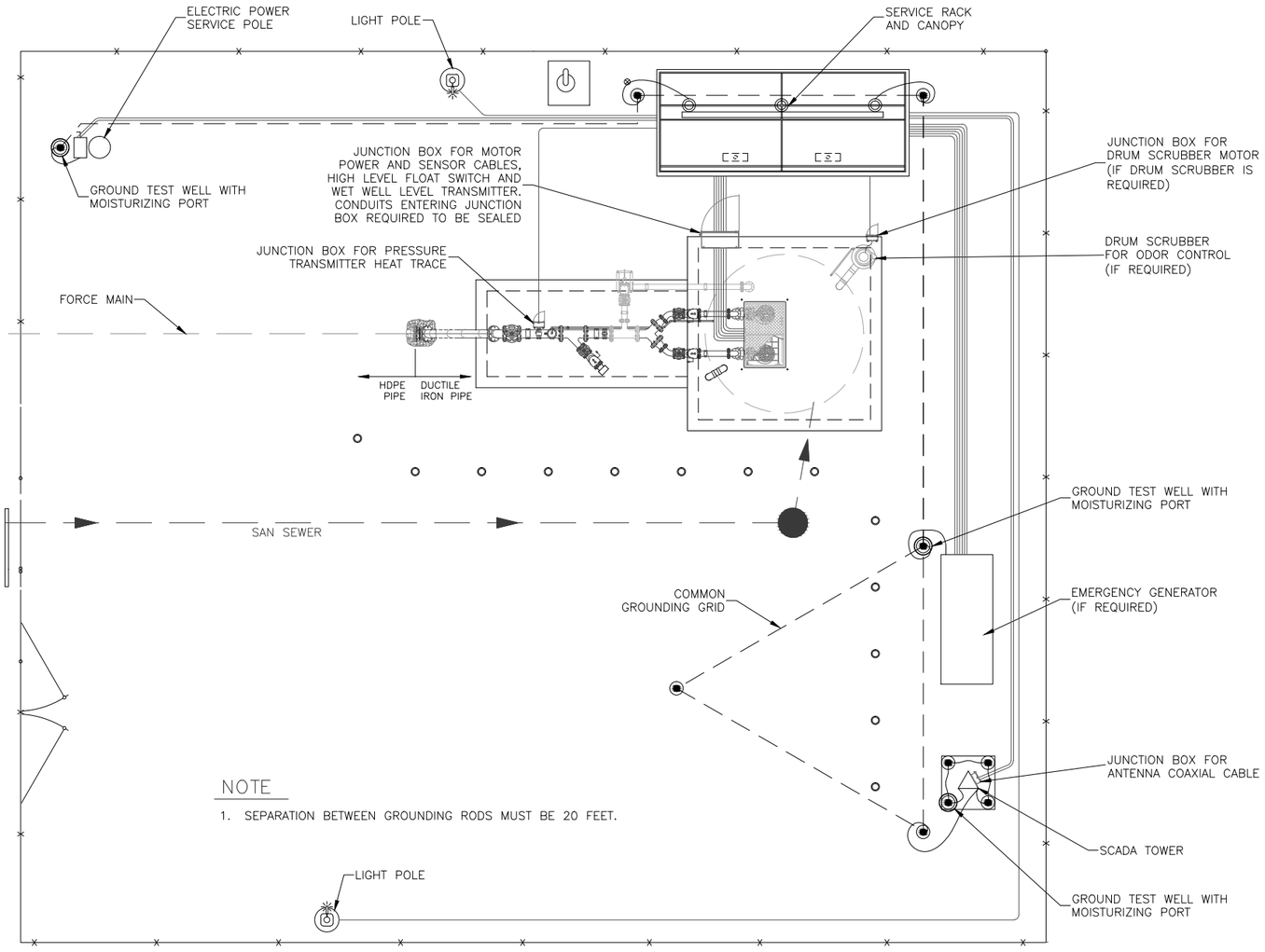
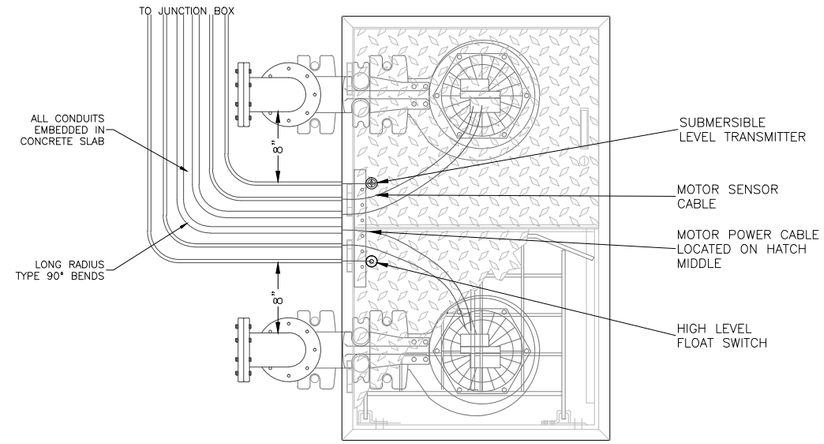
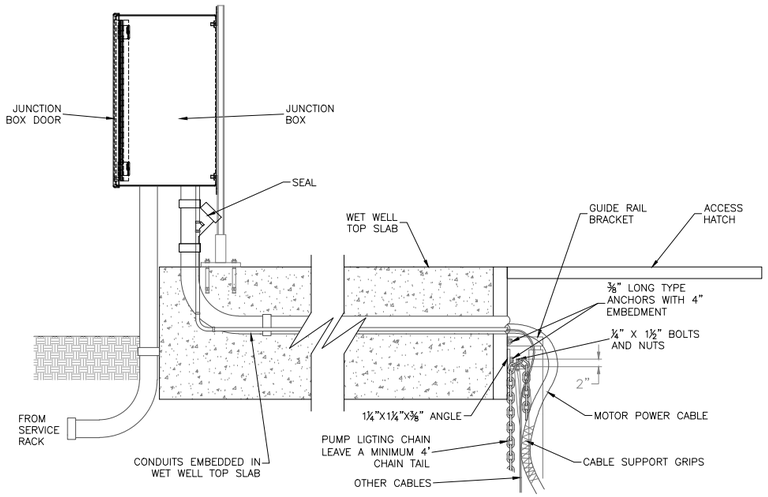


A CONDUIT AND GROUNDING RUN DETAILS

SCALE: N.T.S.



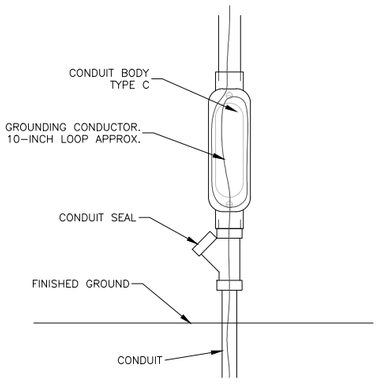
PLAN VIEW



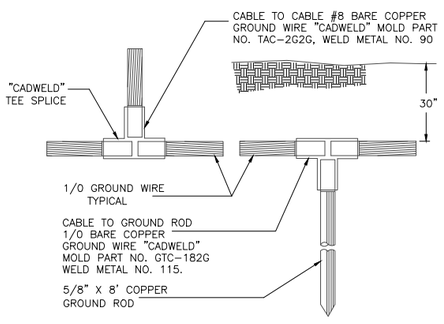
PROFILE VIEW

B CONDUITS AT HATCH DETAILS

SCALE: N.T.S.



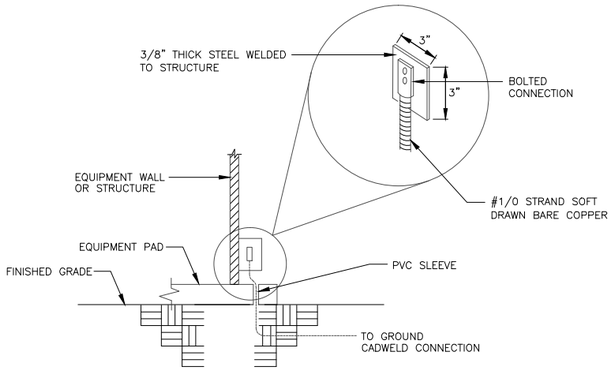
C CONDUIT BODY FOR GROUND RESISTANCE TEST DETAIL



NOTE: THIS DETAIL DOES NOT EXCLUDE CONTRACTOR FROM USING OTHER APPROVED PRODUCTS.

D TYPICAL GROUND DETAIL

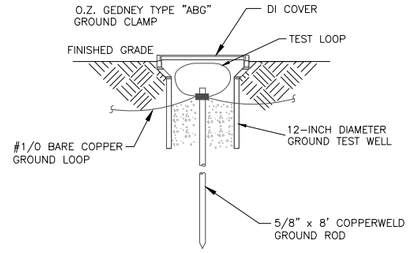
SCALE: N.T.S.



E TYPICAL STRUCTURE GROUND DETAIL

SCALE: N.T.S.

NOTE:
IF METAL STRUCTURES ARE NOT FURNISHED WITH PROVISION FOR BOLTED CONNECTION TO GROUNDING SYSTEM. CONTRACTOR SHALL PROVIDE WELDED PAD FOR GROUND CONNECTION.



F GROUND TEST WELL ARRANGEMENT

SCALE: N.T.S.

CONDUIT RUN AND GROUNDING DETAILS

LIFT STATION DESIGN GUIDELINES

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LIFT STATION SCADA OVERALL SCHEMATIC

SCADA SYSTEM DIGITAL INPUTS
SCADA SYSTEM ANALOG INPUTS

LOCAL SCADA PANEL

UTILITY POWER — EI — IR30
GENERATOR POWER — EI — IR31
TRANSFER FAIL — YA — IR32
GENERATOR LOW FUEL LEVEL — HS — IR26
CONTROL POWER FAILURE — HS — IR29
LEVEL ALARM LOW — LAL — IR27
LEVEL ALARM HIGH — LAH — IR28
WET WELL LEVEL — LI — IR1
PUMP #1 HAND — HS — IR2
PUMP #1 AUTO — HS — IR3
PUMP #1 RUN STATUS — IR — IR4
PUMP #1 HI TEMP — TAH — IR5
PUMP#1 SEAL LEAK — YA — IR6
PUMP#1 MOTOR OVERLOAD — YA — IR9
PUMP #2 HAND — HS — IR10
PUMP #2 AUTO — HS — IR11
PUMP #2 RUN STATUS — IR — IR12
PUMP #2 HI TEMP — TAH — IR13
PUMP#2 SEAL LEAK — YA — IR14
PUMP#2 MOTOR OVERLOAD — YA
FORCE MAIN PRESSURE — PI
SCADA PANEL TEMPERATURE — TI

PUMP CONTROL PANEL

POWER ON — YA 101 — CPF — 120V CONTROL POWER
ALARM BEACON & HORN — YA 01 — HLR — LLR
HOA — HS 101 — SS HS 102 — LOC/REM HS 103 — TR1 — CR1 — M1
OT YA 101 — HTR1
SL YA 102 — LDR1 — PR1
OL YA 102 — MO1
ETM 101 — ON YL 101 — OFF YL 102
LIC 01
OL OE 101
HOA — HS 201 — SS HS 202 — LOC/REM HS 203 — TR2 — CR2 — M2
OT YA 201 — HTR2
SL YA 202 — LDR2 — PR2
OL YA 102 — MO2
ETM 201 — ON YL 201 — OFF YL 202
OL OE 201

RESET HS 104 — TAH 101 — LAH 101 — MOTOR OVERTEMP & SEAL FAIL PROTECTION
RESET HS 204 — TAH 201 — LAH 201 — MOTOR OVERTEMP & SEAL FAIL PROTECTION

ATS/MTS LOAD
TFR — PFR 01
MAIN DISC. SWITCH OR ATS/MTS NORMAL — PFR
GEN. CONN. BOX OR ATS/MTS EMERGENCY — PFR

GENERATOR FUEL TANK — LS
WET WELL
LE — LS-LE-01
LS — LS-LAH-01
LS-ILP-01 — M — TE — ME
LS-ILP-02 — M — TE — ME
INFLUENT
PIT — LS-PIT-01
EFFLUENT

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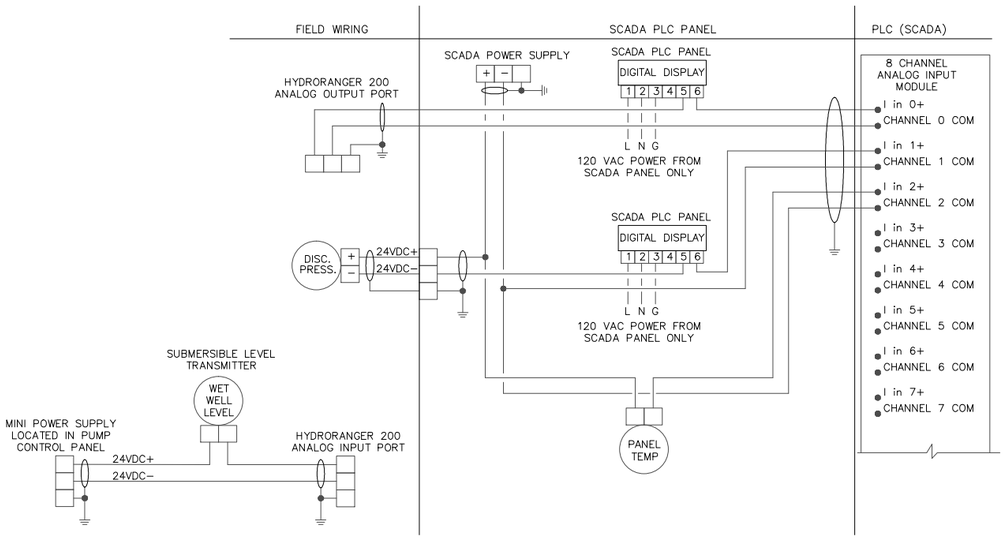
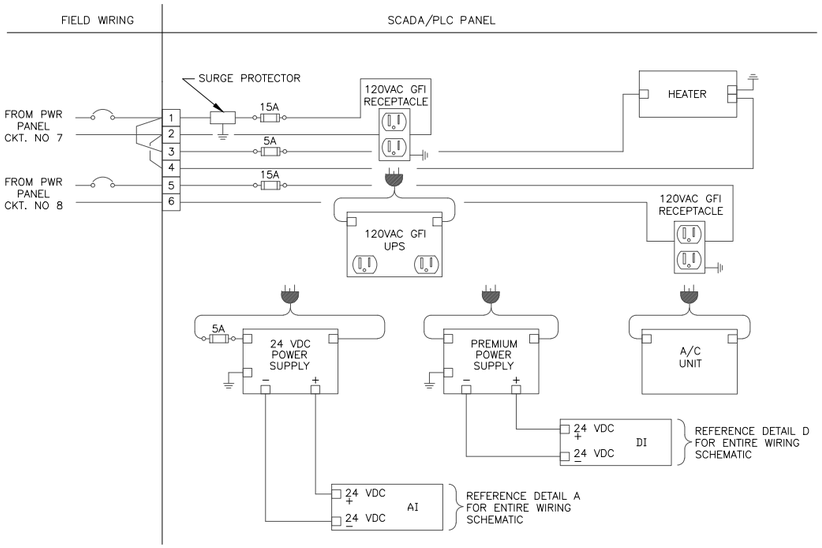


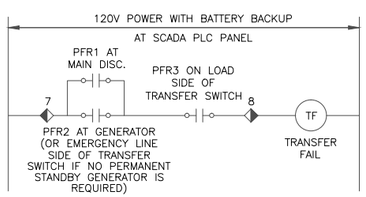
A SCADA ANALOG INPUT

SCALE: N.T.S.



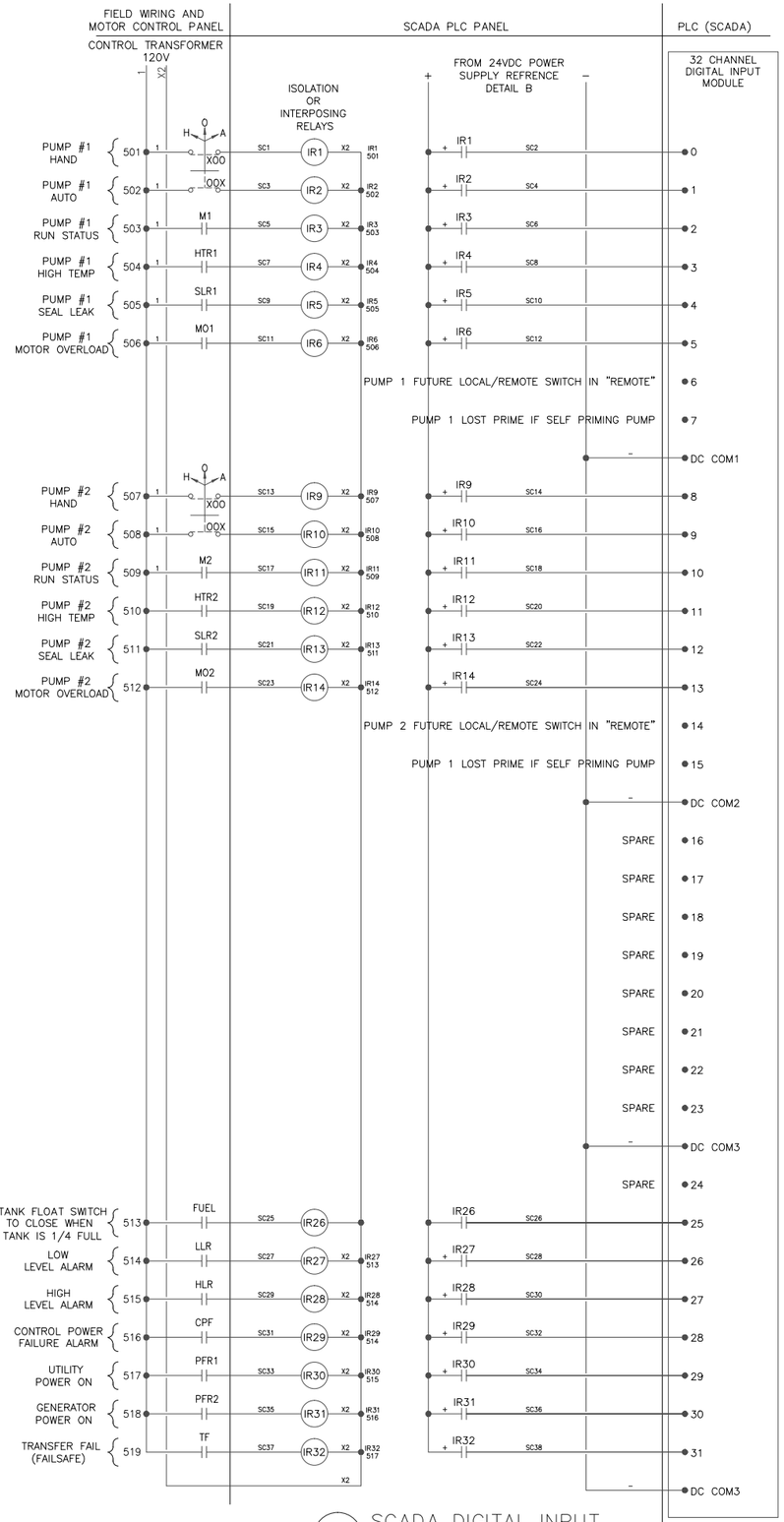
B SCADA POWER DISTRIBUTION

SCALE: N.T.S.



C SCADA TRANSFER FAIL SCHEMATIC

SCALE: N.T.S.



LEGEND

PFR PHASE FAILURE RELAY

D SCADA DIGITAL INPUT

SCALE: N.T.S.

SCADA WIRING DETAILS.

LIFT STATION
DESIGN GUIDELINES

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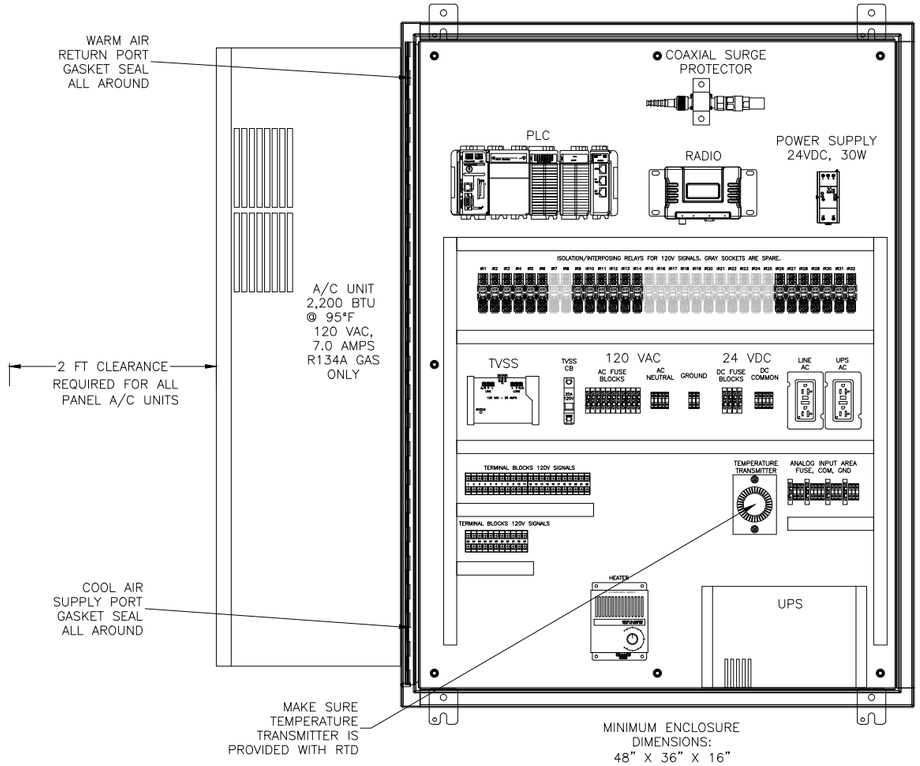
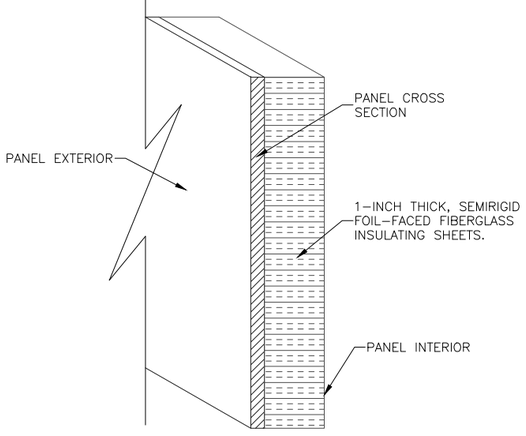


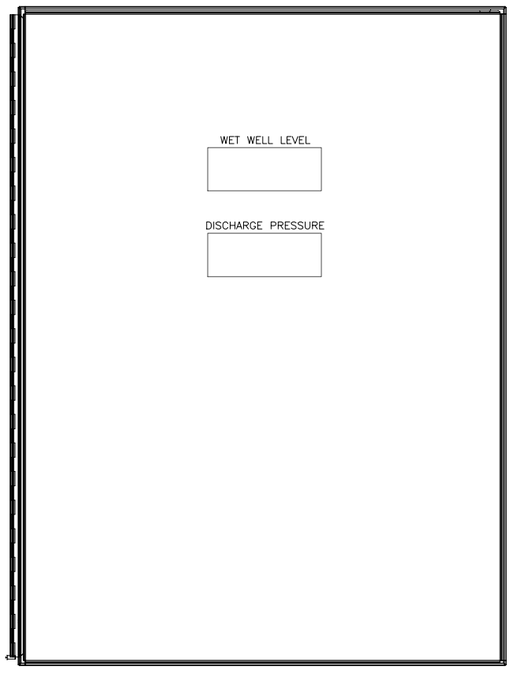
A SCADA INTERIOR PANEL LAYOUT



C CLIMATE CONTROLLED PANEL INSULATION

SCALE: N.T.S.

NOTES:
- REQUIRED FOR ALL ENCLOSURES EQUIPPED WITH A/C UNIT.
- INSTALL INSULATING SHEETS IN THE INTERIOR SURFACES OF THE PANEL, INCLUDING DOOR(S).



B SCADA EXTERIOR PANEL LAYOUT

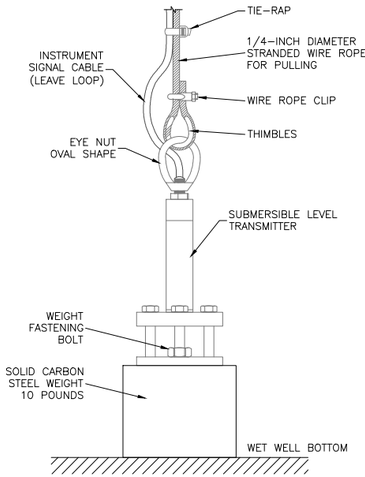
QTY.	DESCRIPTION	MANUFACTURER	MODEL NO.
1	NEMA 4X STAINLESS STEEL ENCLOSED 3 POLE DISCONNECT SWITCH	SQUARE D OR EQUAL	CLASS 3110 H36_DS
1	AUTOMATIC OR MANUAL TRANSFER SWITCH DEPENDING UPON LIFT STATION SIZE AND LOCATION WITH REGARDS TO EDWARDS AQUIFER RECHARGE ZONE		
IF RQD	STANDBY GENERATOR		
1	480VAC NEMA 4X WIRING GUTTER		
1	NEMA 4X ENCLOSED 120 VAC GFCI RECEPTACLE RATED AT 20 AMPS		
1	NEMA 4X ENCLOSED 120 VAC SNAP SWITCH RATED AT 20 AMPS		
2	FLUORESCENT WORK LIGHT		
1	NEMA 3R STAINLESS STEEL ENCLOSED COMBINATION TRANSFORMER AND POWER PANEL CONSISTING OF TRANSFORMER, PRIMARY AND SECONDARY BREAKERS, AND 10 CIRCUIT MINIMUM POWER PANELBOARD.	EATON/CUTLER-HAMMER OR EQUAL	MINI POWER CENTER
2	480VAC PHASE FAILURE RELAY (ONE LOCATED IN TRANSFER SWITCH ENCLOSURE AND ONE LOCATED IN MAIN DISCONNECT ENCLOSURE) ADDITIONAL UNIT REQUIRED IN TRANSFER SWITCH ENCLOSURE AT EMERGENCY POWER TERMINALS IF NO STANDBY GENERATOR PROVIDED.	SQUARE D	8430MPDV29
1	WEATHER PROTECTION COVER TO COVER ALL EQUIPMENT MOUNTED ON SERVICE RACK		
PUMP CONTROL PANEL CONSISTING OF:			
1	NEMA 4X STAINLESS STEEL ENCLOSURE WITH DOUBLE SWING PANEL AND BACKPANEL. DOORS TO HAVE PIANO HINGES WITH STAINLESS STEEL HINGE PIN. 3 POINT LATCHING EXTERIOR DOOR.	HOFFMAN OR RITTAL	
AS RQD.	NEMA RATED STARTERS WITH CIRCUIT BREAKER DISCONNECTS AND SOLID STATE OVERLOADS	SQUARE D OR EQUAL	
AS RQD.	480VAC-120VAC CONTROL POWER TRANSFORMER	SQUARE D OR EQUAL	
1	120 VAC GFCI RECEPTACLE RATED AT 20 AMPS		
1	FLASHING ALARM LIGHT WITH HORN TO BE LOCATED ON EXTERIOR OF PUMP CONTROL PANEL		
1	120VAC LEVEL CONTROLLER WITH 6 RELAY OUTPUTS, 4-20mA OUTPUT, AND SUBMERSIBLE LEVEL TRANSDUCER INPUT	SIEMENS MILLTRONICS	7ML1034-3AA11
AS RQD.	120VAC ELAPSED TIME METER		
SCADA PANEL CONSISTING OF:			
1	NEMA 4X STAINLESS STEEL ENCLOSURE WITH BACKPANEL. DOOR TO HAVE PIANO HINGES WITH STAINLESS STEEL HINGE PIN AND 3 POINT LATCH.	HOFFMAN OR RITTAL	
1	COMBINATION LIGHTNING ARRESTOR AND TRANSIENT VOLTAGE SURGE SUPPRESSOR DIN RAIL MOUNTED INSIDE THE SCADA PANEL	PHOENIX CONTACT	COMBOTRAB 2856702
2	120VAC POWERED 3-1/2" PANEL MOUNTED DIGITAL INDICATOR WITH 4-20mA INPUT	NEWPORT ELECTRONICS OR PRECISION DIGITAL CORP.	202A-P OR PD 765-6RO
1	750VA, 120 VAC POWERED UNINTERRUPTIBLE POWER SUPPLY (UPS)	POWERWARE	5115 750 USB
1	120 VAC POWERED 24VDC POWER SUPPLY RATED AT 30 WATTS	IDEC	PS5R-SC24
1	POWER SUPPLY MODULE	ALLEN BRADLEY	1769-PA4
1	PLC COMPACT LOGIX WITH 1-ETHERNET/IP AND 1-R232 SERIAL PORTS	ALLEN BRADLEY	1769-L32E
1	24VDC POWERED 32 CHANNEL DIGITAL INPUT MODULE	ALLEN BRADLEY	1769-IQ32
1	24VDC POWERED 8 CHANNEL ANALOG INPUT MODULE	ALLEN BRADLEY	1769-IF8
1	RIGHT END CAP / TERMINATOR	ALLEN BRADLEY	1769-ECR
1	LEFT END CAP / TERMINATOR	ALLEN BRADLEY	1769-ECL
1	RIGHT TO RIGHT BANK IN TERCONNECTION	ALLEN BRADLEY	1769-CRR3
1	RIGHT TO LEFT BANK INTERCONNECTION	ALLEN BRADLEY	1769-CRL3
1	MODBUS COMMUNICATION MODULE	PROSOFT INC.	MVI69-MCM
1	CPU BATTERY	ALLEN BRADLEY	1769-BA
1	PLC CONFIGURATION SOFTWARE	ALLEN BRADLEY	RSLOGIX 5000 FULL EDITION OR LATEST APPROVED VERSION
1	NEMA 4X 304 STAINLESS STEEL ENCLOSED AIR CONDITIONER WITH CLOSED LOOP COOLING. 2200 BTU @ 95ºF, 120V, 7.0 AMPS.	McLEAN	T20-0216-G100
1	13.8VDC POWERED 900MHz UNLICENSED FIXED FREQUENCY MICROWAVE RADIO TRANSCEIVER WITH 4.6 AMP/HOUR BATTERY BACKUP WITH CHARGER	MICROWAVE DATA SYSTEMS, INC.	MDS TRANSNET 900 (METAL CASE)
1	50 kA SURGE PROTECTOR FOR RADIO ANTENNA CABLE	POLY PHASER	IS-50NX-C2
MISCELLANEOUS INSTRUMENTS/EQUIPMENT:			
1	900MHz NOMINAL, 10dBd GAIN, 50 OHM, DIRECTIONAL YAGI ANTENNA	KATHREIN INC. SCALA DIVISION	TY-900
AS RQD.	ANTENNA FEEDLINE - IF 50 FEET OR LESS USE RG-8 A/U COAXIAL CABLE, IF OVER 50 FEET USE 1/2" HELIAX CABLE		
1	24VDC POWERED DISCHARGE PRESSURE TRANSMITTER WITH 150 PSI INPUT RANGE AND 4-20mA OUTPUT	ROSEMOUNT	2088G2S22A1B4E5M5
1	SUBMERSIBLE LEVEL TRANSDUCER SEE DETAIL A ON SHEET DD-903-04 PAGE 10 OF 13	MERCOID	PBLT2
1	NON-MERCURY LEVEL FLOAT SWITCH	FLYGT OR EQUAL	ENM-10

D BILL OF MATERIALS

SCALE: N.T.S.

NOTES:
1. USE SUBMERSIBLE LEVEL TRANSMITTERS FOR WET WELL LEVEL CONTROL IN LIEU OF THE ULTRASONIC TRANSDUCER. A 10 POUND WEIGHT MADE OF SOLID STAINLESS STEEL 316 SHALL BE SOLIDLY FASTENED TO THE INSTRUMENT.
2. ALL INSTRUMENT SIGNAL CABLES (SHIELDED CABLES) SHALL BE CONTINUOUS WITHOUT SPLICES.
3. CABLE LENGTHS WILL VARY DEPENDING ON LIFT STATION DESIGN.

SCADA PANEL LAYOUT, INSULATION DETAIL AND BILL OF MATERIALS

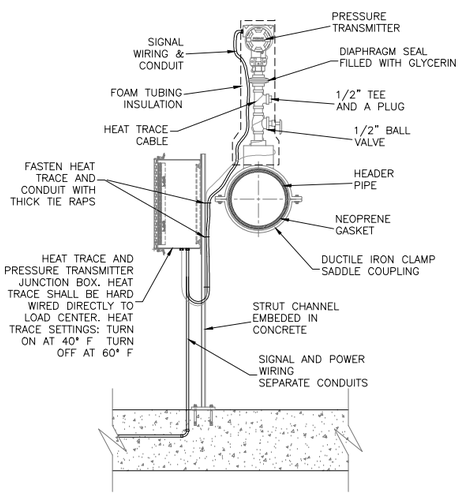


A SUBMERSIBLE LEVEL TRANSDUCER MOUNTING DETAIL

SCALE: N.T.S.

IMPORTANT NOTES:

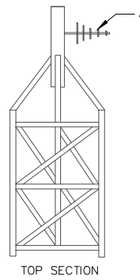
1. INSTRUMENT, WIRE ROPE AND ALL FASTENERS SHALL BE OF STAINLESS STEEL 316 TYPE.
2. WEIGHT SHALL BE DRILLED AND TAPPED AT THE CENTER TO ALLOW A BOLT TO SOLIDLY FASTEN INSTRUMENT TO WEIGHT.
3. INSTRUMENT SIGNAL CABLE SHALL BE FASTENED TO WIRE ROPE WITH THICK PLASTIC TIE–RAPS.
4. EYE NUT THREADED TO INSTRUMENT AND OVAL SIZE SHALL BE LARGE ENOUGH TO ALLOW SIGNAL CABLE TO FREELY BEND AND PASS THROUGH.



B DISCHARGE PRESSURE TRANSMITTER MOUNTING DETAIL

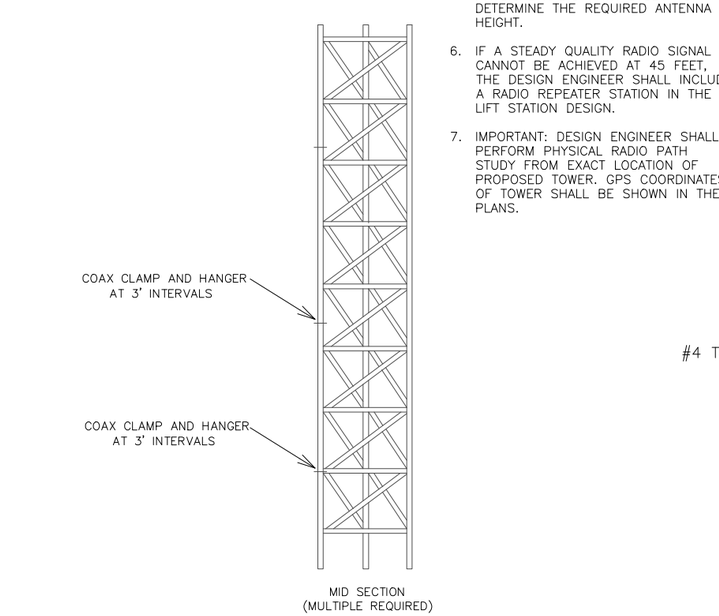
SCALE: N.T.S.

INCLUDE TOWER NAD83 STATE COORDINATES:
LATITUD: __D__M__S = __.______
LONGITUDE: __D__M__S = __._____



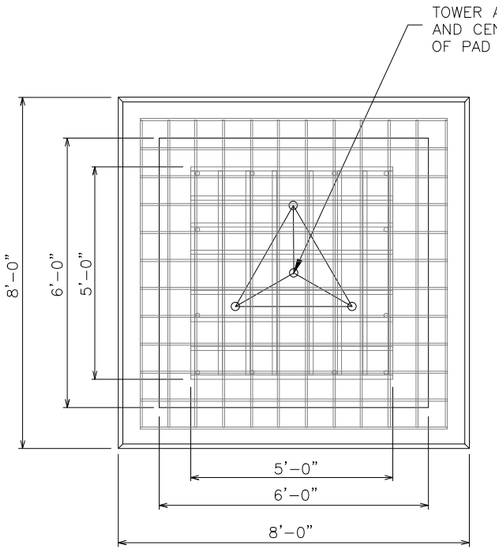
NOTES:

1. TOWER SHALL BE ROHN SELF–SUPPORTED TOWER MODEL 55G PART No. 25SS040 OR EQUIVALENT
2. OVERTURNING MOMENT: 22,900 FT–LB
3. MAX ALLOWABLE SHEAR: 1,600 LB
4. TOWER MAXIMUM HEIGHT IS 45 FT.
5. DESIGN ENGINEER SHALL PERFORM A PHYSICAL RADIO PATH STUDY TO DETERMINE THE REQUIRED ANTENNA HEIGHT.
6. IF A STEADY QUALITY RADIO SIGNAL CANNOT BE ACHIEVED AT 45 FEET, THE DESIGN ENGINEER SHALL INCLUDE A RADIO REPEATER STATION IN THE LIFT STATION DESIGN.
7. IMPORTANT: DESIGN ENGINEER SHALL PERFORM PHYSICAL RADIO PATH STUDY FROM EXACT LOCATION OF PROPOSED TOWER. GPS COORDINATES OF TOWER SHALL BE SHOWN IN THE PLANS.



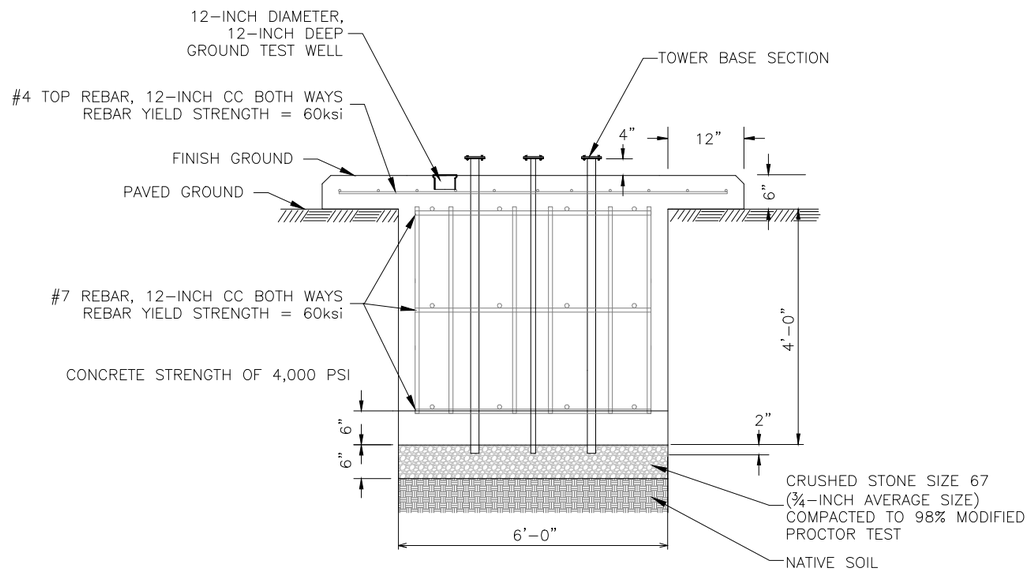
C SCADA TOWER SECTIONS

SCALE: N.T.S.



D PLAN VIEW TOWER FOUNDATION

SCALE: N.T.S.



E SIDE VIEW TOWER FOUNDATION

SCALE: N.T.S.

NOTES:

1. FOR REQUIRED MATERIAL SPECIFICATIONS, INSTALLATION NOTES, AND TOLERANCES SEE MANUFACTURER DRAWINGS.
2. MAST SHOWN FOR INFORMATION PURPOSES ONLY. SAWS TO DETERMINE MAST HEIGHT AND TYPE.

INSTRUMENTATION AND TOWER STRUCTURAL DETAILS.

LIFT STATION DESIGN GUIDELINES

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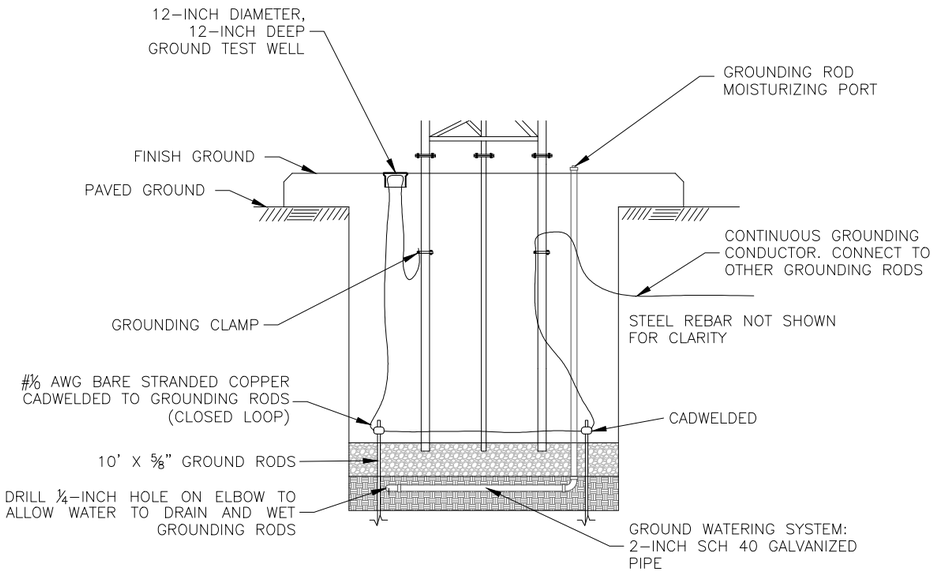
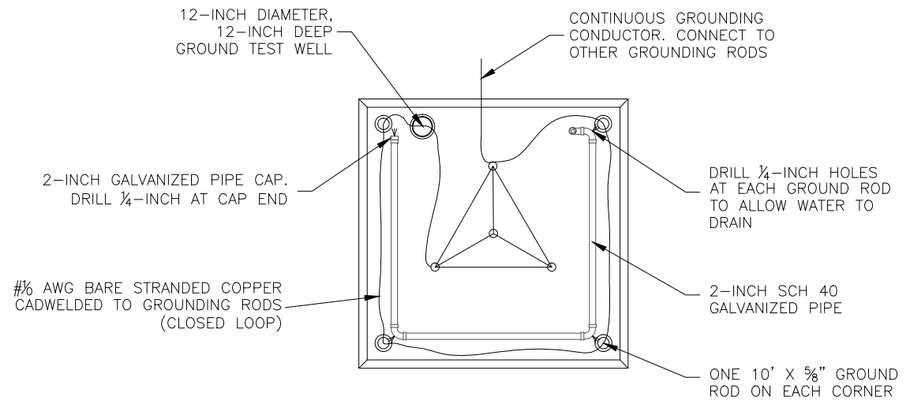
SAN ANTONIO, TEXAS

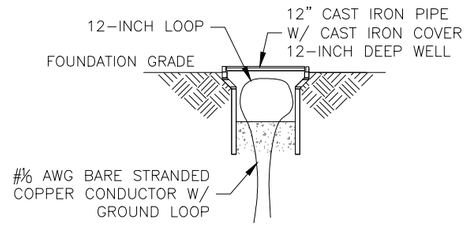
DD–903–04



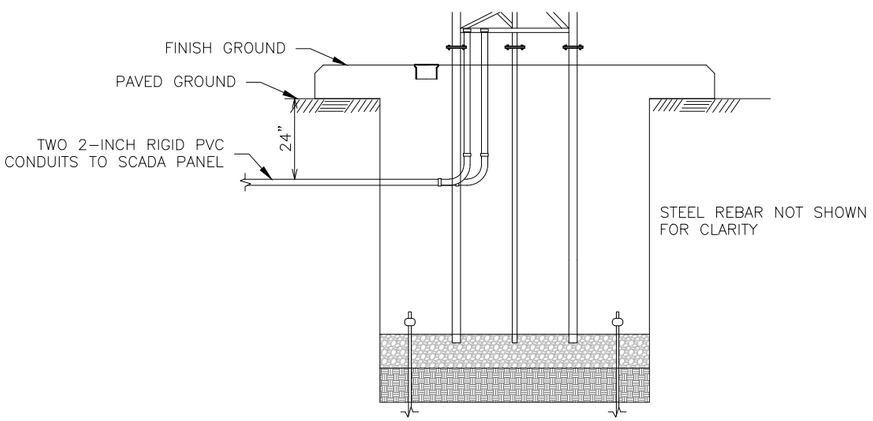
A ANTENNA GROUNDING DETAILS
SCALE: N.T.S.



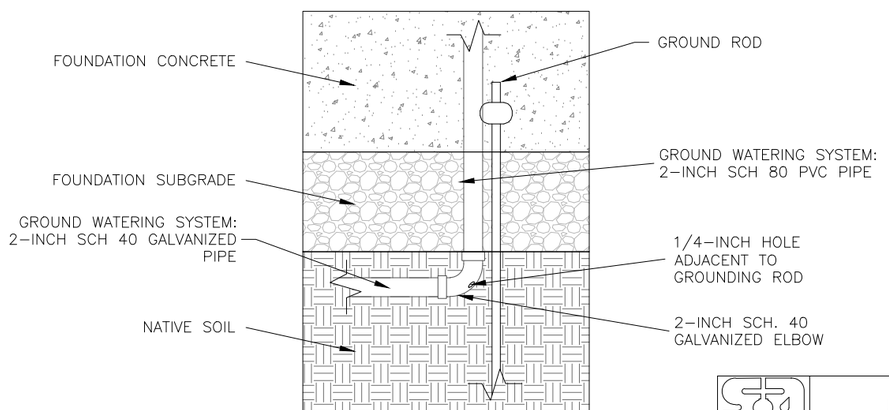
B ANTENNA GROUNDING DETAILS
PLAN VIEW
SCALE: N.T.S.



E GROUND TEST WELL ARRANGEMENT
SCALE: N.T.S.



C ANTENNA CABLE CONDUIT RUN
DETAIL
SCALE: N.T.S.



D MOISTURIZING PIPE DETAILS
SCALE: N.T.S.

TOWER CONDUIT RUN AND GROUNDING DETAILS.

LIFT STATION
DESIGN GUIDELINES

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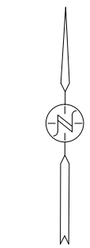
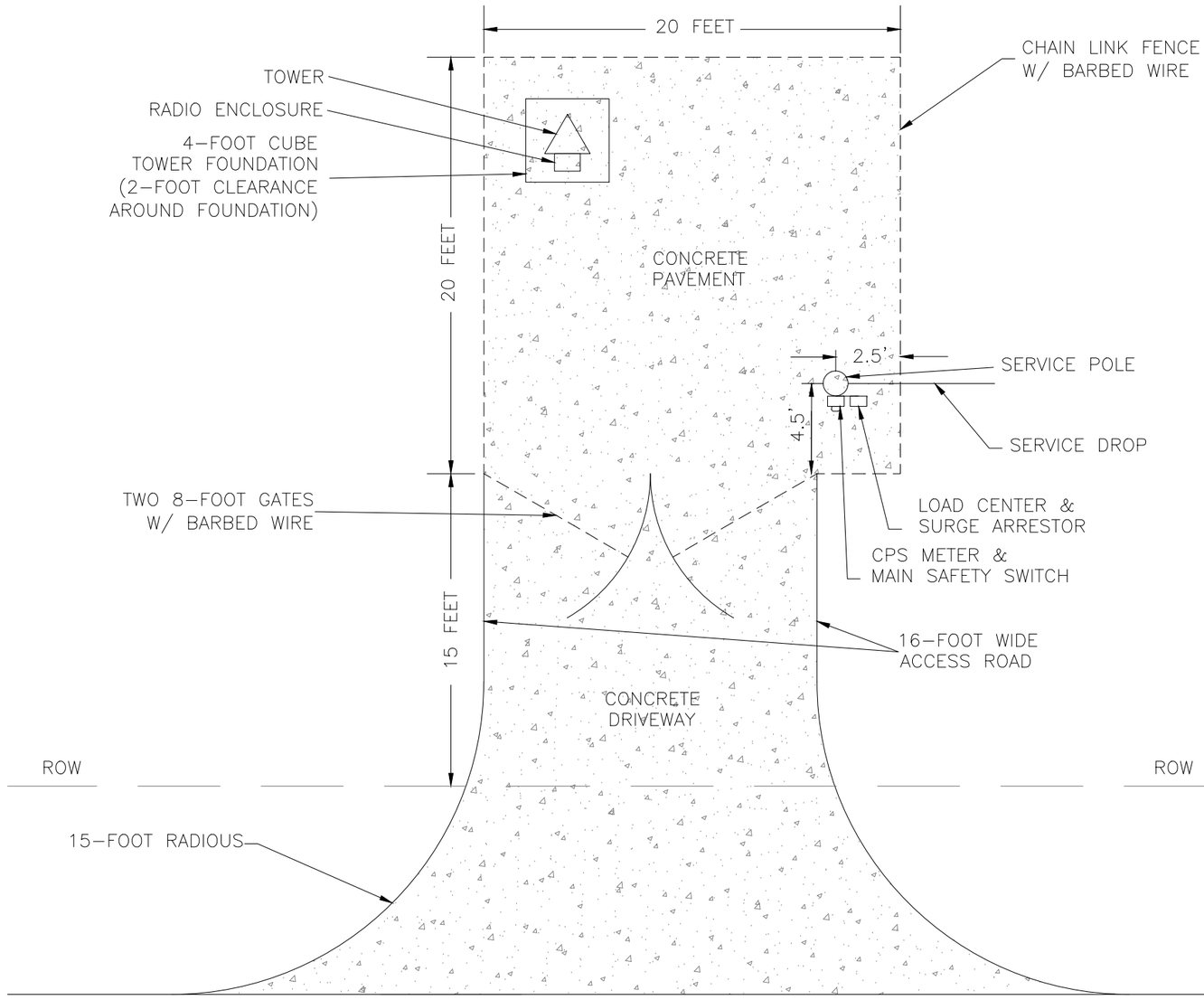


SHOW SITE ORIENTATION



IMPORTANT NOTE:

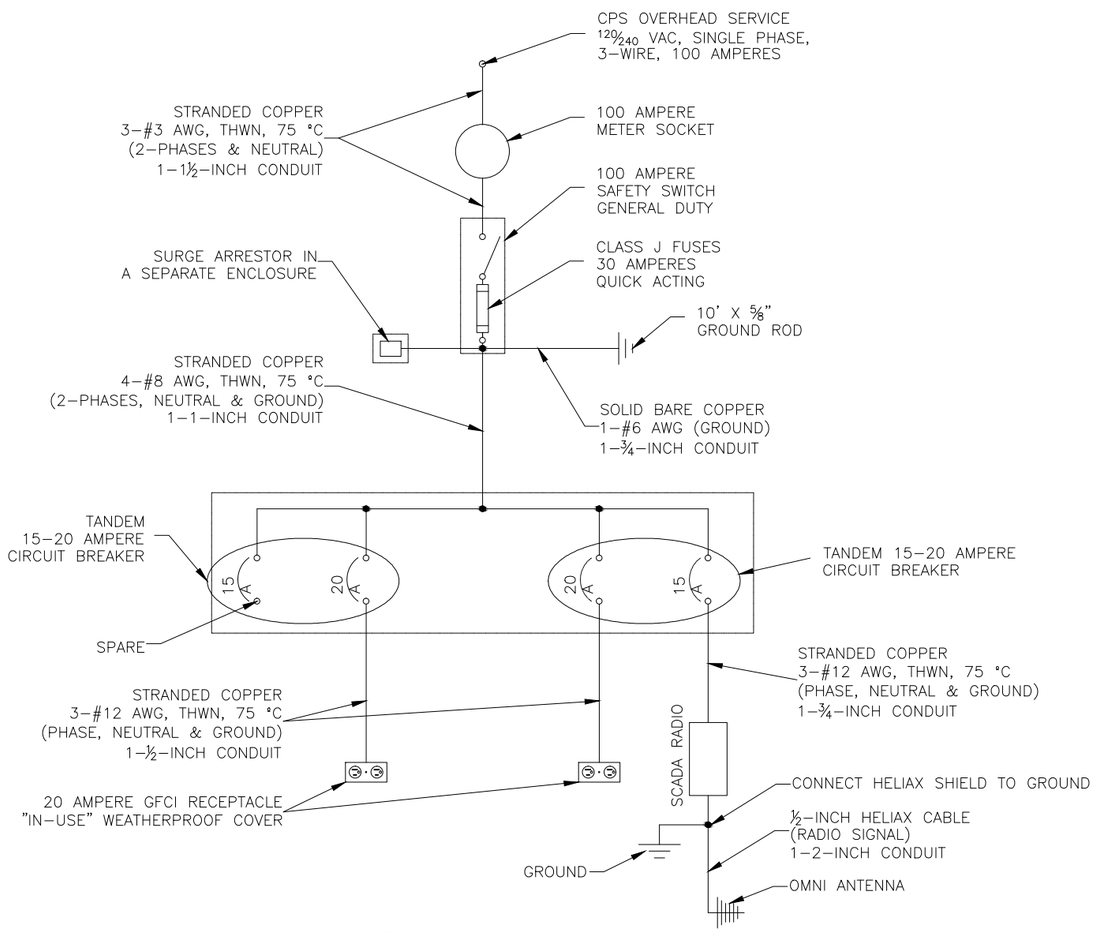
1. SCADA REPEATER STATION MUST COMPLY WITH ALL LIFT STATION DESIGN REQUIREMENTS, INCLUDING, BUT NOT LIMITED TO: ACCESS ROAD, STORM RUNOFF PROTECTION, FENCING AND SAFETY.

2. LOCATION OF TOWER WITH RESPECT TO SERVICE POLE MUST BE AS SHOWN IN THIS LAYOUT. A MIRROR ARRANGEMENT IS ALSO ACCEPTABLE.

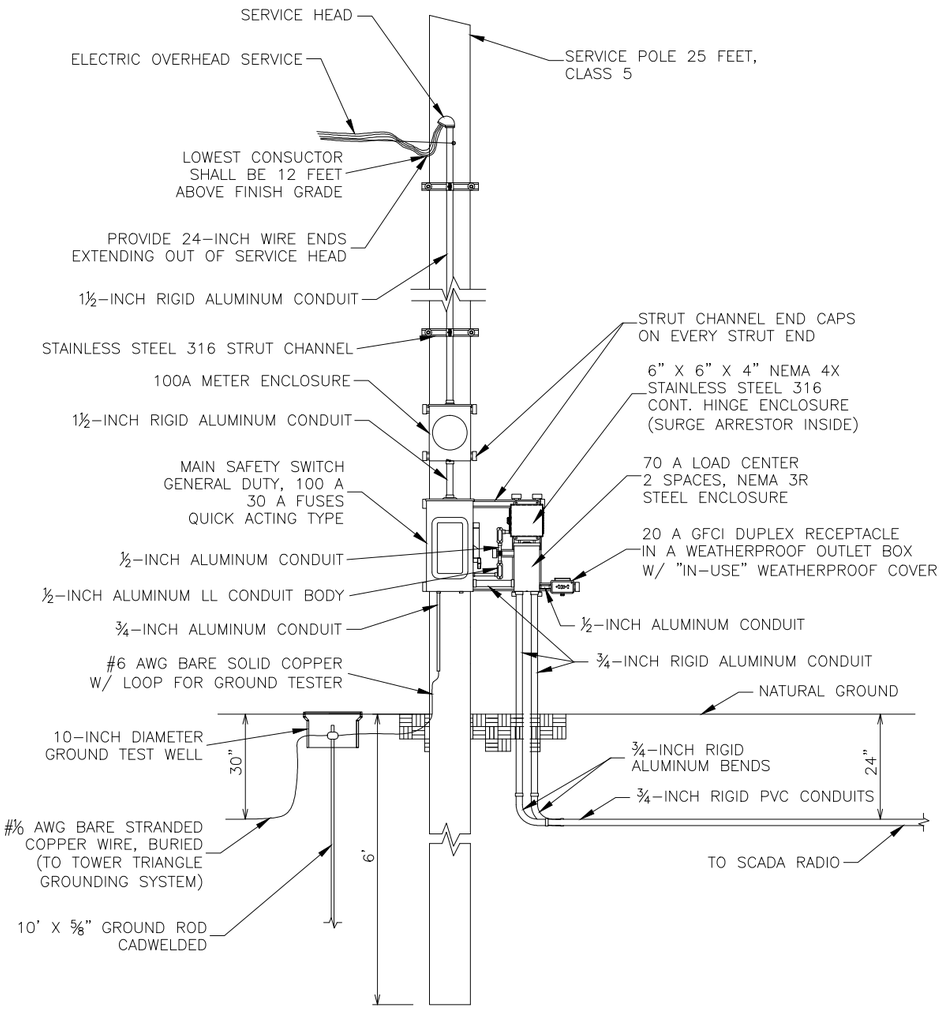
3. OVERHEAD LINES INCLUDING, BUT NOT LIMITED TO: PRIMARY AND SECONDARY POWER LINES, ELECTRIC SERVICE DROPS, CABLE AND TELEPHONE LINES SHALL NOT BE LOCATED OVER THE SITE TO allow MAINTENANCE RAISING PLATFORM RISE SAFELY.

4. ELECTRIC SERVICE DROP MUST BE LOCATED AS SHOWN IN THIS LAYOUT.

SCADA REPEATER STATION SITE LAYOUT DETAILS



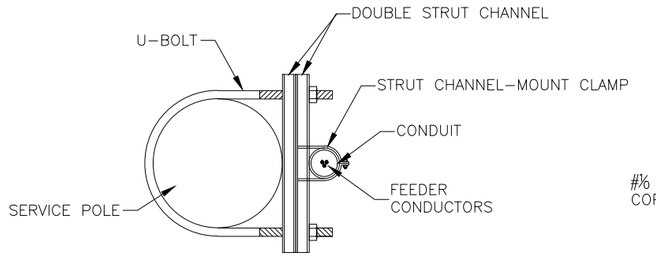
A ONE LINE DIAGRAM
SCALE: N.T.S.



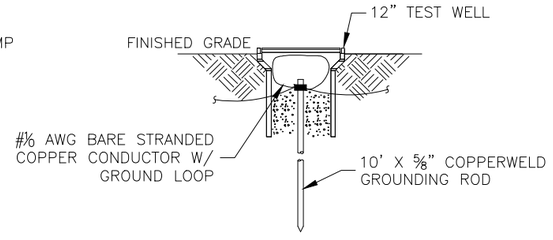
B SERVICE POLE DETAIL
SCALE: N.T.S.

NOTES:

1. ALL ELECTRIC CONDUIT RUNS SHALL BE DIRECTLY BURIED 24 INCHES.
2. ABOVE GROUND CONDUIT SHALL BE RIGID ALUMINUM CONDUIT, UNLESS OTHERWISE NOTED.
3. UNDER GROUND CONDUIT SHALL BE RIGID PVC CONDUIT.
4. ALL ENCLOSURES AND DISCONNECTS SHALL BE PAD–LOCKABLE.
5. ALL MOUNTING HARDWARE AND STRUT CHANNEL SHALL BE 316 STAINLESS STEEL. ALL ENCLOSURES SHALL BE NEMA 4X, UNLESS OTHERWISE NOTED.
6. RADIO ENCLOSURE SHALL BE PROVIDED WITH SUNSHIELD TOP AND SIDES.
7. MAIN STRUT CHANNEL STRUCTURE SHALL BE 1⅝" X 1⅝" AND REINFORCE STRUT CHANNEL SHALL BE 1⅝" X 13/16" MINIMUM.
8. PROVIDE SEALING FITTINGS AT RADIO ENCLOSURE PENETRATIONS.
9. PROVIDE A SURGE ARRESTOR IN A 316 STAINLESS STEEL NEMA 4X ENCLOSURE AND LOCATE IN MINI RACK AT SERVICE POLE. CONNECTED TO LOAD SIDE OF MAIN SAFETY SWITCH.
10. GROUND RESISTANCE SHALL BE AS MINIMUM AS POSSIBLE, BUT IN NO CASE SHALL EXCEED 5 OHMS.



C STRUT CHANNEL MOUNTING DETAIL
SCALE: N.T.S.



D GROUND TEST WELL DETAIL
SCALE: N.T.S.

SCADA REPEATER STATION
ONE LINE DIAGRAM AND SERVICE
POLE DETAILS

LIFT STATION
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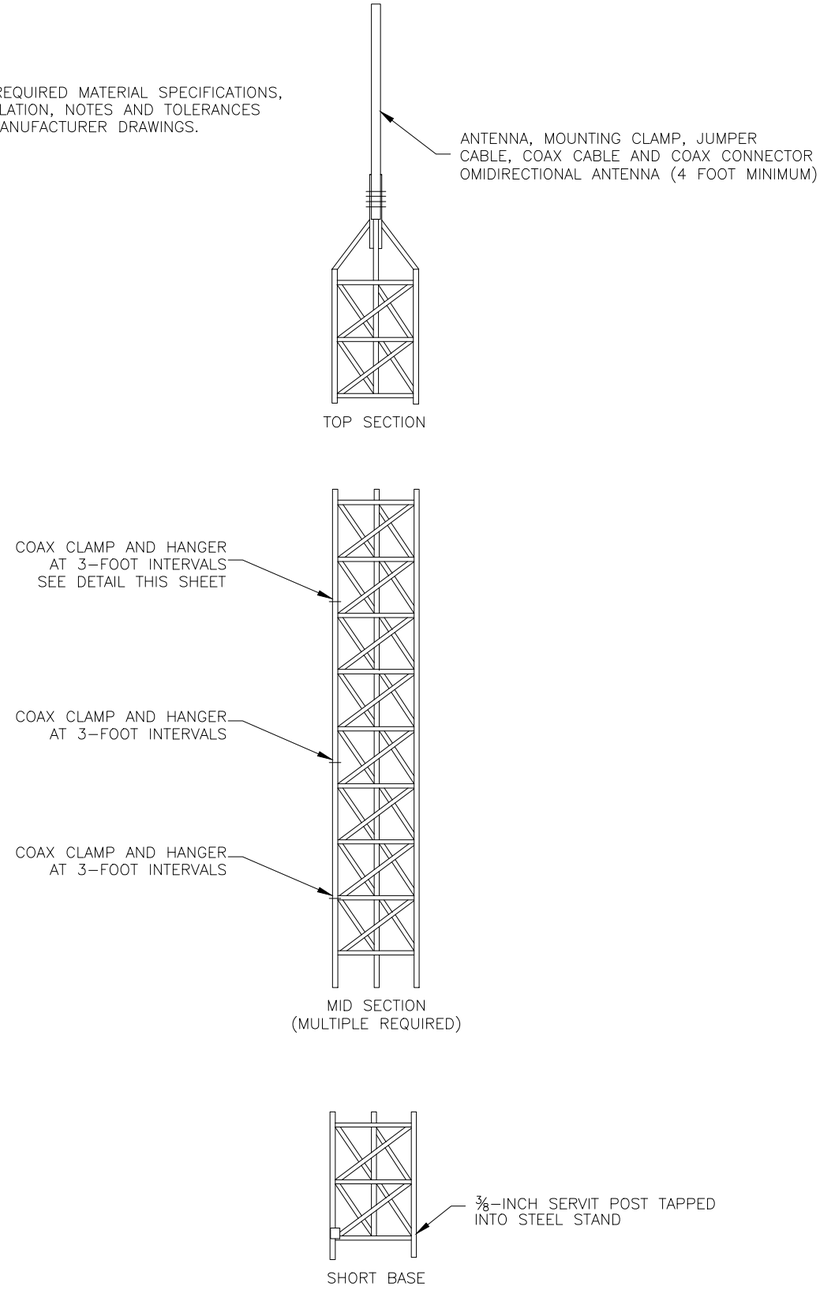
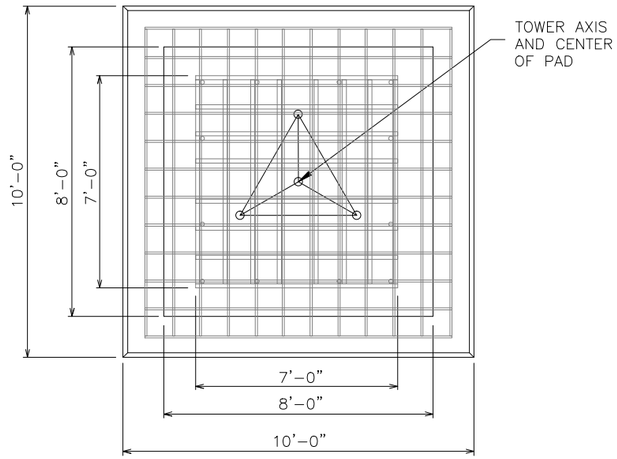
SHEET
14
OF 16

NOTES:

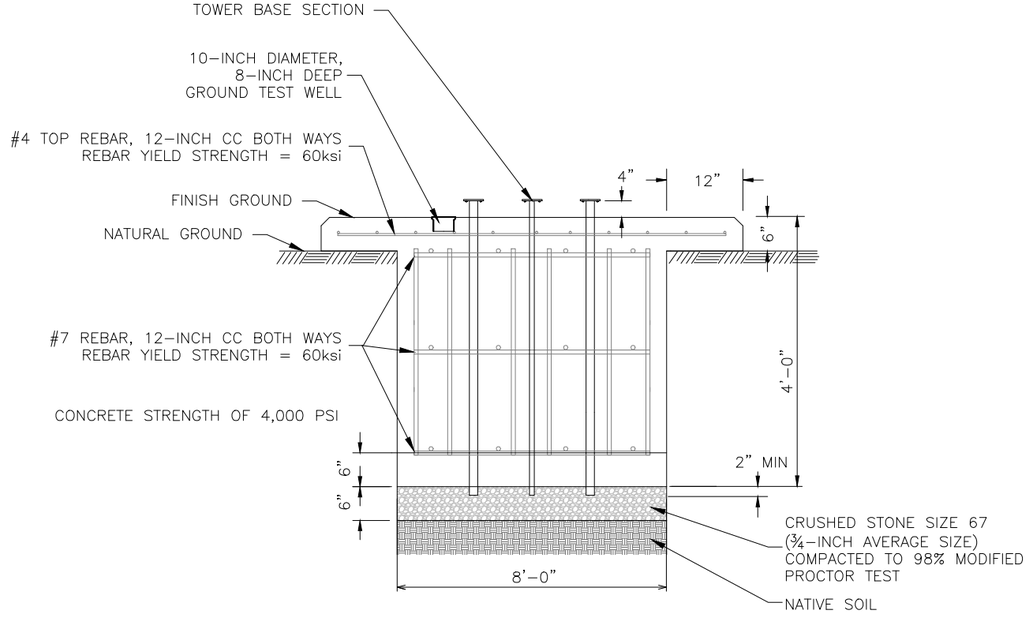
1. FOR REQUIRED MATERIAL SPECIFICATIONS, INSTALLATION, NOTES AND TOLERANCES SEE MANUFACTURER DRAWINGS.



A SCADA TOWER SECTIONS
SCALE: N.T.S.



B PLAN VIEW TOWER FOUNDATION
SCALE: N.T.S.



C SIDE VIEW TOWER FOUNDATION
SCALE: N.T.S.

SCADA REPEATER SITE TOWER
STRUCTURAL DETAILS

LIFT STATION
DESIGN GUIDELINES

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JAN 2012

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SHEET 15 OF 16

NOTES:

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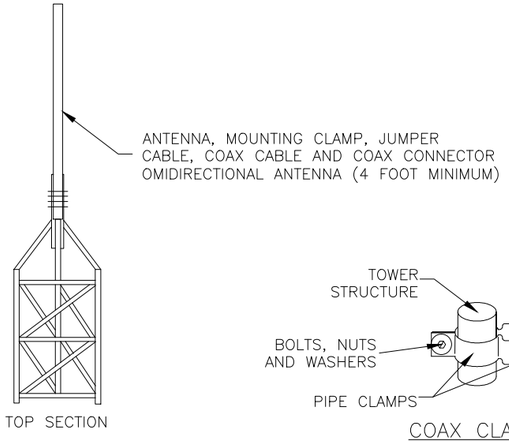
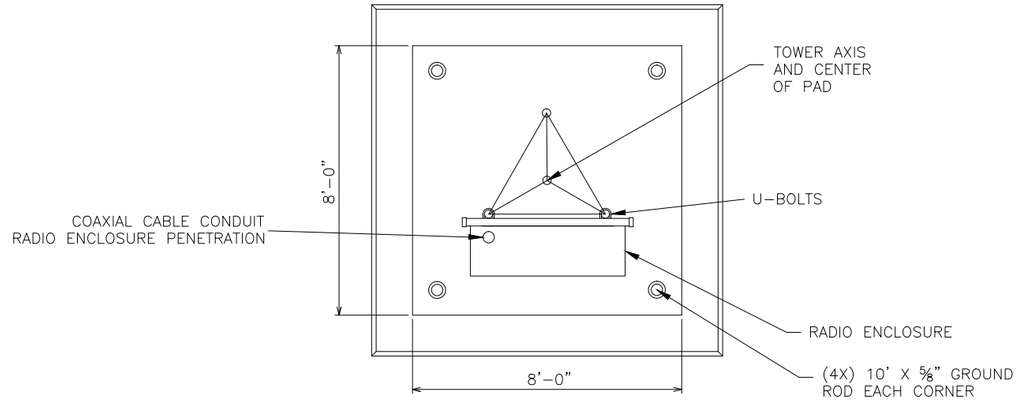
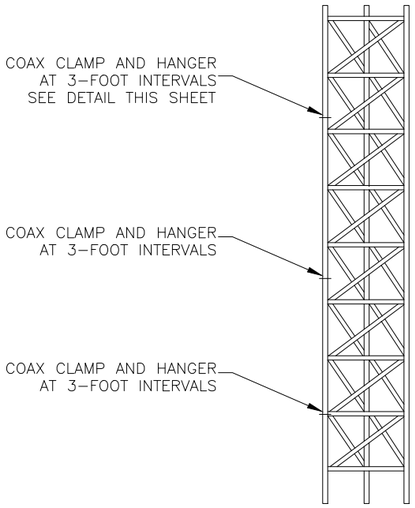


COAX CLAMP AND HANGER DETAIL



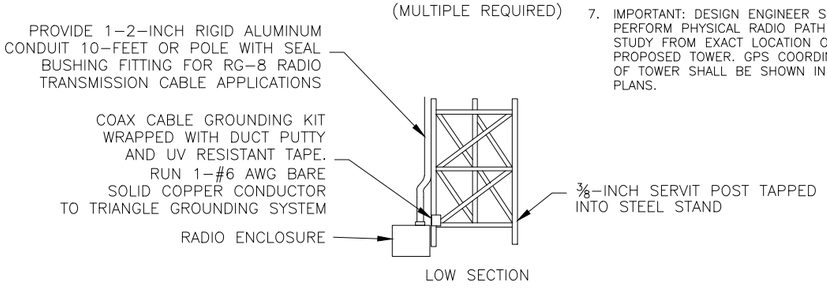
B PLAN VIEW TOWER FOUNDATION
SCALE: N.T.S.



TOWER NAD83 STATE COORDINATES:
LATITUDE: __D__M__S = __.______
LONGITUDE: __D__M__S = __.______

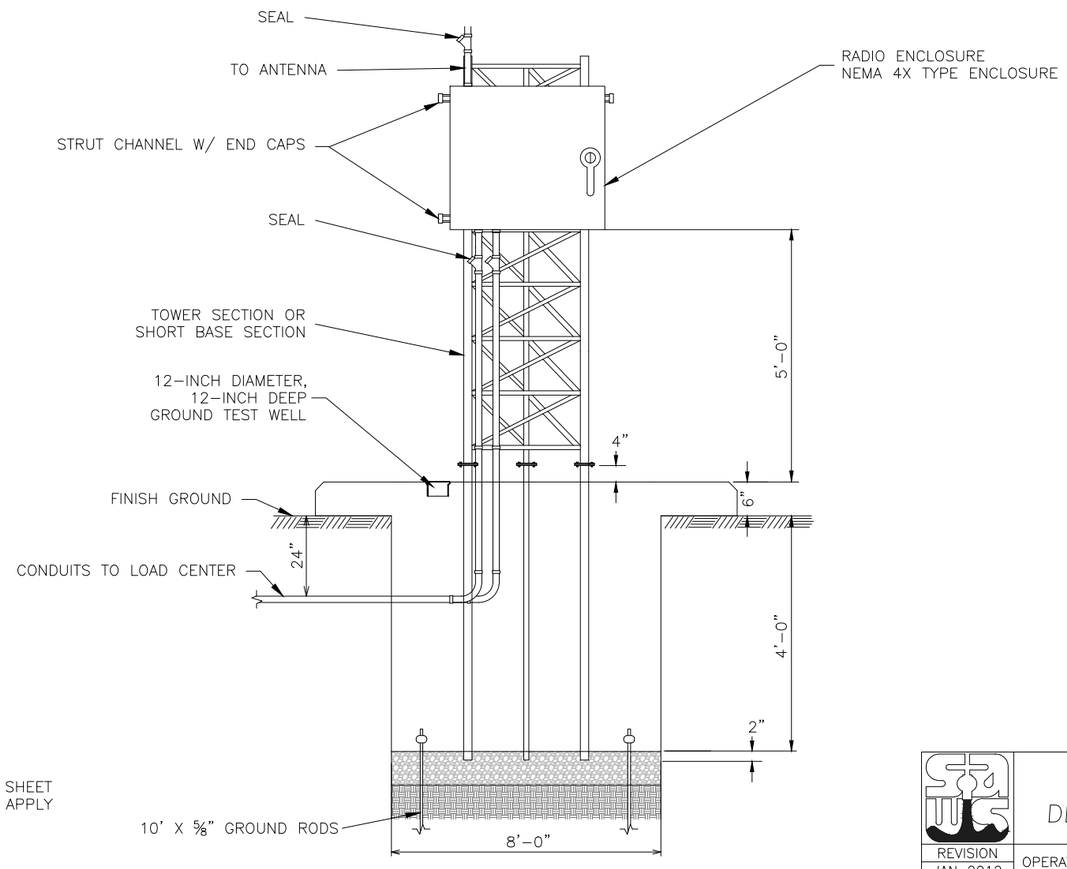
NOTES:

1. TOWER SHALL BE ROHN SELF-SUPPORTED TOWER MODEL 65G PART No. 65SS060 OR EQUIVALENT
2. OVERTURNING MOMENT: 49,600 FT-LB
3. MAX ALLOWABLE SHEAR: 3,800 LB
4. TOWER HEIGHT SHALL NOT EXCEED 60'
5. DESIGN ENGINEER SHALL PERFORM A PHYSICAL RADIO PATH STUDY TO DETERMINE THE REQUIRED ANTENNA HEIGHT.
6. IF A STEADY QUALITY RADIO SIGNAL CANNOT BE ACHIEVED AT 60 FEET, THE DESIGN ENGINEER SHALL COORDINATE WITH SAWS TO EVALUATE ALTERNATIVES.
7. IMPORTANT: DESIGN ENGINEER SHALL PERFORM PHYSICAL RADIO PATH STUDY FROM EXACT LOCATION OF PROPOSED TOWER. GPS COORDINATES OF TOWER SHALL BE SHOWN IN THE PLANS.



A SCADA TOWER SECTIONS
SCALE: N.T.S.

GROUNDING REQUIREMENTS SHOWN IN SHEET DD-903-04, SHEET 12 OF 16 SHALL APPLY FOR SCADA REPEATER STATIONS



C SIDE VIEW TOWER FOUNDATION
SCALE: N.T.S.

SCADA REPEATER SITE TOWER INSTALLATION DETAILS

LIFT STATION DESIGN GUIDELINES

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