

**NOTES:**

1. CONSULT MANUFACTURER'S RECOMMENDED INSTALLATION PRACTICES. REQUIREMENTS MAY VARY.
2. WALL MOUNT SIGNAL CONDITIONER.
3. PROVIDE GROUNDING GASKET & STRAPS FOR NONCONDUCTIVE OR LINED PIPE.
4. USE RIGID CONDUIT WHEN SIGNAL LINE IS LONGER THAN 6'-0".

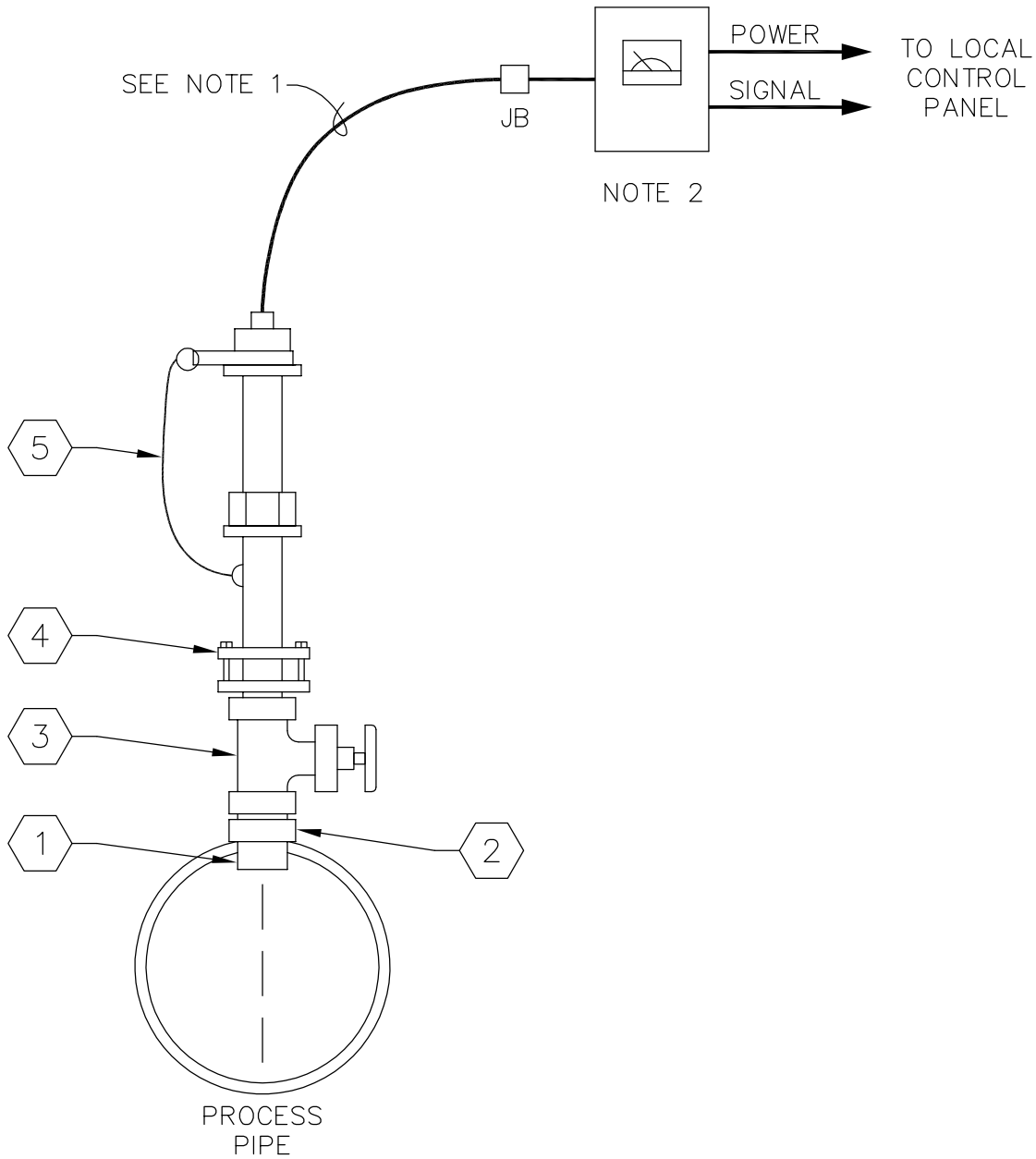
DRAWING NAME: MAGNETIC FLOW METER REMOTE TRANSMITTER



**City of Seattle**  
Ray Hoffman,  
Director

**SEATTLE PUBLIC UTILITIES  
DESIGN STANDARDS  
AND GUIDELINES**

REVISION DATE:	9/30/2010
DRAWING #	DRG 10-1
SHEET	OF



**BILL OF MATERIALS:**

- 1 PROBE WITH MAGNETIC ELECTRODES
- 2 WELDED THREADOLET
- 3 INSERTION VALVE
- 4 CONNECTING FLANGE
- 5 SENSOR RETENTION CHAIN OR CABLE

**NOTES:**

1. INSTALL LIQUID TIGHT FLEXIBLE CONNECTING CABLE BETWEEN SENSOR AND JUNCTION BOX.
2. LOCATE INDICATOR/TRANSMITTER APPROXIMATELY FOUR FEET ABOVE FLOOR AND WIRE BETWEEN SENSOR CABLE AND LOCAL CONTROL PANEL WITH RIGID CONDUIT.

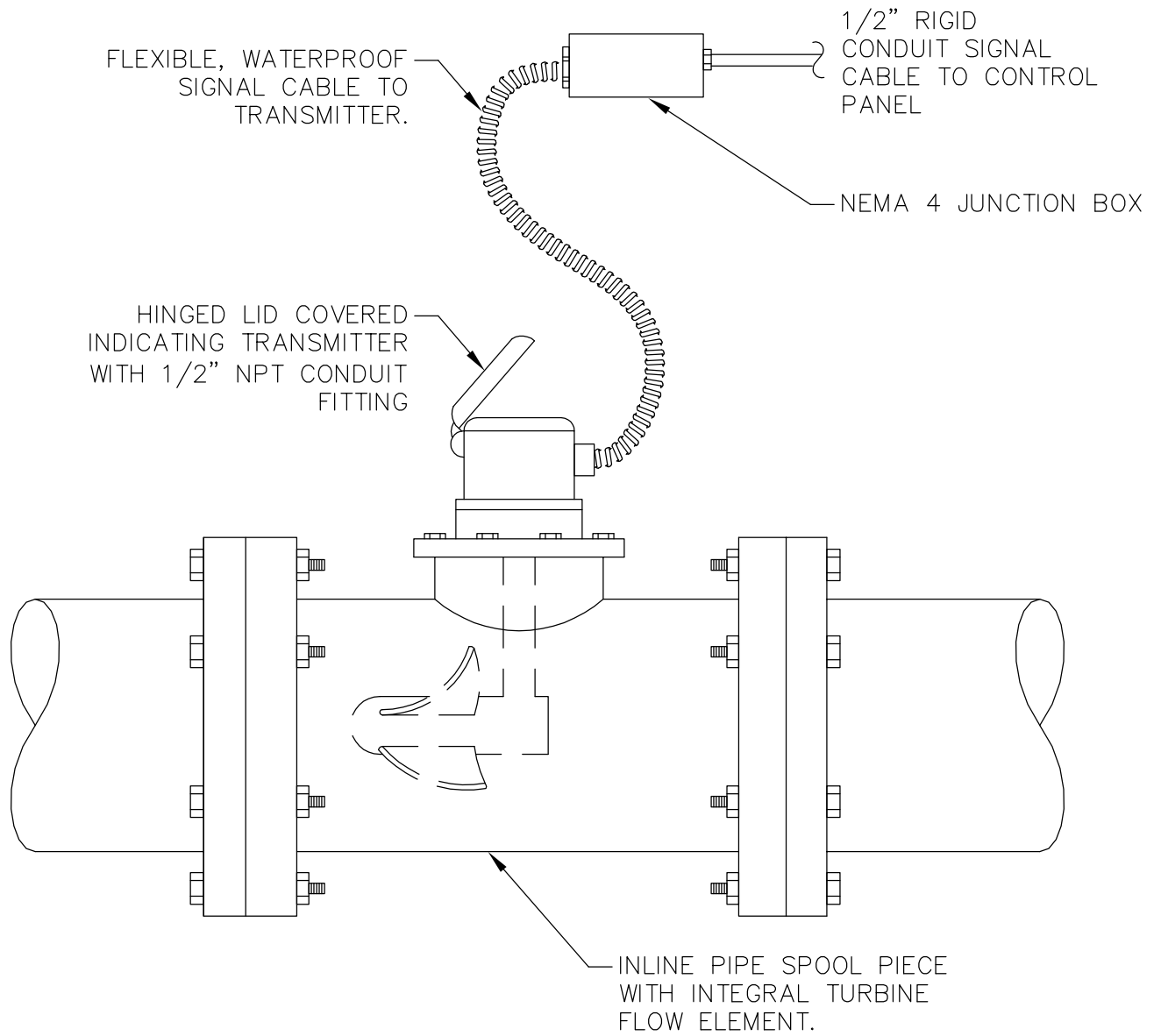
DRAWING NAME: MAGNETIC FLOW METER INSERTION TYPE



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REVISION DATE:	9/30/2010
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SHEET	OF



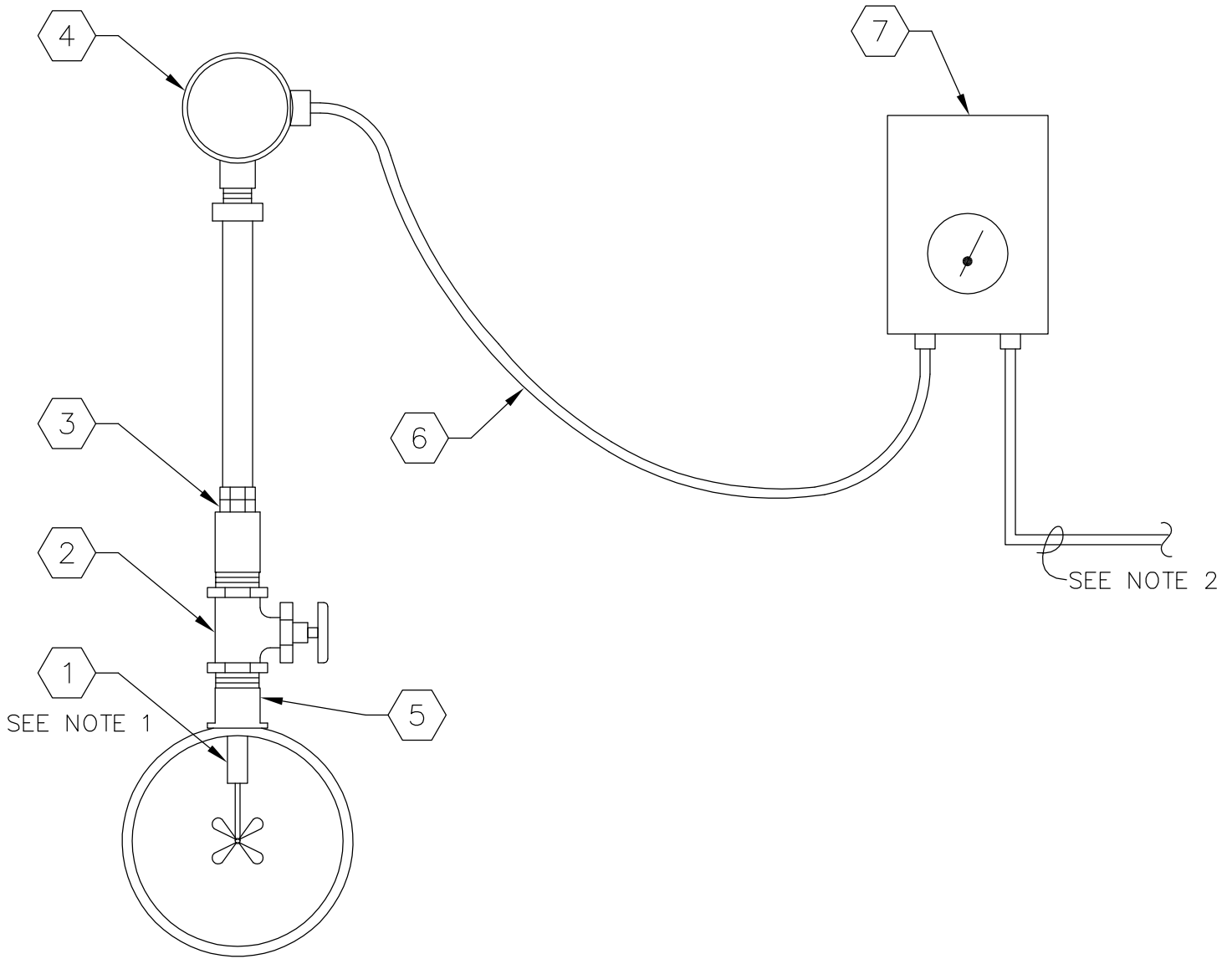
DRAWING NAME: FLOW TURBINE INLINE



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REVISION DATE:	9/30/2010
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SHEET	OF



BILL OF MATERIALS:

- ① TURBINE FLOW METER SENSING ELEMENT ASSEMBLY
- ② ISOLATION VALVE
- ③ COMPRESSION COUPLING
- ④ CAST ALUMINUM ELECTRICAL CONNECTION JUNCTION BOX
- ⑤ THREADED RISER WELDED TO STEEL PIPE
- ⑥ FLEXIBLE, WATERPROOF SIGNAL CABLE TO TRANSMITTER
- ⑦ NEMA 4X TRANSMITTER WITH FLOW INDICATOR. LOCATE 4-5 FEET ABOVE FLOOR.

NOTES:

1. INSERT TURBINE SENSOR TO APPROXIMATE CENTER OF PIPE
2. CONNECT SIGNAL WIRES FROM TRANSMITTER TO LOCAL CONTROL PANEL VIA RIGID CONDUIT

DRAWING NAME: FLOW METER TURBINE INSERTION TYPE



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REVISION DATE:	9/30/2010
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SHEET	OF

SURFACE MOUNT INDICATING TRANSMITTER BETWEEN 40" & 60" ABOVE FLOOR LEVEL.

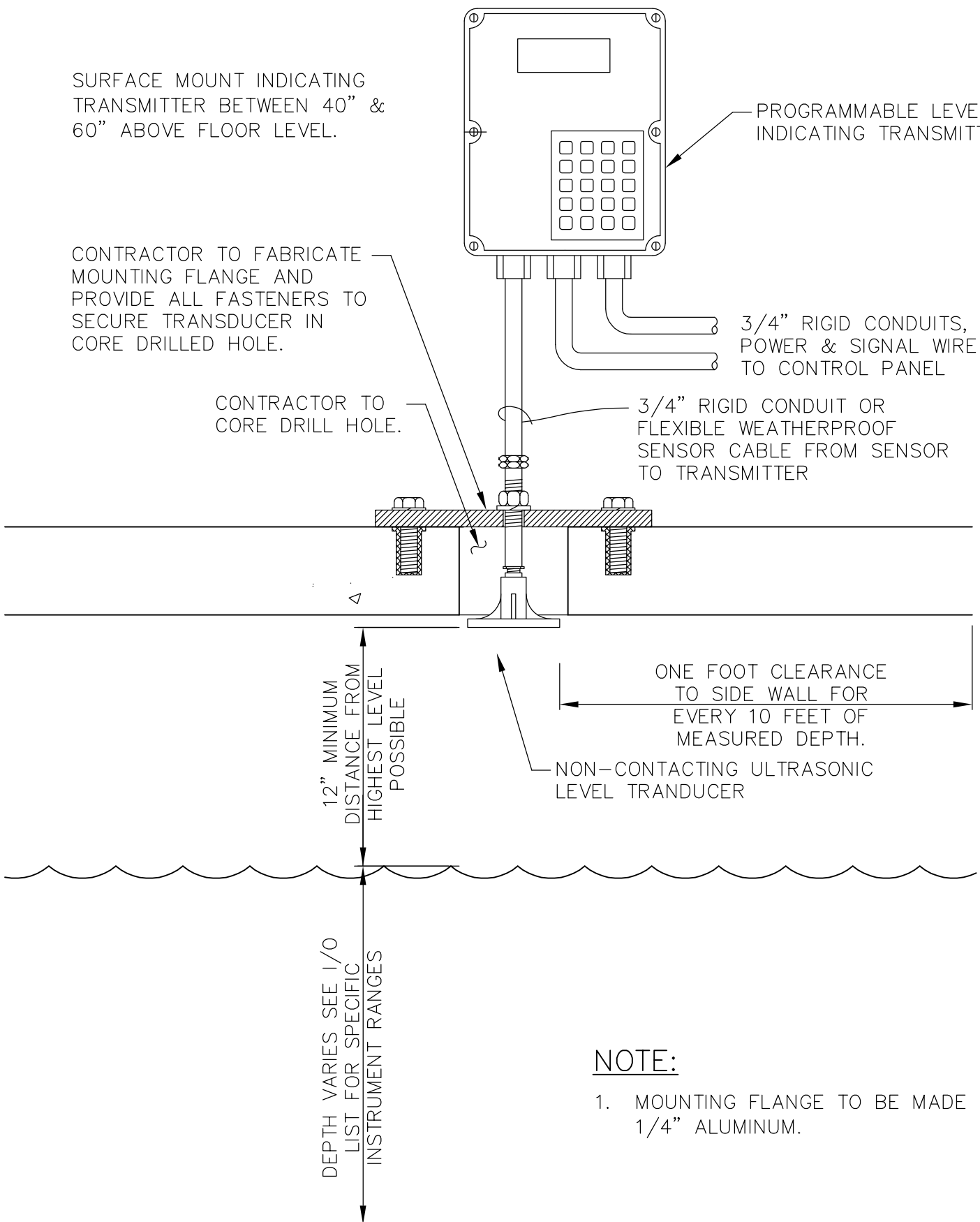
PROGRAMMABLE LEVEL INDICATING TRANSMITTER

CONTRACTOR TO FABRICATE MOUNTING FLANGE AND PROVIDE ALL FASTENERS TO SECURE TRANSDUCER IN CORE DRILLED HOLE.

CONTRACTOR TO CORE DRILL HOLE.

3/4" RIGID CONDUITS, POWER & SIGNAL WIRE TO CONTROL PANEL

3/4" RIGID CONDUIT OR FLEXIBLE WEATHERPROOF SENSOR CABLE FROM SENSOR TO TRANSMITTER



**NOTE:**

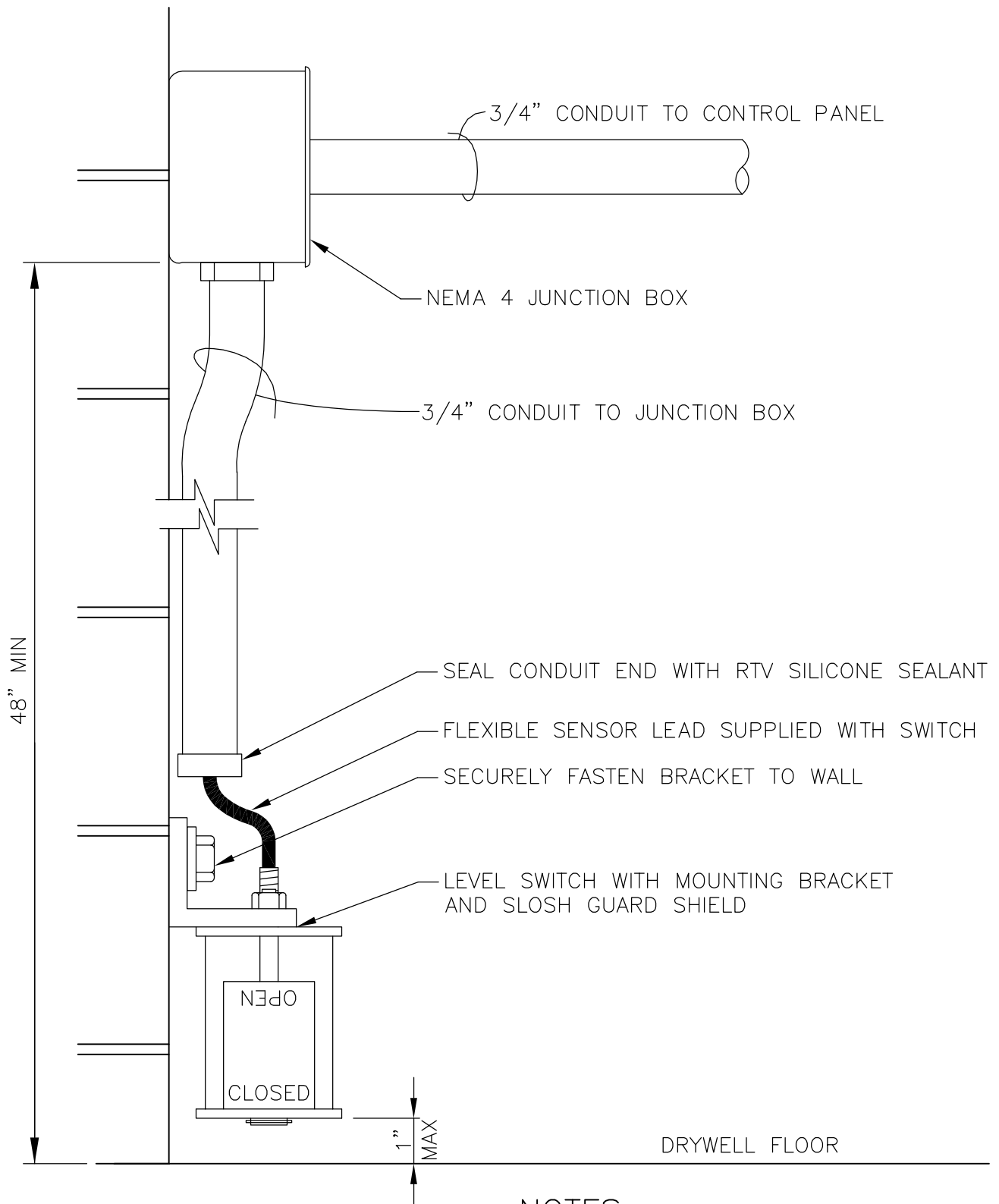
1. MOUNTING FLANGE TO BE MADE OF 1/4" ALUMINUM.

DRAWING NAME: LEVEL TRANSMITTER NON-CONTACTING ULTRASONIC



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SHEET	OF



**NOTES:**

1. THE SWITCH WILL BE WIRED NORMALLY CLOSED (N.C.) OPEN ON RISE.
2. SWITCH MUST BE MOUNTED VERTICALLY TO PROVIDE SMOOTH FLOAT OPERATION.

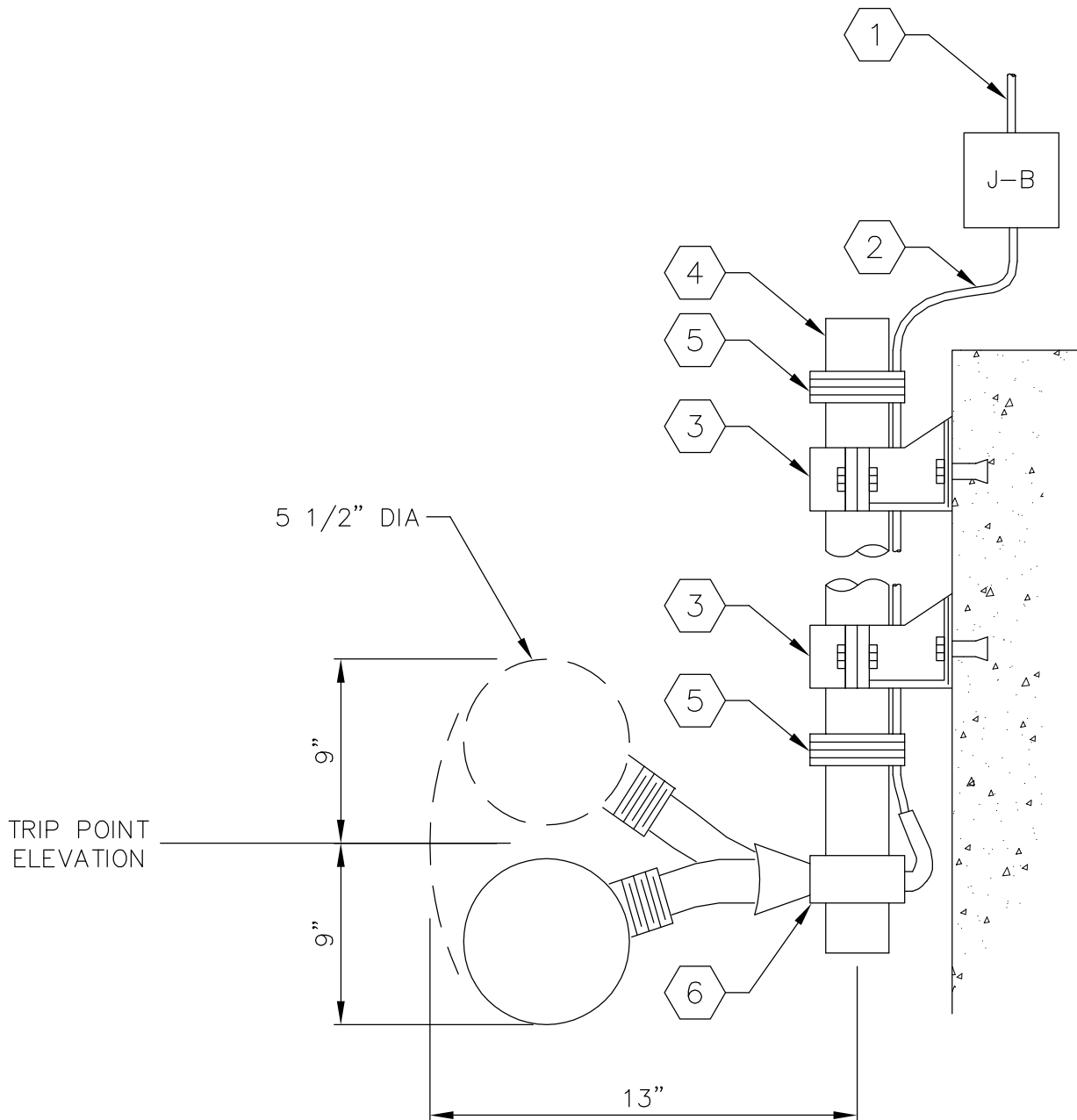
DRAWING NAME: DRYWELL FLOOD LIQUID LEVEL SWITCH FLOAT TYPE



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REVISION DATE:	9/30/2010
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SHEET	OF



BILL OF MATERIALS:

- ① RIGID CONDUIT TO CONTROL PANEL
- ② FLEXIBLE WEATHERPROOF CABLE
- ③ SURFACE MOUNTING BRACKET AS REQ'D (MINIMUM TWO.)
- ④ 1"-2" PIPE SUPPORT. LENGTH AS REQ'D
- ⑤ TIE WIRE TO POLE EVERY THREE FEET
- ⑥ POLE CLAMP FOR FLOAT
- ⑦ FLOAT BULB WITH INTEGRAL HEAVY DUTY MERCURY SWITCH

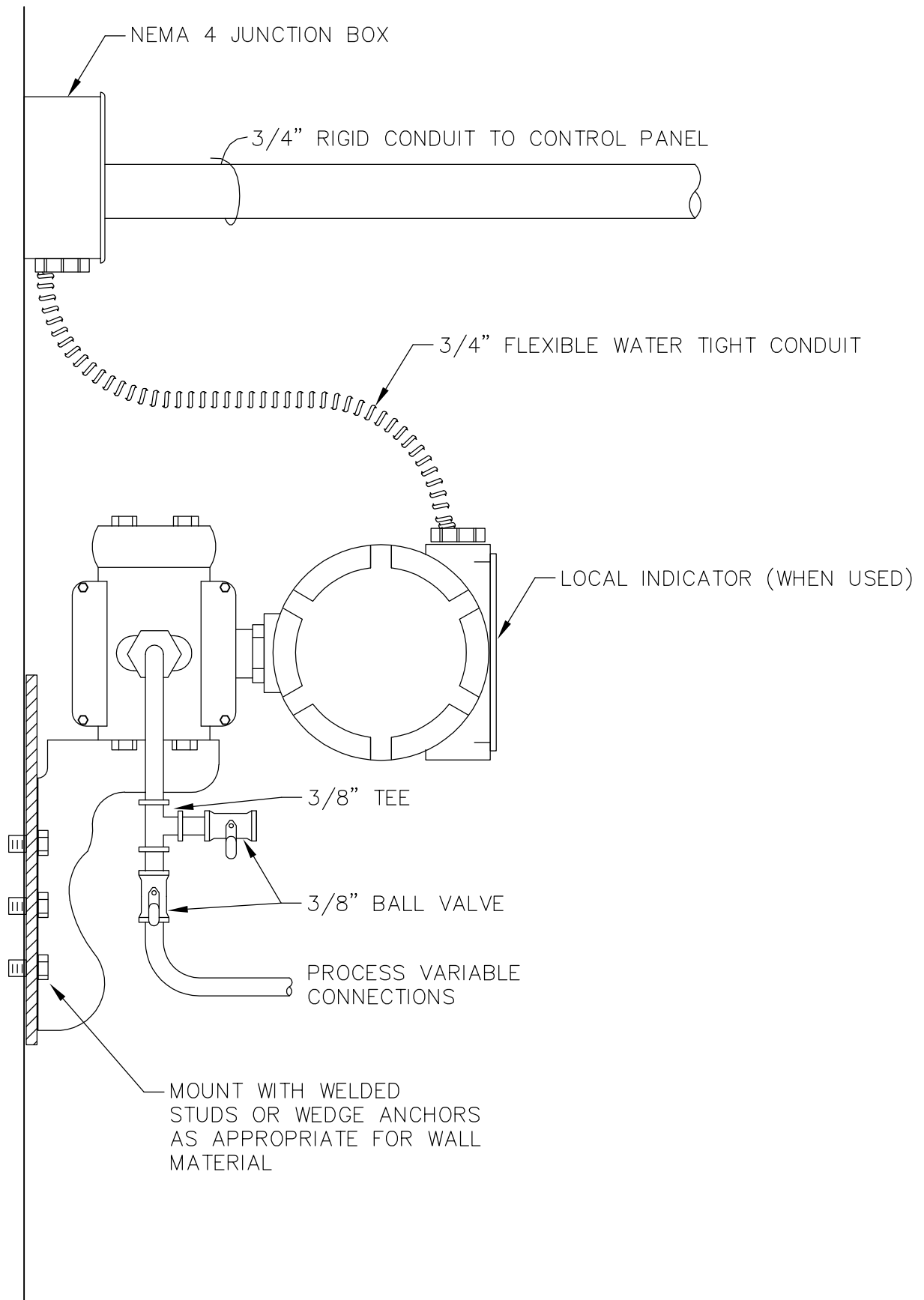
DRAWING NAME: LEVEL SWITCH FLOAT TYPE



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REVISION DATE:	9/30/2010
DRAWING #	DRG 10-7
SHEET	OF



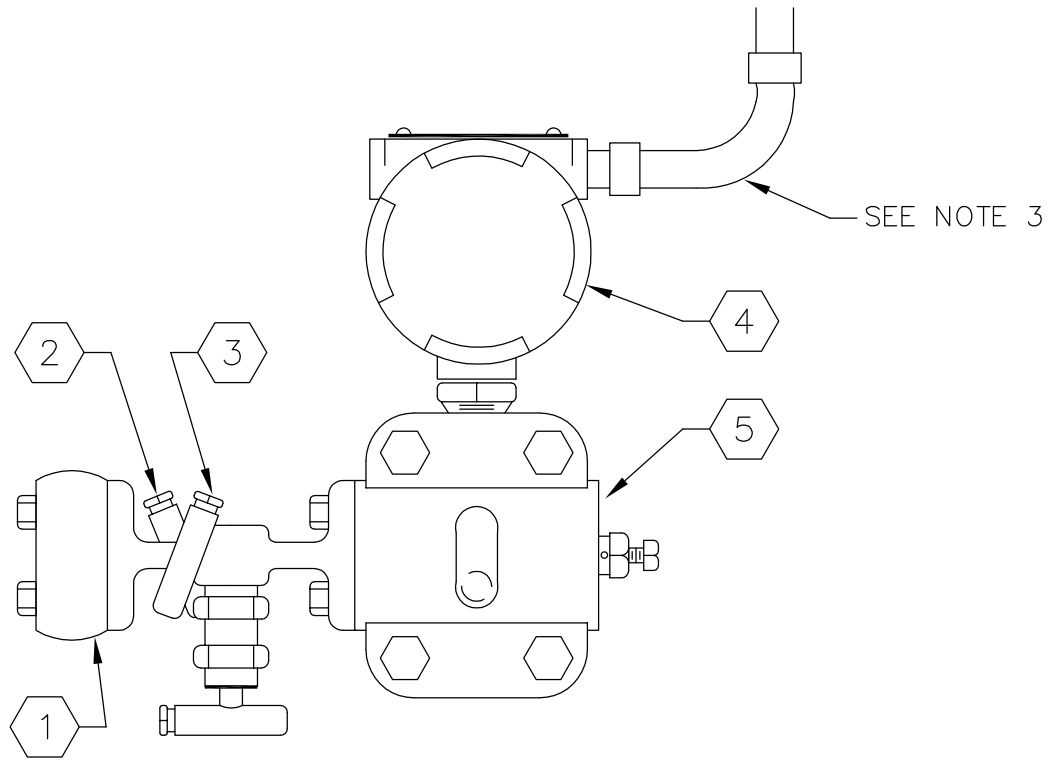
DRAWING NAME: PRESSURE TRANSMITTER, ELECTRO-MECHANICAL FLANGE MOUNT



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SHEET	OF



BILL OF MATERIALS:

- ① 3-VALVE MANIFOLD
- ② HIGH TAP SHUTOFF VALVE
- ③ LOW TAP SHUTOFF VALVE
- ④ DIFFERENTIAL PRESSURE TRANSMITTER
- ⑤ BLEEDER VALVE

NOTES:

1. MOUNT WITH MANUFACTURERS SUPPLIED BRACKET ON 2" PIPE STAND.
2. PROVIDE NEMA 4 WALL MOUNTED JUNCTION BOX AND RIGID CONDUIT TO INTERFACE CABINET
3. PROVIDE FLEX CONDUIT TO MENA 4 JUNCTION BOX

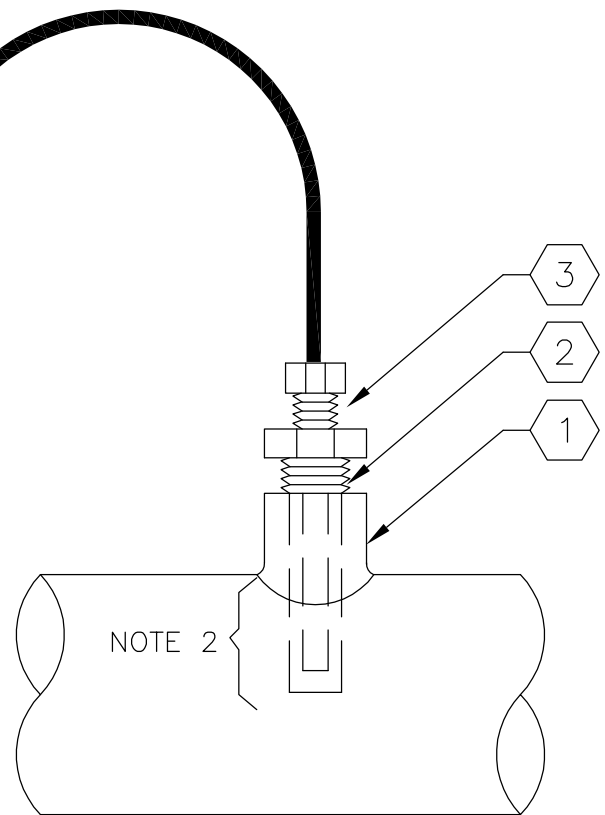
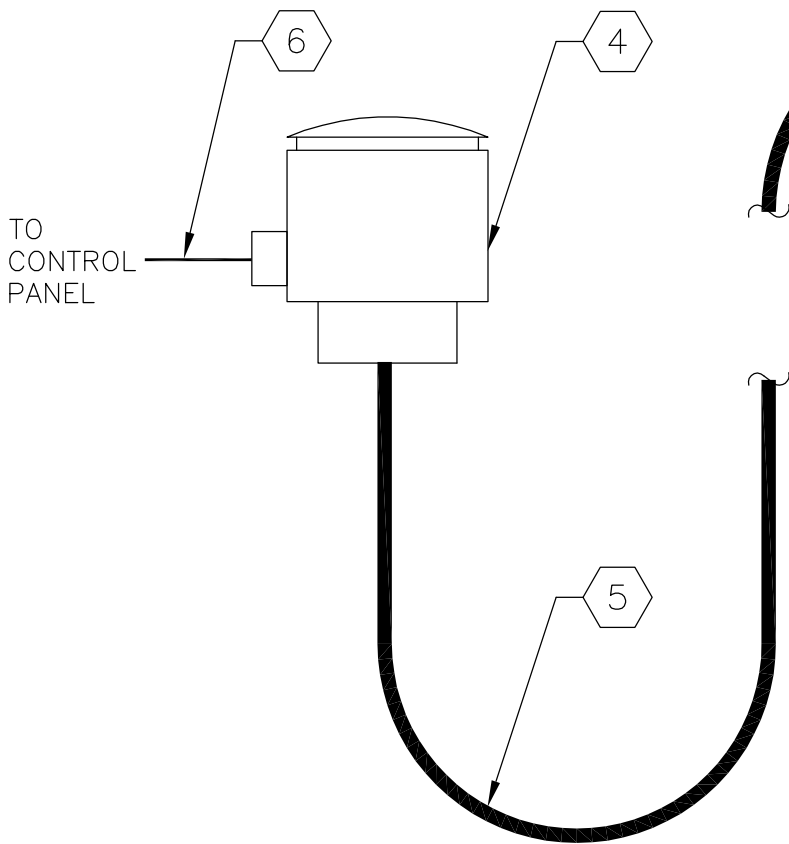
DRAWING NAME: FLOW METER TURBINE INSERTION TYPE



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REVISION DATE:	9/30/2010
DRAWING #	DRG 10-9
SHEET	OF



BILL OF MATERIALS:

- ① 3/4" THREADOLET
- ② THERMOWELL
- ③ RTD MUST BE EASILY REMOVABLE
- ④ TWO WIRE TEMPERATURE TRANSMITTER (WALL MOUNTED)
- ⑤ WATERTIGHT FLEX CONDUIT
- ⑥ RIGID CONDUIT CONTAINING SIGNAL CABLE

NOTES:

1. THERMOWELL AND RTD ASSEMBLY TO BE MOUNTED VERTICALLY.
2. THERMOWELL DIMENSION SHOULD MEET MANUFACTURERS, RECOMMENDATION. USE STAINLESS STEEL THERMOWELLS.

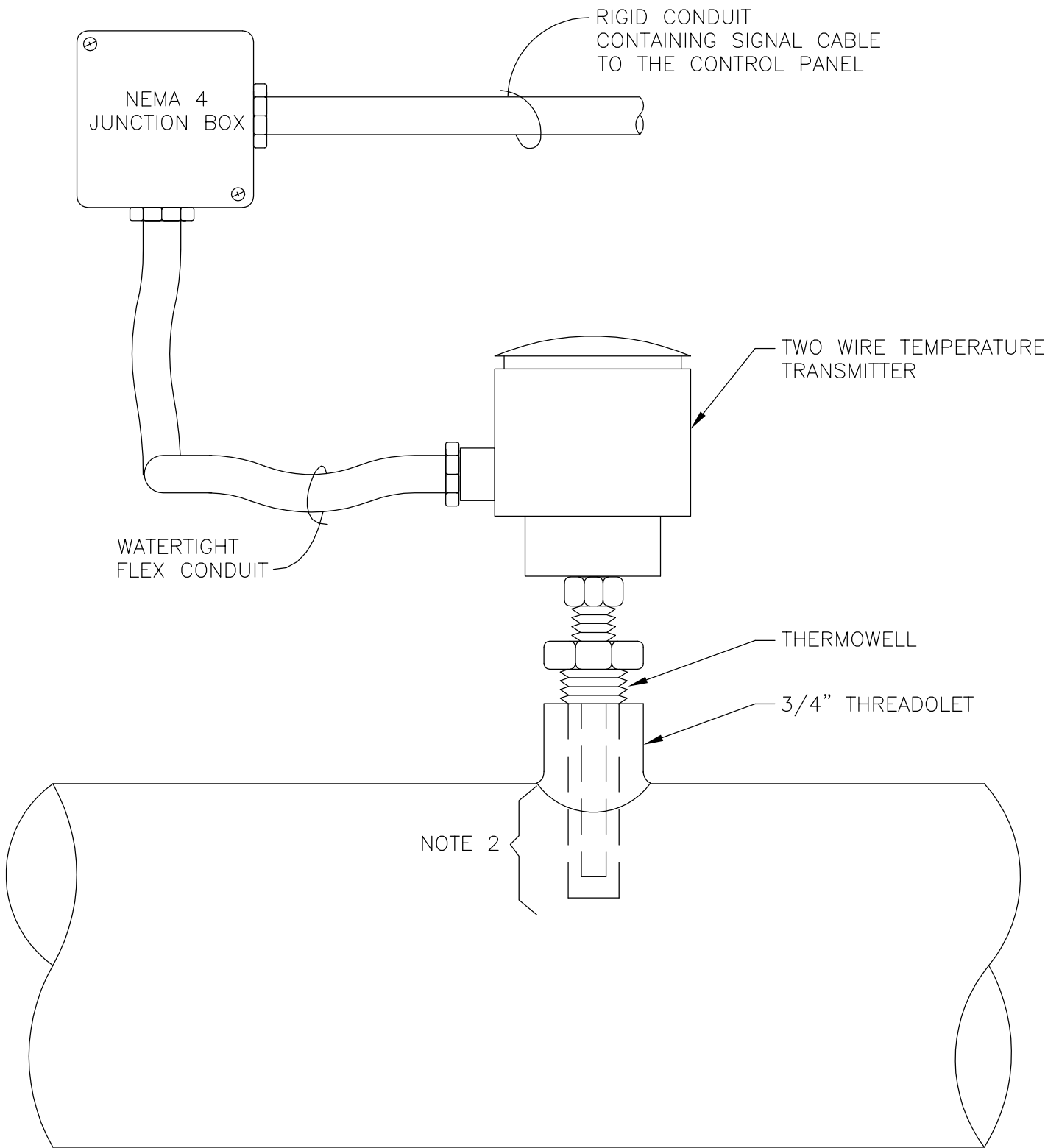
DRAWING NAME: TEMPERATURE TRANSMITTER



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SHEET	OF



**NOTES:**

1. THERMOWELL AND RTD ASSEMBLY TO BE MOUNTED VERTICALLY.
2. THERMOWELL DIMENSION SHOULD MEET MANUFACTURES RECOMMENDATION. USE STAINLESS STEEL THERMOWELLS.
3. RTD MUST BE EASILY REMOVABLE

DRAWING NAME: TEMPERATURE TRANSMITTER RTD TYPE PROCESS PIPE MOUNTED

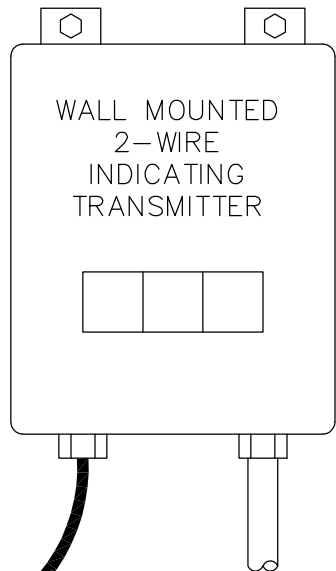


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REVISION DATE:	9/30/2010
DRAWING #	DRG 10-11
SHEET	OF

FLEXIBLE CABLE/ CONDUIT  
FROM SENSOR TO  
TRANSMITTER



SIGNAL/POWER  
RIGID CONDUIT  
TO LOCAL  
CONTROL PANEL

PROBE COMPRESSION CONNECTOR \*

BALL VALVE \* 1-1/4" FULL PORT 316 S.S.


1" NPT WELD-BOSS CONNECTION,  
SAME MATERIAL AS PIPE

PROBE \* : SENSOR SHEATH  
WITH ANTI-BLOWOUT LIP.  
16" STANDARD LENGTH

**NOTES:**

1. COMPONENTS DESIGNATED BY \* ARE SUPPLIED BY INSTRUMENT MANUFACTURER.
2. PROVIDE A MINIMUM OF 14" CLEARANCE ABOVE PROBE FOR REMOVAL.

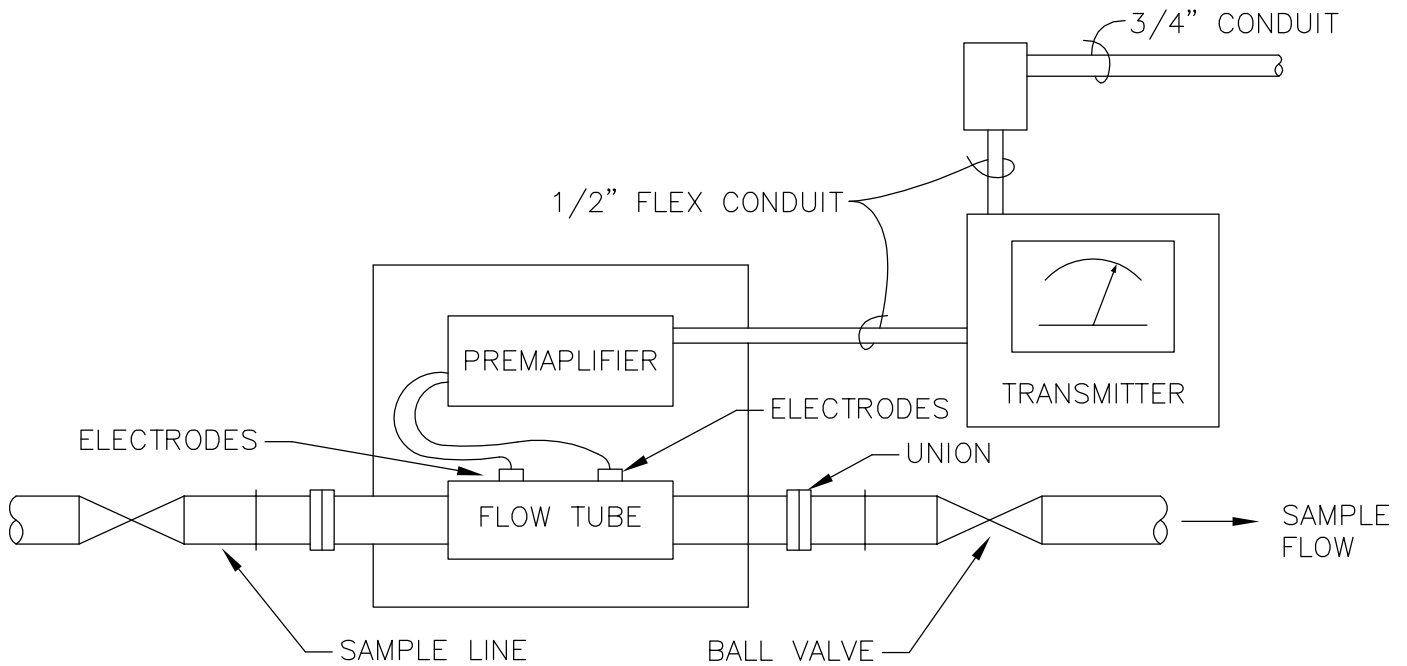
DRAWING NAME: RETRACTABLE PH SENSOR



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REVISION DATE:	9/30/2010
DRAWING #	DRG 10-12
SHEET	OF



**NOTES:**

1. MOUNT PREAMPLIFIER AND TRANSMITTER ON WALL OR IN SAMPLE PANEL NEXT TO PROBE.
2. PROVIDE SAMPLE VALVE NEAR SAMPLER FOR CONFORMANCE CHECK.
3. INSTALL IN AREA WHERE EQUIPMENT CAN BE EASILY ACCESSED.
4. INSTALL PROBE IN HORIZONTAL SECTION OF SAMPLE LINE.

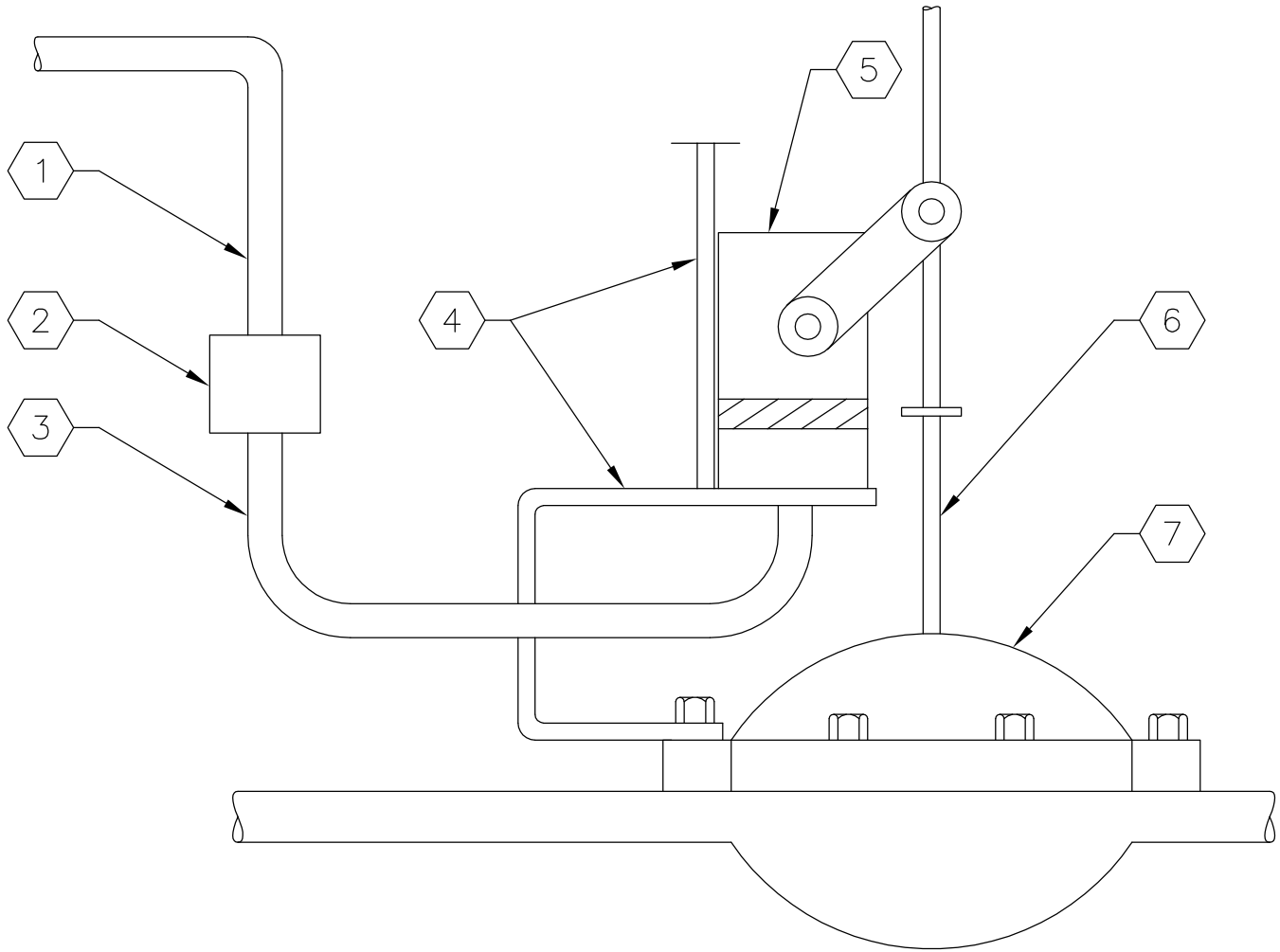
DRAWING NAME: PH METER MOUNTING DIAGRAM



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REVISION DATE:	9/30/2010
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SHEET	OF



BILL OF MATERIALS:

- ① 1/2" RIGID CONDUIT FOR 120 VAC CONDUCTORS.
- ② JUNCTION BOX.
- ③ 1/2" FLEXIBLE CONDUIT.
- ④ MOUNTING BRACKET.
- ⑤ LIMIT SWITCH.
- ⑥ VALVE POSITION SPINDLE.
- ⑦ CONTROL VALVE.

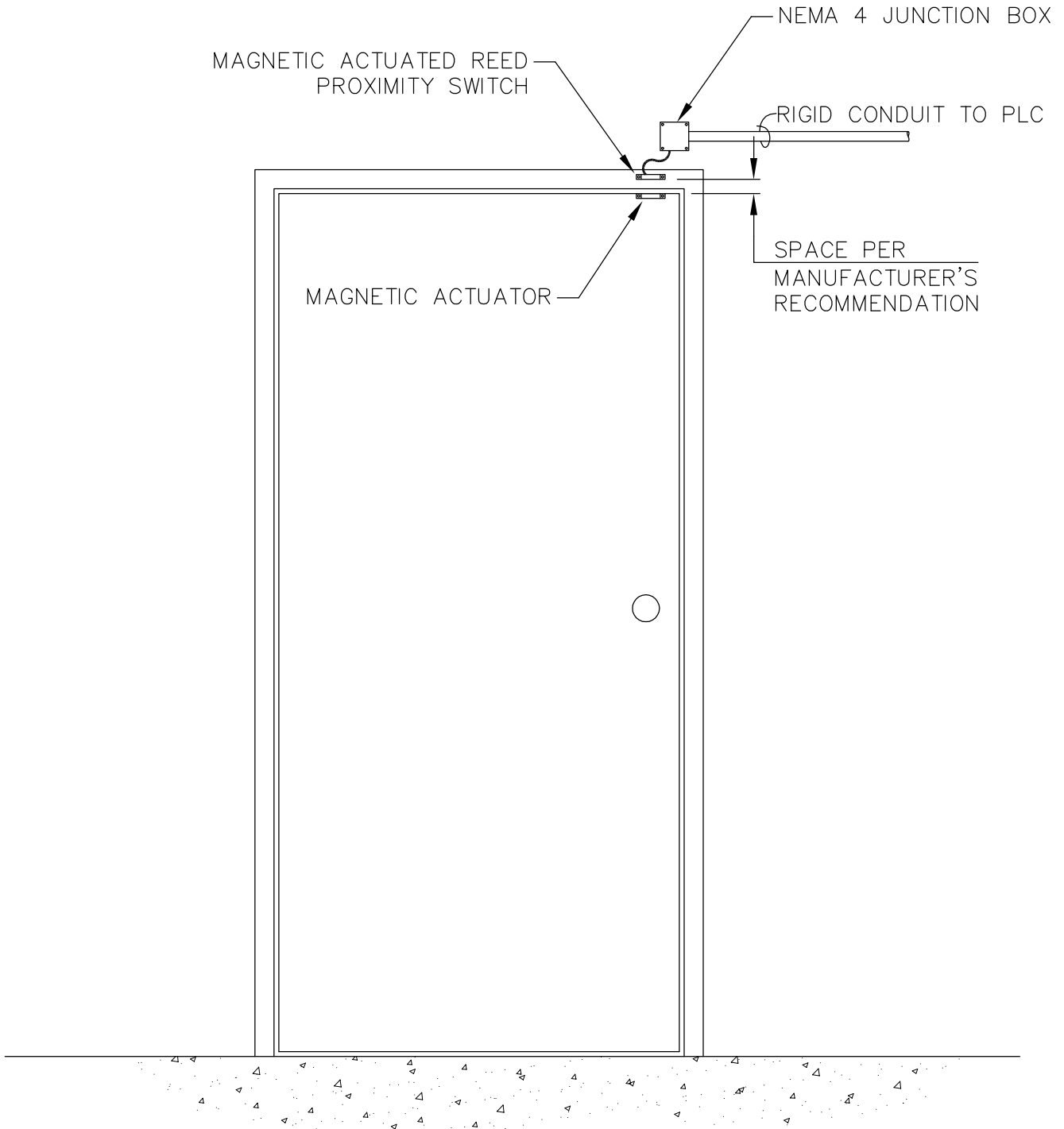
DRAWING NAME: POSITION LIMIT SWITCH



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SHEET	OF



NOTE:

1. MOUNT SWITCH AND ACTUATOR ON INNER MOST DOOR.

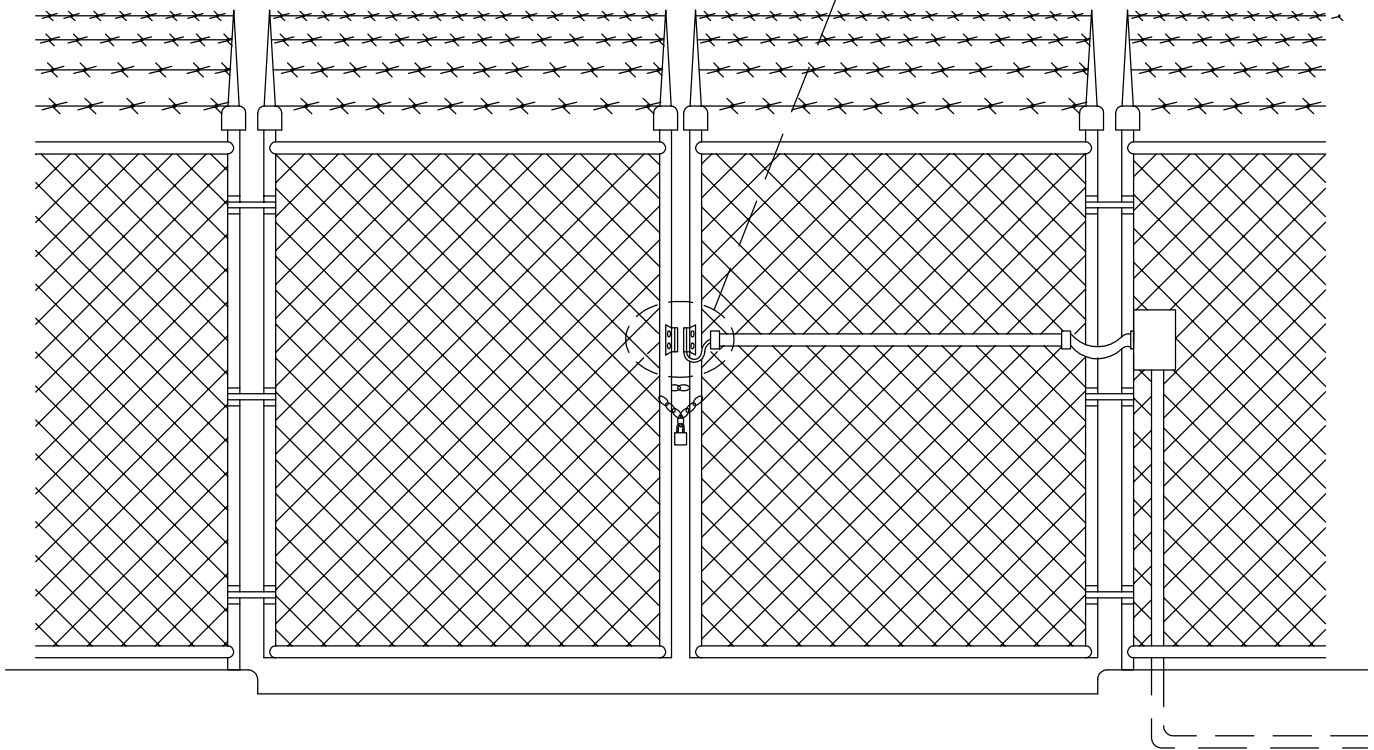
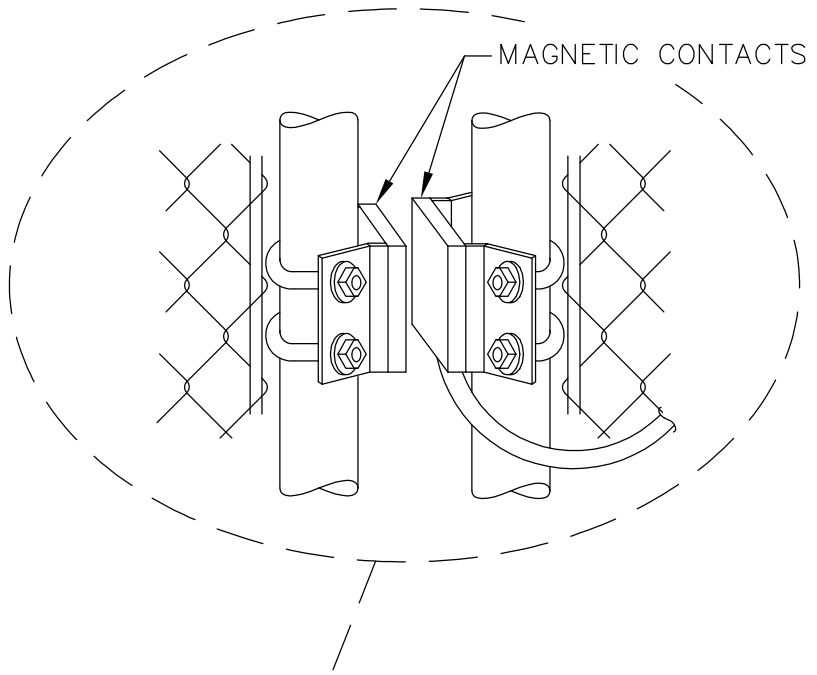
DRAWING NAME: INTRUSION DETECTION SWITCH MAGNETIC REED PROXIMITY SINGLE DOOR



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SHEET	OF



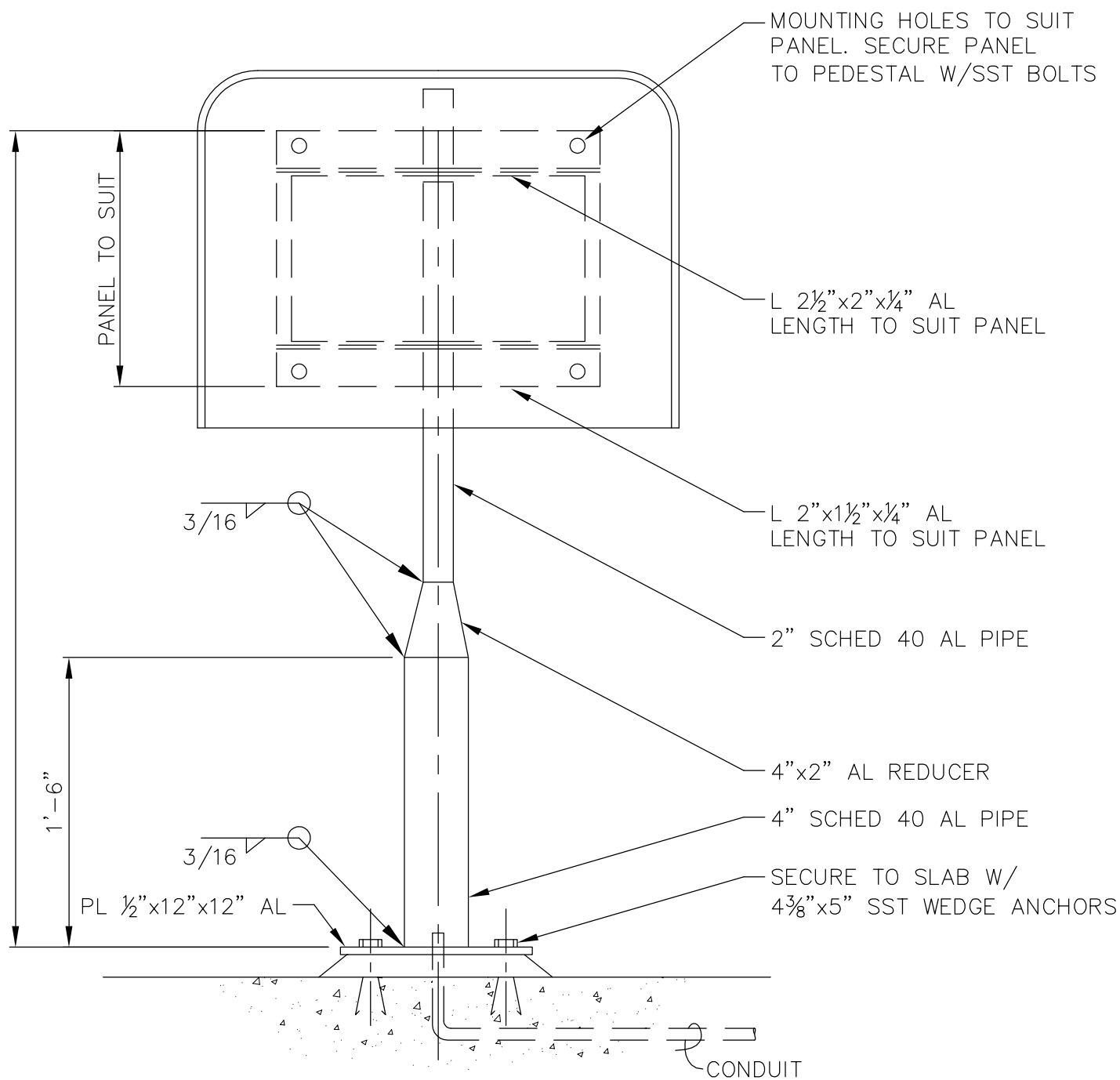
DRAWING NAME: INTRUSION DETECTION SWITCH MAGNETIC REED PROXIMITY GATE



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DRAWING #	DRG 10-16
SHEET	OF



## NOTES:

1. ROUND OFF ALL EXPOSED EDGES & CORNERS.
2. PAINT AL IN CONTACT WITH CONCRETE.
3. PROVIDE 6"x18"x18" CONCRETE BASE.

DRAWING NAME: PANEL MOUNTING PEDESTAL

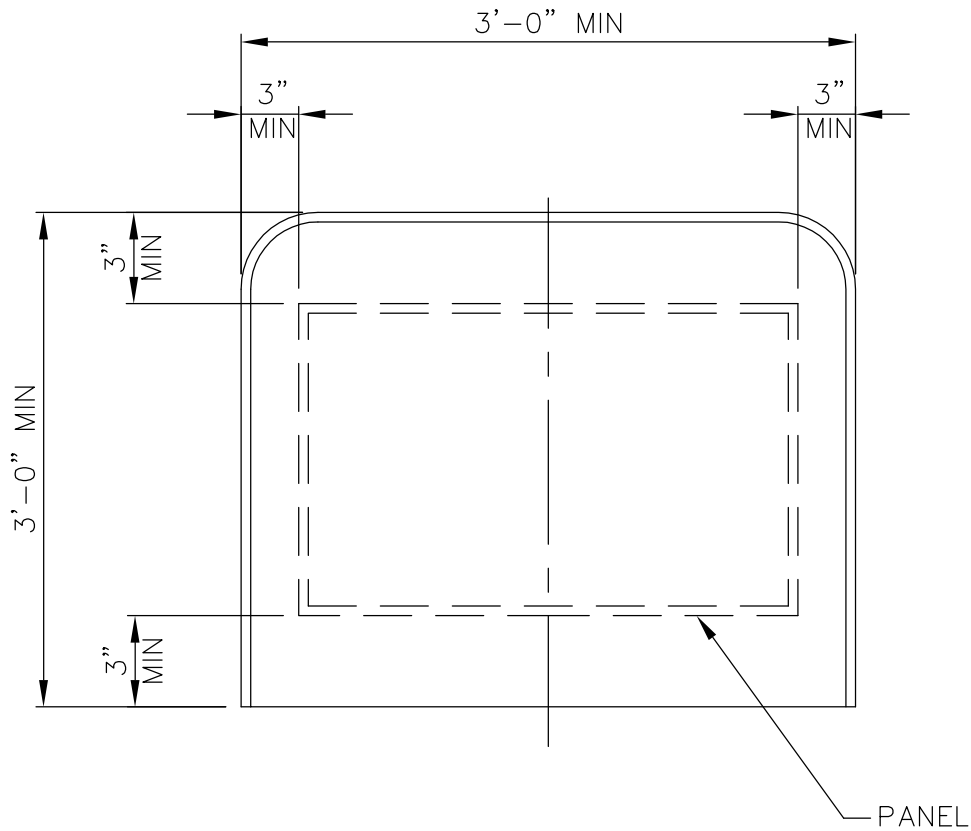


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DRG 10-17  
SHEET OF



**NOTES:**

1. ROUND OFF ALL EXPOSED EDGES & CORNERS.
2. MOUNT RAINHOOD BETWEEN PANEL & SUPPORT. DRILL HOLES IN RAINHOOD AS PER MOUNTING HOLES FOR PANEL

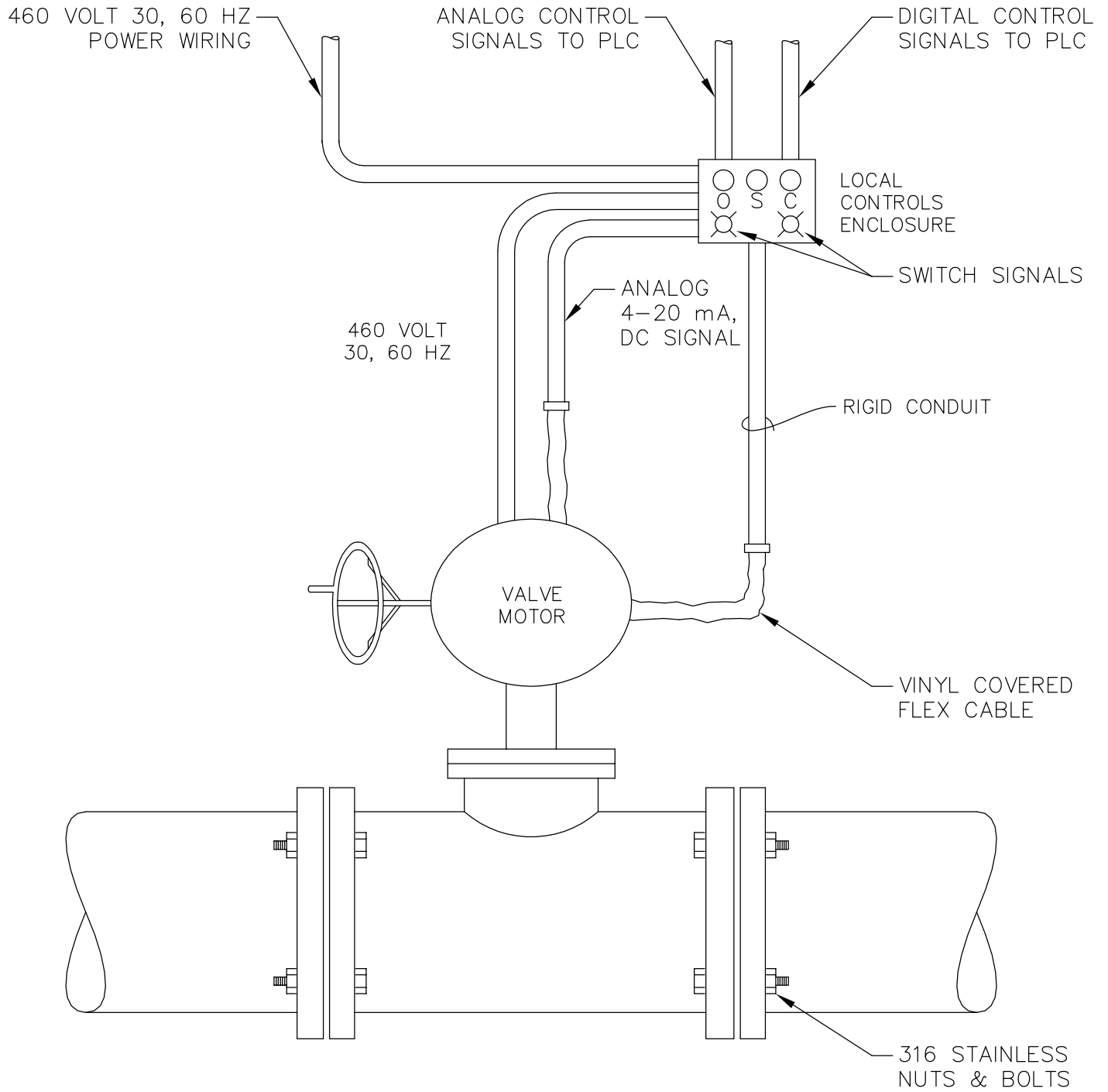
DRAWING NAME: PANEL MOUNTING RIANHOOD INSTALLATION



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SHEET	OF



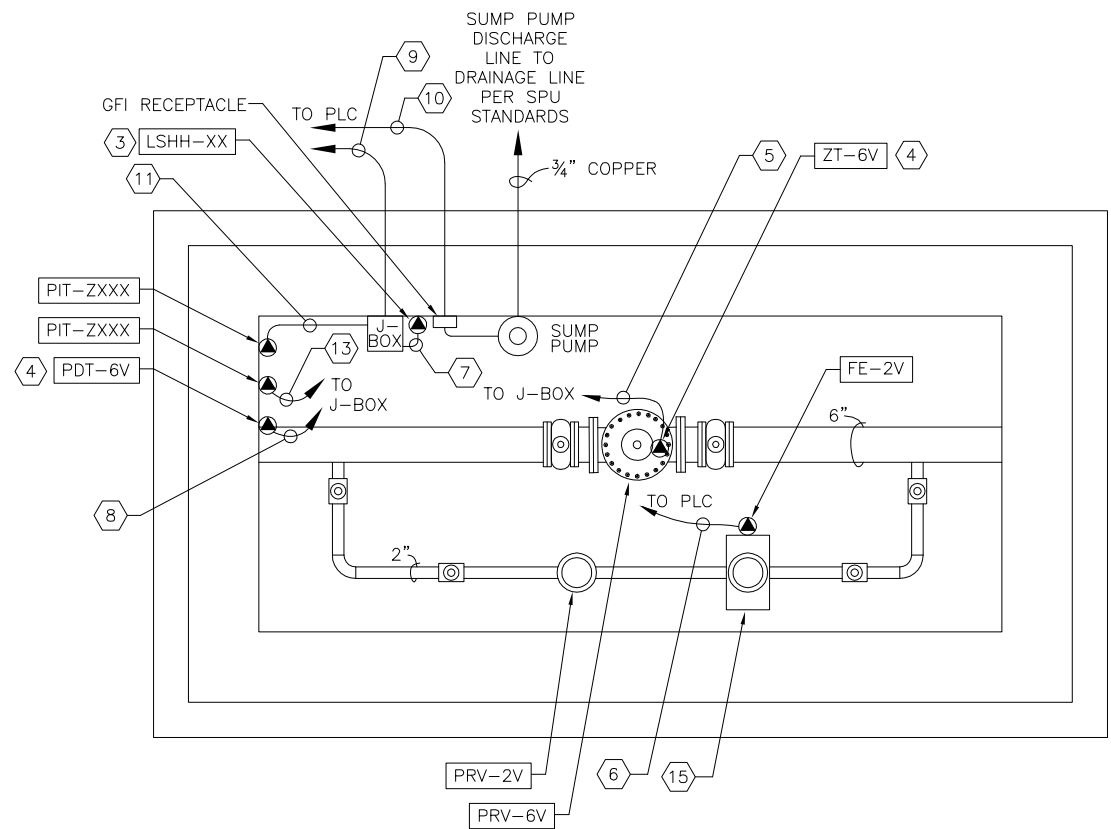
DRAWING NAME: QUARTER-TURN FLOW CONTROL VALVE



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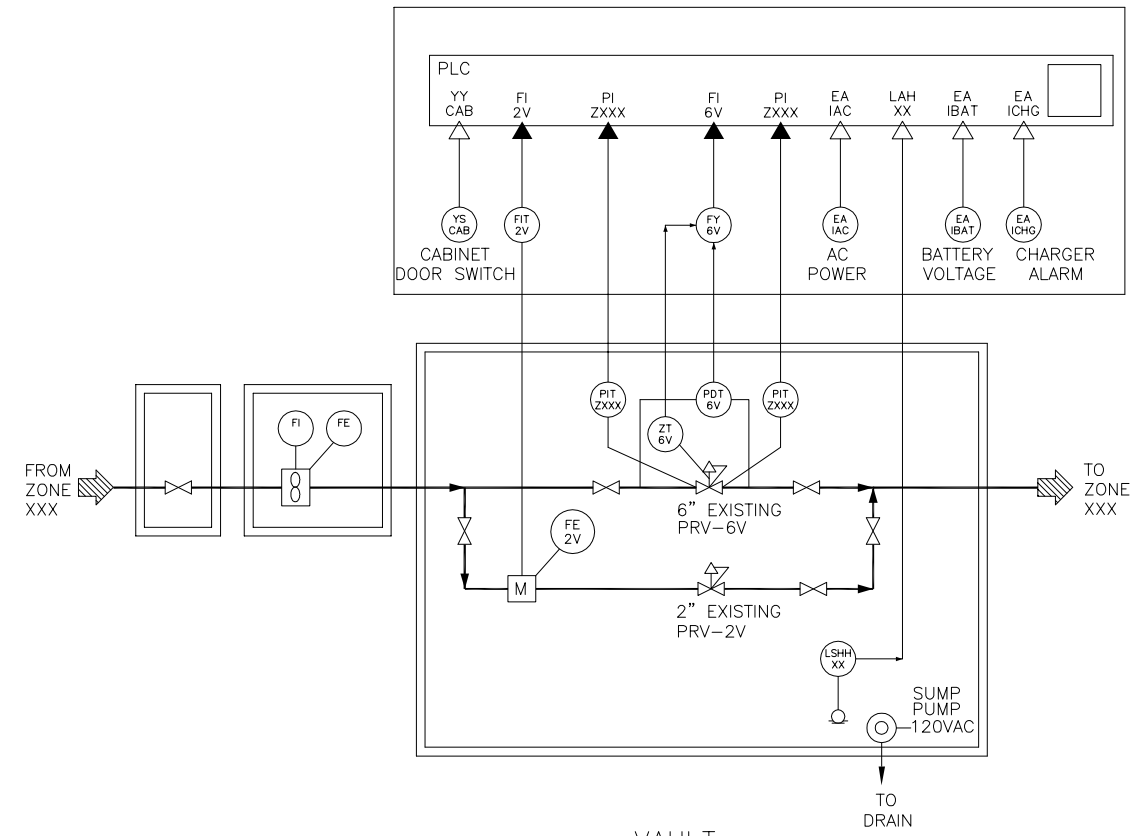
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SHEET	OF



VAULT PLAN  
NTS

PLC - TYPE C



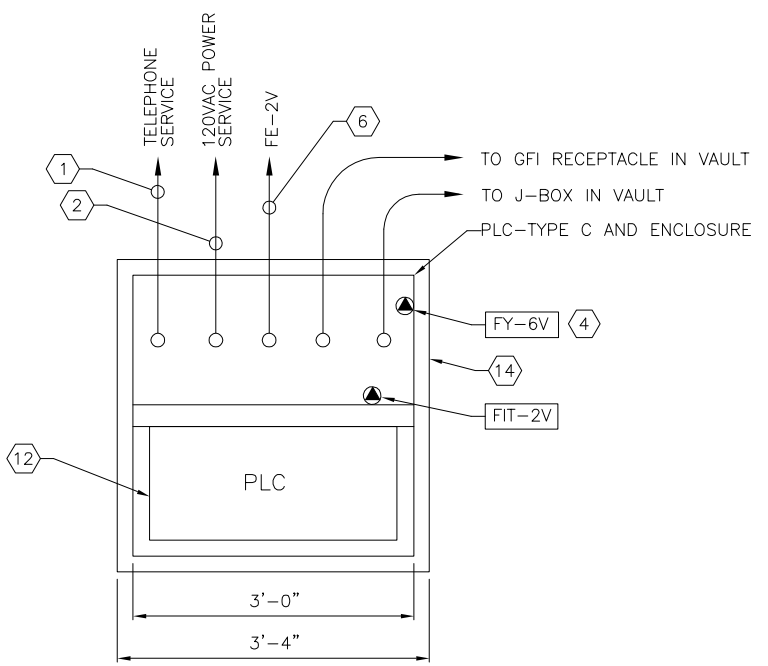
VAULT  
P&ID

KETNOTES:

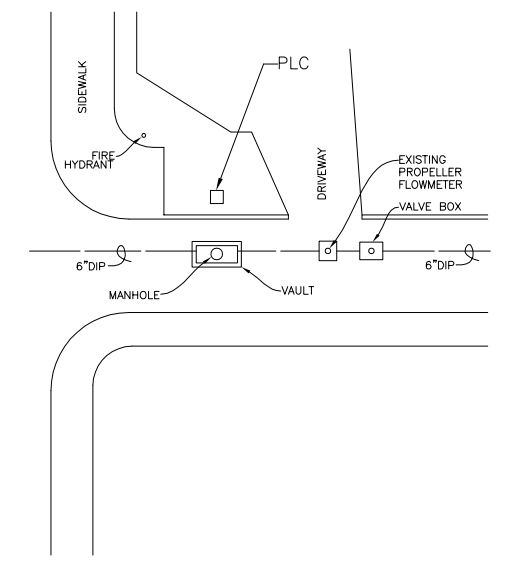
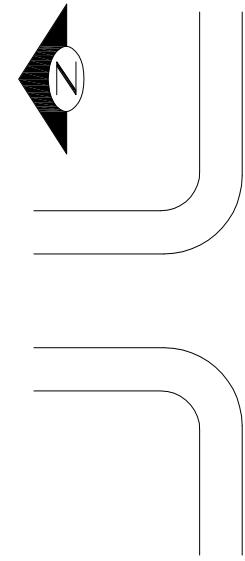
- 1 INSTALL FRAME RELAY TELEPHONE SERVICE PER SPU STANDARDS.
- 2 INSTALL 120VAC POWER SERVICE AND CONDUIT PER SPU STANDARDS.
- 3 INSTALL FLOOD SWITCH LSHH-XX PER MANUFACTURER'S INSTRUCTIONS. INSTALL CLA-VAL FLOW METER SYSTEM AT REGULATOR.
- 4 INSTALL PER MANUFACTURER'S INSTRUCTIONS. LOCATE CLA-VAL FLOW COMPUTATION MODULE AT PLC, INSTALL PER MANUFACTURER'S INSTRUCTIONS.
- 5 (1) TSP, 3/4" CONDUIT TO J-BOX, (ZT-6V).
- 6 (1) MANUFACTURER SUPPLIED CABLE, 1" CONDUIT TO PLC, (FE-2V).
- 7 (2) #14, 3/4" CONDUIT TO J-BOX, (LSHH-XX).
- 8 (1) TSP, 1" CONDUIT TO J-BOX, (PDT-6V).
- 9 (5) TSP, (2) #14, 2" CONDUIT, (PDT-6V, ZT-6V, XS-602, PIT-ZXXX, PIT-ZXXX, FIT-2V). (2) #12, #12G, 2" CONDUIT, (POWER).
- 10 (1) TSP, 1" CONDUIT TO J-BOX, (PIT-ZXXX).
- 11 PLC AND COMPONENTS SHOWN WITHIN THE PLC ENCLOSURE PROVIDED BY OWNER.
- 12 (1) TSP, 1" CONDUIT TO J-BOX, (PIT-ZXXX).
- 13 CONCRETE PAD FOR PLC ENCLOSURE PER SPU STANDARDS.
- 14 INSTALL 2" MAGNETIC FLOW METER PER MANUFACTURER'S INSTRUCTIONS. PROVIDE A MINIMUM OF 5 DIAMETERS UPSTREAM AND 5 DIAMETERS DOWNSTREAM OF THE METER FROM PIPE DISTURBANCES, SUCH AS ELBOW, GATE VALVE, OR PRV.
- 15

GENERAL NOTES:

- 1. EXISTING PIPING, EQUIPMENT & INSTRUMENTS ARE SHOWN LIGHT-LINED OR SCREENED.
- 2. CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY. DETERMINE ACTUAL CONDUIT RUNS IN THE FIELD.



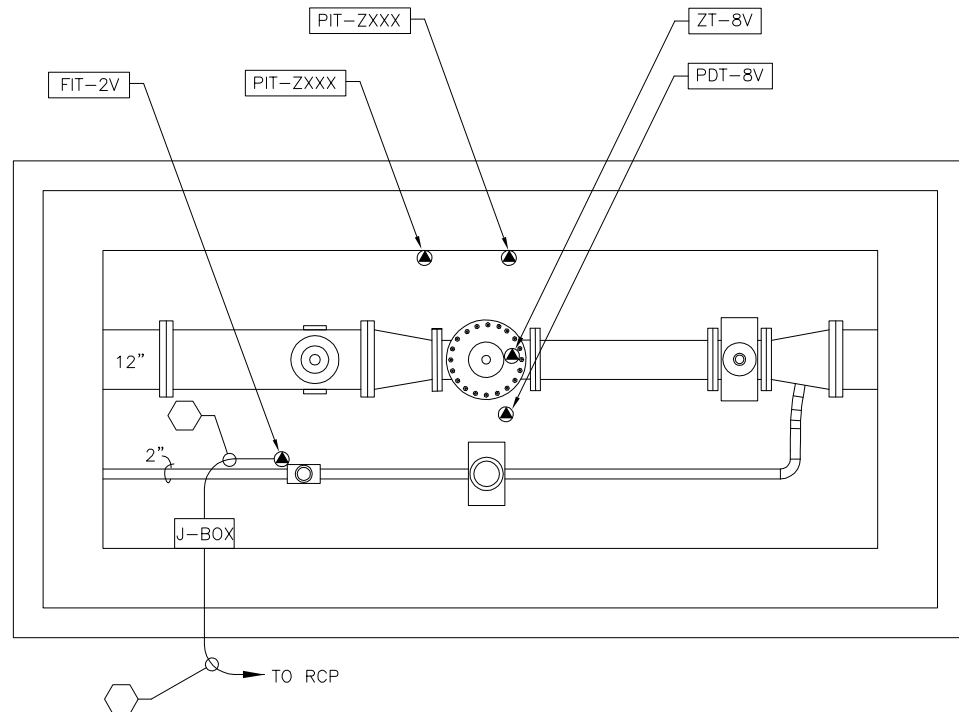
PLC PLAN  
NTS



SITE PLAN  
NTS

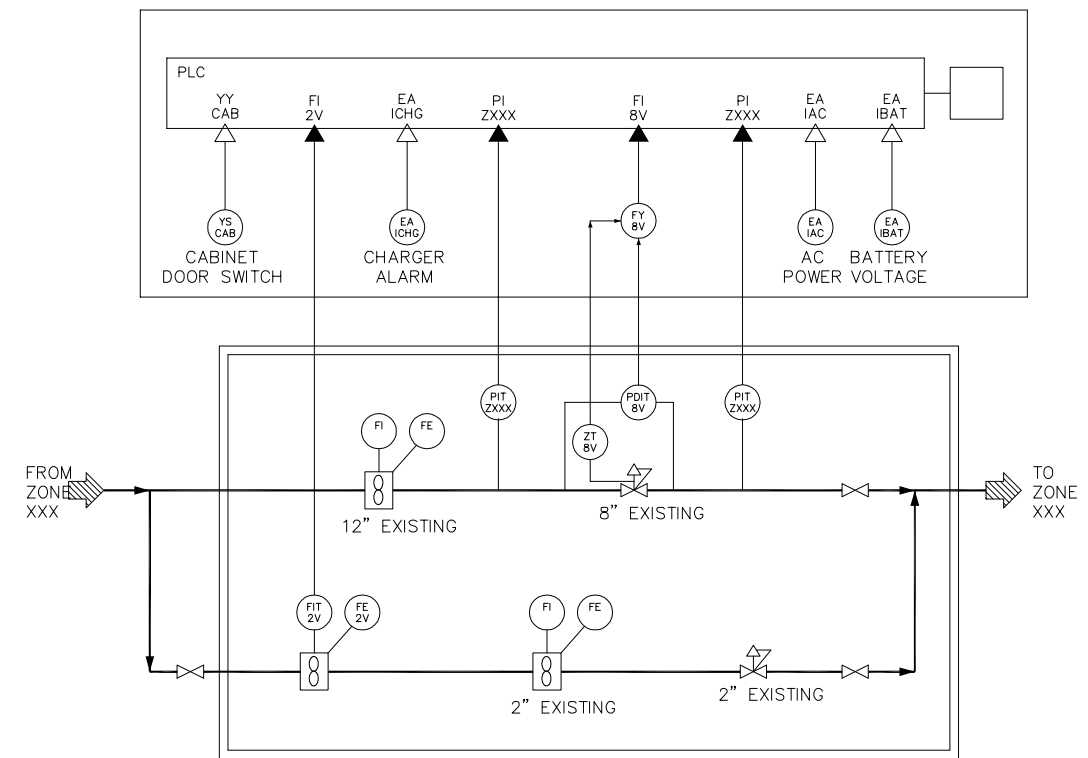
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DSG REFERENCE -					DRAWING NAME: SCADA CONTROL SYSTEM	
DATE	REVISION NAME	MADE	CHACKED	FINALIZED	NAME AND DATE DESIGNED:	<b>City of Seattle</b> Ray Hoffman, Director
					APPROVED:	
					DATUM:	SEATTLE PUBLIC UTILITIES DESIGN STANDARDS AND GUIDELINES
						REVISION DATE: 9/30/2010 DRAWING # DRG 10-20 SHEET OF



VAULT PLAN  
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RCP - TYPE C

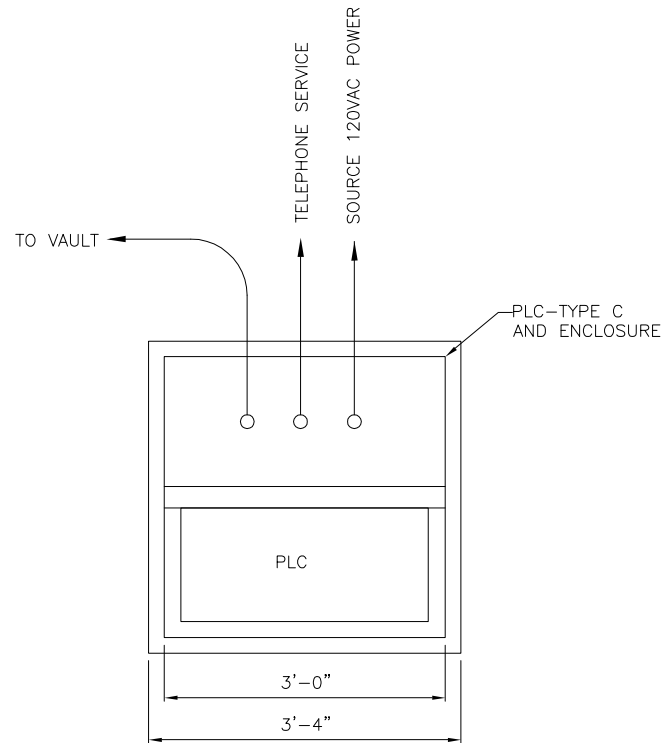


VAULT  
P&ID

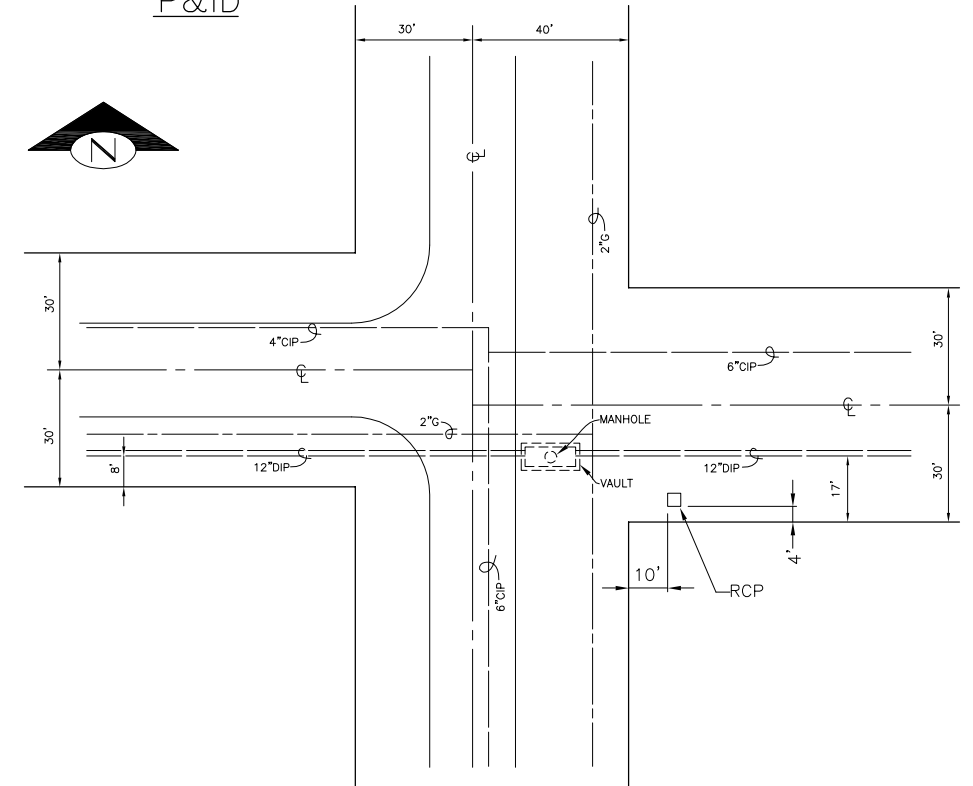
- 1 INSTALL RCP-TSR, TRANSMITTER PANEL AND ANTENNA PER DETAIL SHEET #61.
- 2 REMOVE CHART RECORDER, TONE TELEMETRY, AND MOUNTING POLE, RETURN TO OWNER. SAVE PRESSURE SENSE LINES. PULL NEW 110VAC POWER WIRING BETWEEN RCP AND POWER PEDESTAL. EXTEND EXISTING SENSE LINE CONDUIT UNDERGROUND TO TRANSMITTER PANEL PER SECTION 16110. EXTEND EXISTING 110VAC POWER CONDUIT UNDERGROUND TO RCP PER SECTION 16110.
- 3 INSTALL FLOOD SWITCH XS-602 PER MANUFACTURE INSTRUCTIONS.
- 4 INSTALL CLA-VAL FLOW METER SYSTEM AT REGULATORS (2 PLACES), INSTALL PER MANUFACTURE INSTRUCTIONS. LOCATE CLA-VAL FLOW COMPUTATION MODULE(S) AT RCP, INSTALL PER MANUFACTURE INSTRUCTIONS .
- 5 (2) TSP, 3/4" CONDUIT TO J-BOX, (PDT-305, ZT-305)
- 6 (2) TSP, 1" CONDUIT TO J-BOX, (PDT-306, ZT-306)
- 7 (2) #14, 3/4" CONDUIT TO J-BOX, (XS-602)
- 8 (2) 3/8" COPPER TUBE, 2" CONDUIT, (UPSTREAM PRESSURE, DOWNSTREAM PRESSURE) CORE DRILL VAULT FOR 2" CONDUIT. INSTALL CONDUIT FROM CORE DRILL TO TRANSMITTER PANEL. INSTALL 3/8" COPPER FROM OWNER SUPPLIED ISOLATION VALVES ON PRV'S THROUGH NEW CONDUIT TO TRANSMITTER PANEL, CONNECT TO TRANSMITTER PER P&ID. USE METAL CLAMPS EVERY 36" ANCHORED TO VAULT WALL TO SECURE COPPER TUBING IN VAULT.
- 9 (4) TSP, (2) #14, 2" CONDUIT, (PDT-305, 306, ZT-305, 306, XS-602)
- 10 (2) #12, #12G, 2" CONDUIT, (POWER)
- 11 (2) TSP, (2) #14, 1" CONDUIT, (PIT-301, 302, XS-602).
- 12 RCP AND COMPONENTS SHOWN WITHIN THE RCP, PROVIDED BY OWNER.

GENERAL NOTES:

1. EXISTING PIPING, EQUIPMENT & INSTRUMENTS ARE SHOWN LIGHT-LINED OR SCREENED.
2. CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY. DETERMINE ACTUAL CONDUIT RUNS IN THE FIELD.



RCP PLAN  
NTS



SITE PLAN  
NTS

DSG REFERENCE -					NAME AND DATE DESIGNED:
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					APPROVED: _____ DATUM: _____

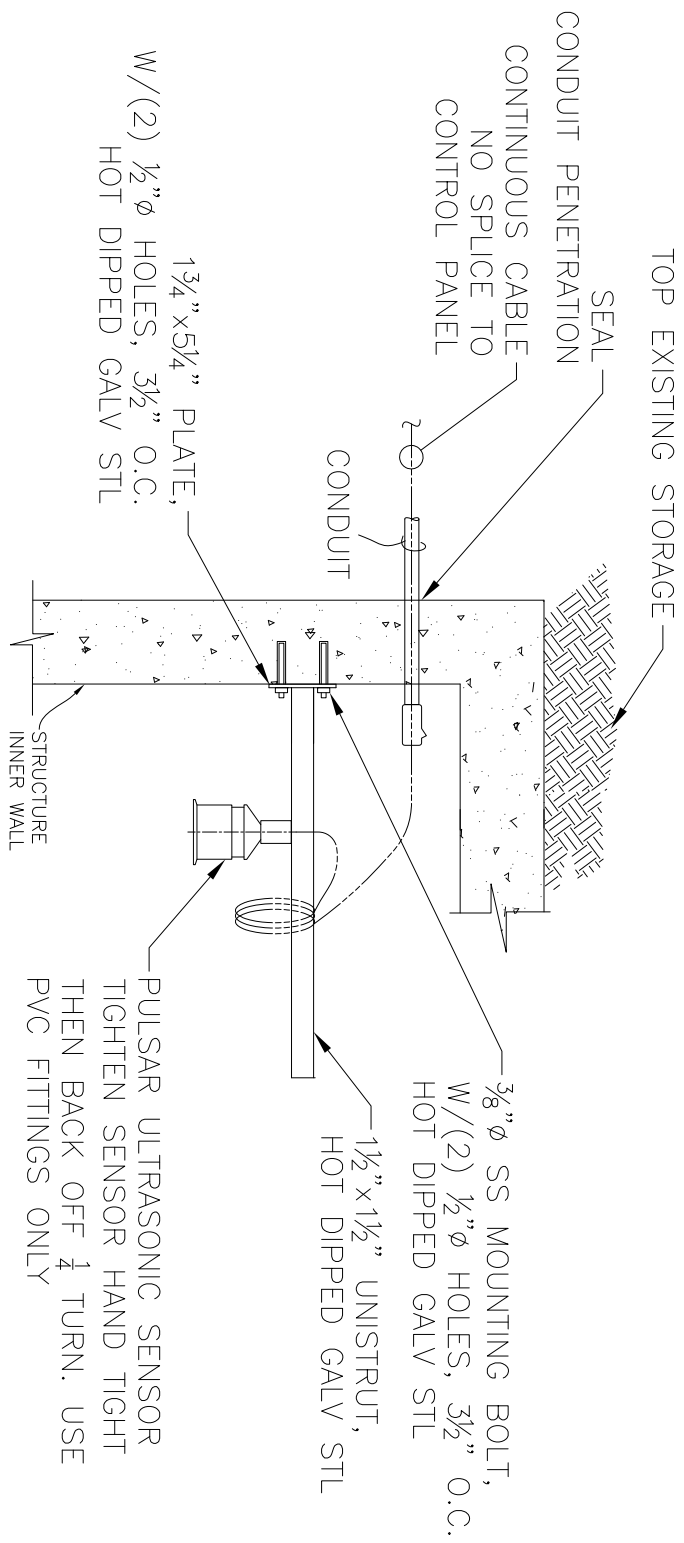
DRAWING NAME: SCADA CONTROL SYSTEM

**Seattle Public Utilities** **City of Seattle**  
Ray Hoffman, Director

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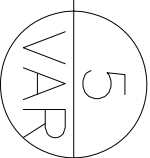


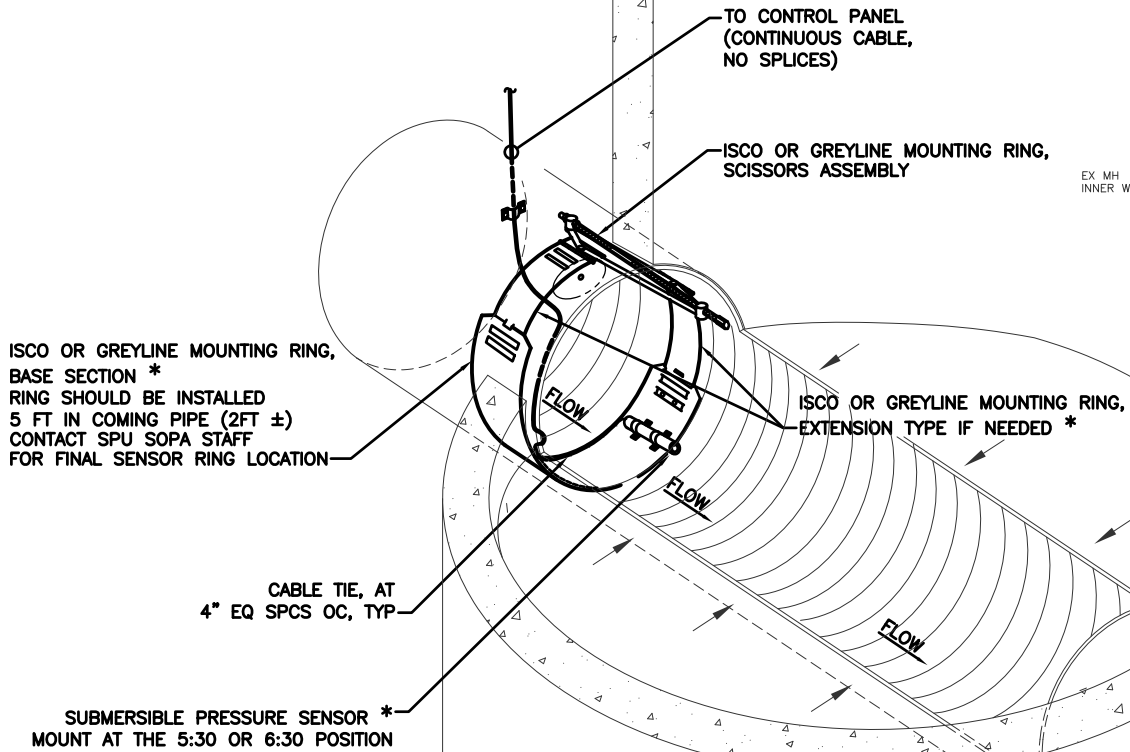
SECTION

TYPICAL ULTRASONIC LEVEL SENSOR

W/ BRACKET

NTS

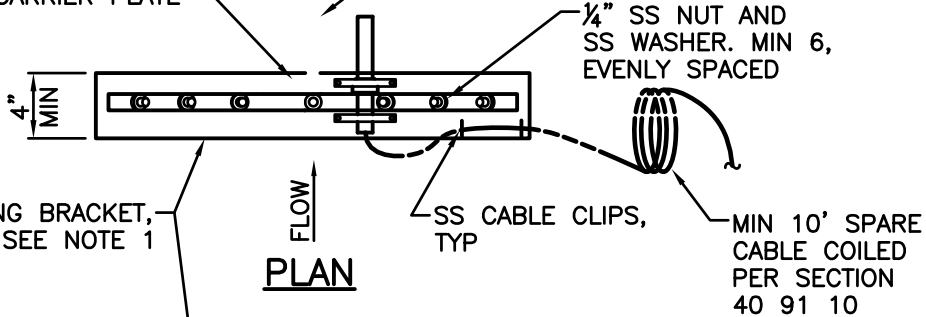




**SUBMERSIBLE PRESSURE SENSOR**  
**FULL RING**  
**INSTALLATION DETAIL**  
 NTS

1/2" CONDUIT CLAMPS (2 EA)  
DIRECTLY ATTACHED WITH  
ANCHORS THROUGH MOUNTING  
BRACKET AND CARRIER PLATE

MOUNTED PRESSURE SENSOR \*  
SEE NOTES 2 & 3



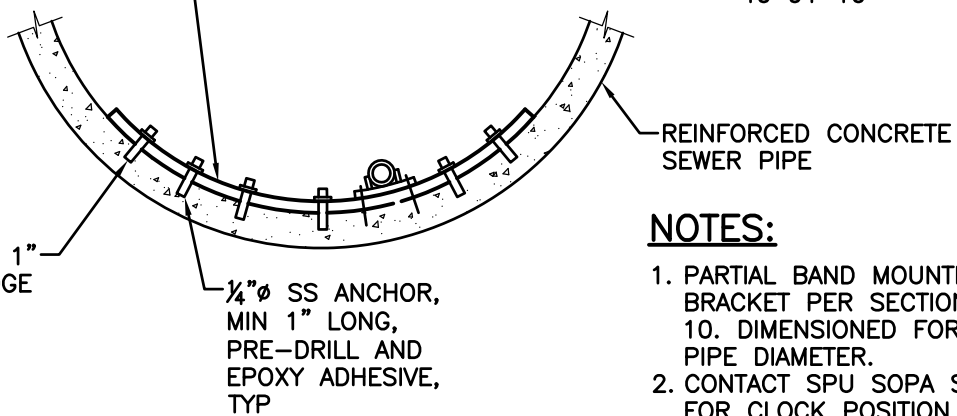
SS MOUNTING BRACKET,  
SEE NOTE 1

1/4" SS NUT AND  
SS WASHER. MIN 6,  
EVENLY SPACED

SS CABLE CLIPS,  
TYP

MIN 10' SPARE  
CABLE COILED  
PER SECTION  
40 91 10

**PLAN**



REINFORCED CONCRETE  
SEWER PIPE

END ANCHOR, 1"  
MAX FROM EDGE  
OF MOUNTING  
BRACKET, TYP

1/4"  $\phi$  SS ANCHOR,  
MIN 1" LONG,  
PRE-DRILL AND  
EPOXY ADHESIVE,  
TYP

**NOTES:**

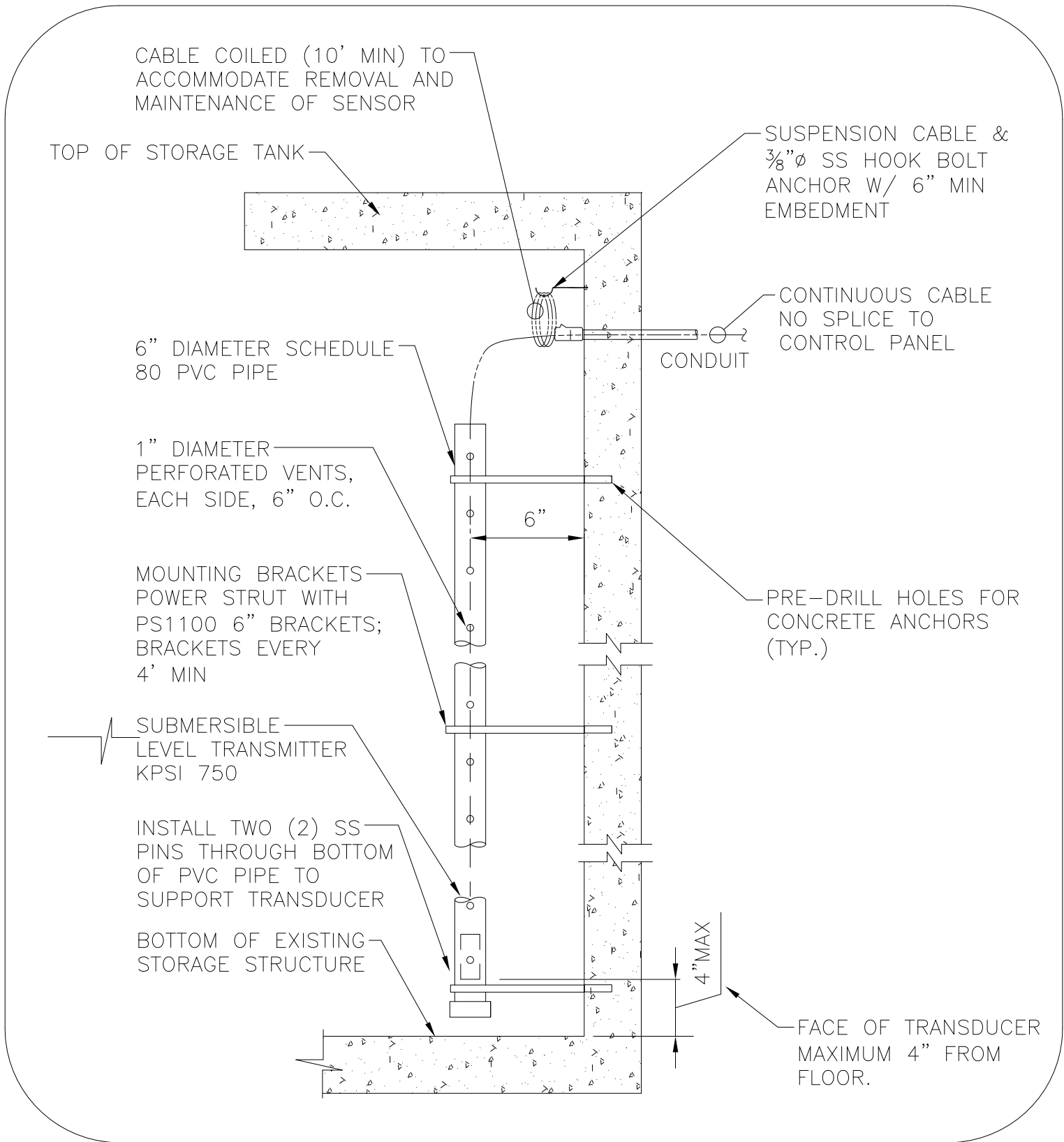
1. PARTIAL BAND MOUNTING BRACKET PER SECTION 40 91 10. DIMENSIONED FOR SEWER PIPE DIAMETER.
2. CONTACT SPU SOPA STAFF FOR CLOCK POSITION OF SENSOR IN PIPE.
3. SENSOR MOUNTED WITH CABLE END FACING UPSTREAM.

**SECTION**

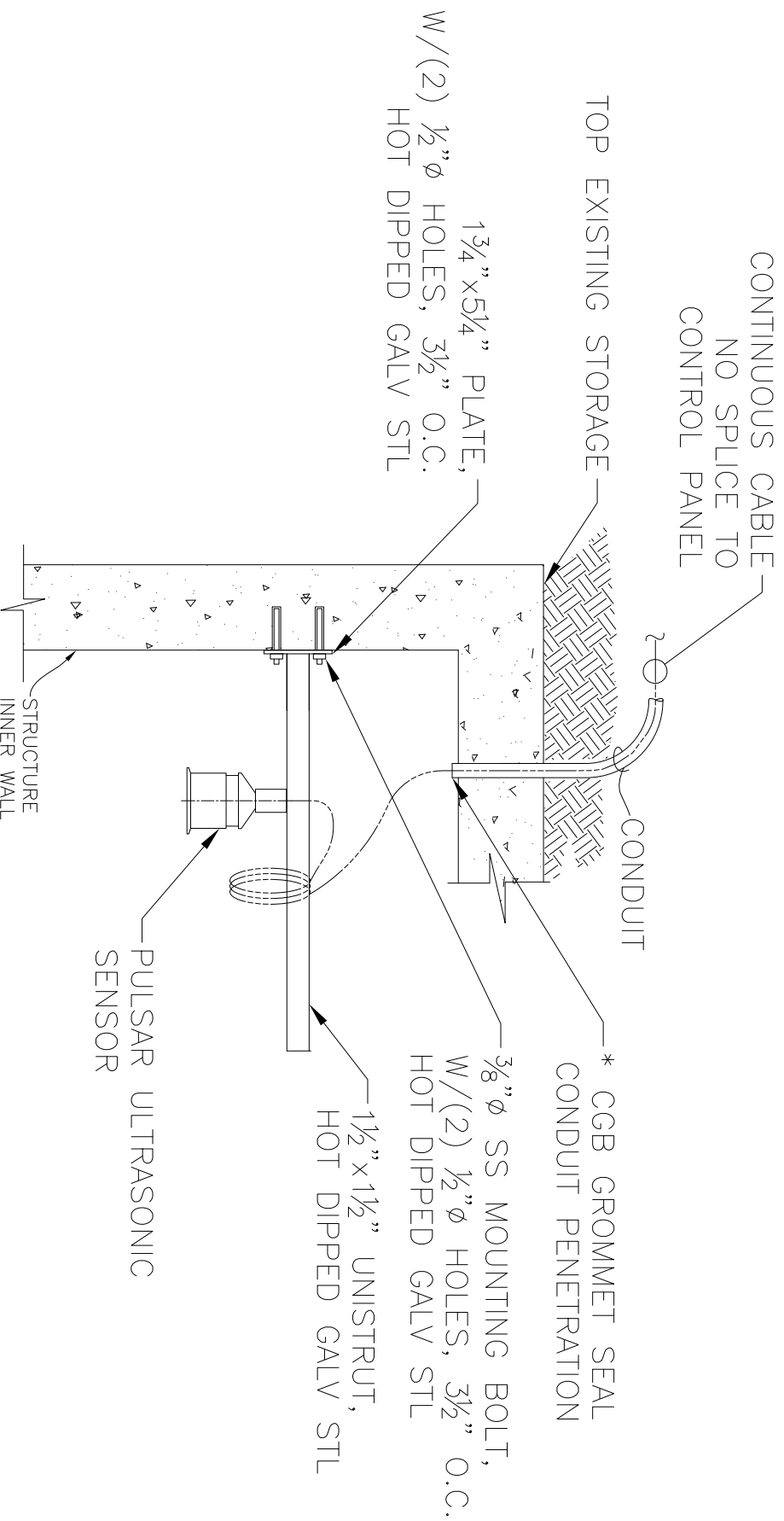
\* SEE "MONITORING EQUIPMENT SPECIFICATIONS TABLE"  
FOR SPEC.

**SUBMERSIBLE PRESSURE SENSOR**  
**PARTIAL RING**  
**INSTALLATION DETAIL**

NTS

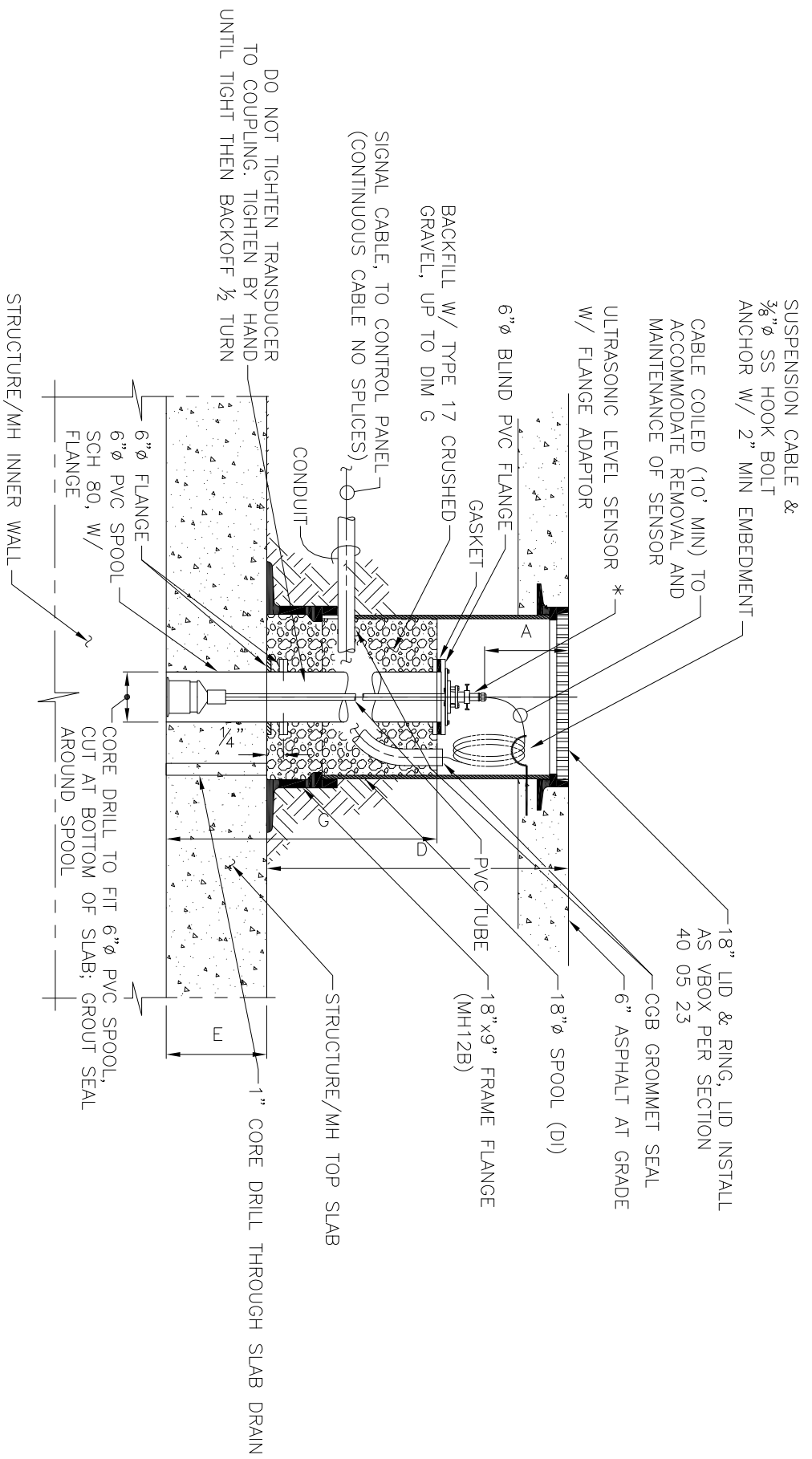


KPSI PRESSURE TRANSDUCER  
IN STILLING WELL



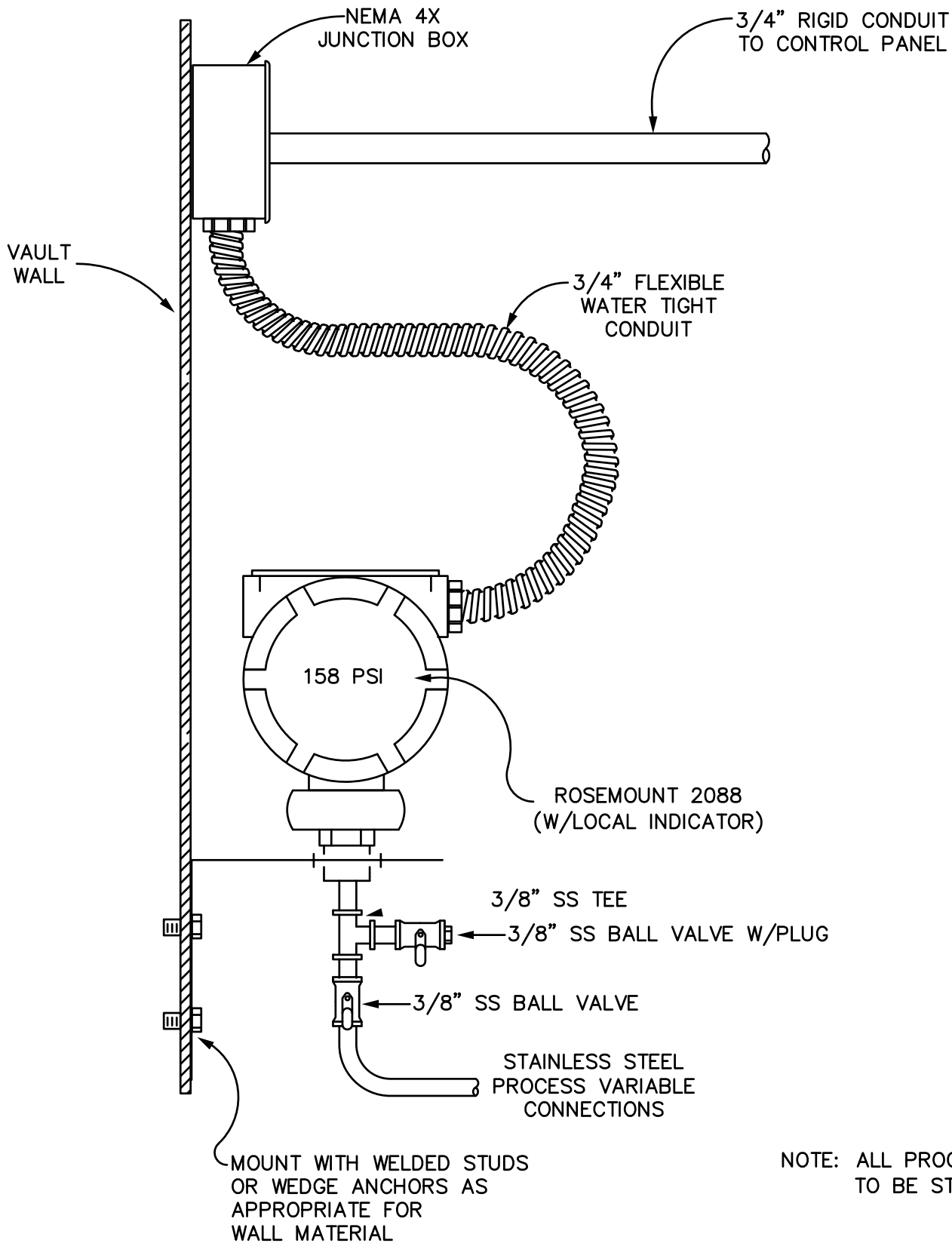
TYPICAL ULTRASONIC LEVEL SENSOR

W/ BRACKET  
NTS

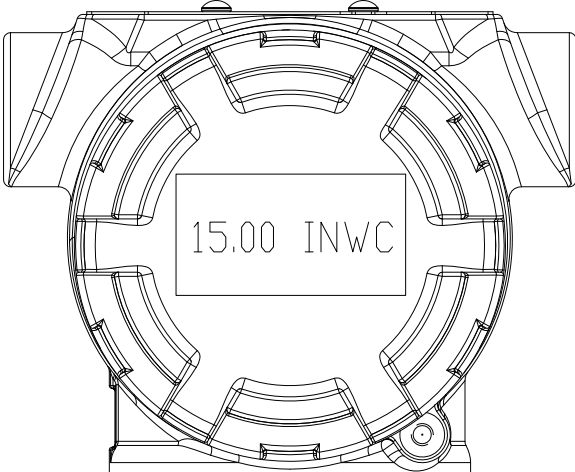


\* SEE "MONITORING EQUIPMENT SPECIFICATIONS TABLE" FOR SPEC.

TYPICAL ULTRASONIC LEVEL SENSOR  
 INSTALLATION THROUGH STRUCTURE SLAB DETAIL  
 SCALE: 1"=1'-0"



ROSEMOUNT 3051

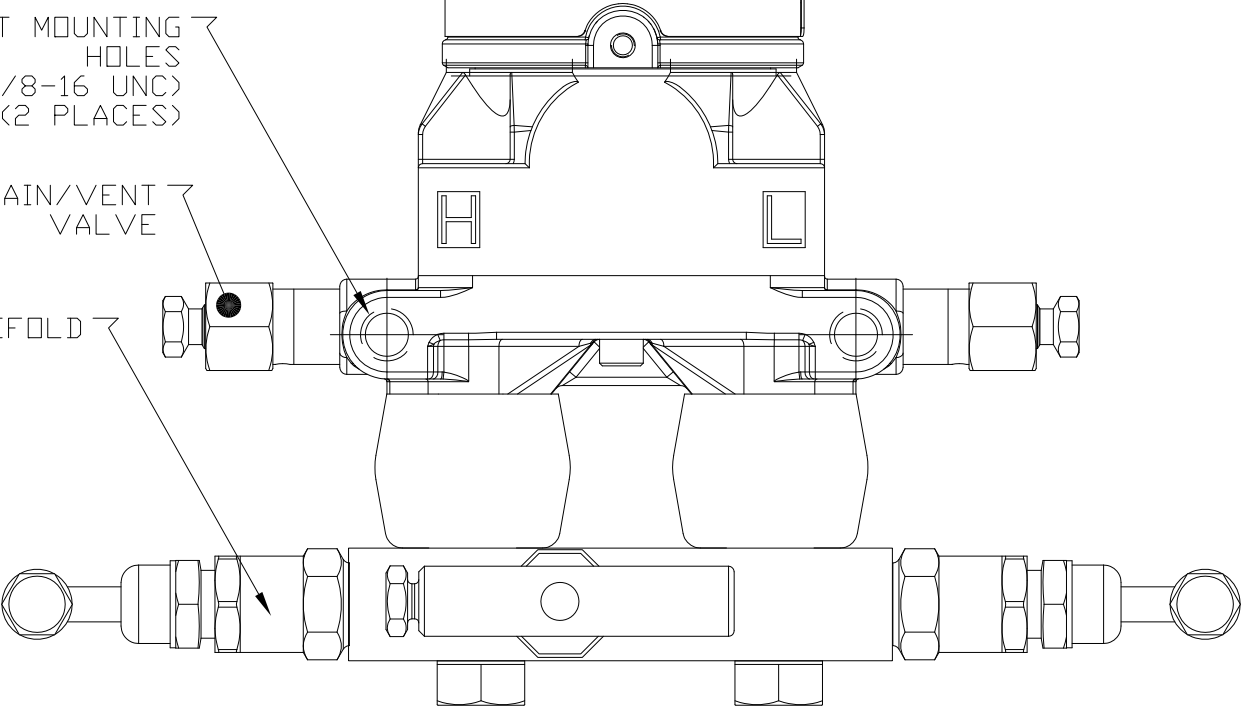


15.00 INWC

BRACKET MOUNTING HOLES  
(3/8-16 UNC)  
(2 PLACES)

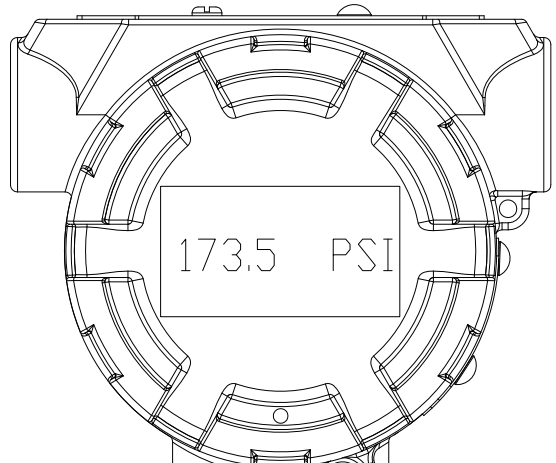
DRAIN/VENT VALVE

3 WAY MANIFOLD

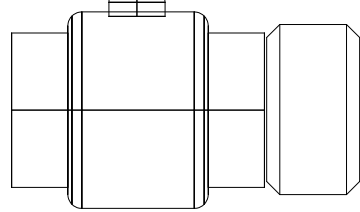
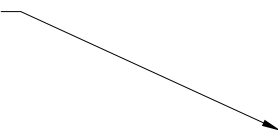
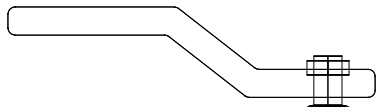


DIFFERENTIAL PRESSURE

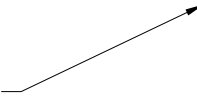
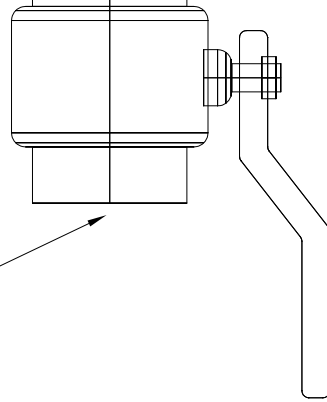
ROSEMOUNT 2088



CALIBRATION TEST PORT



PROCESS CONNECTION



GAUGE PRESSURE