

# BANGOR NATURAL GAS ORONO CULVERT

## TEMPORARY SUPPORT SYSTEM FOR NATURAL GAS PIPELINES



PROJECT LOCATION: ~432 MAIN ST, ORONO, ME 04473  
SCALE: 1" = 100'-0"

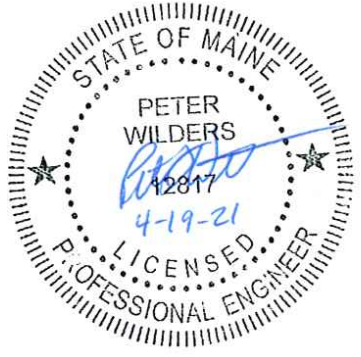
3	3/31/21	REV. WELD FROM FILLET TO V-GROOVE	DF	JD	PW
2	3/23/21	REVISION 2	DF	JD	PW
1	3/4/21	REVISION 1	DF	JD	PW
0	3/1/21	ISSUED FOR CONSTRUCTION	DF	JD	PW
B	2/12/21	REVISION B	IM	JMD	--
A	2/3/21	ISSUED FOR REVIEW	IM	JMD	--
REV	DATE	DESCRIPTION	DRWN	CHK'D	APP'D

**AMITECHNICAL SOLUTIONS**  
A FENNEL & MCCOY Group Company

PROJECT#:  
55001027

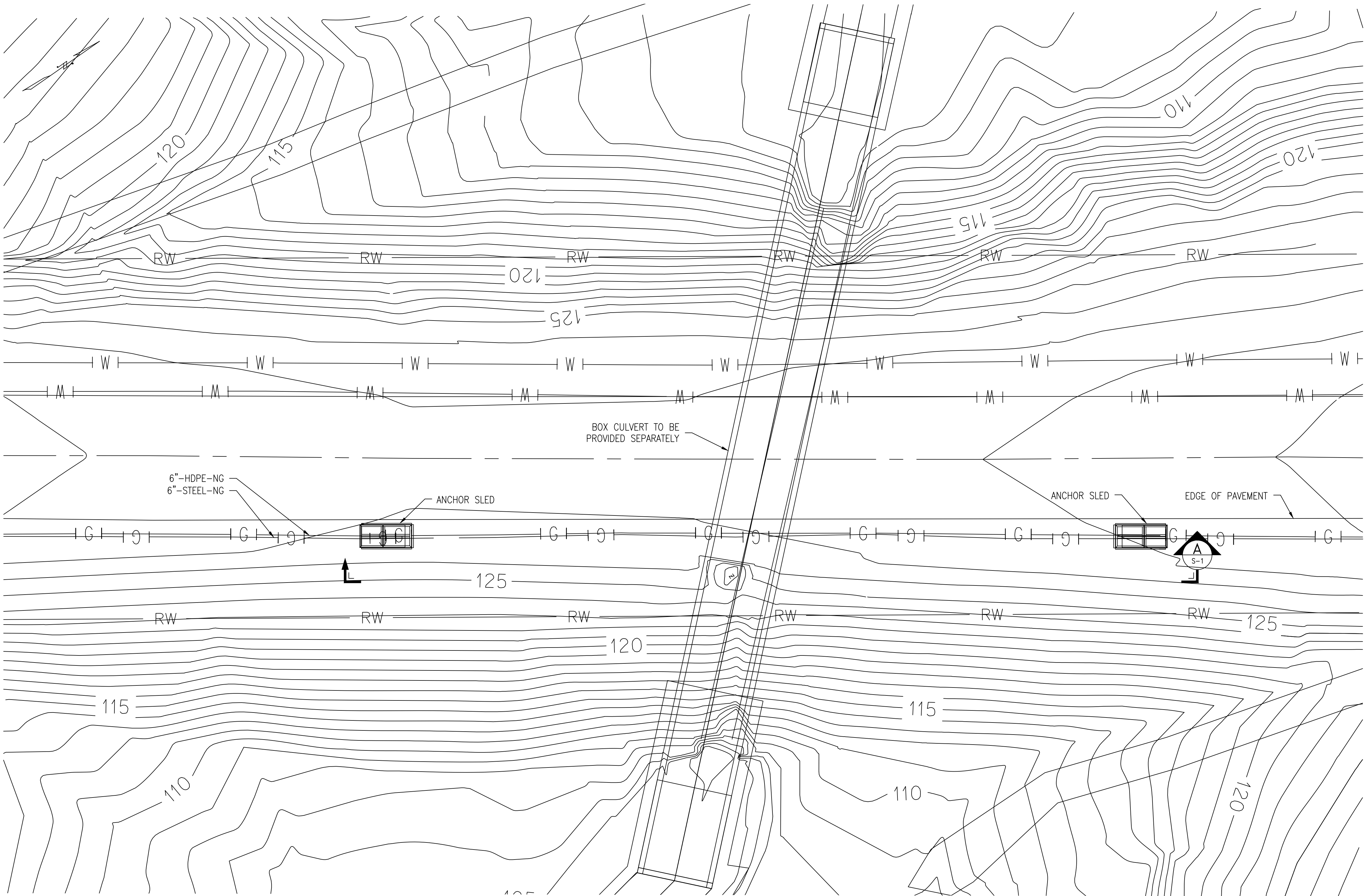
BANGOR NATURAL GAS ORONO CULVERT  
TEMPORARY SUPPORT SYSTEM FOR NATURAL GAS PIPELINES  
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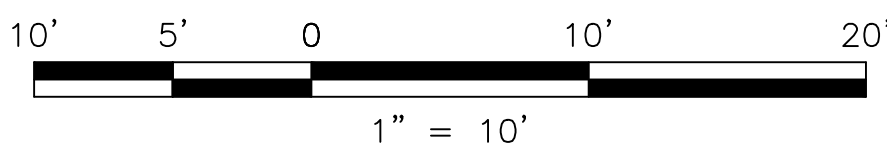


\\NEWELSON\IT\DEPARTMENTS\ENGINEERING\PROPOSALS\ACTUAL GAS BRIDGE MATERIAL GAS BRIDGE ROAD 33, ECHOING CAVE\SH\T\SUP. BRIDGE.DWG. DATE: 4/19/2021 11:34:55 AM



PIPE SUSPENSION BRIDGE  
PLAN VIEW

SCALE: 1"=10'



LEGEND:

EDGE OF PAVEMENT
ROAD CENTERLINE
RIGHT OF WAY
NATURAL GAS LINE
WATER LINE
CONTOUR

OVERALL BILL OF MATERIALS			
DESCRIPTION	QTY	PRICE	SUB-TOTAL
6" LINED PIPE CLAMP, CAT. NO 33178169 BY WALRAVEN (WLL 855 LBS)	23	\$42.38	\$974.74
1/2" EYE BOLT, CAT. NO 1043374 BY CROSBY (WLL 2,600 LBS)	23	\$28.61	\$658.03
1/2" TURNBUCKLE, JAW-JAW, CAT. NO 1032554 BY CROSBY (WLL 2,200 LBS)	23	\$32.77	\$753.71
1/2" WIRE ROPE THIMBLE CAT. NO 1037354 BY CROSBY	46	\$9.40	\$432.40
1/2" WIRE ROPE CLIP CAT. NO 1010131 BY CROSBY	138	\$10.34	\$1,426.92
3/4" WIRE ROPE CLIP CAT. NO 1010195 BY CROSBY	16	\$15.99	\$255.84
4x4 x 2' LONG, SOUTHERN PINE, PRESSURE TREATED	8	\$4.39	\$35.12
1/2" H.S. STEEL, 6x19, IWRC GALVANIZED, WIRE ROPE MEETING FEDERAL SPEC. RR-W-410D (RBS 26,600 LBS)	276	\$1.48	\$408.48
1 1/4" TURNBUCKLE, JAW-EYE, TB1141E12LN BY ANDERSON (RBS 76,000 LBS)	4	\$357.00	\$1,428.00
THIMBLE CLEVIS, FSA-125-8 BY MACLEAN POWER SYSTEMS (RBS 60,000 LBS)	4	\$92.00	\$368.00
PREFORMED GRIP, BG-1112 BY PREFORMED LINE PRODUCTS (RBS 58,300 LBS)	2	\$106.94	\$213.88
PREFORMED GRIP, BG-2115 BY PREFORMED LINE PRODUCTS (RBS 26,900 LBS)	2	\$28.74	\$57.48
3/4" E.H.S. STEEL, 1x19, GALVANIZED STRAND CABLES PER ASTM A-475 (RBS 58,300 LBS)	160	\$4.13	\$660.80
1/2" E.H.S. STEEL, 1x7, GALVANIZED STRAND CABLES PER ASTM A-475 (RBS 26,900 LBS)	160	\$1.68	\$268.80
6x4x1/4 ANGLE	56	\$31.15	\$1,744.40
4x4x1/4 ANGLE	102	\$18.86	\$1,923.72
3x3x1/4 ANGLE	51	\$13.65	\$696.15
2x2x1/4 ANGLE	32	\$8.37	\$267.84
FABRICATION ADDER	2	\$4,563.86	\$9,127.72
5/8"Ø x 1 1/2" LONG BOLTS	66	\$1.51	\$99.66
5/8"Ø x 1 3/4" LONG BOLTS	8	\$1.72	\$13.76
5/8"Ø HEAVY HEX NUTS	74	\$1.13	\$83.62
5/8"Ø FLAT WASHERS	74	\$0.69	\$51.06
1/4" PLATE WASHERS	8	\$5.87	\$46.96
2'x2'x4" PRECAST CONCRETE	28	\$49.99	\$1,399.72
<b>TOTAL</b>			<b>\$21,997.09</b>

3	3/31/21	REV. WELD FROM FILLET TO V-GROOVE	DF	JD	PW
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REV	DATE	DESCRIPTION	DRWN	CHK'D	APP'D

**AMITECHNICAL SOLUTIONS**  
A FENNELLS & MCCOY Group Company

PROJECT#:  
55001027

BANGOR NATURAL GAS ORONO CULVERT  
TEMPORARY SUPPORT SYSTEM FOR NATURAL GAS PIPELINES  
PLAN VIEW

DRAWN BY:	IM	SCALE:	AS NOTED	DATE:	4/19/21	
DESIGN BY:	JMD	DWG NO.:	G-2			
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APPROVED BY:	--					

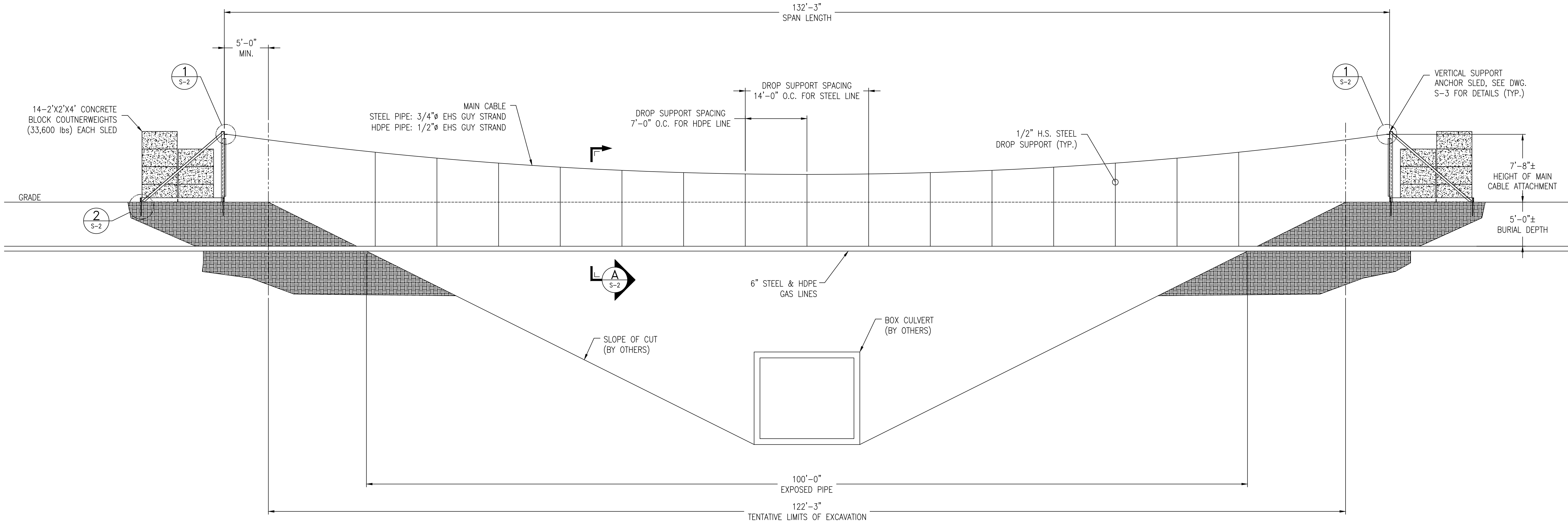
2 OF 6

REV.  
2





\\VME\SSD\T\DEPARTMENT\DESIGN\ENGINEERING\PROPOSALS\ACTUAL\GAS\BANGOR\ROAD\3. EXCAVATION\CAO\SHT\1\SUP. BRIDGE.DWG. JED:BLE 4/19/2021 11:34:59 AM



INSTALLATION NOTES:

1. CONTRACTOR TO SUBMIT EXCAVATION PLAN TO BANGOR NATURAL GAS (BNG) DETAILING SEQUENCE OF EXCAVATION AND EQUIPMENT TO BE USED FOR REVIEW AND ACCEPTANCE.
2. LOCATE STEEL AND MDPE GAS LINES. VERIFY BURIAL DEPTH AND PLAN LOCATION ARE IN AGREEMENT WITH MaineDOT PROVIDED PLANS USING VACUUM EXCAVATION.
3. REPORT FINDINGS TO BNG FOR REVIEW. BNG WILL ADVISE IF REVISIONS TO SUPPORT PLANS ARE REQUIRED BASED UPON OBSERVED LOCATIONS.
4. ERECT ANCHOR SLEDS AND PIN USING REBAR, AS SHOWN IN DETAIL 2 ON SHT S-2.
5. SET CONCRETE COUNTERWEIGHT BLOCKS, IF NOT USING INTERLOCKING BLOCKS, BAND BLOCKS TOGETHER TO PREVENT INADVERTENT SEPARATION.
6. STRING SUPPORT CABLES BETWEEN ANCHOR SLEDS USING MATERIAL DETAILED ON SHT. S-2. ADJUST CABLES PER SAG CHART ON THIS SHEET USING SAG OR TENSION VALUES SHOWN. USE OF SAG MEASUREMENTS IS PREFERRED.
7. AS PIPES ARE EXPOSED, INSTALL DROP SUPPORTS AND ATTACH TO PIPES PER DETAILS SHOWN ON SHT. S-2. INSTALL ROCK SHIELD AFTER ATTACHING PIPE CLAMPS.
8. INSTALL SPACER BLOCKS WHERE STEEL AND HDPE SUPPORTS ARE CO-LOCATED, APPROXIMATELY EVERY OTHER HDPE SUPPORT.
10. MONITOR ASSEMBLY FOR EXCESSIVE CABLE SAG, DAILY. ADJUST SUSPENSION CABLES USING TURNBUCKLES, AS NEEDED, TO MAINTAIN SLOPE OF BOTH LINES. IF NECESSARY, MINOR ADJUSTMENTS CAN BE MADE USING DROP CABLE TURNBUCKLES.
11. REMOVE SUPPORT MATERIAL IN REVERSE ORDER AS PIPING IS REBURIED. ROCK SHIELD TO BE LEFT IN PLACE ON STEEL PIPE.

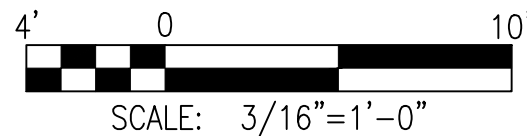
PIPE SUSPENSION BRIDGE  
ELEVATION VIEW

SCALE: 3/16"=1'-0"

SPAN LENGTH (FT)	SAG (FT)							
	20' F	30' F	40' F	50' F	60' F	70' F	80' F	90' F
1/2"Ø-7 STRAND EXTRA HIGH STRENGTH STEEL								
127	6.89	6.92	6.94	6.96	6.98	6.99	7.00	7.03
TENSION (LBS)	166	166	167	169	150	135	129	149
3/4"Ø-19 STRAND EXTRA HIGH STRENGTH STEEL								
127	6.89	6.91	6.94	6.97	6.98	7.00	7.02	7.05
TENSION (LBS)	347	346	346	353	335	330	329	331

UNLOADED CABLE SAGS FOR INITIAL INSTALLATION

SCALE: NONE



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A FENNELLS & MCCOY Group Company

PROJECT#:  
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BANGOR NATURAL GAS ORONO CULVERT  
TEMPORARY SUPPORT SYSTEM FOR NATURAL GAS PIPELINES  
SUSPENSION ELEVATION

DRAWN BY:	PLS	SCALE:	AS NOTED	DATE:	4/19/21	REV.	
DESIGN BY:	DAF	DWG NO.:					
CHECKED BY:	DAF	S-1	3	OF	6		2
APPROVED BY:	--						



DROP CABLE SUPPORT VIEW (B) SCALE: 1"=1'-0"

DROP CABLE SUPPORT SECTION (A) SCALE: 1"=1'-0"

DROP CABLE SUPPORT BILL OF MATERIAL				
ITEM NO.	QTY./SPP'T	TOTAL QTY.	DESCRIPTION	
1	1	23	6" LINED PIPE CLAMP, CAT. NO 33178169 BY WALRAVEN (WLL 855 LBS)	
2	1	23	1/2" EYE BOLT, CAT. NO 1043374 BY CROSBY (WLL 2,600 LBS)	
3	1	23	1/2" TURNBUCKLE, JAW-JAW, CAT. NO 1032554 BY CROSBY (WLL 2,200 LBS)	
4	2	46	1/2" WIRE ROPE THIMBLE CAT # 1037354 BY CROSBY	
5	6	138	1/2" WIRE ROPE CLIP CAT # 1010131 BY CROSBY	
6	2	16	3/4" WIRE ROPE CLIP CAT # 1010195 BY CROSBY	
7	1	8	4x4 x 2' LONG, SOUTHERN PINE, PRESSURE TREATED	
8	12'	276'	1/2" H.S. STEEL, 6x19, IWRC GALVANIZED, WIRE ROPE MEETING FEDERAL SPEC. RR-W-410D (RBS 26,600 LBS)	

NOTES:  
1. RBS= RATED BREAKING STRENGTH  
2. WLL = WORKING LOAD LIMIT



MAIN CABLE TERMINATIONS BILL OF MATERIAL		
ITEM NO.	QTY.	DESCRIPTION
1	4	1 1/4" TURNBUCKLE, JAW-EYE, TB114JE12LN BY ANDERSON (RBS 76,000 LBS)
2	4	THIMBLE CLEVIS, FSA-125-8 BY MACLEAN POWER SYSTEMS (RBS 60,000 LBS)
3	2	PREFORMED GRIP, BG-1112 BY PREFORMED LINE PRODUCTS (RBS 58,300 LBS)
3A	2	PREFORMED GRIP, BG-2115 BY PREFORMED LINE PRODUCTS (RBS 26,900 LBS)
160 FT		3/4" E.H.S. STEEL, 1x19, GALVANIZED STRAND CABLES PER ASTM A-475 (RBS 58,300 LBS)
160 FT		1/2" E.H.S. STEEL, 1x7, GALVANIZED STRAND CABLES PER ASTM A-475 (RBS 26,900 LBS)



MAIN CABLE DEADEND ATTACHMENT DETAIL (1) SCALE: 1 1/2"=1'-0"

REV	DATE	DESCRIPTION	DRWN	CHK'D	APP'D
3	3/31/21	REV. WELD FROM FILLET TO V-GROOVE	DF	JD	PW
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0	3/1/21	ISSUED FOR CONSTRUCTION	DF	JD	PW
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A	2/3/21	ISSUED FOR REVIEW	PLS	DAF	--

PROJECT#: 55001027

BANGOR NATURAL GAS ORONO CULVERT  
TEMPORARY SUPPORT SYSTEM FOR NATURAL GAS PIPELINES  
SECTIONS AND DETAILS

DRAWN BY: PLS  
DESIGN BY: DAF  
CHECKED BY: DAF  
APPROVED BY: --

SCALE: AS NOTED  
DWG NO.: S-2  
DATE: 4/19/21  
4 OF 6  
REV. 2

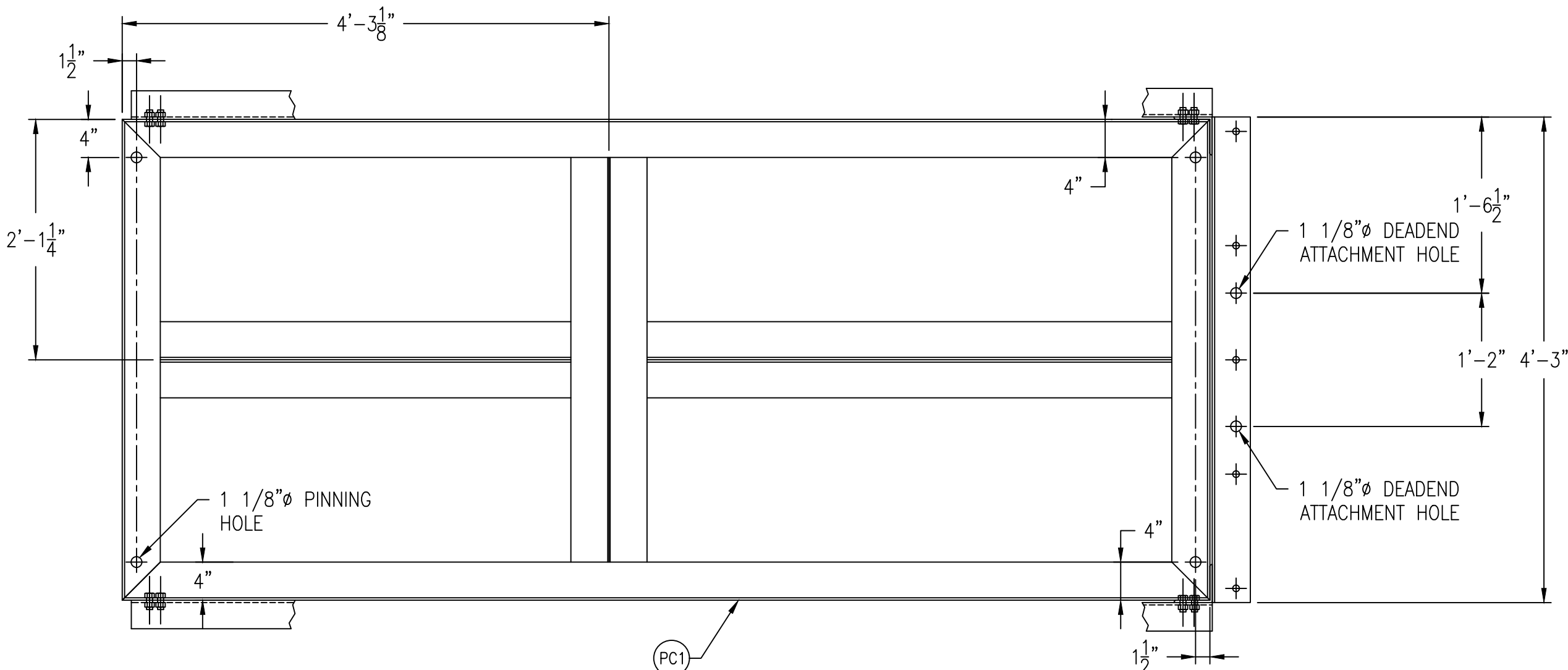


REBAR PINNING DETAIL (2) SCALE: 1"=1'-0"

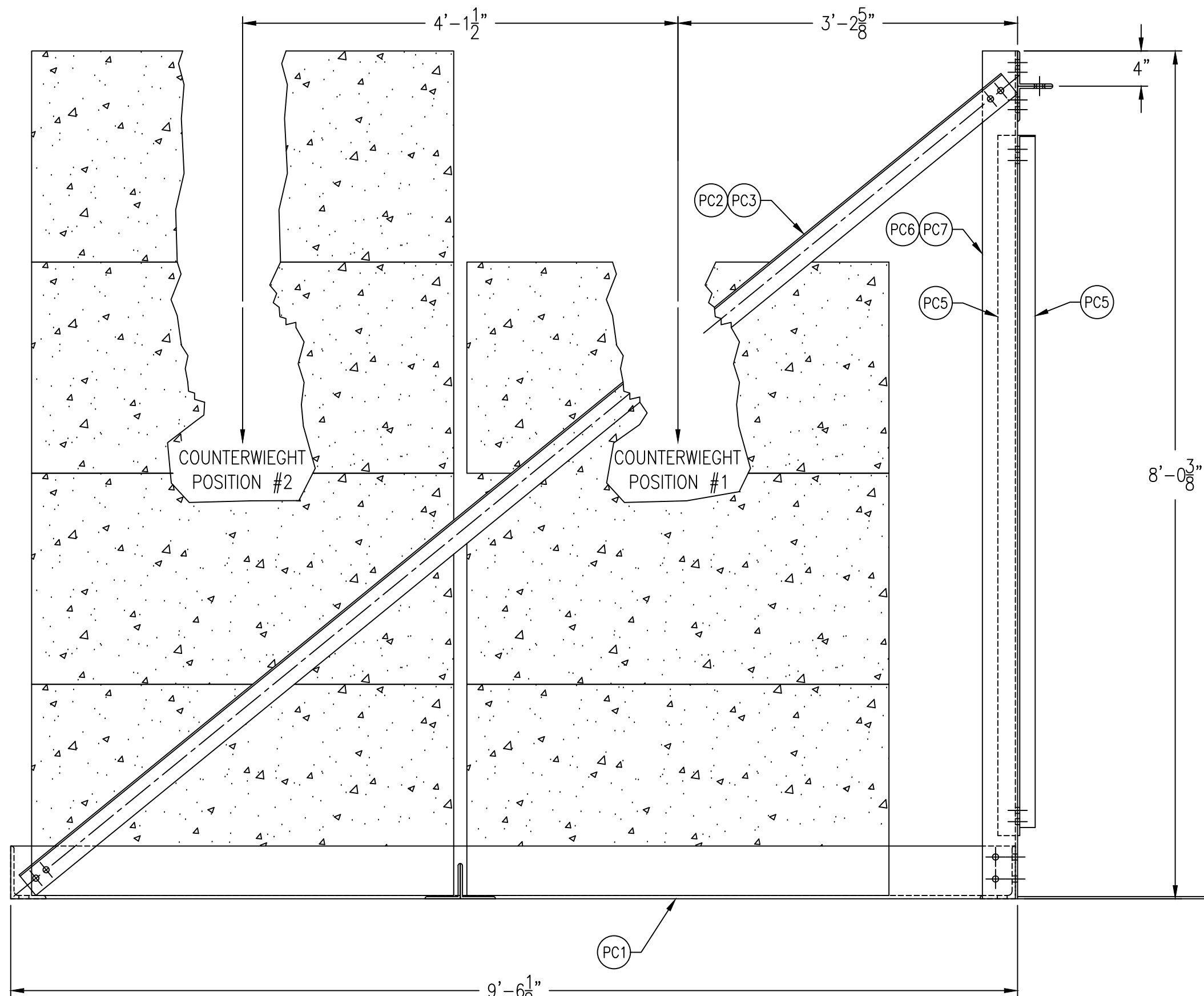
NOTE: 8 - 2 FT LONG, #6 REBAR REQUIRED.







PLAN VIEW



SIDE VIEW

BILL OF MATERIAL			
ITEM NO.	QTY.	DESCRIPTION	FAB. DWG
(PC1)	1	L6x4x1/4 WELDMENT	S-4
(PC2)	1	L3x3x1/4 x 12'-0 1/8" LONG	S-4
(PC3)	1	L3x3x1/4 x 12'-0 1/8" LONG	S-4
(PC4)	2	L4x4x1/4 x 4'-3" LONG	S-4
(PC5)	2	L2x2x1/4 x 7'-7 7/8" LONG	S-4
(PC6)	1	L4x4x1/4 x 8'-0 3/8" LONG	S-4
(PC7)	1	L4x4x1/4 x 8'-0 3/8" LONG	S-4
HARDWARE TAKE-OFF			
33	5/8"Ø x 1 1/2" LONG BOLTS		
4	5/8"Ø x 1 3/4" LONG BOLTS		
37	5/8"Ø HEAVY HEX NUTS		
37	5/8"Ø FLAT WASHERS		
4	1/4" PLATE WASHERS, 1 1/2"Ø W/1 1/16" HOLE		

NOTES:  
1. MATERIAL QUANTITIES SHOWN FOR ONE SLED. TWO SLEDS REQUIRED FOR PROJECT.

COUNTERWEIGHTS		
QTY.	DESCRIPTION	POSITION
6	2'x2'x4' PRECAST CONCRETE BLOCKS	1
8	2'x2'x4' PRECAST CONCRETE BLOCKS	2

NOTES:  
1. MATERIAL QUANTITIES SHOWN FOR ONE SLED. TWO SLEDS REQUIRED FOR PROJECT.

MEMBER	ASTM	MIN. STRENGTH
STRUCTURAL TUBING	A500 (GRADE B)	46 KSI
STEEL PIPE	A53 (TYPE E, GR. B)	35 KSI
OTHER ROLLED PLATES/SHAPES	A36	36 KSI
CONNECTION BOLTS	A325	92 KSI
ANCHOR BOLTS	A307	---
THREADED RODS	A36	36 KSI

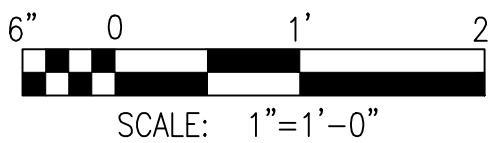
- ALL STRUCTURAL BOLTS, NUTS AND WASHERS SHALL BE 5/8" DIAMETER HIGH STRENGTH ASTM A-325 UNLESS OTHERWISE NOTED. ALL BOLTS, NUTS & WASHERS SHALL BE TIGHTENED ACCORDING TO THE AISC TURN OF THE NUT METHOD OR BY A CALIBRATED TORQUE WRENCH.
- ALL WELDING SHALL CONFORM TO THE LATEST STANDARDS FOR ARC AND GAS WELDING AS SET FORTH BY THE AMERICAN WELDING SOCIETY. WELDING ELECTRODES SHALL CONFORM TO ASTM A-233 E70 SERIES.
- ALL WELDING SHALL BE DONE BY CERTIFIED WELDERS, AND SHALL CONFORM TO THE LATEST STANDARDS FOR ARC AND GAS WELDING AS SET FORTH BY THE AMERICAN WELDING SOCIETY. WELDING ELECTRODES SHALL BE AS FOLLOWS:

BASE METALS	WELDING ELECTRODE
CARBON STEEL TO CARBON STEEL	E70XX
TYPE 304 STAINLESS STEEL TO 304 STAINLESS STEEL	E308
CARBON STEEL TO TYPE 304 STAINLESS STEEL	E309

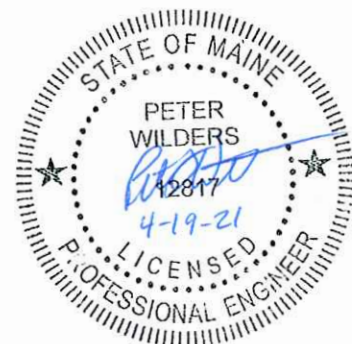
- CONNECTIONS:
  - ALL CONNECTIONS SHALL BE FRAMED BEAM CONNECTIONS CONFORMING TO THE REQUIREMENTS OF PART 4 OF THE AISC MANUAL, UNLESS NOTED OTHERWISE.
  - ALL BOLTED CONNECTIONS SHALL BE MADE WITH HIGH STRENGTH BOLTS, UNLESS NOTED. CONNECTIONS SHALL BE "BEARING TYPE", WITH THREADS INCLUDED IN THE SHEAR PLANE, UNLESS NOTED OTHERWISE.
  - ALL HIGH STRENGTH BOLTS SHALL BE TIGHTENED TO PROVIDE AT LEAST THE MINIMUM TENSION SHOWN IN TABLE 4, FASTENER TENSION, OF THE SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS, UNLESS NOTED OTHERWISE.
  - SHOP AND FIELD CONNECTIONS SHALL BE MADE WITH BOLTS OR WELDS.
  - SEATED CONNECTIONS WILL NOT BE PERMITTED UNLESS SHOWN ON THE DRAWING.
  - BRACING CONNECTIONS SHALL BE DESIGNED AND DETAILED SO THAT ALL FORCE COMPONENTS WILL BE TRANSMITTED DIRECTLY TO THE CENTER LINE OF INTERSECTING MEMBERS, UNLESS NOTED OTHERWISE.
  - BRACING CONNECTIONS SHALL DEVELOP THE FORCES SHOWN ON THE DRAWINGS. WHERE FORCES ARE NOT SHOWN, CONNECTIONS SHALL DEVELOP AT LEAST ONE-HALF OF THE ALLOWABLE TENSION FORCE OF THE BRACING MEMBER. A MINIMUM OF 2 BOLTS SHALL BE USED AT EACH CONNECTION.
  - GUSSET PLATES FOR ALL BRACING CONNECTIONS SHALL BE 3/8" THICK, UNLESS NOTED OTHERWISE.
  - FIELD CONNECTIONS TO EXISTING STEEL SHALL BE WELDED, UNLESS NOTED OTHERWISE.
- THE CONTRACTOR SHALL SUPPLY ALL TEMPORARY BRACING REQUIRED TO MAINTAIN PLUMBNESS AND STABILITY DURING ERECTION. BRACING SHALL NOT BE REMOVED UNTIL ALL PERMANENT BRACING HAS BEEN INSTALLED, ALL WELDING HAS BEEN COMPLETED, ALL BOLTS HAVE BEEN PROPERLY TIGHTENED AND ROOFDECK AND FLOOR HAVE BEEN PROPERLY PLACED.
- ALL HOLES TO BE 11/16", UNLESS OTHERWISE NOTED. HOLES IN STEEL SHALL BE DRILLED OR PUNCHED. ALL SLOTTED HOLES SHALL BE PROVIDED WITH SMOOTH EDGES. BURNING OF HOLES AND TORCH CUTTING AT THE SITE IS NOT PERMITTED.
- STEEL SHOP DRAWINGS SHALL BE SUBMITTED TO ENGINEER AND APPROVED PRIOR TO FABRICATION. ALL FABRICATION SHALL BE DONE BY LICENSED STEEL FABRICATORS.
- ALL NEW STRUCTURAL STEEL SHALL BE PAINTED WITH COLD GALVANIZING COMPOUND, AS MANUFACTURED BY ZRC WORLDWIDE. APPLY TWO 3 MIL COATS. FOLLOW MANUFACTURERS SPECIFICATIONS WITH REGARDS TO SURFACE PREPARATION AND APPLICATION. TOUCH UP ALL FIELD MODIFIED AND/OR DAMAGED SURFACES.

## ANCHOR SLED DETAILS

SCALE: 1"=1'-0"  
COUNTERWEIGHTS SHOWN IN SIDE VIEW FOR CLARITY.



SCALE: 1"=1'-0"



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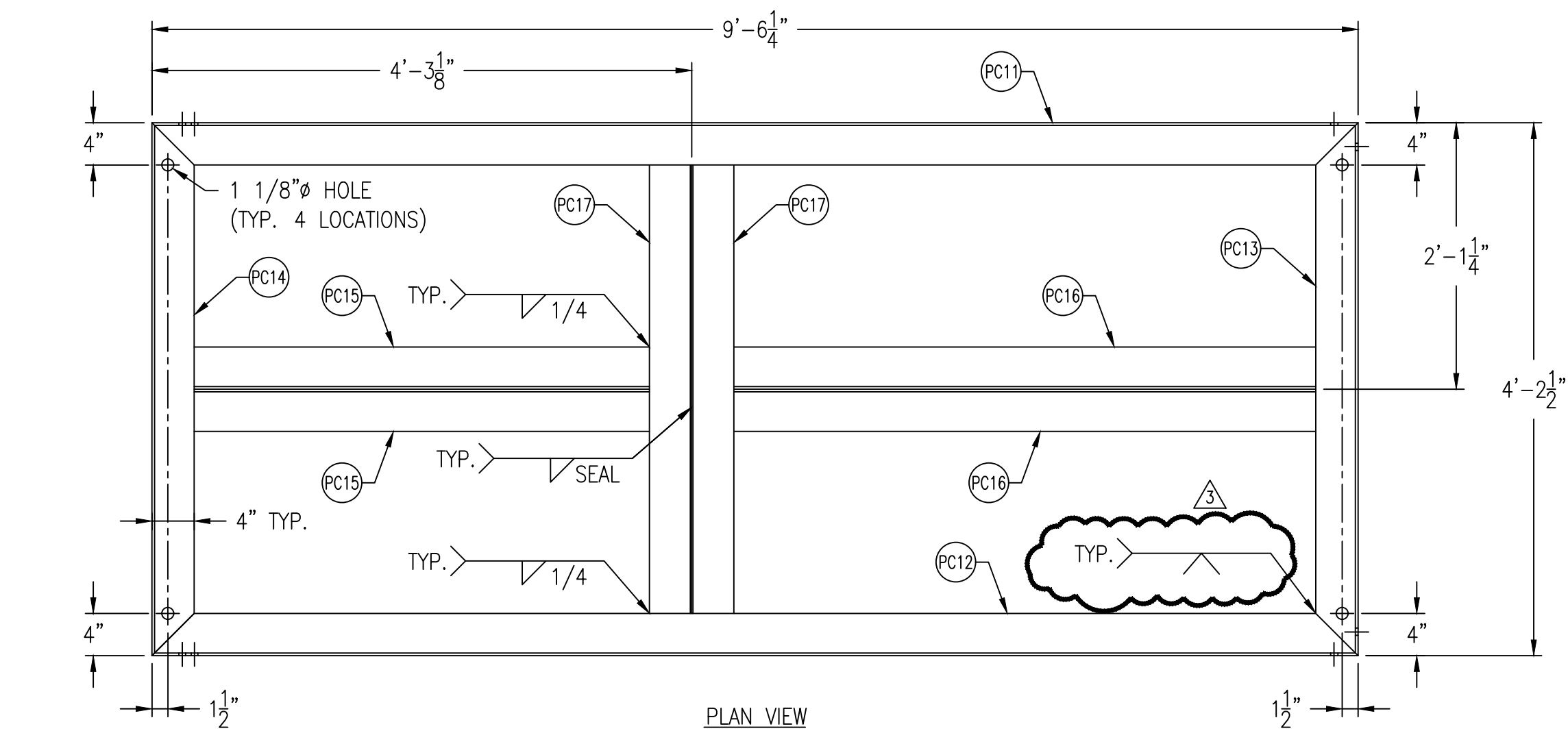
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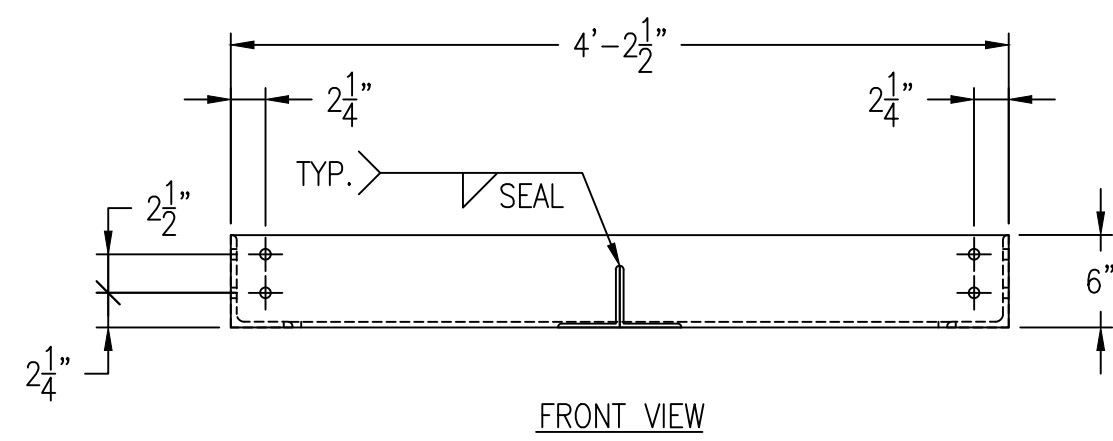
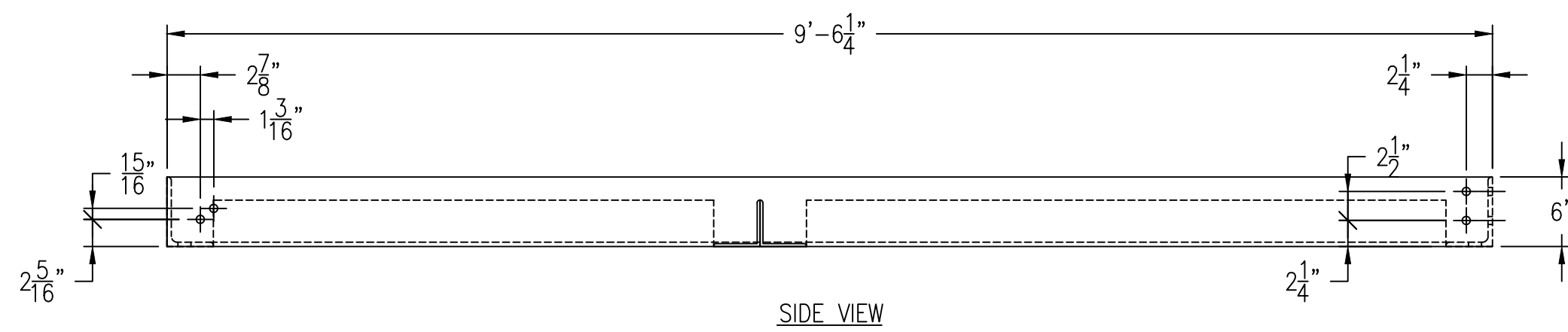
5 OF 6

REV.  
2

\\VME\SSD\T\DEPARTMENT\DE-ENGINEERING\PROPOSALS\ACTUAL\GAS BANGOR NATURAL GAS CARRIER ROAD\3. EXECUTIVE\CAO\SH\SUB. BRIDGE DWG. SHEET 4/19/2021 11:44:59 AM

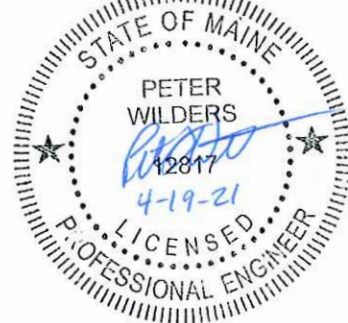
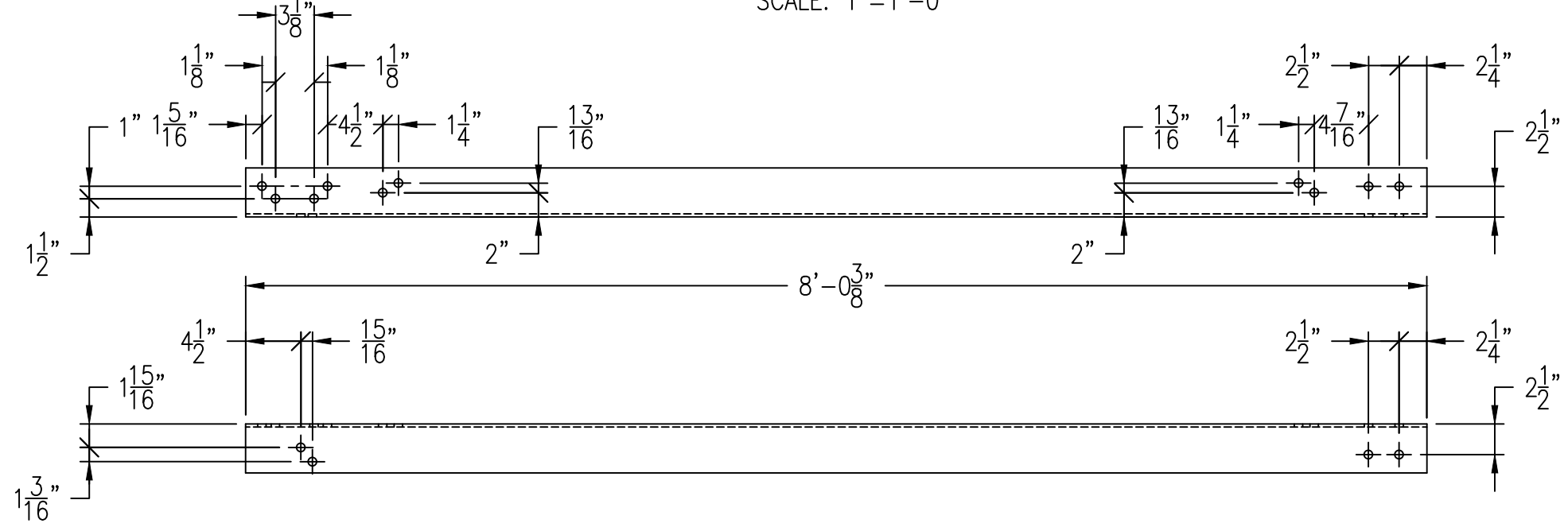
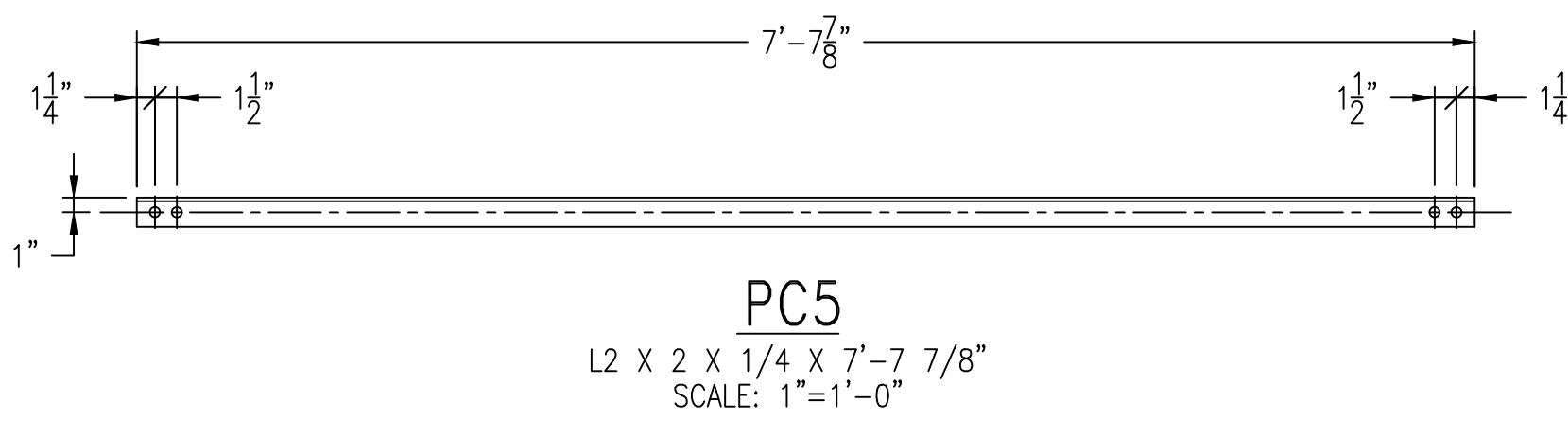
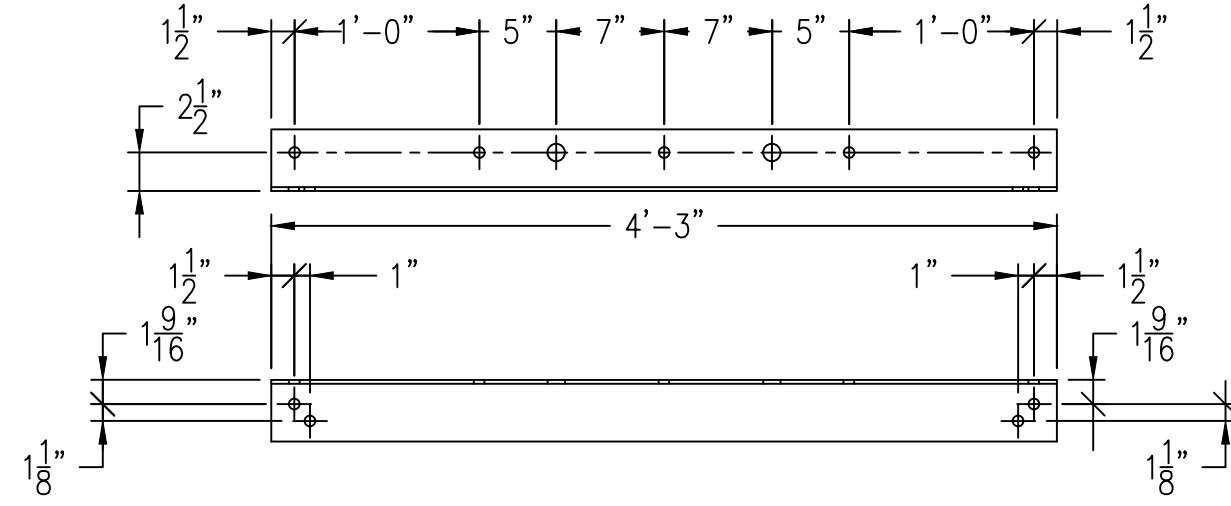
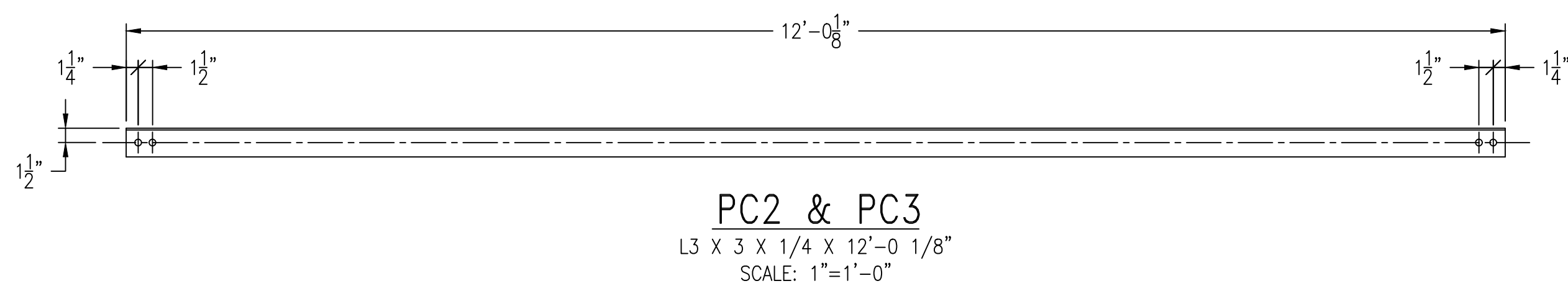


BILL OF MATERIAL			
ITEM NO.	QTY.	DESCRIPTION	FAB. DWG.
PC11	1	L6X4X1/4 x 9'-6 1/4" LONG	-
PC12	1	L6X4X1/4 x 9'-6 1/4" LONG	-
PC13	1	L6X4X1/4 x 4'-2 1/2" LONG	-
PC14	1	L6X4X1/4 x 4'-2 1/2" LONG	-
PC15	2	L4X4X1/4 x 3'-7 1/8" LONG	-
PC16	2	L4X4X1/4 x 4'-7 1/8" LONG	-
PC17	2	L4X4X1/4 x 3'-6 1/2" LONG	-



### PC1 WELDMENT DETAILS

SCALE: 1"=1'-0"



3	3/31/21	REV. WELD FROM FILLET TO V-GROOVE	DF	JD	PW
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ANCHOR SLED DETAILS

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