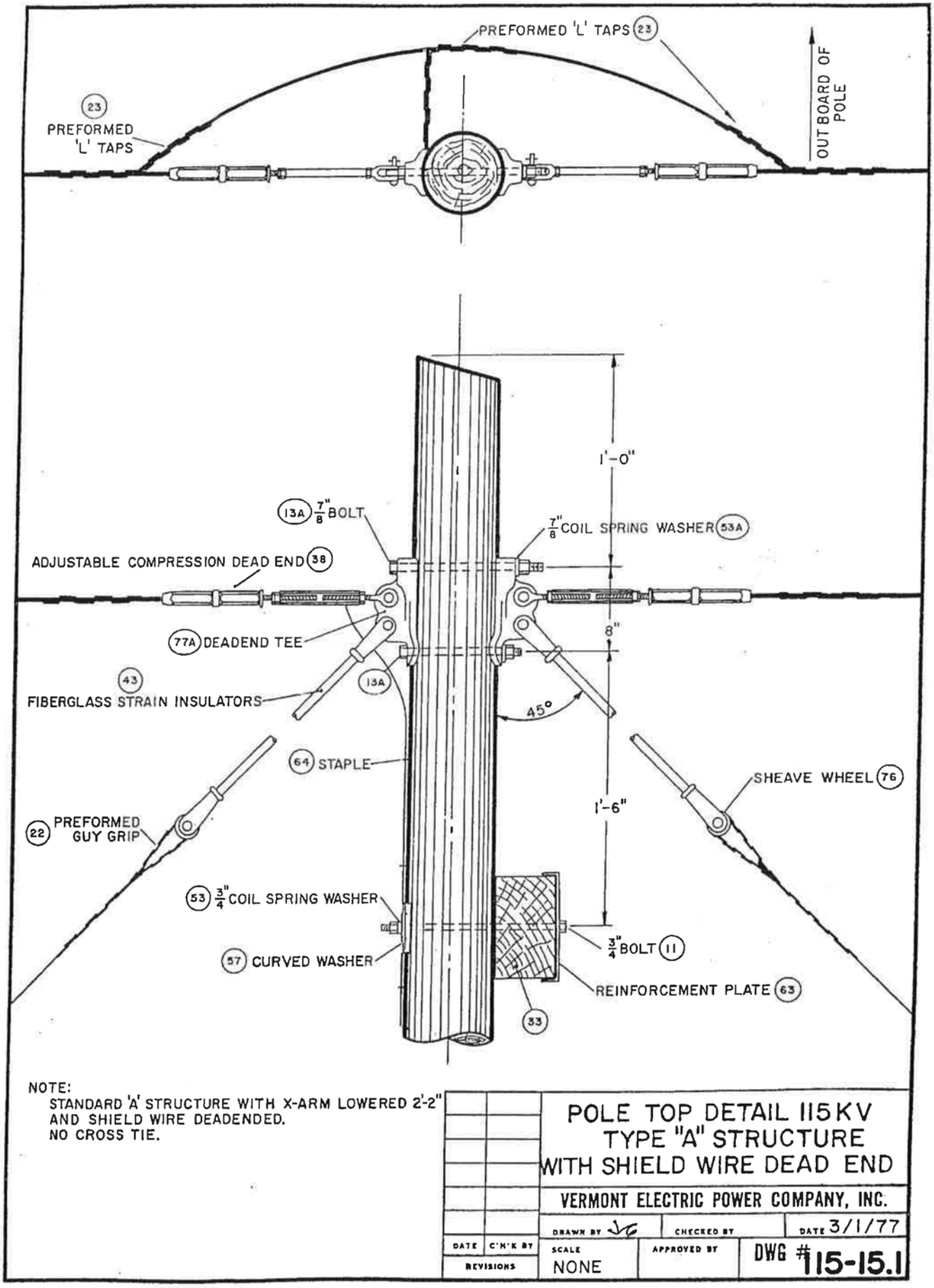
Exhibit VGS-AG-133 Part 3

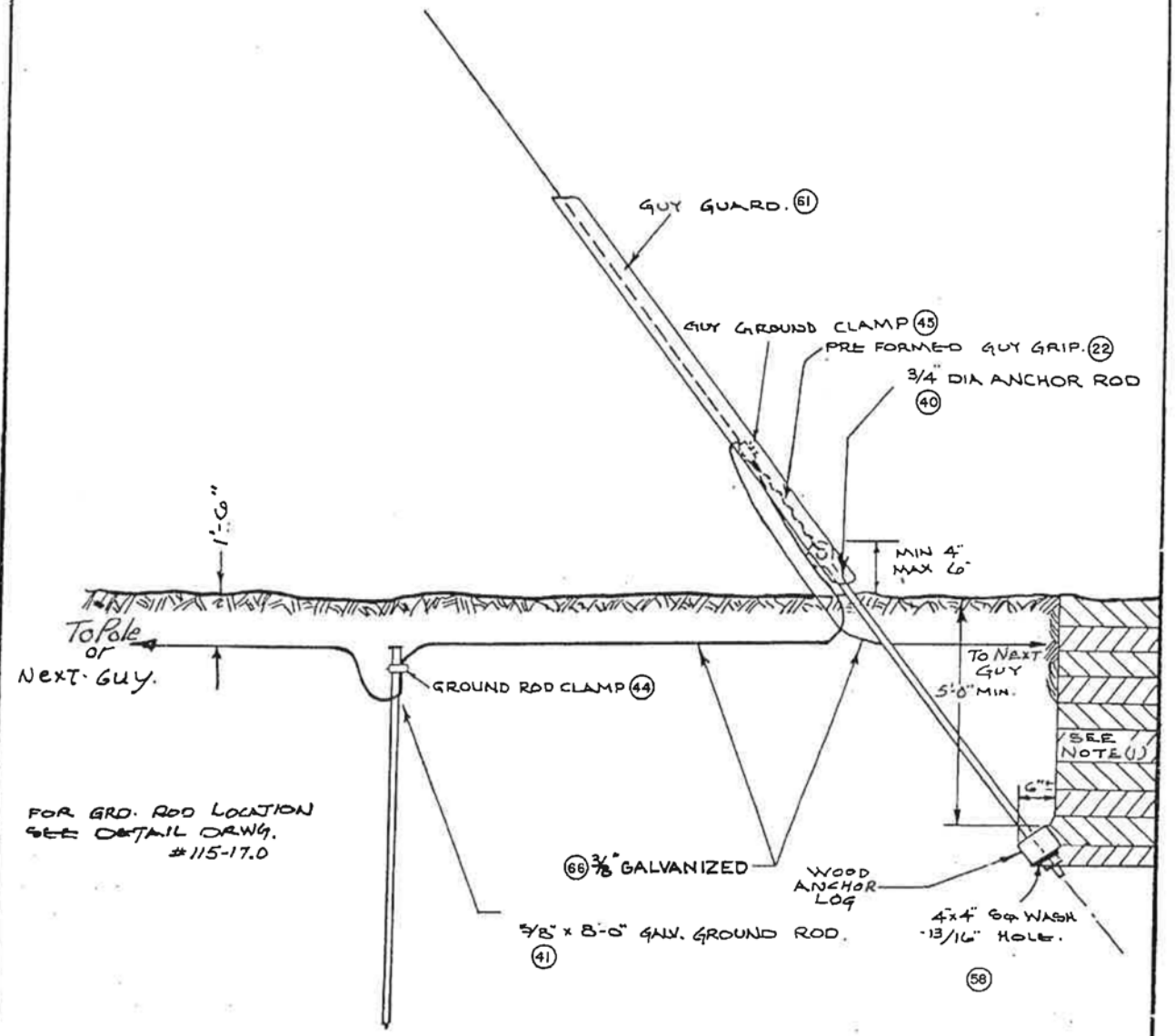


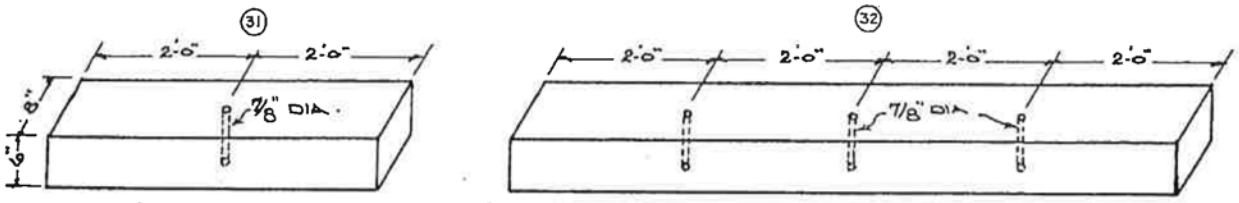
NOTE:
STANDARD 'A' STRUCTURE WITH X-ARM LOWERED 2'-2"
AND SHIELD WIRE DEADENDED.
NO CROSS TIE.

		POLE TOP DETAIL 115KV TYPE "A" STRUCTURE WITH SHIELD WIRE DEAD END	
		VERMONT ELECTRIC POWER COMPANY, INC.	
		DRAWN BY JC	CHECKED BY	DATE 3/1/77
DATE	C'H'K BY	SCALE NONE	APPROVED BY	DWG # 115-15.1
REVISIONS				

Boston Blue Print Co.-100-8-57-8½x 11

FORM CV 198





WOOD ANCHOR LOGS

NOTE:

1. SET ANCHOR LOG FIRMLY AGAINST UNDER CUT, SOIL AND COMPACT IN 8" LIFTS TO 90% SURROUNDING EARTH.
2. WHEN BACKFILLING ANCHOR HOLES, 1000 LB. TENSION SHALL BE MAINTAINED ON THE ANCHOR ROD DURING THE BACKFILLING OPERATION.
3. WHEREVER POSSIBLE, THE GROUND WIRE SHALL BE MADE CONTINUOUS THRU JOINTS.

DATE	C'H'K BY	REVISIONS

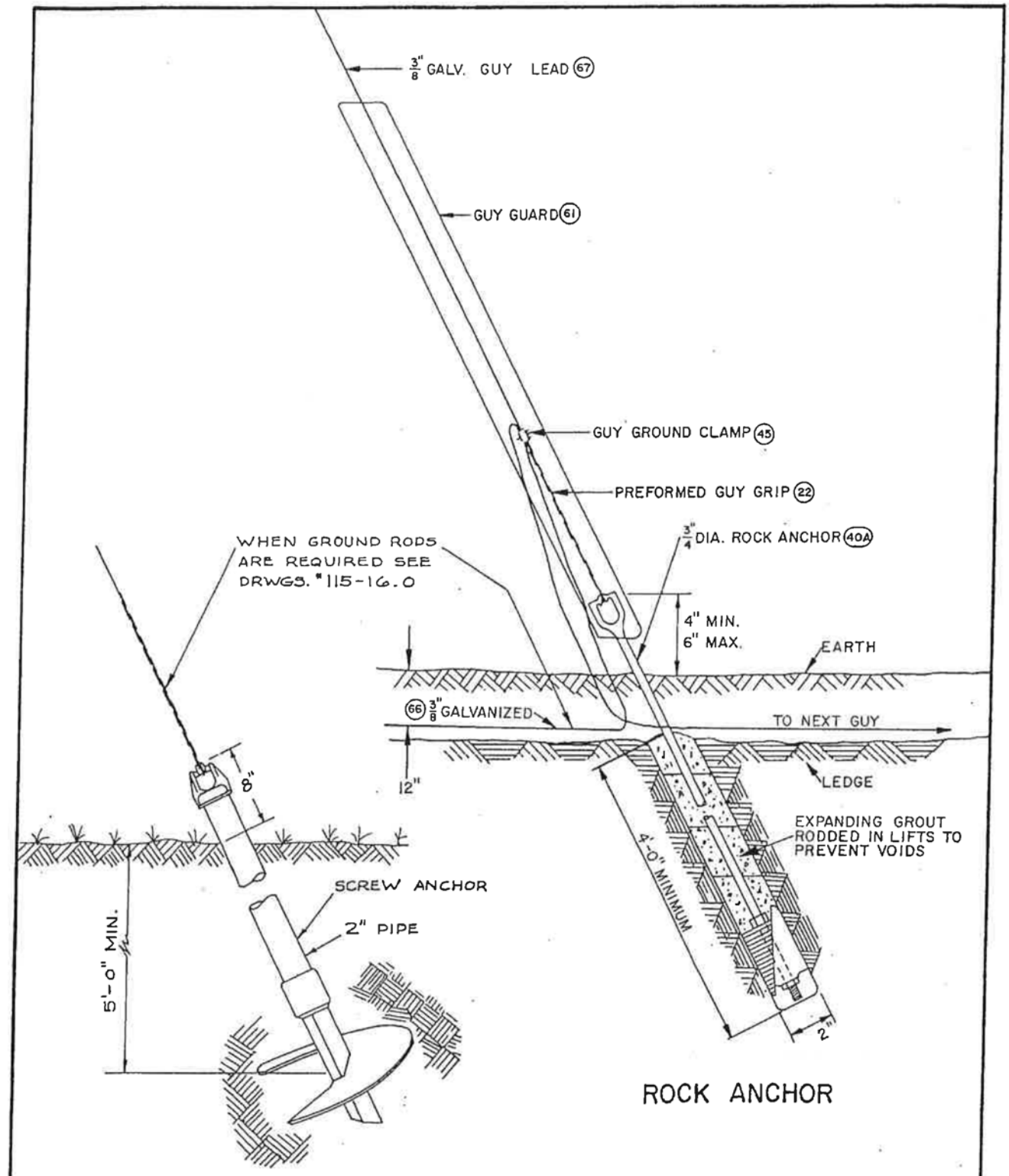
DETAIL OF GUY GROUNDING AND ANCHORS

VERMONT ELECTRIC POWER COMPANY, INC.

DRAWN BY	CHECKED BY	DATE
R.G.		4-7-72

SCALE	APPROVED BY	DWG #
NONE		115-16.0

BOSTON BLUE PRINT CO. 814C - 200 - 3-53



ROCK ANCHOR

SWAMP ANCHOR

SWAMP ANCHORS TO BE INSTALLED BY HAND & USED FOR STRUCTURE STABILIZATION ONLY.

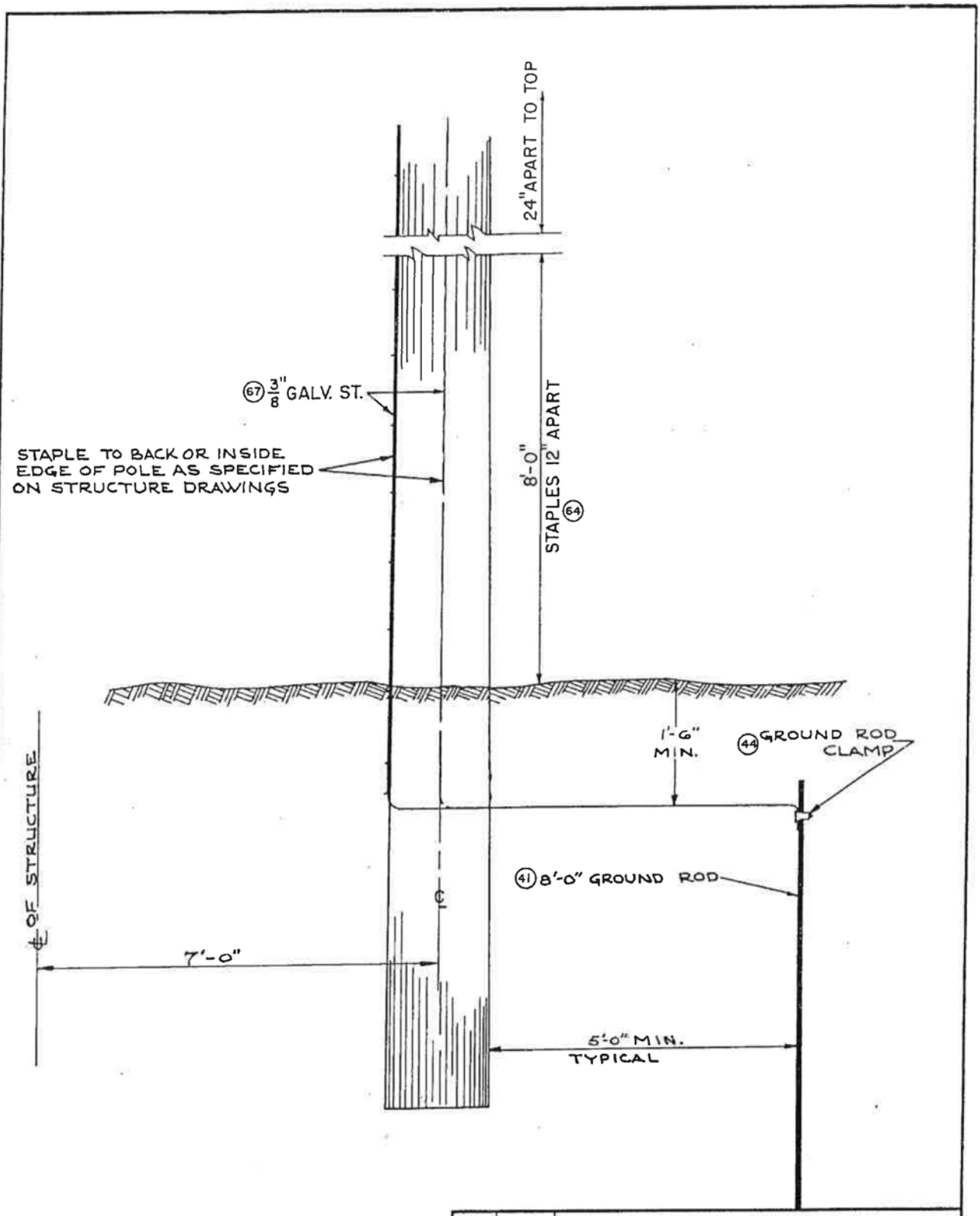
DATE	CH'K BY	REVISIONS

DETAIL OF ROCK AND SWAMP ANCHOR

VERMONT ELECTRIC POWER COMPANY, INC

DRAWN BY	CHECKED BY	DATE
JM		4/8/72

SCALE	APPROVED BY	DWG #
NONE		115-16.1



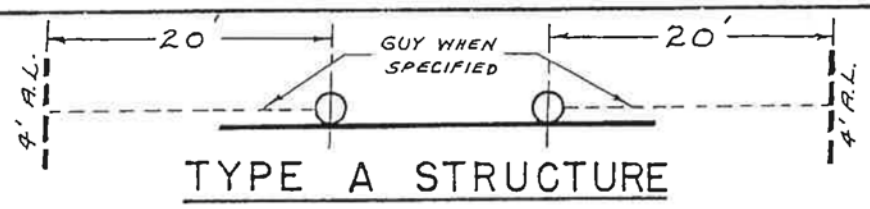
GROUND ROD DETAIL

VERMONT ELECTRIC POWER COMPANY, INC.

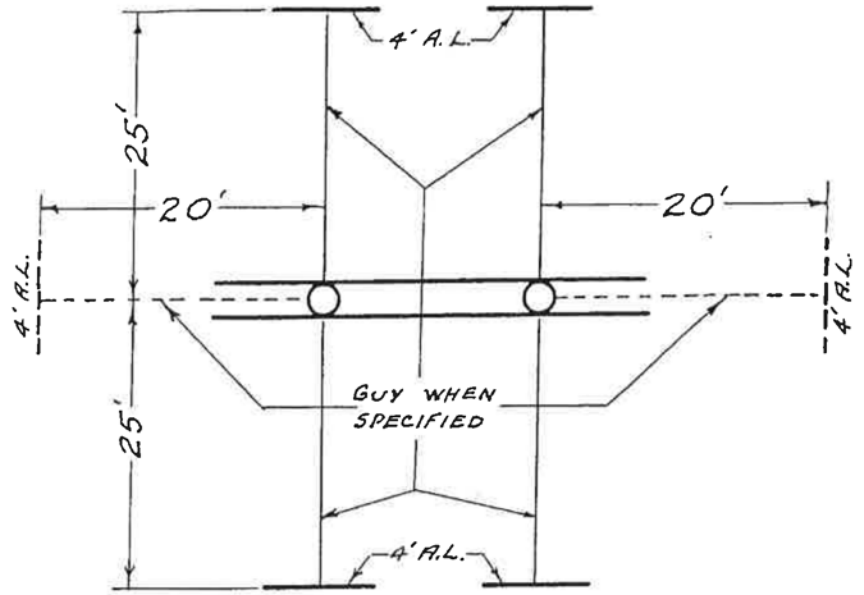
DRAWN BY	CHECKED BY	DATE
JM		4/8/72

DATE	CH'K BY	REVISIONS	SCALE	APPROVED BY	DWG #
			NONE		115-17.0

FORM CV 198

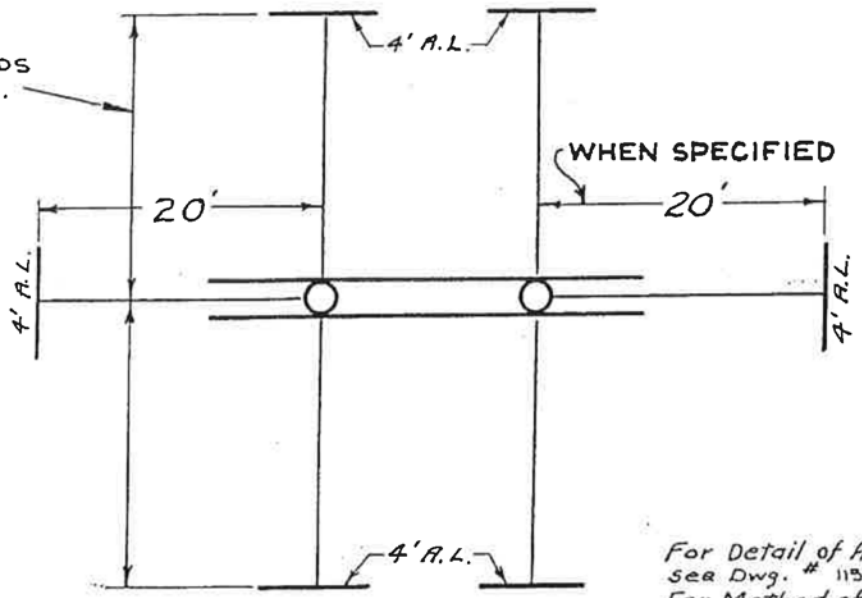


TYPE A STRUCTURE



TYPE D STRUCTURE

NOTE:
GUY LEADS TO BE 1:1.



TYPE E STRUCTURE

For Detail of Anchor Logs, see Dwg. # 115-16.0
For Method of Guy Grounding, see Dwg. # 115-16.1

METHODS OF POLE GUYING

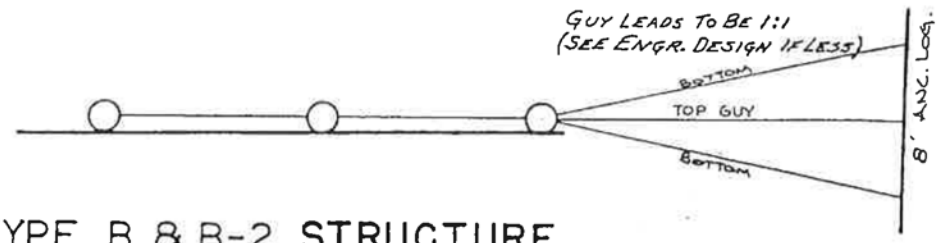
VERMONT ELECTRIC POWER COMPANY, INC.

DRAWN BY R.G.	CHECKED BY	DATE 4-10-72
DATE / C'H'K BY / REVISIONS	SCALE None	APPROVED BY

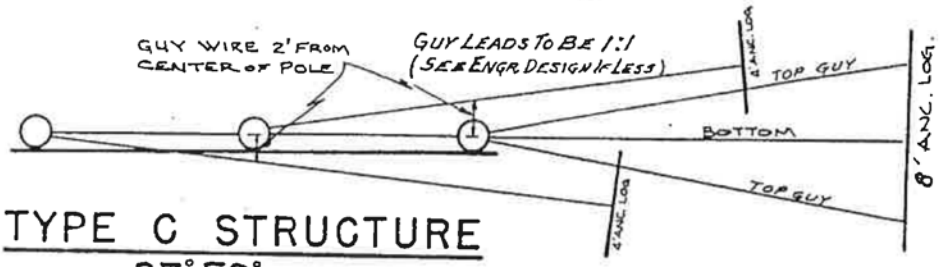
DWG #115-18.0

BOSTON BLUE PRINT CO. 814C - 200 - 8-53

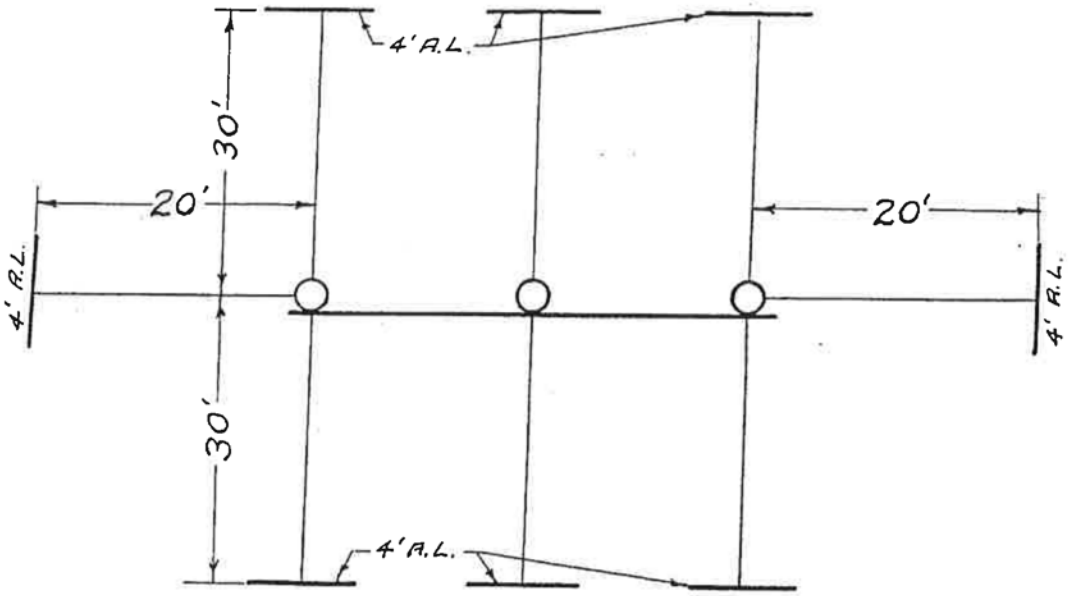
00660



TYPE B & B-2 STRUCTURE
0°-27°



TYPE C STRUCTURE
27°-50°



TYPE F STRUCTURE

For Detail of Anchor Logs, see Dwg. # 115-16.0
For Method of Guy Grounding, see Dwg. # 115-16.1

METHODS OF POLE GUYING

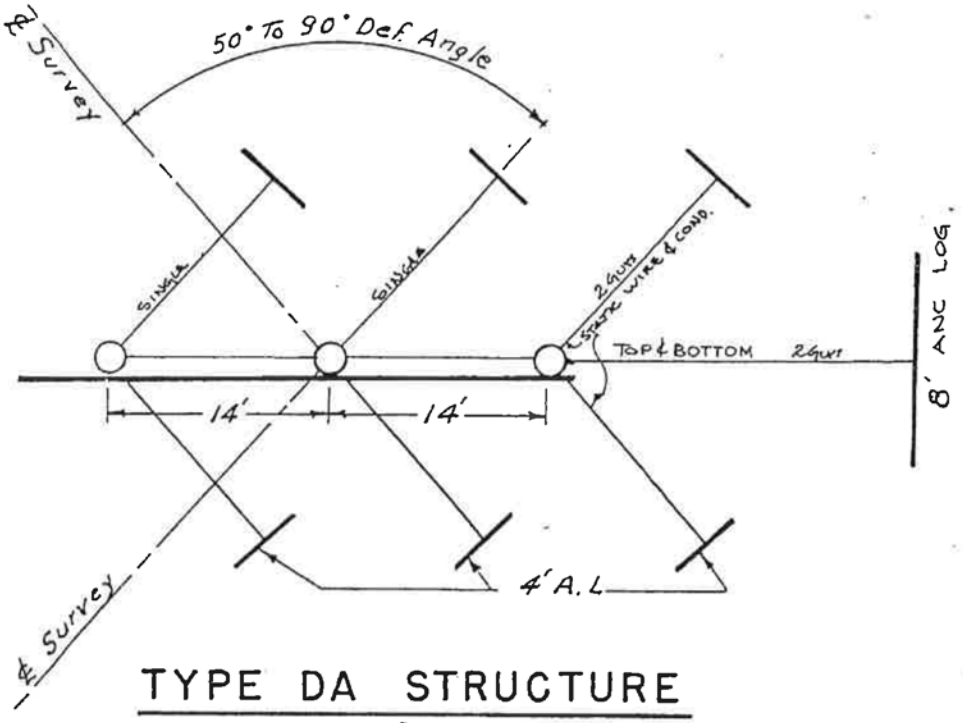
VERMONT ELECTRIC POWER COMPANY, INC.

DATE	C'H'K BY	REVISIONS

DRAWN BY R.G. | CHECKED BY | DATE 4-10-72
SCALE NONE | APPROVED BY | DWG # 115-18.1

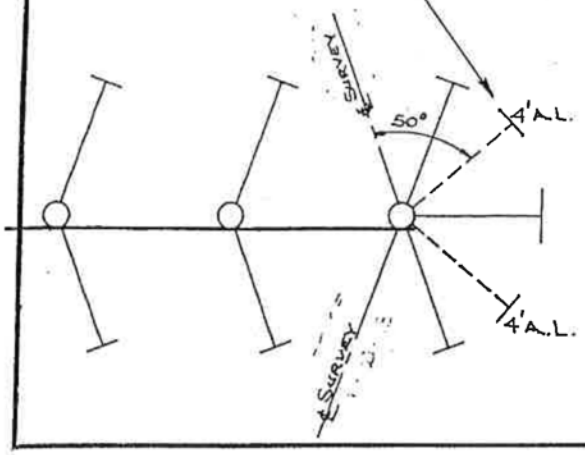
BOSTON BLUE PRINT CO. 814C - 200 - 3-53

NOTE: GUY LEADS TO BE 1:1.
(SEE ENGR. DESIGN IF LESS.)



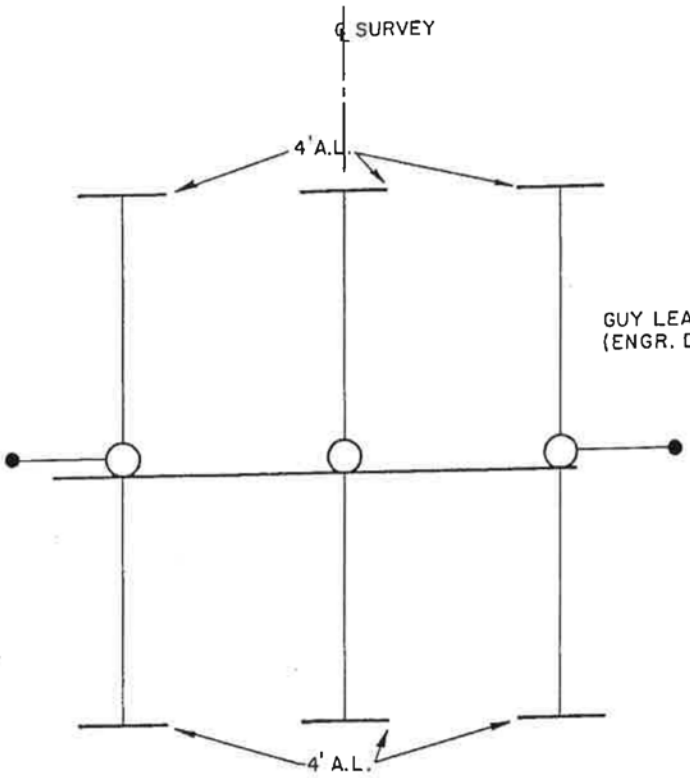
TYPE DA STRUCTURE
50°-UP

FOR LINE ANGLES LESS THAN 50°, SHIELD WIRE DE. GUYS WILL GO TO ADDITIONAL 4' ANCHOR LOGS AT 50° DEFLECTION ANGLE FROM OUTSIDE PHASE.



For Detail of Anchor Logs see Dwg. 115-16.0
For Method of Guy Grounding see Dwg. 115-16.1

		METHODS OF POLE GUYING
		VERMONT ELECTRIC POWER COMPANY, INC.
3/1/77	JE	DRAWN BY R.G. / CHECKED BY / DATE 4-10-72
DATE	C'H'K BY	SCALE None. / APPROVED BY / DWG # 115-18.2
REVISIONS		



TYPE DA-T STRUCTURE

FOR LONG SPAN AND/OR DIFFERENTIAL
CONDUCTOR TENSIONS

NOTE:
FOR DETAIL OF ANCHOR LOGS SEE DRWG.# 115-16.0
FOR DETAIL OF GROUNDING SEE DRWG.# 115-17.0

METHODS OF POLE GUYING

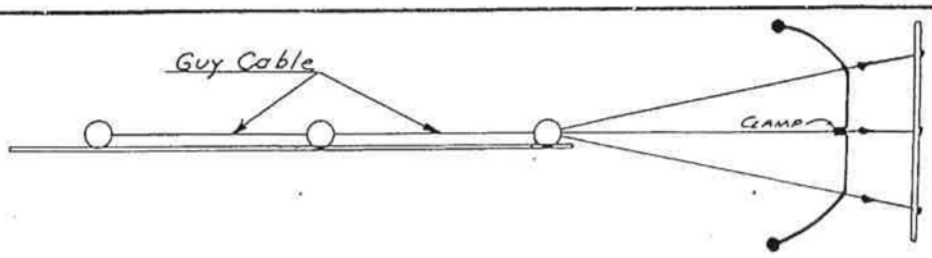
VERMONT ELECTRIC POWER COMPANY, INC.

DRAWN BY	CHECKED BY	DATE 3/1/77
DATE / C'H'K BY / REVISIONS	SCALE NONE	APPROVED BY

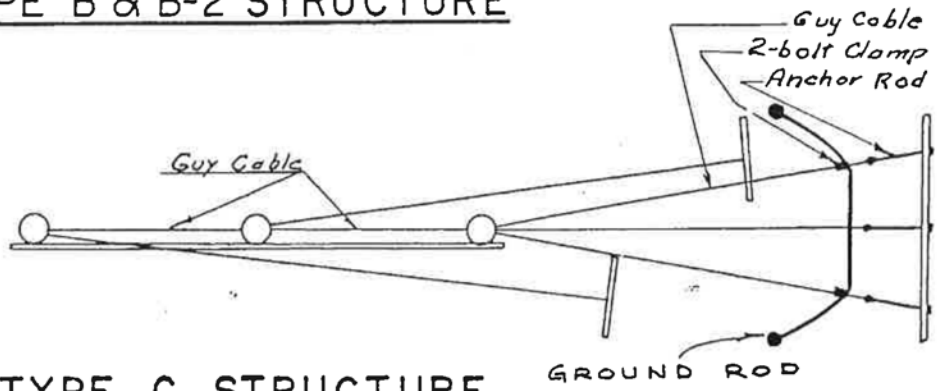
DWG # 115-18.3

Boston Blue Print Co -100-8-57-8½x11

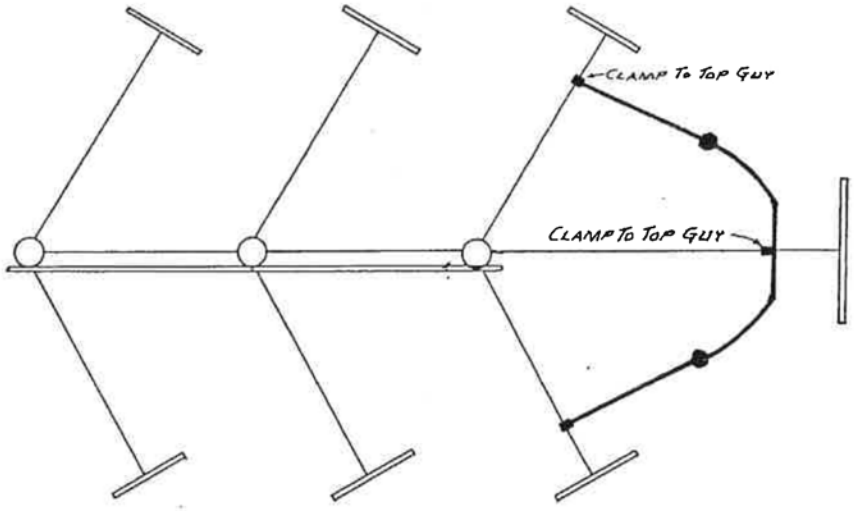
00663



TYPE B & B-2 STRUCTURE



TYPE C STRUCTURE



TYPE DA STRUCTURE

NOTE:
All Ground Rods to have a minimum distance of 5' from Poles.

For Pole Ground Detail, see Dwg. 115-16.0
For Method of Guying, see Dwg. 115-18.1 & 115-18.2

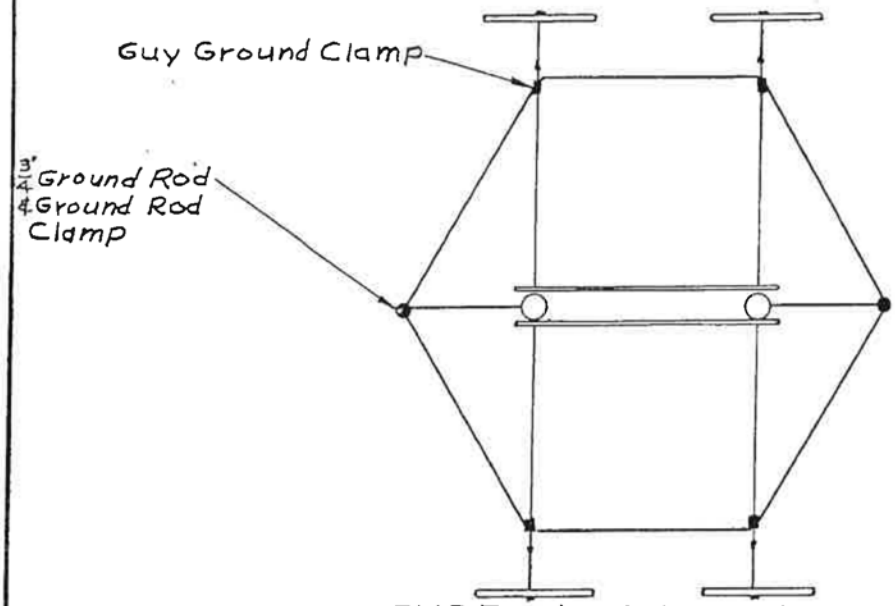
METHODS OF POLE & GUY GROUNDING 3-POLE STRUCTURE

VERMONT ELECTRIC POWER COMPANY, INC.

DRAWN BY R.G.	CHECKED BY	DATE 4-11-72
SCALE NONE	APPROVED BY	DWG #115-19.0

DATE	C'H'K BY
REVISIONS	

BOSTON BLUE PRINT CO. 814C - 200 - 3-53



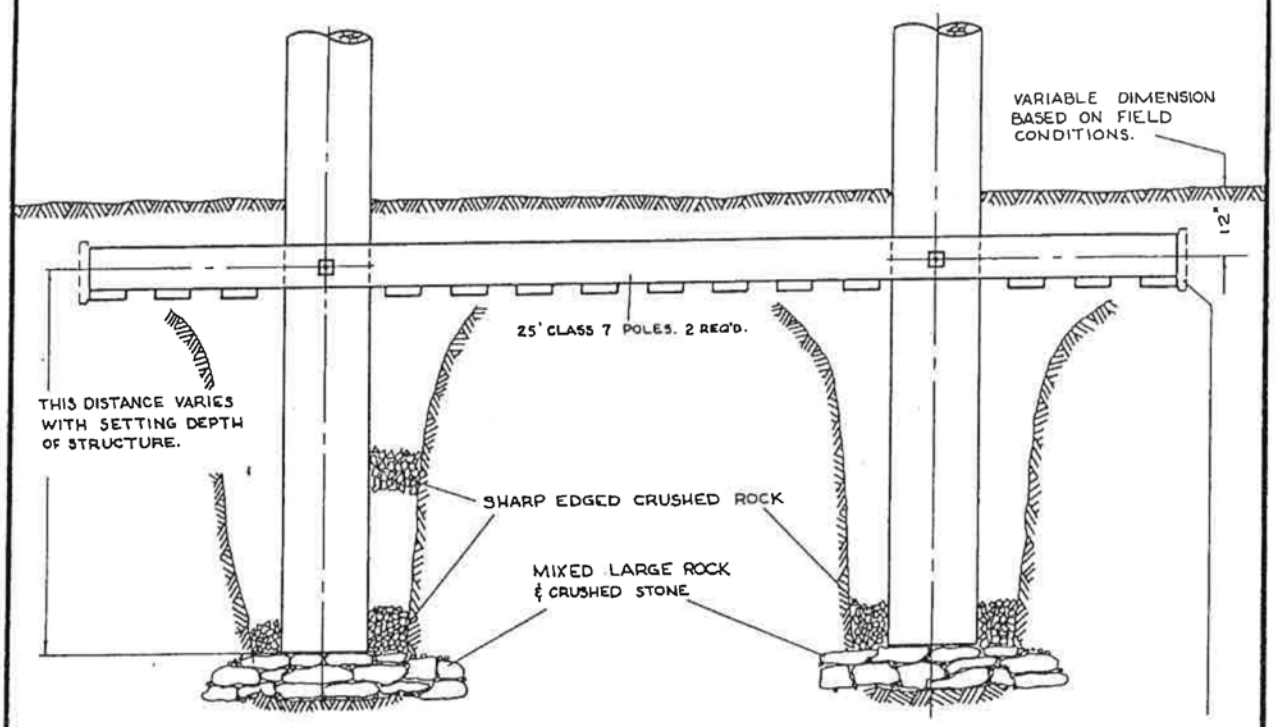
TYPE D&E STRUCTURE

For Pole Ground Detail, see Dwg # 115-16.0
For Method of Guying, see Dwg # 115-18.2

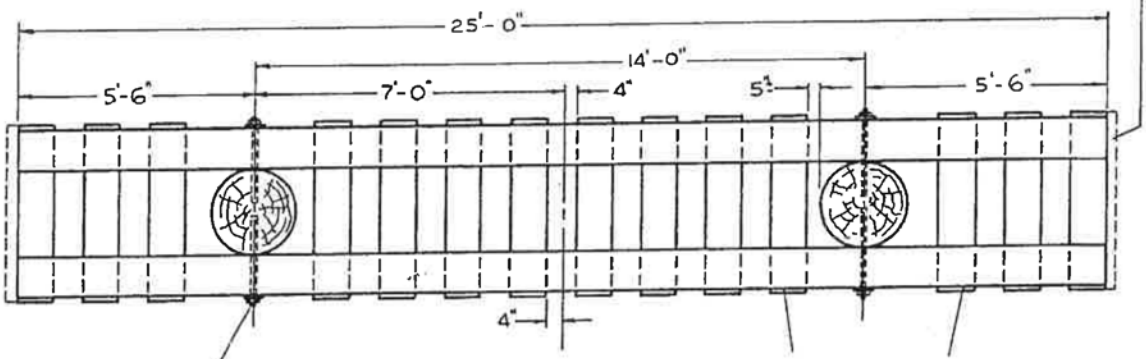
		METHODS OF POLE & GUY GROUNDING 2-POLE STRUCTURE		
		VERMONT ELECTRIC POWER COMPANY, INC.		
		DRAWN BY R. G.	CHECKED BY	DATE 4-11-72
DATE	C'H'K BY	SCALE NONE	APPROVED BY	DWG # 115-19.1
REVISIONS				

BOSTON BLUE PRINT CO. 814C - 200 - 3-63

FORM CV 188



LAG 2"x10"x4' PLANK TO BUTT WHEN REQUIRED.



3/4" THREADED ROD WITH 4" CURVED WASHERS & 3/4" NUTS.
ALT-
DRIVE 3/4" BOLT INTO UNDERSIZED HOLE, OR USE 18" DRIVE LAG.

14 - 2"x10"x4' PLANKS WITH 8" SPACING BETWEEN THEM.
(ADD MORE PLANKS IF FIELD CONDITIONS REQUIRE.)

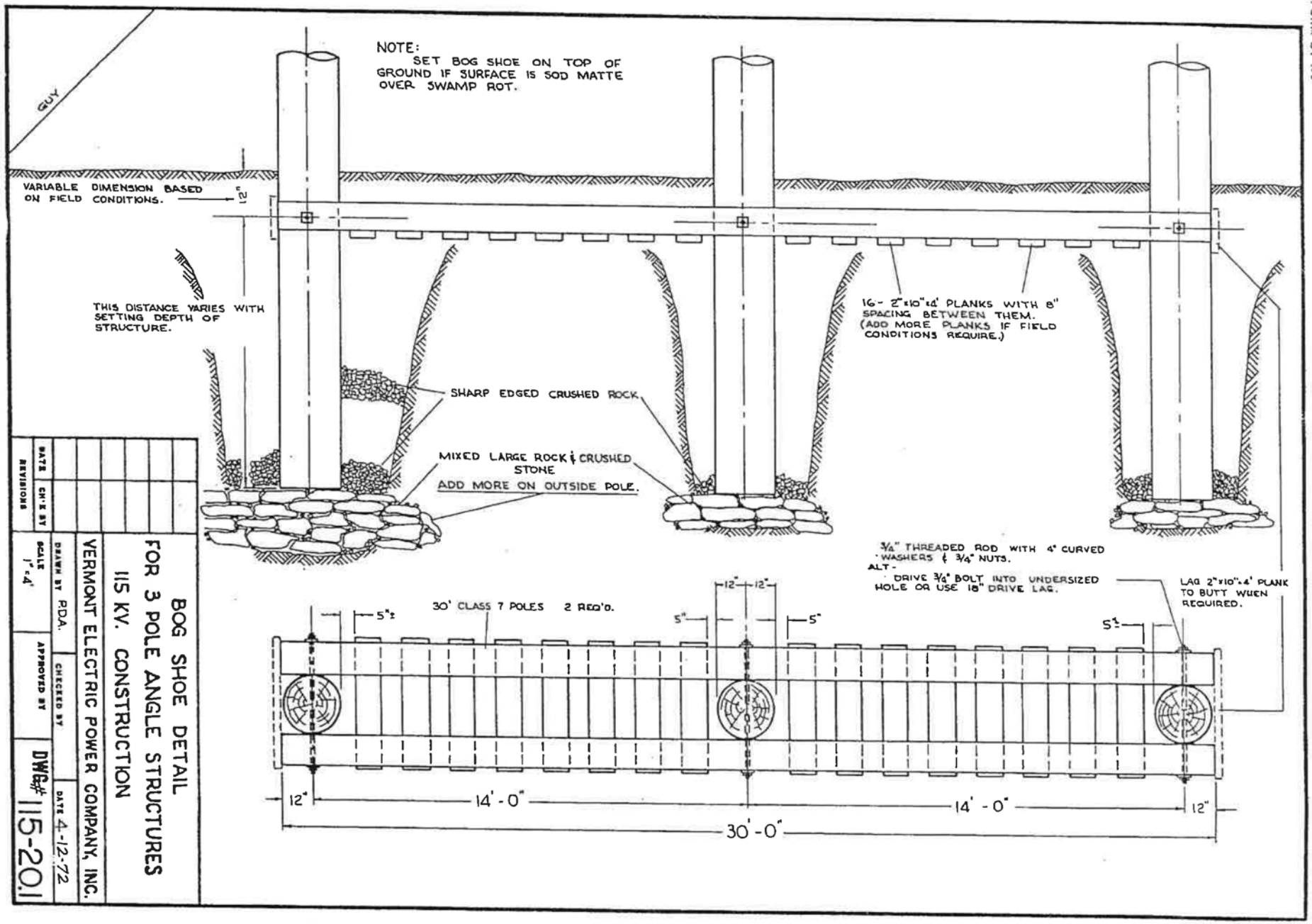
NOTE:
SET BOG SHOE ON TOP OF GROUND IF SURFACE IS SOD MATTE OVER SWAMP ROT.

BOG SHOE DETAIL TANGENT "A" STRUCTURE 115 KV. CONSTRUCTION

VERMONT ELECTRIC POWER COMPANY, INC.

DRAWN BY	CHECKED BY	DATE
PDA		4-12-72

DATE	CH'K BY	REVISIONS	SCALE	APPROVED BY	DWG#
			1"=4'		115-20.0



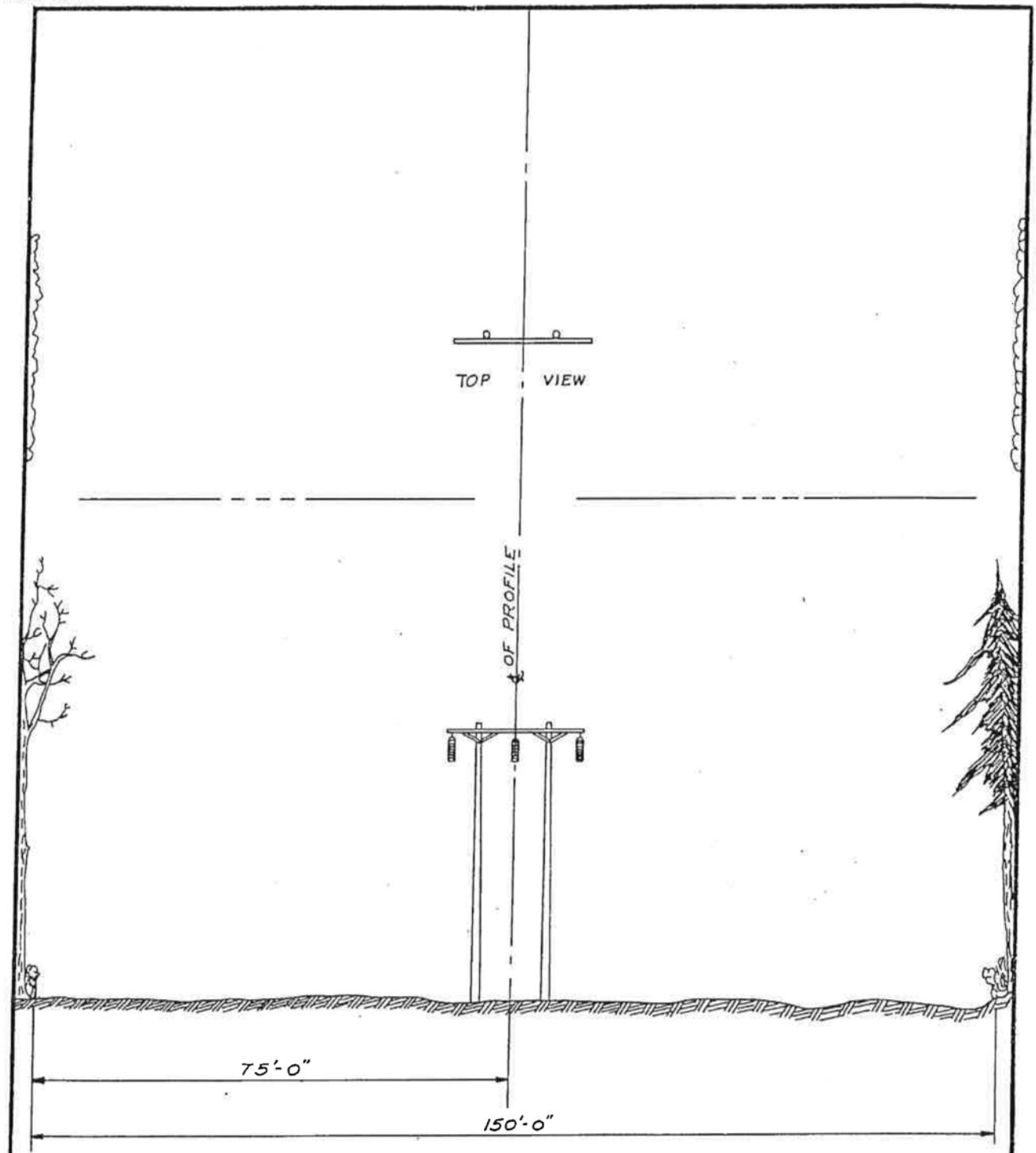
BOG SHOE DETAIL FOR 3 POLE ANGLE STRUCTURES 115 KV. CONSTRUCTION

VERMONT ELECTRIC POWER COMPANY, INC.

REVISIONS	DATE	CH'K BY

SCALE	DRAWN BY	CHECKED BY	APPROVED BY	DWG#	DATE
1" = 4'	RDA.			115-20.1	4-12-72

00667

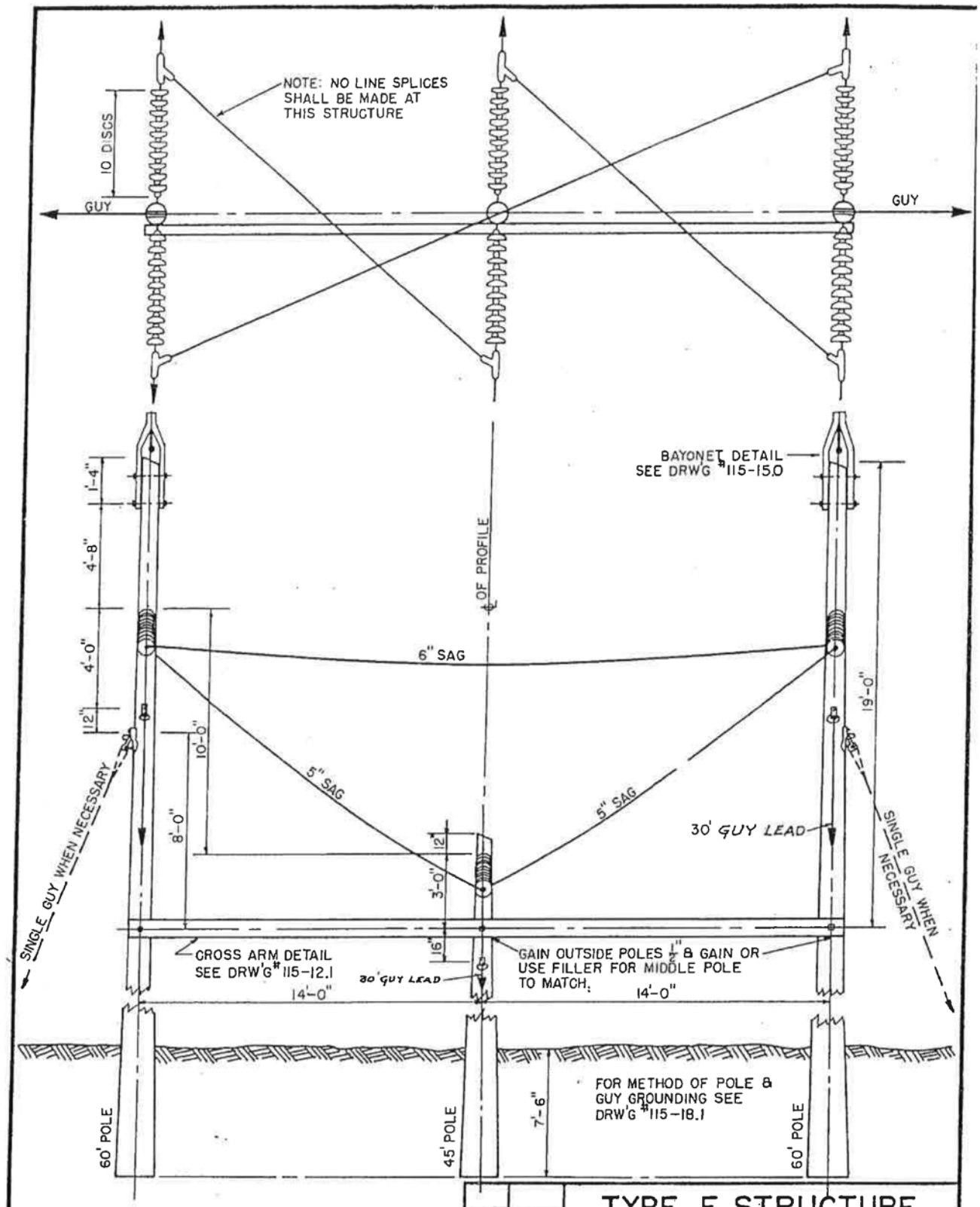


GENERAL PLAN
FOR PILING WOOD & BRUSH
150' RIGHT OF WAY

VERMONT ELECTRIC POWER COMPANY, INC.

DRAWN BY	CHECKED BY	DATE
JM		4/13/72

DATE	CH'K BY	SCALE	APPROVED BY	DWG #
REVISIONS		NONE		115-21.0



NOTE:
FOR STRUCTURAL DETAILS SEE DRW'G 115-11.2

TYPE F STRUCTURE
TRANSPOSITION
115 KV CONSTRUCTION

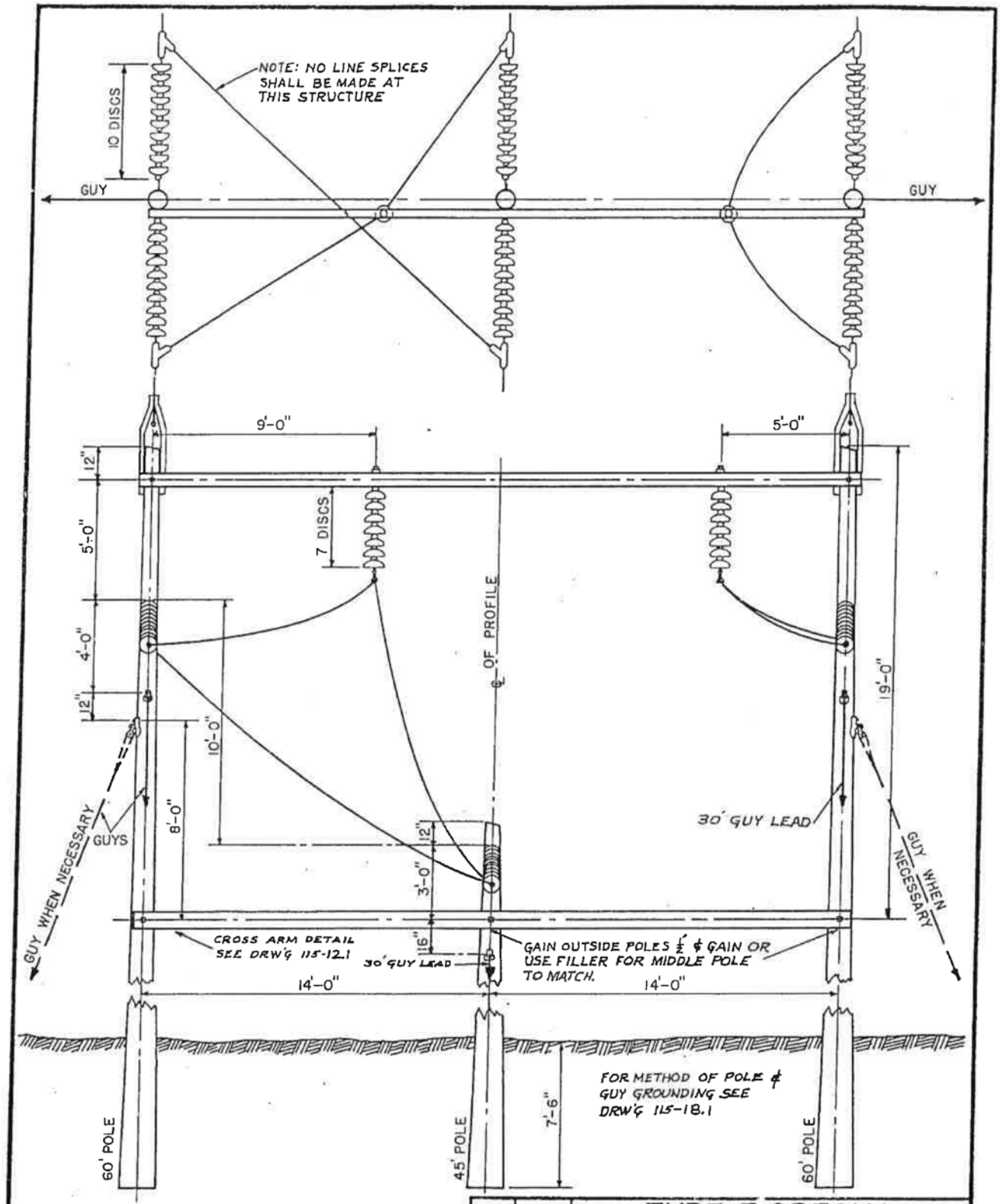
VERMONT ELECTRIC POWER COMPANY, INC.

DATE	CH'K BY	REVISIONS
3/1/77	JC	

DRAWN BY JM | CHECKED BY | DATE 4/22/72

SCALE NONE | APPROVED BY | DWG# 115-22.0

FORM CV 188



NOTE: FOR STRUCTURAL DETAILS SEE DRW'G. 115-11.2

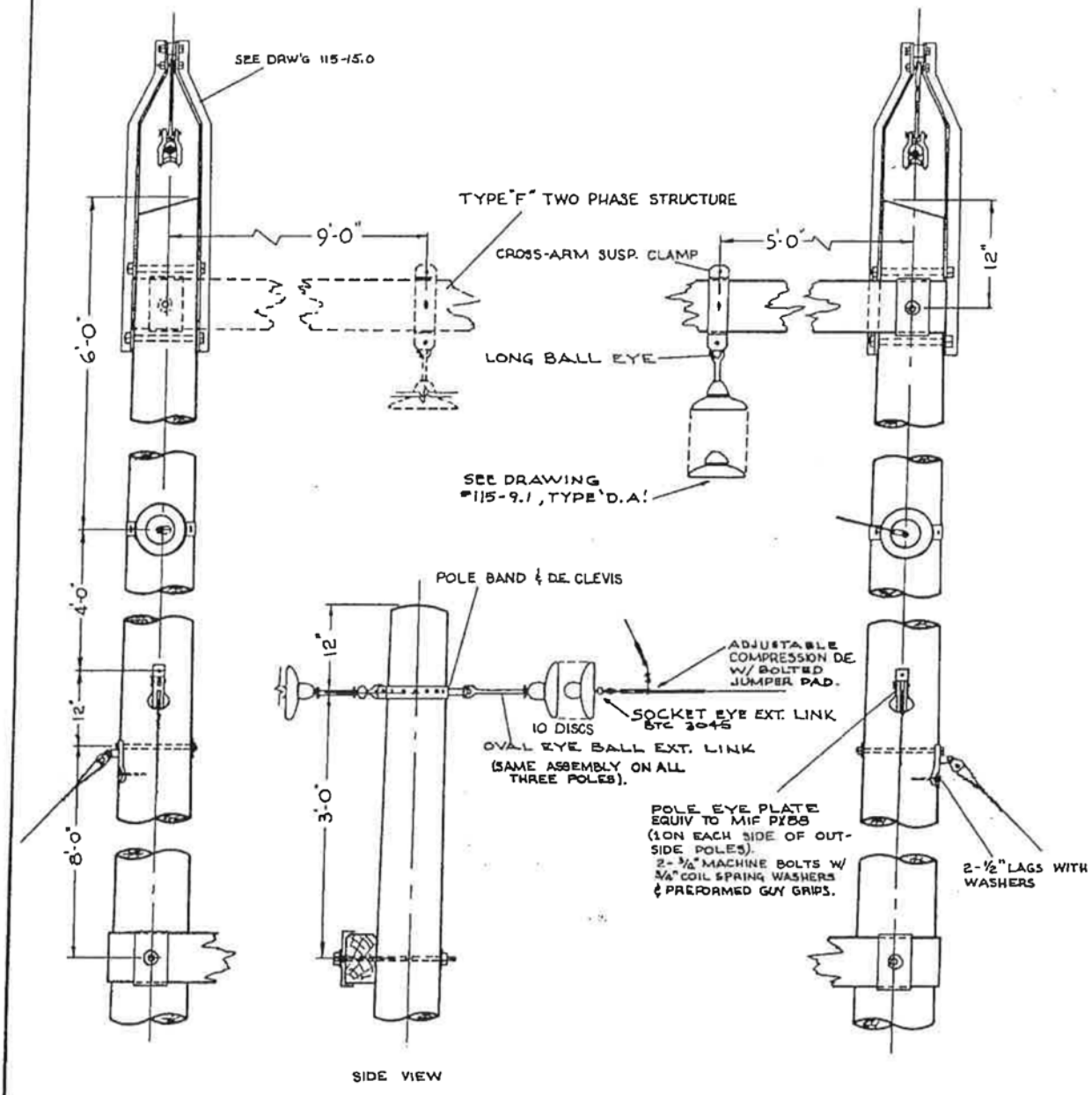
TYPE F SPECIAL
TWO PHASE TRANSPOSITION 115KV CONSTRUCTION

VERMONT ELECTRIC POWER COMPANY, INC.

DATE	CH'K BY	REVISIONS
3/1/77		

DRAWN BY JM | CHECKED BY | DATE 4/22/72

SCALE NONE | APPROVED BY | DWG # 115-22.1



SIDE VIEW

3 PHASE TRANSPOSITION STRUCTURE

2 PHASE TRANSPOSITION STRUCTURE
(ALL DIMENSIONS, EXCEPT THOSE NOTED, ARE SAME AS THREE PHASE STRUCTURE).

NOTE:
OUTSIDE POLES 60'
MIDDLE POLE 45'

		POLE TOP DETAILS TYPE "F" 2 & 3 PHASE TRANSPOSITION STRUCTURES 115 KV. CONSTRUCTION		
		VERMONT ELECTRIC POWER COMPANY, INC.		
3/1/77	JV	DRAWN BY PDA	CHECKED BY	DATE 4/22/72
DATE	CH'K BY	SCALE NONE	APPROVED BY	DWG # 115-22.2
REVISIONS				

West Rutland-New Haven

Burns & McDonnell Project No. 40240

345KV STRUCTURE DRAWING INDEX

DRAWING NO.	TITLE
345-0.0	345KV CONSTRUCTION INDEX TO DRAWINGS
345-1.0	TANGENT SUSPENSION STRUCTURE TYPE 'A'
345-1.1	TANGENT SUSPENSION POLE TOP DETAILS TYPE 'A'
345-1.2	TANGENT SUSPENSION BILL OF MATERIALS TYPE 'A'
345-1.3	SHIELD WIRE DEAD END ATTACHMENT TYPE 'A' STRUCTURE
345-1.4	OPTICAL WIRE DEAD END ATTACHMENT TYPE 'A' STRUCTURE
345-3.0	SUSPENSION ANGLE STRUCTURE TYPE 'SA2' (12° TO 22°)
345-3.1	SUSPENSION ANGLE POLE TOP DETAILS TYPE 'SA2' (12° TO 22°)
345-3.2	SUSPENSION ANGLE BILL OF MATERIALS TYPE 'SA2' (12° TO 22°)
345-4.0	SUSPENSION ANGLE STRUCTURE TYPE 'SA3' (22° TO 35°)
345-4.1	SUSPENSION ANGLE POLE TOP DETAILS TYPE 'SA3' (22° TO 35°)
345-4.2	SUSPENSION ANGLE BILL OF MATERIALS TYPE 'SA3' (22° TO 35°)
345-5.0	STRAIGHT LINE DEAD END STRUCTURE TYPE 'DE1'
345-5.1	STRAIGHT LINE DEAD END SHIELD WIRE DEAD END TYPE 'DE1'
345-5.2	STRAIGHT LINE DEAD END OPTICAL WIRE DEAD END TYPE 'DE1'
345-5.3	STRAIGHT LINE DEAD END POLE TOP DETAILS-TIMBER CONNECTIONS TYPE 'DE1'
345-5.4	STRAIGHT LINE DEAD END POLE TOP DETAILS-COND. & GUY ATTACH. TYPE 'DE1'
345-5.5	STRAIGHT LINE DEAD END BILL OF MATERIALS TYPE 'DE1'
345-6.0	ANGLE DEAD END STRUCTURE TYPE 'DE2' (35° TO 55°)
345-6.1	ANGLE DEAD END POLE TOP DETAILS TYPE 'DE2' (35° TO 55°)
345-6.2	ANGLE DEAD END POLE TOP DETAILS-COND. & GUY ATTACH. TYPE 'DE2' (35° TO 55°)
345-6.3	ANGLE DEAD END BILL OF MATERIALS TYPE 'DE2' (35° TO 55°)
345-7.0	ANGLE DEAD END STRUCTURE TYPE 'DE3' (55° TO 75°)
345-7.1	ANGLE DEAD END POLE TOP DETAILS TYPE 'DE3' (55° TO 75°)
345-7.2	ANGLE DEAD END POLE TOP DETAILS-COND. & GUY ATTACH. TYPE 'DE3' (55° TO 75°)
345-7.3	ANGLE DEAD END BILL OF MATERIALS TYPE 'DE3' (55° TO 75°)
345-9.0	CROSSARM DETAILS
345-9.1	CROSSARM DETAILS
345-10.0	ANCHOR AND GUY GROUNDING DETAILS
345-10.1	ROCK ANCHOR DETAILS
345-10.2	METHOD OF POLE GUYING
345-11.0	2-POLE GROUNDING DETAILS TYPE A, B & C
345-11.1	METHOD OF POLE AND GUY GROUNDING
345-13.0	FOUNDATIONS AND BOG SHOE PLATFORM FOR 2 POLE STRUCTURE
345-14.0	BOG SHOE PLATFORM FOR 3 POLE STRUCTURE 29'-0" & 29'-6" POLE SPACING
345-14.1	BOG SHOE PLATFORM FOR 3 POLE STRUCTURE 29'-0" & 29'-6" POLE SPACING
345-DG	345KV STRUCTURE POLE DRILLING GUIDE TYPE "A"
345-SIGN	AERIAL PATROL AND STRUCTURE NUMBER SIGNS

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

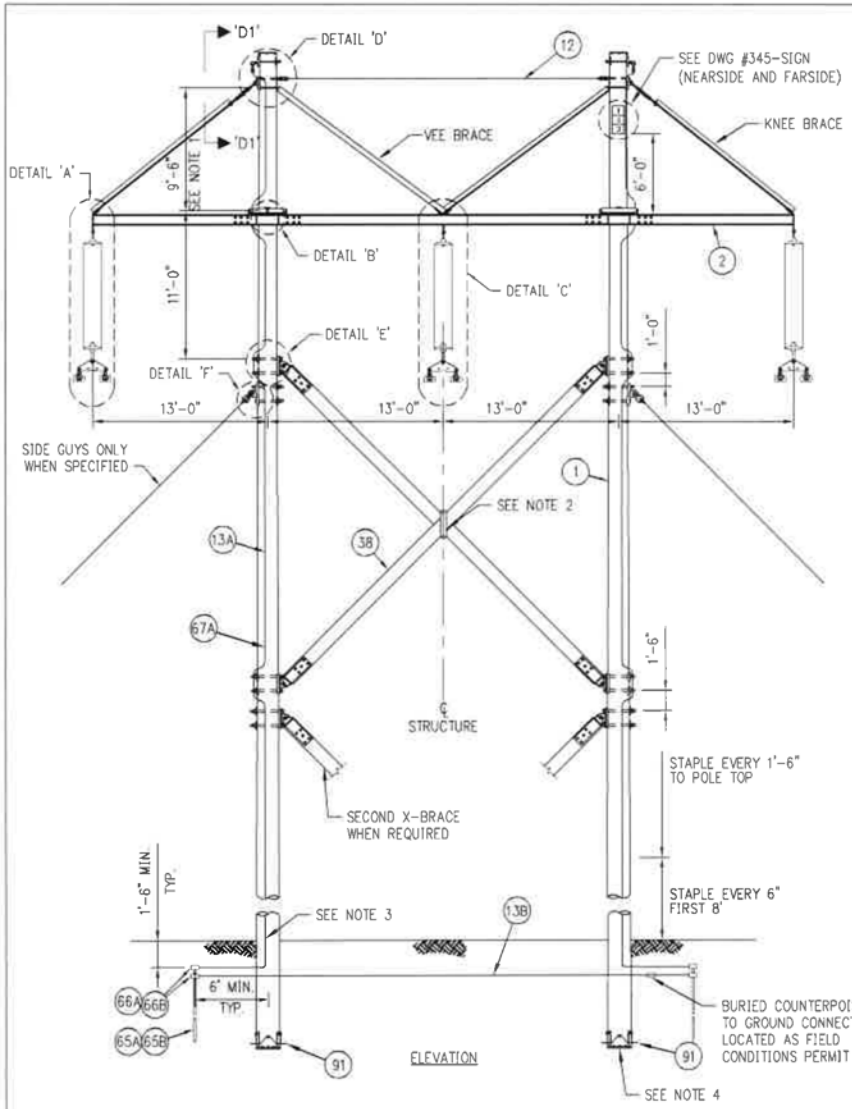
REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

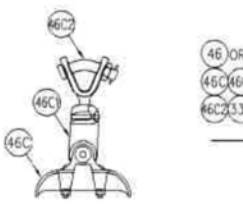
VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345KV

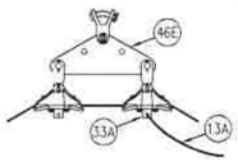
345KV CONSTRUCTION INDEX TO DRAWINGS

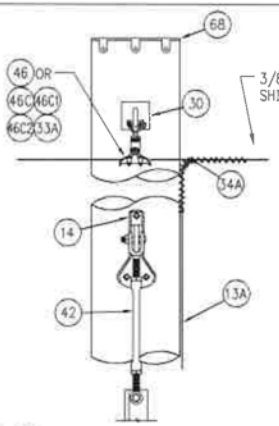
SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-0.0			1 REV.
PLOT: 1=1			

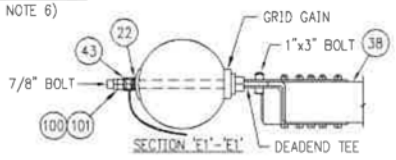
FILE: K:\Velco\345KV WR-NH EPC\cad\STANDARD POLES\345KV\345-00.0.dwg 09-29-2005 16:27 6

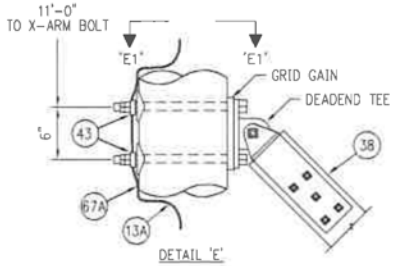


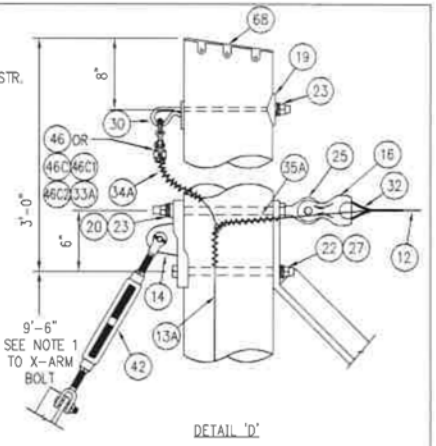












NOTES:

1. DIMENSION INCREASED TO 10'-0" ON APPROXIMATELY HALF OF STRUCTURES INSTALLED TO ALLOW USE OF LARGER STATIC WIRE RUNNING BLOCK.
2. BRACKET INSTALLED HORIZONTALLY ON APPROXIMATELY HALF OF STRUCTURES INSTALLED; HORIZONTAL INSTALLATION WAS APPROVED BY HUGHES.
3. AN ADDITIONAL PARALLEL GROOVE CONNECTOR AND GROUND WIRE WAS EXTENDED TO CONNECT TO GROUND LUG ON MARK 91 IN AREAS OF HIGH SOIL RESISTANCE.
4. FOUR SECTION PLATES WERE USED IN POOR SOILS; TWO SECTION PLATES WERE TYPICALLY INSTALLED.
5. PENETROX GREASE REQUIRED AT CONNECTION OF MARK 33A AND 46C.
6. USE DOUBLE OPTICAL WIRE SUSPENSION ASSEMBLY WHEN VERTICAL ANGLE EXCEEDS 30 DEGREES.

FOR ANCHOR AND GUY GROUNDING DETAILS, SEE DWG. #345-10.0 & #345-10.1
FOR POLE GUYING DETAILS, SEE DWG. #345-10.2
FOR GROUNDING DETAILS, SEE DWG. #345-11.0
FOR FOUNDATION DETAILS, SEE DWG. #345-FDN-1 THRU FDN-4

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

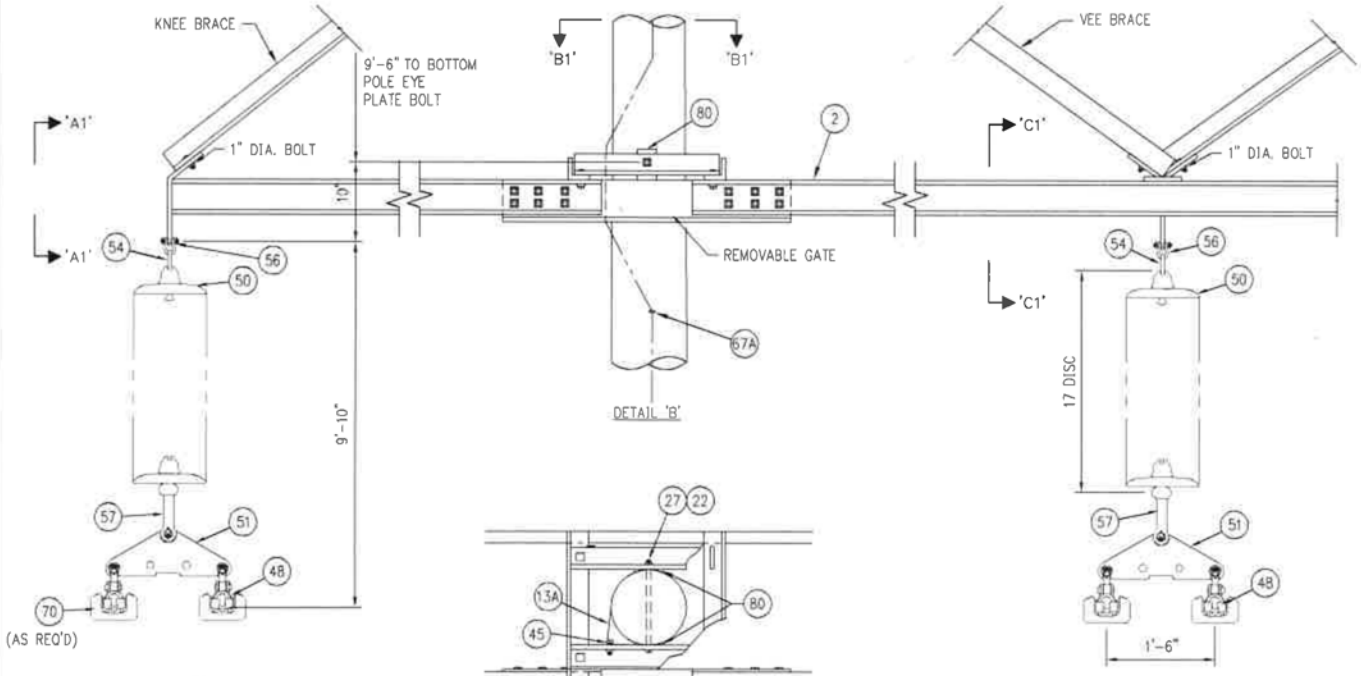
VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

TANGENT SUSPENSION STRUCTURE TYPE 'A'

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-1.0 PLOT: 1=1			1 REV.

FILE: N:\Velco\345 NH-RH (P)\cad\STANDARD PLOTS\345KV\345-1.0.dwg 02-07-2005 11:30:05 BMcD

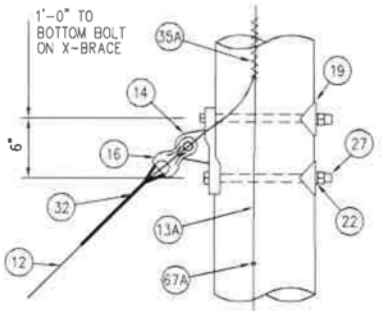


DETAIL 'A'

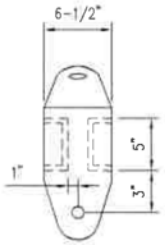
DETAIL 'B'

DETAIL 'C'

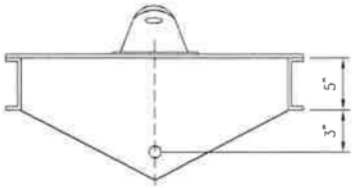
SECTION 'B1'-'B1'



DETAIL 'F'
(AS REQUIRED)



SECTION 'A1'-'A1'



SECTION 'C1'-'C1'

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
1	2/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO — VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

TANGENT SUSPENSION POLE TOP DETAILS TYPE 'A'

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-1.1 PLOT: 1=1			1 REV.

FILE: K:\Velco\345 NH-RH EPC\CAD\STANDARD POLES\DRAWS\345-1.1.dwg 02-07-2006 11:30 (CSM BMcD)

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURE	CATALOG NUMBER
1		2	POLE, WOOD		
2	0000560	1	CROSSARM, ASSEMBLY, WEATHERING STEEL, 345kV, 52', INCLUDES CROSSARM, 2 KNEE BRACES & 2 VEE BRACES WEATHERING STEEL, AND ALL MOUNTING HARDWARE EXCEPT TURNBUCKLES,THRU BOLTS FOR ARM, HARDWARE FOR UPPER END OF BRACES.	T&B/MEYER	DWG #7453
12		27	GUY STRAND, 1/2"EHS-7 STRAND (FT)		
13A		235	BONDING WIRE #2 COPPER, SOLID (FT)		
13B		38	GROUND WIRE, 7 NO. 8 COPPERWELD (FT) DEAD SOFT ANNEALED		
14		2	PLATE,POLE EYE,7/8"BOLT,6"BOLT SPCG,SGL EYE, 7/8" PIN	MACLEAN	EPR-77S-7
16	0201520	2	THIMBLE CLEVIS, 20K	MACLEAN	CT-88H
19		2	WASHER, SQ, CURVED, 4"x4",FOR 7/8" BOLT	JOSLYN	P144B
20	0204650	2	WASHER, ROUND, 2", FOR 3/4" BOLT	HUGHES	RW2-70
22		12	WASHER, COIL, DOUBLE SPRING, FOR/7/8" BOLT	HUGHES	SLW2-80
23	0200110	4	WASHER, COIL, DOUBLE SPRING, FOR/3/4" BOLT	HUGHES	SLW2-70
25		2	BOLT, DBL ARM, EYE BOLT, W/2 NUTS, 3/4"xXX"	JOSLYN	J96XX
27		4	BOLT, MACHINE, 7/8"xXX", W/NUT	HUGHES	B8XX
30		2	SUPPORT, STATIC WIRE, 3/4"xXX", W/ 5/8" LINK	HUGHES	2812.6-XX-BCL
32	0203860	2	GUY GRIP, DEADEND, GALV, 1/2" BLUE 7W	HELICAL	HG212-1/2
33A		2	CONNECTOR, GROUND CLAMP, BRONZE FOR OPTICAL WIRE SUSPENSION CLAMP, SX-48/33/520	ANDERSON	GTCL-23A
34A		1	L-TAP, 3/8" GALV TO #2 SOLID CU	HELICAL	
35A		2	L-TAP, 1/2" GALV TO #2 SOLID CU	HELICAL	
38		1	BRACE-X, ASSEMBLY, 345KV, 5-1/8"x 7-1/2", 26' POLE SP, LAMINATED, INCLUDES DEADEND TEES, CURVED WASHERS, NUTS, 7/8" x XX"MTG BOLTS, GRID GAINS AND CENTER CLAMP.	HUGHES	2093K-26-0-CPT
42		2	TURNBUCKLE, CLEVIS-CLEVIS, 7/8" x12", 35K	HUGHES	AS2545-C
43	0204530	8	CLIP, GRND WIRE BONDING, #2 CU TO 7/8 BOLT	HUGHES	2727.8
45	0202660	2	CLIP, GROUND WIRE BONDING, GALV, #2 CU TO FLAT SURF. 1/2" BOLT, NUT AND LOCK NUT	HUGHES	GWB-51-1/2
46	0100050	1	CLAMP, SHIELD WIRE, SUSP., 3/8"EHS-7 STRAND (.20-.46) W/O FITTING	MACLEAN	FS-46-N
46C		1	CLAMP, OPTICAL WIRE, SUSP., SX-48/33/520	ALCOA	SUME 500/527
46C1		1	SOCKET EYE	HUBBELL	SA16
46C2		1	Y-CLEVIS BALL	MACLEAN	YCB-65A
48	0101850	6	CLAMP, COND, FORMULA, SUSPENSION, 1.2"MAX DIA, 15"L, 23K, W/90° Y-CLEVIS EYE FITTING F/ 954MCM 45/7ACSR CORONA FREE	MACLEAN	ACFS-120-15-23-RYCE
50		51	INSULATOR, SUSP, 30K M&E, 5-3/4"x10", BALL & SOCKET, GRAY	LAPP	5960A-70
51		3	PLATE, YOKE, TRI, 18" SPCG, 15/16" HOLES, 40K ULT, 5/8" THICK	MACLEAN	ASM-6229-3
54	0201600	3	OVAL-EYE BALL, GALV, FORGED STEEL, 30K, 3-23/32" LONG	ANDERSON	BE-30
56	0206010	3	SHACKLE, ANCHOR, BNK, 35K, W/ 3/4" BOLT NUT & COTTER KEY	ANDERSON	AS-35-BNK
57	0207860	3	SOCKET, CLEVIS, 4-1/2" L, 13/16"W, 2"D, 5/8"P, 30K	MACLEAN	SCL-55B
65A		4	GROUND ROD, COPPER CLAD, 3/4" x 10'	BLACKBURN	7510
65B		2	COUPLING, GROUND ROD, 3/4" COPPER CLAD COMPRESSION	E&J DEMARK	GRC-34B
66A		2	EXOTHERMIC WELD, #2 SOLID CU TO 3/4" CU ROD	ERICO/CADWELD	
66B		2	EXOTHERMIC WELD, 7 NO. 8 COPPERWELD TO 3/4" CU ROD	ERICO/CADWELD	
67A		110	STAPLE, GROUND WIRE, COPPERCLAD, 1-1/2"x3/8", ROLLED POINT	CHANCE	9167
80	0203760	4	GRID GAIN, CURVED, 6-3/4"x4-1/8", FOR 7/8" BOLT CTR HOLE, F/CROSSARM	JOSLYN	PX261

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURE	CATALOG NUMBER
91		2	ANCHOR, POLE, 4-SECTION, W/ 7/8" x XX" THREADED ROD W/4 NUTS, 4 LOCKNUTS & LAG SCREWS	HUGHES	A1895-3-XX
100		8	NUT, SQUARE, 7/8"	HUGHES	N80
101		8	LOCKNUT, SQUARE, 7/8"	HUGHES	MF80
			MATERIAL REQUIRED FOR DOUBLE OPTICAL WIRE SUSPENSION		
46E		1	CLAMP ASSEMBLY, OPTICAL WIRE, DBL. SUSP. W/2 CLEVIS EYE, 1 YOKE PLATE, 1 Y-CLEVIS CLEVIS, SX-48/33/520	ALCOA	OSPSS4
			SIDE GUY MATERIAL ONLY		
12		110	GUY STRAND, 1/2"EHS-7 STRAND (FT)		
14		2	PLATE,POLE EYE,7/8"BOLT,6"BOLT SPCG,SGL EYE, 7/8"PIN	MACLEAN	EPR-77S-7
16	0201520	2	THIMBLE CLEVIS, 20K	MACLEAN	CT-88H
19		4	WASHER, SQ, CURVED, 4"x4",FOR 7/8" BOLT	JOSLYN	P144B
21		2	WASHER RND 6" FOR 1" ANCHOR ROD	JOSLYN	PB5A-1
22		4	WASHER, COIL, DOUBLE SPRING, FOR/7/8" BOLT	HUGHES	SLW2-80
27		4	BOLT, MACHINE, 7/8"xXX", W/NUT	HUGHES	B8XX
32	0203860	4	GUY GRIP, DEADEND, GALV, 1/2" BLUE 7W	HELICAL	HG212-1/2
35A		2	L-TAP, 1/2" GALV. TO #2 SOLID CU	HELICAL	
44		2	CLAMP, BONDING, GUY-GROUND, FOR #2 CU TO 1/2"-7 STRAND	CHANCE	6484
71	0205180	2	ANCHOR, LOG, 8"x8"x8'		
72		2	ANCHOR ROD, 1"x10' LONG, HD GALV., THMBL EYE	CHANCE	5340
73	0205950	2	GUY MARKER, FULL RND, YEL, 84"x 1.5", 3/16-1/2" W/PIGTAIL POLYETHYLENE	CHANCE	84FRPM-YEL
			MATERIAL USED AS REQUIRED		
68	0204390	AR	POLE ROOF, NON METALLIC	OSMOSE	70-110-020-016
70	0202550	AR	WEIGHT, HOLD DOWN,150#, W/ HARDWARE, FOR FORMULA CLAMP 954MCM ACSR 45/7	MACLEAN	ASM-389-150

Burns & McDonnell

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0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT

WEST RUTLAND – NEW HAVEN 345 KV

TANGENT SUSPENSION
BILL OF MATERIALS
TYPE 'A'

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-1.2 PLOT: 1=1			1 REV.

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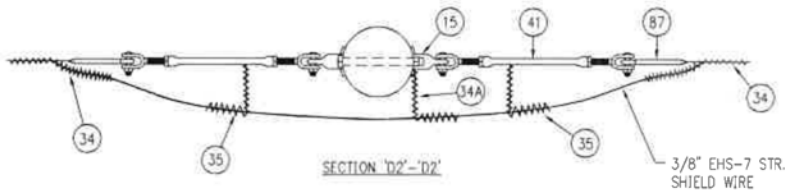
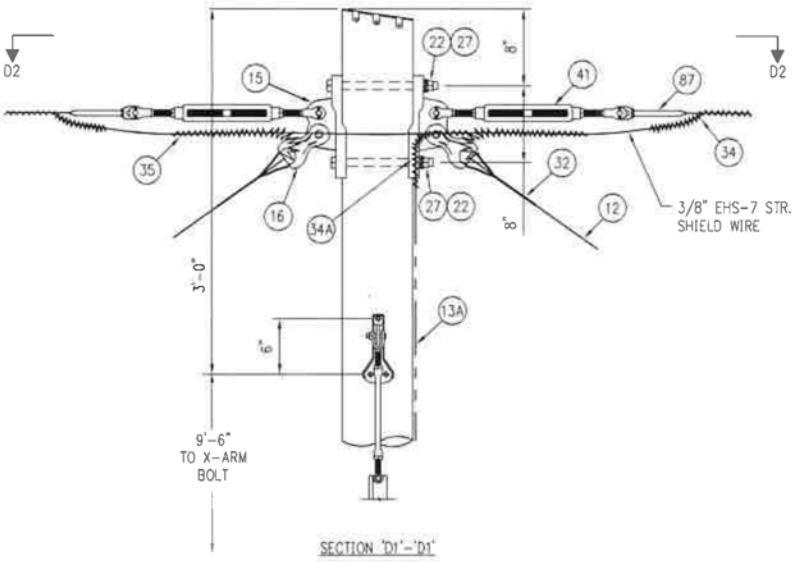


SECTION 'D2'-'D2'



SECTION 'D1'-'D1'

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
MATERIALS REQUIRED TO DOUBLE DEADEND 1 SHIELD WIRE ON TYPE "A" STRUCTURE					
15	0201470	2	PLATE, POLE EYE, DBL EYE, GALV, 15/16" HOLES, 8" BOLT SPCG, 7/8" BOLTS, & PIN	MACLEAN	EPR8-77-D7
22		2	WASHER, COIL, DOUBLE SPRING, FOR 7/8" BOLT	HUGHES	SLW2-80
27		2	BOLT, MACHINE, 7/8"x XX", W/NUT	HUGHES	B8XX
34		2	L-TAP, 3/8" GALV. TO 3/8" GALV.	HELICAL	
34A		1	L-TAP, 3/8" GALV. TO #2 SOLID CU	HELICAL	
41	0202540	2	TURNBUCKLE, CLEVIS-CLEVIS, 3/4"x 9", 28K	HUGHES	AS2545-A
87	0101410	2	DEADEND, ALUM, COMP, W/EYE, SHIELD WIRE, 3/8" EHS-7 STR, STL	ALCOA	E4514.12
MATERIALS REQUIRED FOR IN-LINE GUYING					
12		200	GUY STRAND, 1/2" EHS-7 STRAND (FT)		
13A		200	BONDING WIRE, #2 COPPER, SOLID (FT)		
16	0201520	2	THIMBLE CLEVIS, 20K	MACLEAN	CT-8BH
21		2	WASHER RND 6" FOR 1" ANCHOR ROD	JOSYLN	P85A-1
32	0203860	4	GUY GRIP, DEADEND, GALV, 1/2" BLUE 7W	HELICAL	HG212-1/2
35	0202780	2	L-TAP, 1/2" GALV. TO 3/8" GALV.	HELICAL	
44		2	CLAMP, BONDING, GUY-GROUND, FOR #2 CU TO 1/2"-7 STRAND	CHANCE	6484
66A		2	EXOTHERMIC WELD, #2 SOLID CU WIRE TO 3/4" CU ROD	ERICO/CADWELD	
71	0205180	2	ANCHOR, LOG, 8"x8"x8"		
72		2	ANCHOR ROD, 1"x10'-0" LONG, HOT DIP GALV, THIMBLE EYE	CHANCE	5340
73	0205950	2	GUY MARKER, FULL RND, YEL, 84"x 1.5", 3/16"-1/2" W/PIGTAIL POLYETHYLENE	CHANCE	84FRPM-YEL

NOTES:

1) THESE ITEMS WILL BE CALLED FOR BY THE LINE DESIGNER, AS NEEDED
2) IF DEAD ENDS ARE USED FOR UPLIFT, GUYS MAY BE ELIMINATED.

Burns & McDonnell

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REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	JAH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

SHIELD WIRE DEAD END ATTACHMENT
TYPE 'A' STRUCTURE

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-1.3		1 REV.

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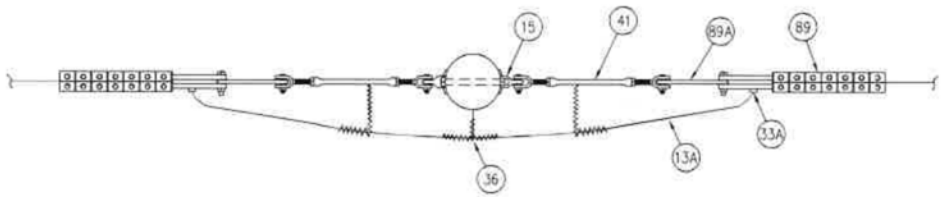

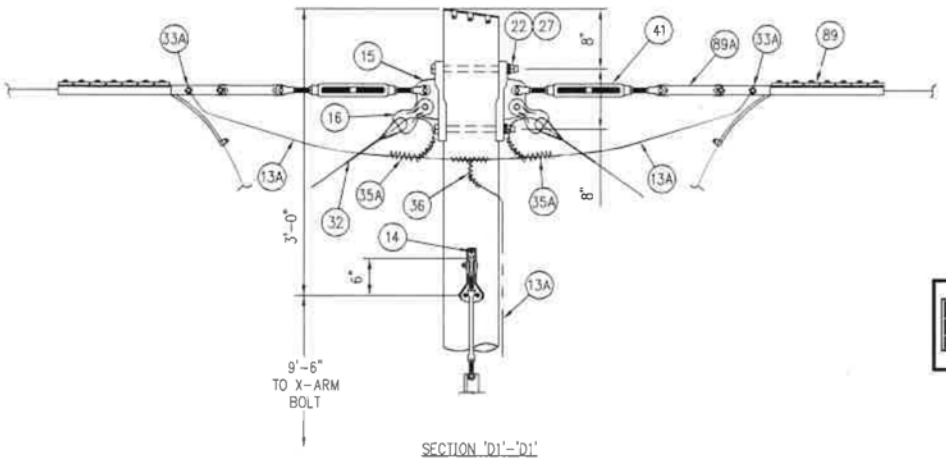

SECTION 'D1'-'D1'

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
MATERIALS REQUIRED TO DOUBLE DEADEND 1 OPTICAL WIRE ON TYPE "A" STRUCTURE					
13A		10	BONDING WIRE, #2 COPPER, SOLID (FT)		
15	0201470	2	PLATE, POLE EYE, DBL EYE, GALV, 15/16" HOLES, 8" BOLT SPCG, 7/8" BOLTS, & PIN	MACLEAN	EPR8-77-D7
22		2	WASHER, COIL, DOUBLE SPRING, FOR 7/8" BOLT	HUGHES	SLW2-80
27		2	BOLT, MACHINE, 7/8"x XX", W/NUT	HUGHES	B8XX
33A		2	CONNECTOR, GROUND CLAMP, BRONZE	ANDERSON	GTCL-23A
36		1	L-TAP, #2 SOLID CU TO #2 SOLID CU	HELICAL	
41		2	TURNBUCKLE, CLEVIS-CLEVIS, 3/4"x 9", 28K	HUGHES	AS2545-A
89		2	BOLTED DEADEND, OPTICAL WIRE, SX-48/33/520	ALCOA	ODE 47/34520G
89A		2	LINK, EXTENSION, OPTICAL WIRE, 5" C-C	ALCOA	ODELP05
89B		15	GUIDE CLAMP, WOOD POLE FOR OPTICAL WIRE, W/LAG SCREW, SX-48/33/520	ALCOA	OGW469/561
MATERIALS REQUIRED FOR IN-LINE GUYING					
12		200	GUY STRAND, 1/2" EHS-7 STRAND (FT)		
13A		200	BONDING WIRE, #2 COPPER, SOLID (FT)		
16	0201520	2	THIMBLE CLEVIS, 20K	MACLEAN	CT-88H
21		2	WASHER RND 6" FOR 1" ANCHOR ROD	JOSYLN	P85A-1
32	0203860	4	GUY GRIP, DEADEND, GALV, 1/2" BLUE 7W	HELICAL	HG212-1/2
35A		2	L-TAP, 1/2" GALV. TO #2 SOLID CU	HELICAL	
44		2	CLAMP, BONDING, GUY-GROUND, FOR #2 CU TO 1/2"-7 STRAND	CHANCE	6484
66A		2	EXOTHERMIC WELD, #2 SOLID CU WIRE TO 3/4" CU ROD	ERICO/CADWELD	
71	0205180	2	ANCHOR, LOG, 8"x8"x8"		
72		2	ANCHOR ROD, 1"x10'-0" LONG, HOT DIP GALV, THIMBLE EYE	CHANCE	5340
73	0205950	2	GUY MARKER, FULL RND, YEL, 84"x 1.5", 3/16"-1/2" W/PIGTAIL POLYETHYLENE	CHANCE	84FRPM-YEL

NOTES:
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0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

OPTICAL WIRE DEAD END ATTACHMENT TYPE 'A' STRUCTURE

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-1.4		1 REV.

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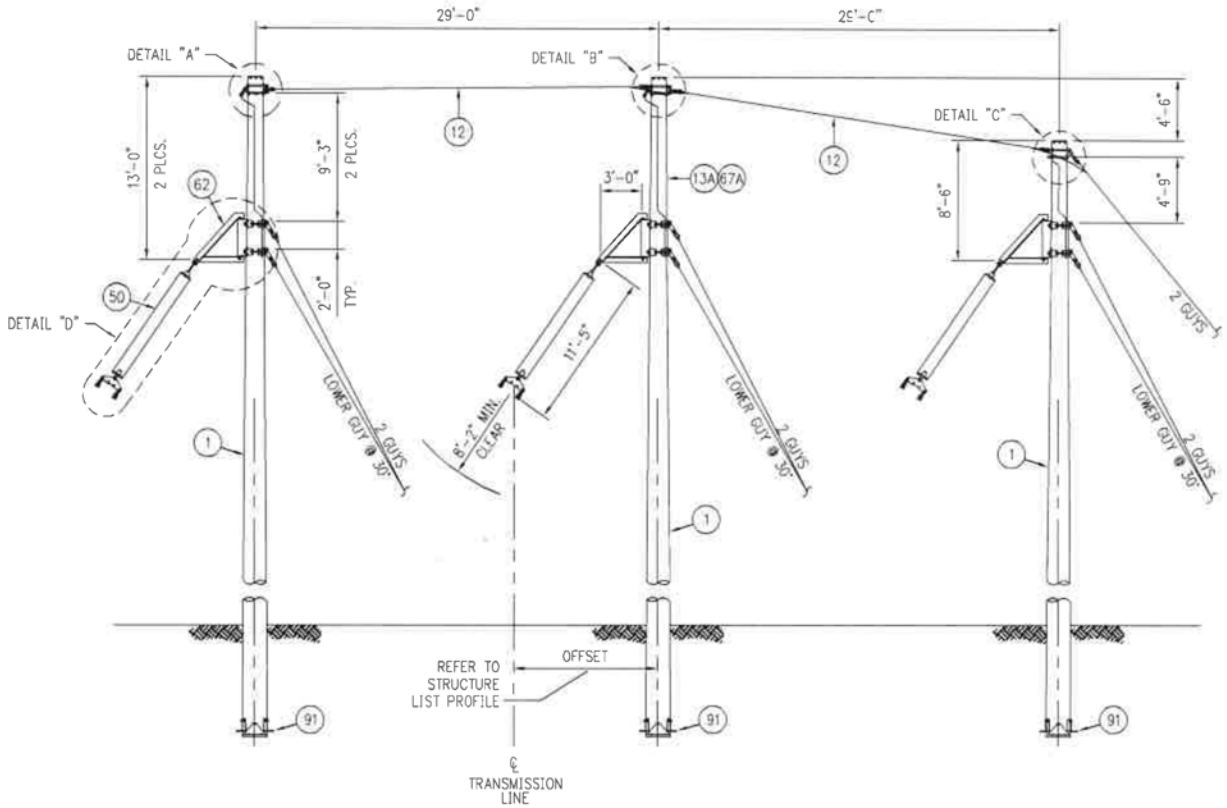

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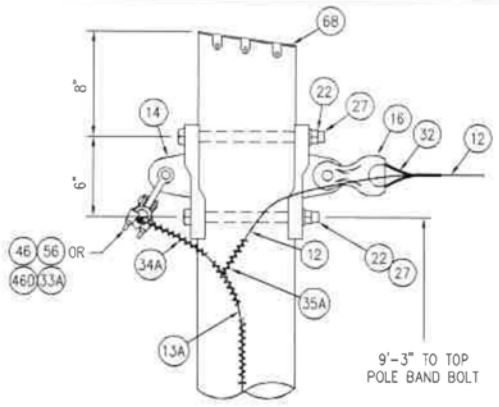
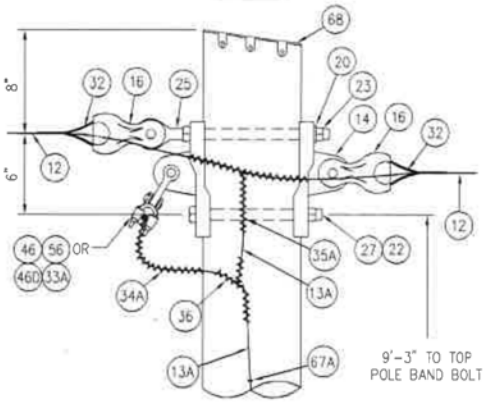


DETAIL "A"



DETAIL "B"

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/05	CSM	JRW	ISSUED FOR CONSTRUCTION

CONFORMED TO CONSTRUCTION RECORDS
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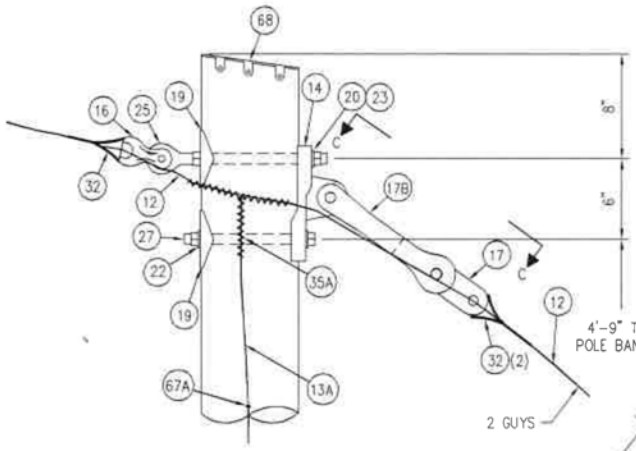
VELCO — VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

SUSPENSION ANGLE STRUCTURE TYPE 'SA2' (12° TO 22°)

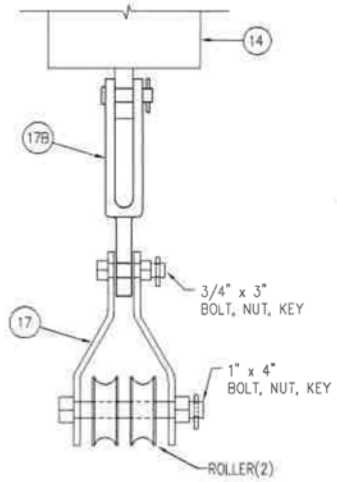
SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-3.0 PLOT: 1=1			1 REV.

FILE: K:\Velco\345kV\345-10.dwg 01-07-2008 11:26 BMcD

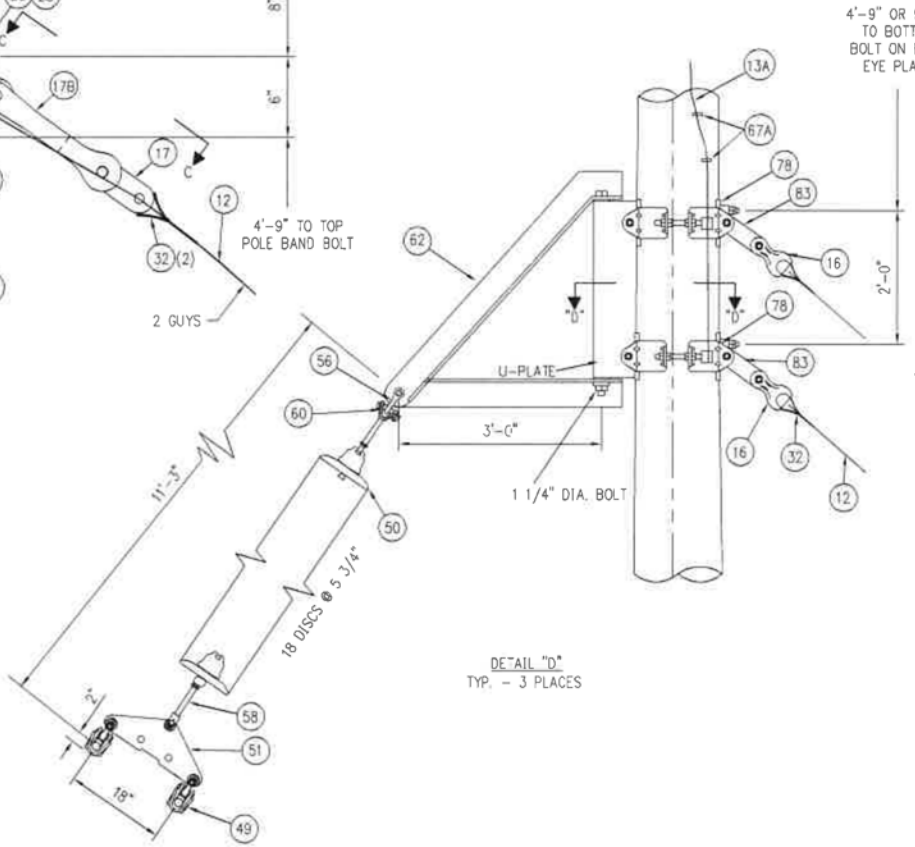
FOR ANCHOR AND GUY GROUNDING DETAILS, SEE DWG. #345-10.0 & #345-10.1
FOR POLE GUYING DETAILS, SEE DWG. #345-10.2
FOR GROUNDING DETAILS, SEE DWG. #345-11.0
FOR FOUNDATION DETAILS, SEE DWG. #345-FDN-1 THRU FDN-4



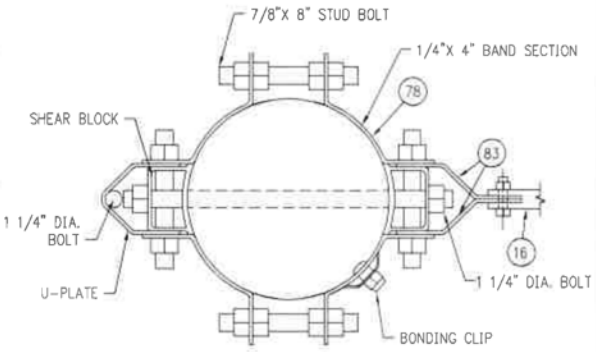
DETAIL "C"



SECTION C-C



DETAIL "D"
TYP. - 3 PLACES



SECTION "D"-"D"

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	6/14/06	CSM	JRW	ADDED EXT. LINK RE-ISSUED FOR CONSTRUCTION
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO
VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

SUSPENSION ANGLE POLE TOP DETAILS TYPE 'SA2' (12' TO 22')

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-3.1		2 REV.

FILE: K:\Proj\345kV\DWG\STANDARD PLATES\345kV_SA2-3.1.dwg 01-07-2008 10:28 (BMcD)

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
1		3	POLE, WOOD		
12		740	GUY STRAND, 1/2"EHS-7 STRAND (FT)		
13A		320	BONDING WIRE #2 COPPER, SOLID (FT)		
14		5	PLATE,POLE EYE,7/8"BOLT,6"BOLT SPCG,SGL EYE, 7/8" PIN	MACLEAN	EPR-77S-7
16	0201520	10	THIMBLE CLEVIS, 20K	MACLEAN	CT-88H
17	0203470	1	PLATE, GUY, DBL, ASSEMBLY, INCL: 2 LINKS (#3157); 2 ROLLERS (#28083); 1 BOLT 3/4"x3" BNK; 1 BOLT 1"x4" BNK	HUGHES	
17B		1	CLEVIS, EYE, EXTENSION LINK	ANDERSON	CEEL-093-06.5
19		2	WASHER, SQ, CURVED, 4"x4",FOR 7/8" BOLT	JOSLYN	P144B
20	0204650	2	WASHER, ROUND, 2", FOR 3/4" BOLT	HUGHES	RW2-70
21		8	WASHER RND 6" FOR 1" ANCHOR ROD	JOSLYN	P85A-1
22		4	WASHER, COIL, DOUBLE SPRING, FOR/7/8" BOLT	HUGHES	SLW2-80
23	0200110	2	WASHER, COIL, DOUBLE SPRING, FOR/3/4" BOLT	HUGHES	SLW2-70
25		2	BOLT, DBL ARM, EYE BOLT, W/2 NUTS, 3/4"xXX"	JOSLYN	J96XX
27		4	BOLT, MACHINE, 7/8"xXX", W/ NUT	HUGHES	B8XX
32	0203860	20	GUY GRIP, DEADEND, GALV, 1/2" BLUE 7W	HELICAL	HG212-1/2
33A		1	CONNECTOR, GROUND CLAMP, BRONZE, FOR OPTICAL WIRE SUSP. CLAMP SX-48/33/520	ANDERSON	GTCL-23A
34A		1	L-TAP, 3/8" GALV. TO #2 SOLID CU	HELICAL	
35A		3	L-TAP, 1/2" GALV. TO #2 SOLID CU	HELICAL	
36		1	L-TAP, #2 SOLID CU TO #2 SOLID CU	HELICAL	
44		8	CLAMP, BONDING, GUY-GROUND, FOR #2 CU TO 1/2"-7 STRAND	CHANCE	6484
46	0100050	1	CLAMP, SHIELD WIRE, SUSP., 3/8"EHS-7 STRAND (.20-.46) W/O FITTING	MACLEAN	FS-46-N
46D		1	CLAMP, OPTICAL WIRE, SGL. SUSPENSION W/ Y-CLEVIS EYE, SX-48/33/520	ALCOA	OSPSP4
49	0101650	6	CLAMP, COND, FORMULA, SUSPENSION, 1.2"MAX DIA, 19"L, 30K, W/90° Y-CLEVIS EYE FITTING F/ 954MCM 45/7ACSR CORONA FREE	MACLEAN	ACFS-120-19-30-RYCE
50		54	INSULATOR, SUSP, 30K M&E, 5-3/4"x10", BALL & SOCKET, GRAY	LAPP	5960A-70
51		3	PLATE, YOKE, TRI, 18" SPCG, 15/16" HOLES, 40K ULT, 5/8" THICK	MACLEAN	ASM-6229-3
56	0206010	4	SHACKLE, ANCHOR, BNK, 35K, W/ 3/4" BOLT NUT & COTTER KEY	ANDERSON	AS-35-BNK
58		3	SOCKET CLEVIS, HOT LINE, 35K, 10" L	MACLEAN	SCHL-55A
60		3	BALL Y-CLEVIS, HOT LINE, 35K, 10-1/8" L	MACLEAN	YCBHL-65A
62	0203930	3	BRACKET, SWINGING ANGLE, 2"x3", 35K W/1-1/4" BOLT & LOCKNUT	HUGHES	1796-C
65A		2	GROUND ROD, COPPER CLAD, 3/4" x 10'	BLACKBURN	7510
66A		2	EXOTHERMIC WELD, #2 SOLID CU TO 3/4" CU ROD	ERICO/CADWELD	
67A		40	STAPLE, GROUND WIRE, COPPERCLAD, 1-1/2"x3/8", ROLLED POINT	CHANCE	9167
71	0205180	8	ANCHOR, LOG, 8"x8"x8'		
72		8	ANCHOR ROD, 1"x10'-0" LONG, HOT DIP GALV, THIMBLE EYE	CHANCE	5340
73	0205950	8	GUY MARKER, FULL RND, YEL, 84"x 1.5", 3/16-1/2" W/PIGTAIL POLYETHYLENE	CHANCE	84FRPM-YEL
78		6	POLE, BAND, HEAVY DUTY, ASSEMBLY, INCLUDES: 1 BONDING CLIP(#2718.55)	HUGHES	3107.X-1796
83		6	CONNECTING LINKS, GUYING 3/8"x3"x12" PAIR	HUGHES	3157
91		3	ANCHOR, POLE, 4-SECTION, W/7/8" x XX" THREADED RODS W/4 NUTS, 4 LOCKNUTS & LAG SCREWS	HUGHES	A1895-3-XX

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
MATERIAL USED AS REQUIRED					
68	0204390	AR	POLE ROOF, NON METALLIC	OSMOSE	70-110-020-016

REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	6/14/06	CSM	JRW	ADDED MARK No. 17B, REVISED BOLT SIZE IN MARK #17 AND RE-ISSUED FOR CONSTRUCTION
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

SUSPENSION ANGLE BILL OF MATERIALS TYPE 'SA2' (12° TO 22°)

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	6/06
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-3.2 PLOT: 1=1			2 REV.

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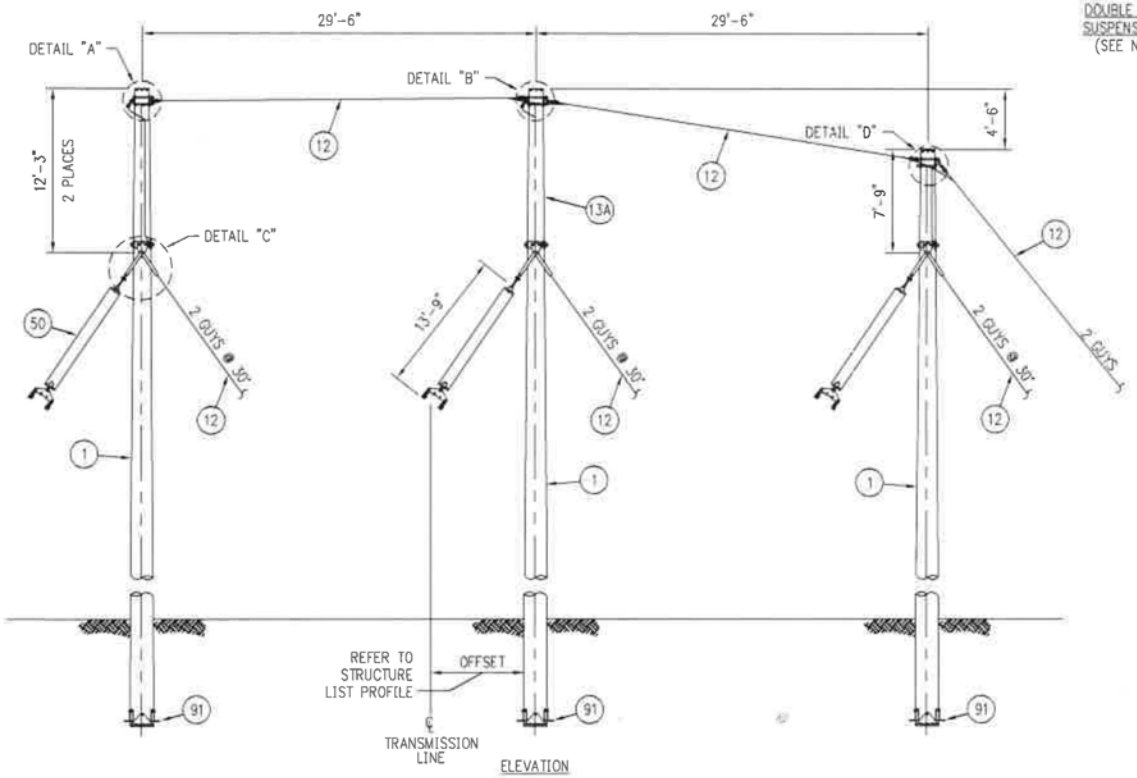

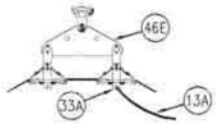

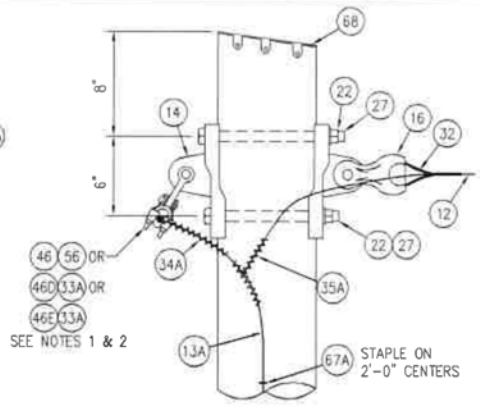

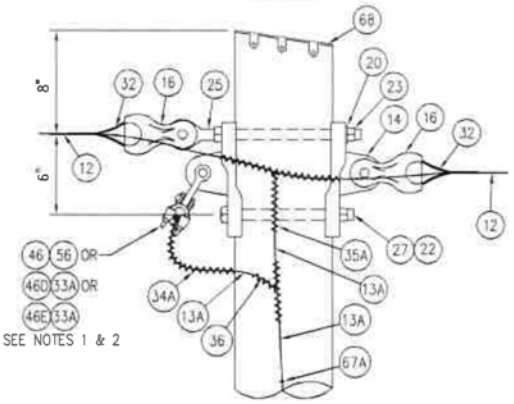

FOR ANCHOR AND GUY GROUNDING DETAILS, SEE DWG. #345-10.0 & #345-10.1
FOR POLE GUYING DETAILS, SEE DWG. #345-10.2
FOR GROUNDING DETAILS, SEE DWG. #345-11.0
FOR FOUNDATION DETAILS, SEE DWG. #345-FDN-1 THRU FDN-4

NOTE:
1. FOR LINE ANGLES LESS THAN 30 DEGREES USE SINGLE OPTICAL WIRE SUSPENSION ASSEMBLY, ITEM #46D.
2. FOR LINE ANGLES GREATER THAN 30 DEGREES OR WHEN VERTICAL ANGLE EXCEEDS 30 DEGREES, USE DOUBLE OPTICAL WIRE SUSPENSION ASSEMBLY ITEM #46E.

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

SUSPENSION ANGLE STRUCTURE TYPE 'SA3' (22° TO 35°)

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-4.0		1 REV.

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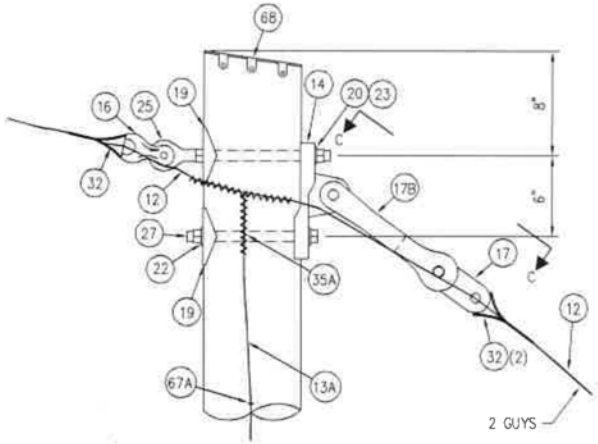
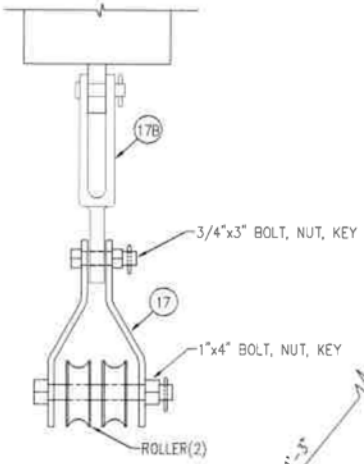
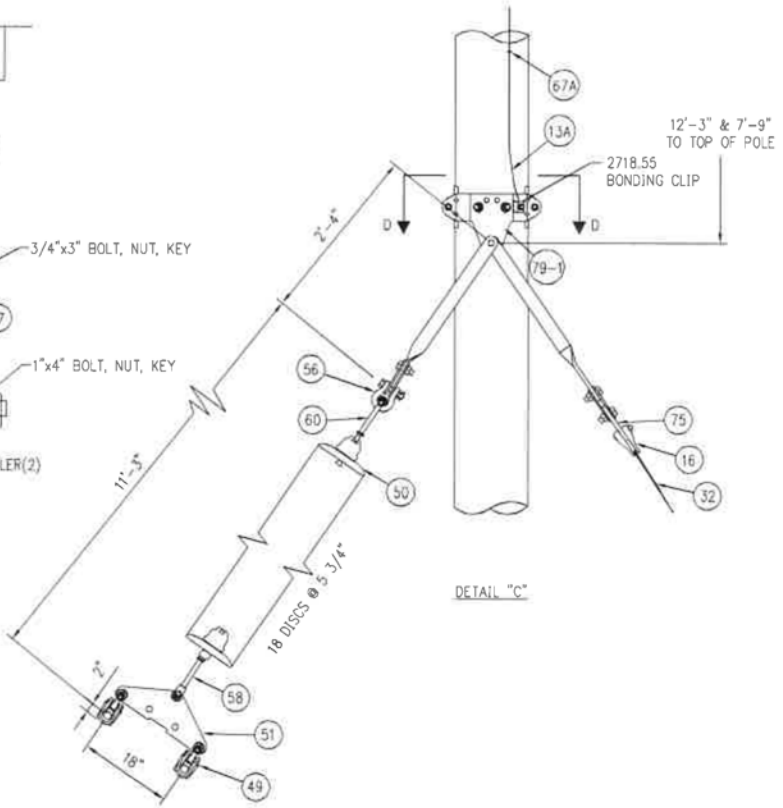


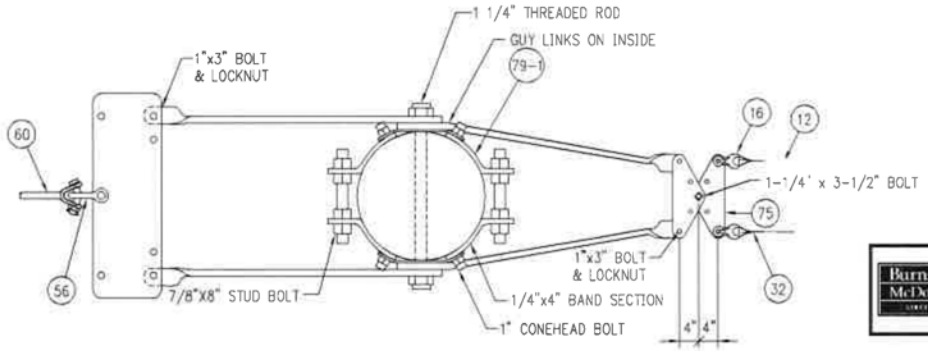
DETAIL "D"



SECTION C-C



DETAIL "C"



SECTION D-D

REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	6/27/06	CSM	JRW	ADDED EXT. LINK, REVISED POLE BAND ASSEMBLY AND RE-ISSUED FOR CONSTRUCTION
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT

WEST RUTLAND – NEW HAVEN 345 KV

SUSPENSION ANGLE POLE TOP DETAILS TYPE 'SA3' (22° TO 35°)

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	6/06 DATE
DATE: 11/05	CHECKED BY: KAW		
DRAWING NUMBER: PLOT: 1=1	345-4.1		2 REV.

FILE: K:\Velco\345 NH-HN LPT\Cads\STANDARD PLOTTS\345-4.1.dwg 02-07-2008 13:12 BMcD

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
1		3	POLE, WOOD		
12		740	GUY STRAND, 1/2"EHS-7 STRAND (FT)		
13A		320	BONDING WIRE, #2 COPPER, SOLID (FT)		
14		5	PLATE,POLE EYE,7/8"BOLT,6"BOLT SPCG,SGL EYE, 7/8" PIN	MACLEAN	EPR-77S-7
16	0201520	10	THIMBLE CLEVIS, 20K	MACLEAN	CT-88H
17	0203470	1	PLATE, GUY, DBL, ASSEMBLY, INCL: 2 LINKS (#3157); 2 ROLLERS (#28083); 1 BOLT 3/4"x3" BNK; 1 BOLT 1"x4" BNK.	HUGHES	
17B		1	CLEVIS, EYE, EXTENSION LINK	ANDERSON	CEEL-093-06.5
19		2	WASHER, SQ, CURVED, 4"x4"FOR 7/8" BOLT	JOSLYN	P1448
20	0204650	2	WASHER, ROUND, 2", FOR 3/4" BOLT	HUGHES	RW2-70
21		8	WASHER RND 6" FOR 1" ANCHOR ROD	JOSLYN	P85A-1
22		4	WASHER, COIL, DOUBLE SPRING, FOR/7/8" BOLT	HUGHES	SLW2-80
23	0200110	2	WASHER, COIL, DOUBLE SPRING, FOR/3/4" BOLT	HUGHES	SLW2-70
25		2	BOLT, DBL ARM, EYE BOLT, W/2 NUTS, 3/4"xXX"	JOSLYN	J96XX
27		4	BOLT, MACHINE, 7/8"xXX", W/NUT	HUGHES	BBXX
32	0203860	20	GUY GRIP, DEADEND, GALV, 1/2" BLUE 7W	HELICAL	HG212-1/2
33A		1	CONNECTOR, GROUND CLAMP, BRONZE FOR OPTICAL WIRE SUSPENSION CLAMP, SX-48/33/520	ANDERSON	GTCL-23A
34A		1	L-TAP, 3/8" GALV. TO #2 SOLID CU	HELICAL	
35A		3	L-TAP, 1/2" GALV. TO #2 SOLID CU	HELICAL	
36		1	L-TAP, #2 SOLID CU TO #2 SOLID CU	HELICAL	
44		8	CLAMP, BONDING, GUY-GROUND, FOR #2 CU TO 1/2"-7 STRAND	CHANCE	6484
46	0100050	1	CLAMP, SHIELD WIRE, SUSP., 3/8"EHS-7 STRAND (.20-.46) W/O FITTING	MACLEAN	FS-46-N
46D		1	CLAMP, OPTICAL WIRE, SGL. SUSPENSION W/ Y-CLEVIS EYE, SX-48/33/520	ALCOA	OSPSP4
49	0101650	6	CLAMP, COND, FORMULA, SUSPENSION, 1.2"MAX DIA, 19"L, 30K, W/90° Y-CLEVIS EYE FITTING F/ 954MCM 45/7ACSR CORONA FREE	MACLEAN	ACFS-120-19-30-RYCE
50		54	INSULATOR, SUSP, 30K M&E, 5-3/4"x10", BALL & SOCKET, GRAY	LAPP	5960A-70
51		3	PLATE, YOKE, TRI, 18" SPCG, 15/16" HOLES, 40K ULT, 5/8" THICK	MACLEAN	ASM-6229-3
56		5	SHACKLE, ANCHOR, BNK, 35K, W/3/4" BOLT NUT & COTTER	ANDERSON	AS-35-BNK
58		3	SOCKET CLEVIS, HOT LINE, 35K, 10" L	MACLEAN	SCHL-55A
60		3	BALL Y-CLEVIS, HOT LINE, 30K, 10-1/8" L,	MACLEAN	YCBHL-65A
65A	0204200	2	GROUND ROD, COPPER CLAD, 3/4" x 10'	BLACKBURN	7510
66A		2	EXOTHERMIC WELD, #2 SOLID CU TO 3/4" CU ROD	ERICO/CADWELD	
67A		40	STAPLE, GROUND WIRE, COPPERCLAD, 1-1/2"x3/8", ROLLED POINT	CHANCE	9167
71	0205180	8	ANCHOR, LOG, 8"x8"x8'		
72		8	ANCHOR ROD, 1"x10'-0" LONG, HOT DIP GALV, THIMBLE EYE	CHANCE	5340
73	0205950	8	GUY MARKER, FULL RND, YEL, 84"x 1.5", 3/16-1/2" W/PIGTAIL POLYETHYLENE	CHANCE	84FRPM-YEL
79-1		3	POLE BAND, EXTRA HEAVY DUTY (SPECIAL NO. 3340 POLE BAND), ASSEMBLY INCLUDES: 1 BONDING CLIP (#2727.8) W/LOCK NUT, 2 TWISTED LINKS (#B1784.1A), 2 TWISTED LINKS (#3341.1A), 1 DOUBLE YOKE PLATE (#3341.1B), 1 YOKE PLATE (#3341.1C), 1 DOUBLE YOKE PLATE (B1784.1B) (POLE DIA. 12"-17")	HUGHES	B1784-A.6
91		3	ANCHOR, POLE, 4-SECTION, W/ 7/8"xXX" THREADED RODS W/4 NUTS, 4 LOCKNUTS & LAG SCREWS	HUGHES	A1895-3-XX

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
MATERIAL REQUIRED FOR DOUBLE OPTICAL WIRE SUSPENSION					
46E		1	CLAMP ASSEMBLY, OPTICAL WIRE, DBL. SUSP. W/2 CLEVIS EYE, 1 YOKE PLATE, 1 Y-CLEVIS CLEVIS, SX-48/33/520	ALCOA	OSPSS4
MATERIAL USED AS REQUIRED					
68	0204390	AR	POLE ROOF, NON METALLIC	OSMOSE	70-110-020-016

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	1/27/06	CSM	JRW	ADDED MARK #17B, REVISED BOLT SIZE IN MARK # 17, REMOVED MARK #'S 74 AND 85, RE-ISSUED FOR CONSTRUCTION
0	7/12/05	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT

WEST RUTLAND – NEW HAVEN 345 KV

SUSPENSION ANGLE BILL OF MATERIALS TYPE "SA3" (22° TO 35°)

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	6/06 DATE
DATE: 11/05	CHECKED BY: KAW		
DRAWING NUMBER: PLOT: 1=1	345-4.2		2 REV.

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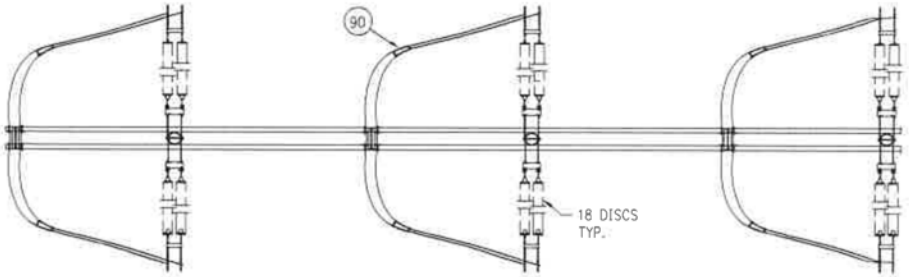
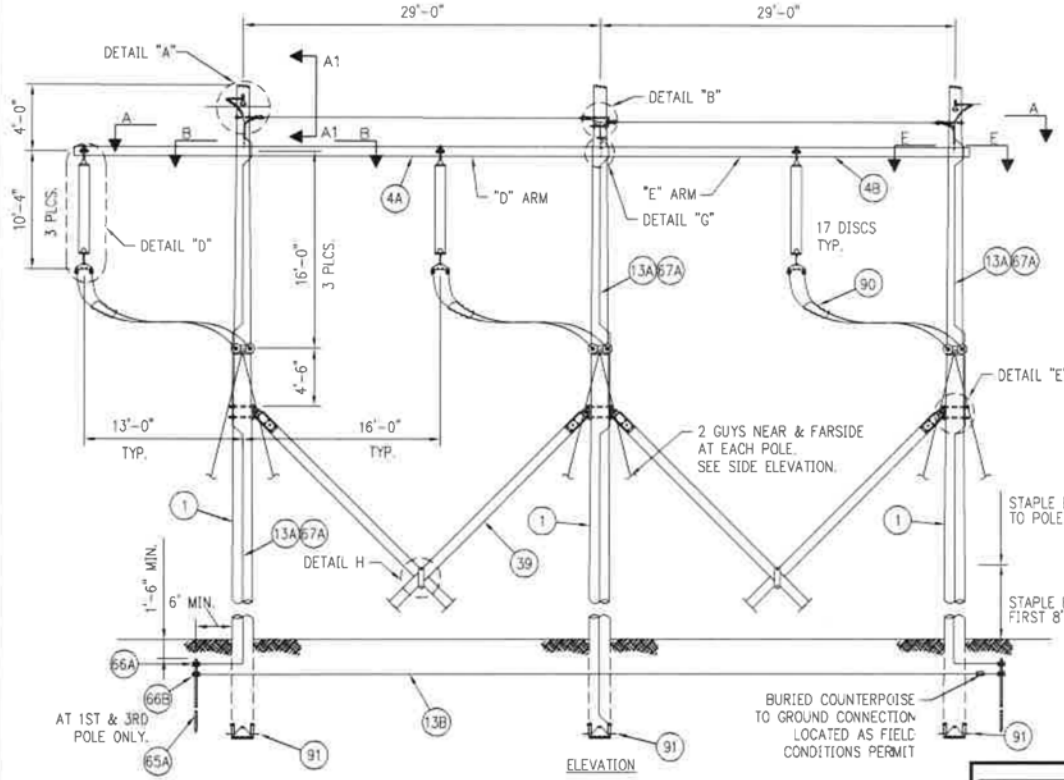
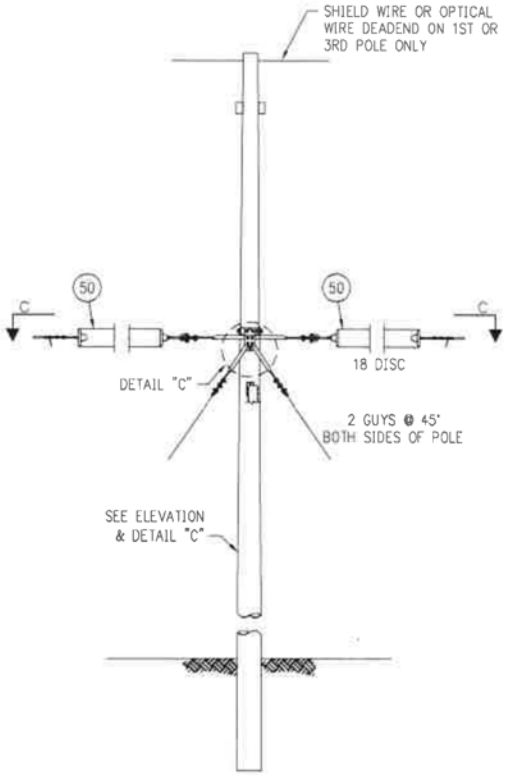


SECTION A-A



ELEVATION



SIDE ELEVATION
TYPICAL

FOR ANCHOR AND GUY GROUNDING DETAILS, SEE DWG. #345-10.0 & #345-10.1
FOR POLE GUYING DETAILS, SEE DWG. #345-10.2
FOR GROUNDING DETAILS, SEE DWG. #345-11.0
FOR FOUNDATION DETAILS, SEE DWG. #345-FDN-1 THRU FDN-4

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	5/14/06	CSM	JRW	REVISED POLE BAND MATERIALS AND RE-ISSUED FOR CONSTRUCTION
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

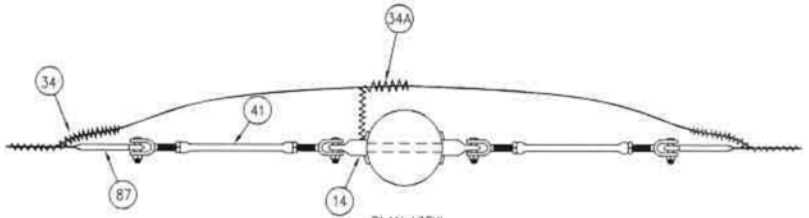
VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

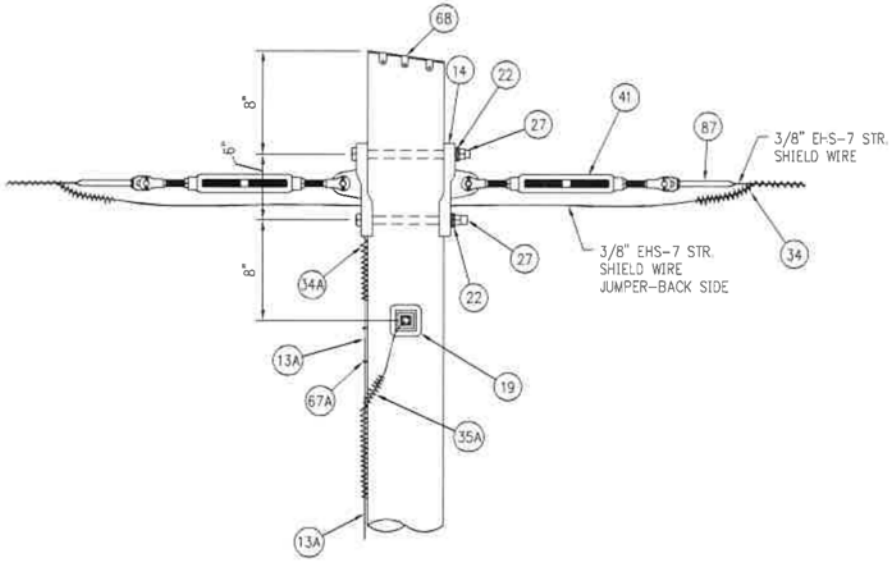
STRAIGHT LINE DEAD END
STRUCTURE
TYPE 'DE1'

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	6/06
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-5.0 PLOT: 1=1			2 REV.

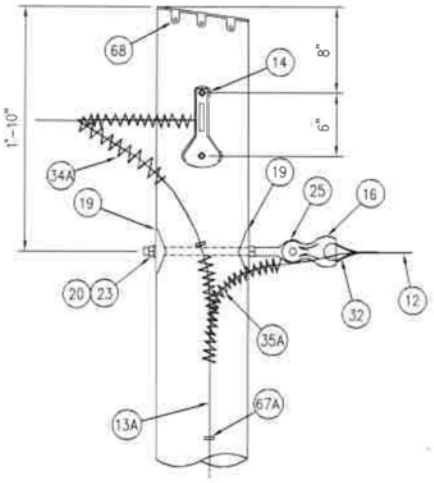
FILE: N:\Velco\345kV\ENGR\STANDARD DETAILS\345KV\345-5.0.dwg 02-07-2008 13:12 (DWG)



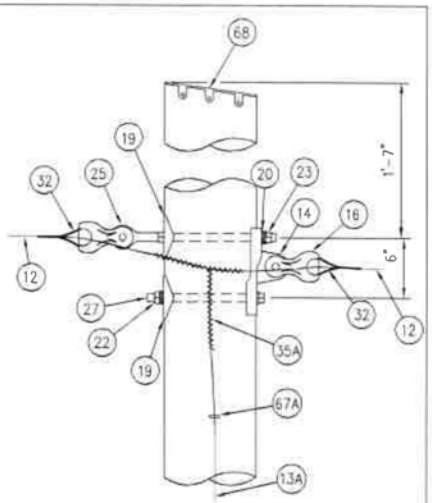
PLAN VIEW
(ITEMS AT SHIELD WIRE LEVEL SHOWN ONLY)



SECTION 'A1'-'A1'
(SIDE ELEV.)
(TYPICAL 1ST & 3RD POLE)



DETAIL "A"
(TYPICAL 1ST & 3RD POLE)



DETAIL "B"

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

Barns & McDonnell

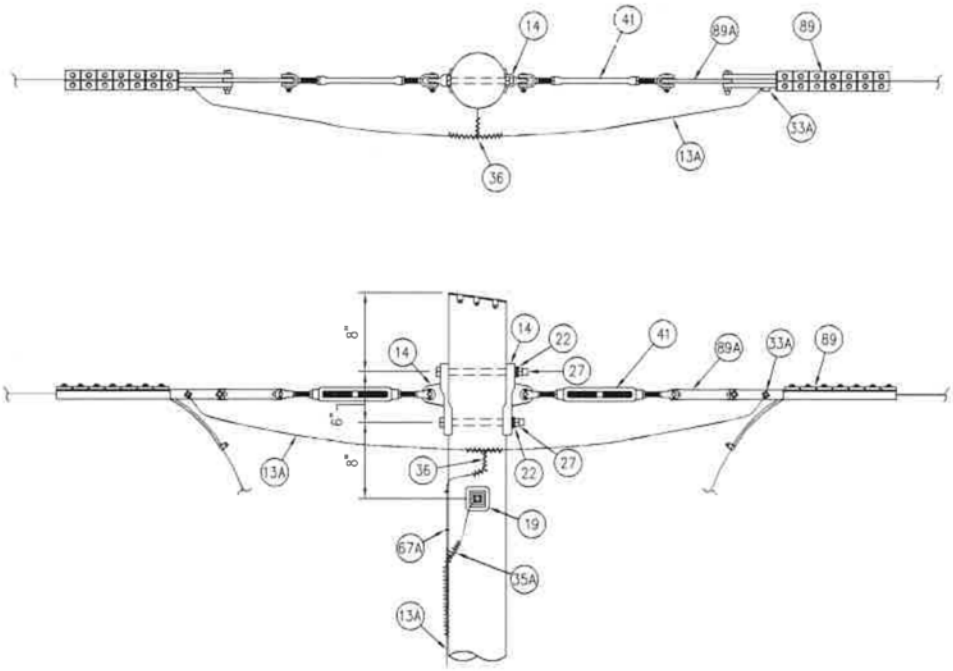
CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

VELCO
VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

STRAIGHT LINE DEAD END SHIELD WIRE DEADEND TYPE 'DE1'

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-5.1		1 REV.

FILE: N:\Velco\345 kV NH EPV\cad\STANDARD PDFS\345KV\345-5.1.dwg 02-07-2008 13:12 BMcD



SECTION 'A1'–'A1'

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

STRAIGHT LINE DEAD END OPTICAL WIRE DEADEND TYPE 'DE1'

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345–5.2		1 REV.

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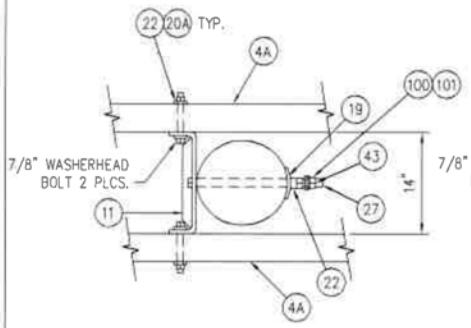
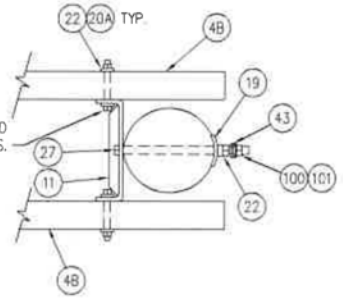
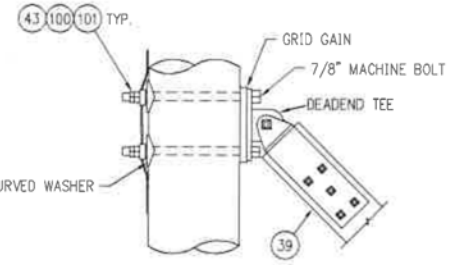


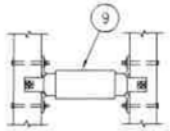
SECT. B-B



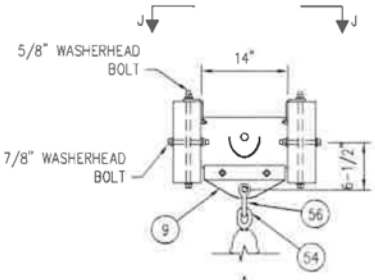
SECT. E-E

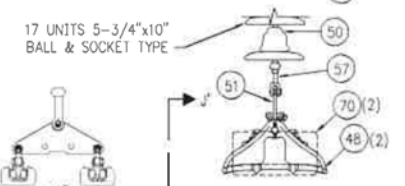


DETAIL "E"
(TYPICAL 1ST & 3RD POLE)

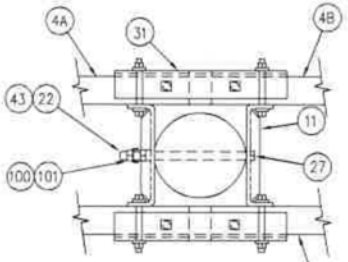


DETAIL J-J



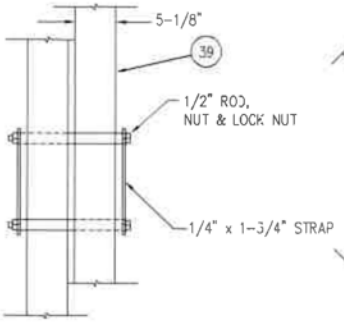


DETAIL "D"
SIDE ELEV.
TYPICAL 3 PLACES

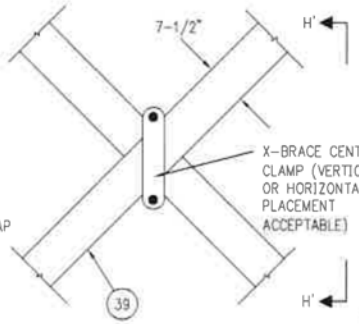


SECT. G-G

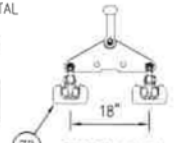
DRILL IN FIELD (4 PLCS.)



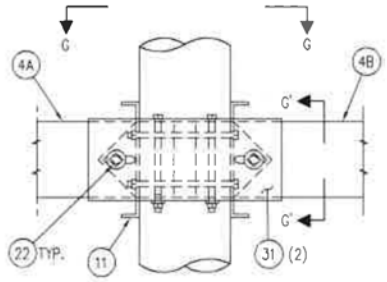
SECTION H'-H'



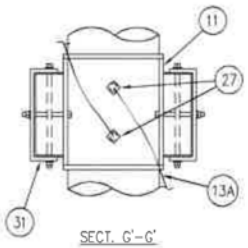
DETAIL H



SECTION J'-J'



DETAIL "G"



SECT. G'-G'

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

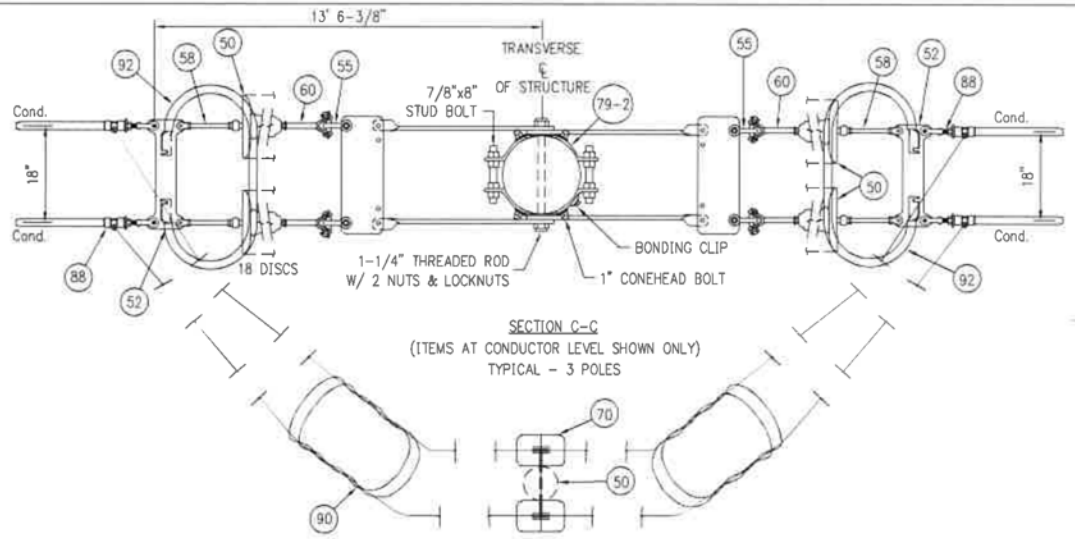
REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

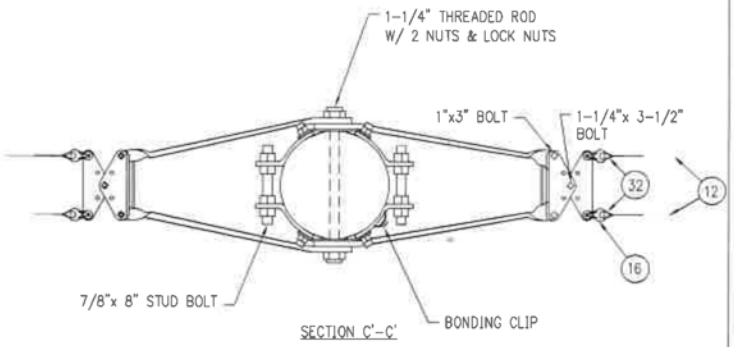
VELCO
VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

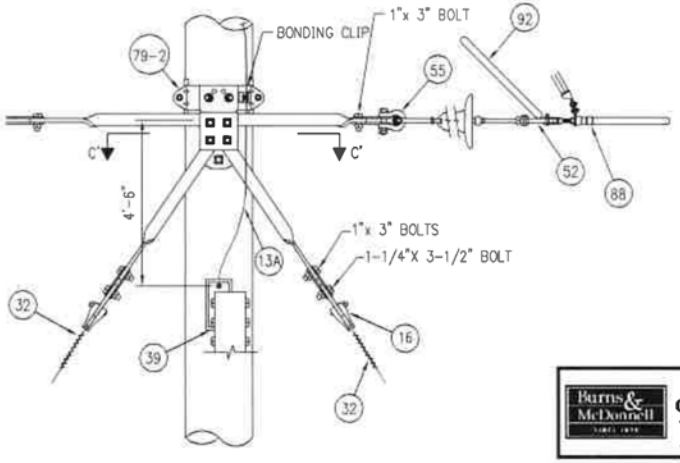
STRAIGHT LINE DEAD END
POLE TOP DETAILS – TIMBER CONNECTIONS
TYPE 'DE1'

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-5.3		1 REV.

FILE: N:\Proj\VE345 WK-NH EPS\cad\STANDARD PLOTS\345KV\345-5.1.dwg 02-01-2006 10:12:09 BMcD







REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	6/14/06	CSM	JRW	REVISED POLE BAND MATERIALS AND RE-ISSUED FOR CONSTRUCTION
0	1/12/05	CSM	JRW	ISSUED FOR CONSTRUCTION

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

VELCO
VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

STRAIGHT LINE DEAD END
POLE TOP DETAILS–COND. & GUY ATTACH.
TYPE 'DE1'

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	6/06 DATE
DATE: 11/05	CHECKED BY: KAW		
DRAWING NUMBER: PLOT: 1=1	345-5.4		2 REV.

FILE: N:\Work\345 KV-WR EF\Cads\STANDARD POLES\345KV\345-5.4.dwg 02-07-2008 11:12 CSM (PMC)

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
1		3	POLE, WOOD		
4		1	CROSSARMS, WOOD, 345KV, LAM, ASSEMBLY 0000530 2 5-1/8"x9"x42'-4"(TYPE D) 0000490 2 5-1/8"x9"x29'-4"(TYPE E)	HUGHES	
9	0203410	3	SPACER FITTING 5-1/8"x9" DBL CROSSARM 14" SEPERATION, ADJUSTABLE	HUGHES	3414.10WV-140
11		4	PLATE, POLE, ARM F/5-1/8"x9" DBL X-ARM, 14" SEPERATION, W/2 7/8" WASHERHEAD BOLTS	HUGHES	A2173-A
12		1220	GUY STRAND, 1/2"EHS-7 STRAND (FT)		
13A		540	BONDING WIRE, #2 COPPER, SOLID (FT)		
13B		70	GROUND WIRE, 7 NO. 8 COPPERWELD, DEAD SOFT ANNEALED (FT)		
14		5	PLATE,POLE EYE,7/8"BOLT,6"BOLT SPCG,SGL EYE, 7/8" PIN	MACLEAN	EPR-77S-7
16	0201520	16	THIMBLE CLEVIS, 20K	MACLEAN	CT-88H
19		8	WASHER, SQ, CURVED, 4"x4",FOR 7/8" BOLT	JOSLYN	P144B
20	0204650	3	WASHER, ROUND, 2" FOR 3/4" BOLT	HUGHES	RW2-70
20A		4	WASHER, ROUND, 3" FOR 7/8" BOLT	HUGHES	RW3-80
21		12	WASHER, RND, 6" FOR 1" ANCHOR ROD	JOSLYN	P85A-1
22		31	WASHER, COIL, DOUBLE SPRING, FOR 7/8" BOLT	HUGHES	SLW2-80
23	0200110	3	WASHER, COIL, DOUBLE SPRING, FOR 3/4" BOLT	HUGHES	SLW2-70
25		3	BOLT, DBL ARM, EYE BOLT, W/2 NUTS, 3/4"xXX"	JOSLYN	J96XX
27		11	BOLT, MACHINE, 7/8"xXX", W/NUT	HUGHES	B8XX
31	0000040	2	PLATE, CROSSARM SPLICE, 345KV, 2'-0" W/2 BOLTS	HUGHES	A1956.1
32	0203860	28	GUY GRIP, DEADEND, GALV, 1/2" BLUE 7W	HELICAL	HG212-1/2
33A		2	CONNECTOR, GROUND CLAMP, BRONZE FOR OPTICAL WIRE SUSPENSION CLAMP, SX-48/33/520	ANDERSON	GTCL-23A
34		2	L-TAP, 3/8" GALV. TO 3/8" GALV.	HELICAL	
34A		1	L-TAP, 3/8" GALV. TO #2 SOLID CU	HELICAL	
35A		3	L-TAP, 1/2" GALV. TO #2 SOLID CU	HELICAL	
36		1	L-TAP, #2 SOLID CU TO #2 SOLID CU	HELICAL	
39		2	BRACE-X ASSEMBLY 345KV 5-1/8"x 7-1/2", 29' POLE SP LAMINATED, INCLUDES TEES AND MTG BOLTS W/ 7/8"xXX" BOLTS	HUGHES	2093K-29-0-CPT
41		4	TURNBUCKLE, CLEVIS-CLEVIS, 3/4"x 9", 28K	HUGHES	AS2545-A
43	0204530	18	CLIP, GRND WIRE BONDING, #2 CU TO 7/8" BOLT	HUGHES	2727.8
44		12	CLAMP, BONDING, GUY-GROUND, FOR #2 CU TO 1/2"-7 STRAND	CHANCE	6484
48	0101850	6	CLAMP, COND, FORMULA, SUSPENSION, 1.2" MAX DIA, 15"L, 23K, W/90° Y-CLEVIS EYE FITTING F/ 954MCM 45/7 ACSR, CORONA FREE	MACLEAN	ACFS-120-15-23-RYCE
50		267	INSULATOR, SUSP, 30K M&E, 5-3/4"x10", BALL & SOCKET, GRAY	LAPP	5960A-70
51		3	PLATE, YOKE, TRI, 18" SPCG, 15/16" HOLES, 40K ULT, 5/8" THICK	MACLEAN	ASM-6229-3
52	0204130	6	PLATE, YOKE, DOGBONE, 18" SPCG, 15/16" HOLES, 40K ULT, 5/8" THICK, GALV. W/CORONA RING MOUNTING HOLES	MACLEAN	M6606-4A
54	0201600	3	OVAL-EYE BALL, GALV, FORGED STEEL, 30K, 3-23/32" LONG	ANDERSON	BE-30
55		12	SHACKLE, ANCHOR, BNK, 80K, 1-1/2" W, W/1" BOLT NUT & COTTER	MACLEAN	ASH-78-BC
56	0206010	3	SHACKLE, ANCHOR, BNK, 35K, W/ 3/4" BOLT NUT & COTTER	ANDERSON	AS-35-BNK
57	0207860	3	SOCKET, CLEVIS, 4-1/2"L, 13/16"W, 2"D, 5/8"P, 30K	MACLEAN	SCL-55B
58		12	SOCKET CLEVIS, HOT LINE, 35K, 10"L	MACLEAN	SCHL-55A
60		12	BALL Y-CLEVIS, HOT LINE, 35K, 10-1/8"L	MACLEAN	YCBHL-65A
65A		2	GROUND ROD, COPPER CLAD, 3/4" X 10'	BLACKBURN	7510
66A		6	EXOTHERMIC WELD, #2 SOLID CU TO 3/4" CU ROD	ERICO/CADWELD	

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
66B		2	EXOTHERMIC WELD, 7 NO. 8 COPPERWELD TO 3/4" CU ROD	ERICO/CADWELD	
67A		60	STAPLE, GROUND WIRE, COPPERCLAD, 1-1/2"x 3/8", ROLLED POINT	CHANCE	9167
70	0202550	6	WEIGHT, HOLD DOWN,150#, W/ HARDWARE, FOR FORMULA CLAMP 954MCM ACSR 45/7	MACLEAN	ASM-389-150
71	0205180	12	ANCHOR, LOG, 8"x8"x8'		
72		12	ANCHOR ROD, 1"x10'-0" LONG, HOT DIP GALV, THIMBLE EYE	CHANCE	5340
73	0205950	12	GUY MARKER, FULL RND, YEL, 84"x 1.5", 3/16-1/2" W/PIGTAIL POLYETHYLENE	CHANCE	84FRPM-YEL
79-2		3	POLE BAND, EXTRA HEAVY DUTY: ASSEMBLY INCLUDES: 4 TWISTED LINKS (#B1784.1A), 4 TWISTED LINKS (#3341.1A), 2 SETS DOUBLE YOKE PLATES (#B1784.1B), 2 SETS DOUBLE YOKE PLATES, (#3341.1B), 2 YOKE PLATES (#3341.1C)	HUGHES	B1784-R4.6
87	0101410	2	DEADEND, ALUM, COMP, W/EYE, 3/8"EHS-7 STRAND	ALCOA	E4514.12
88		12	COMPRESSION DEADEND W/ADJUSTABLE CLEVIS FITTING 954MCM 45/7 ACSR	ALCOA	C43648
89		2	BOLTED DEADEND, OPTICAL WIRE, SX-48/33/520	ALCOA	ODE 47/34520G
89A		2	LINK, EXTENSION, OPTICAL WIRE, 5" C-C	ALCOA	ODELP05
90	0101950	6	SPACER, CONDUCTOR, 18" BUNDLE, 1.141 to 1.196"	PLP	SU-MS-3850
91		3	ANCHOR, POLE, 4-SECTION, W 7/8" xXX" THREADED RODS W/4 NUTS, 4 LOCKNUTS & LAG SCREWS	HUGHES	A1895-3-XX
92	0202770	6	CORONA RING	MACLEAN	ASM-516-5
100		18	NUT, SQUARE, 7/8"	HUGHES	N80
101		18	LOCKNUT, SQUARE, 7/8"	HUGHES	MF80

MATERIAL USED AS REQUIRED

68	0204390	AR	POLE ROOF, NON METALLIC	OSMOSE	70-110-020-016

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

Burns & McDonnell

REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	6/14/06	CSM	JRW	REVISED POLE BAND MATERIALS AND RE-ISSUED FOR CONSTRUCTION
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

STRAIGHT LINE DEAD END
BILL OF MATERIALS
TYPE 'DE1'

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	6/06
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-5.5 PLOT: 1=1			2 REV.

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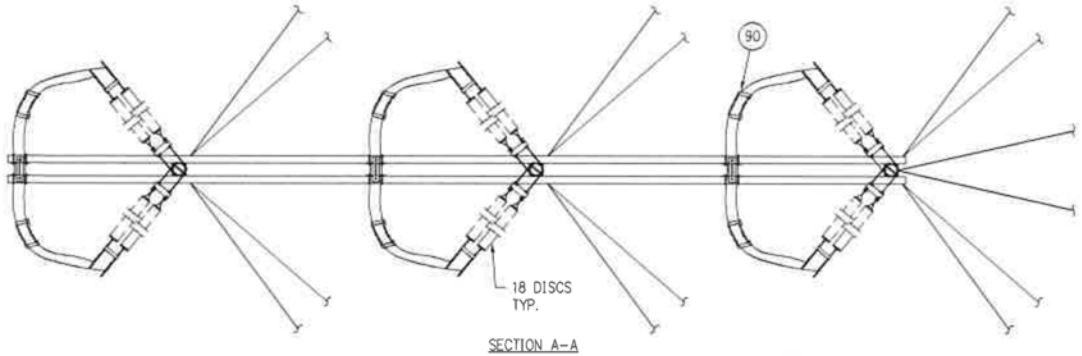
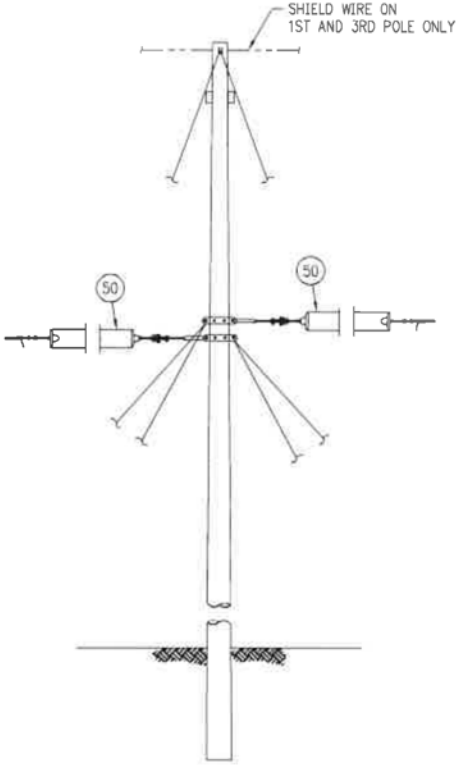
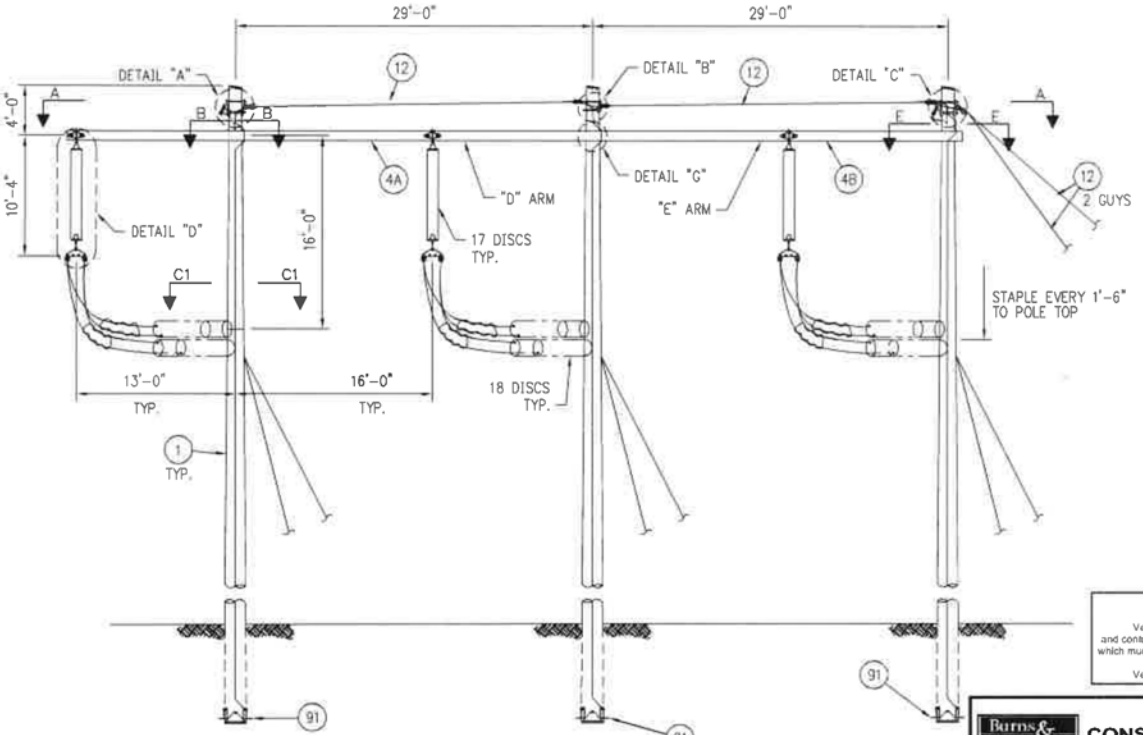
00689



SECTION A-A



SIDE ELEVATION



ELEVATION

FOR ANCHOR AND GUY GROUNDING DETAILS, SEE DWG. #345-10.0 & #345-10.1
FOR POLE GUYING DETAILS, SEE DWG. #345-10.2
FOR GROUNDING DETAILS, SEE DWG. #345-11.0
FOR FOUNDATION DETAILS, SEE DWG. #345-FDN-1 THRU FDN-4

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	12/12/05	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT

WEST RUTLAND - NEW HAVEN 345 KV

ANGLE DEAD END STRUCTURE TYPE 'DE2' (7° TO 55°)

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-6.0	PLOT: 1=1		1 REV.

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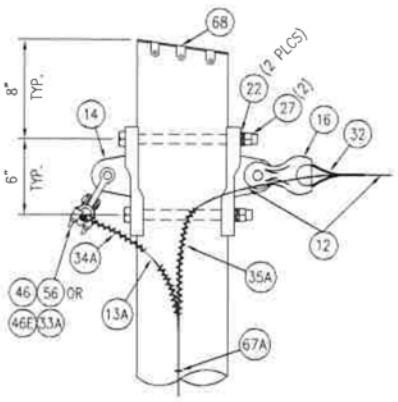
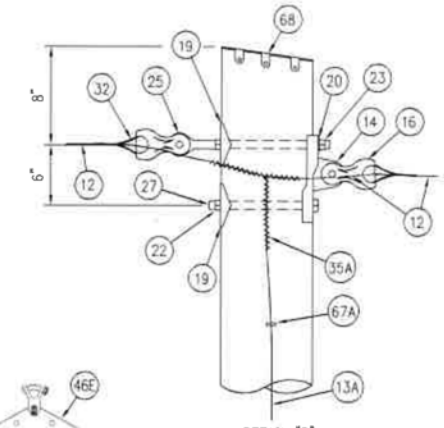
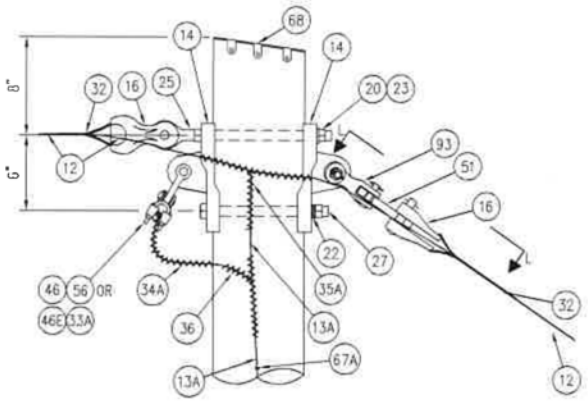
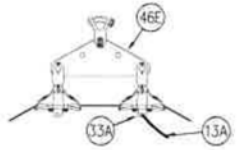
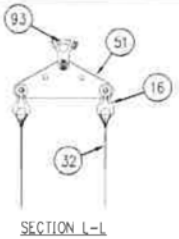
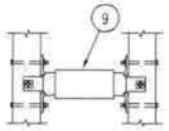


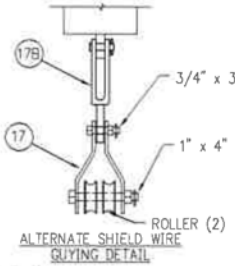


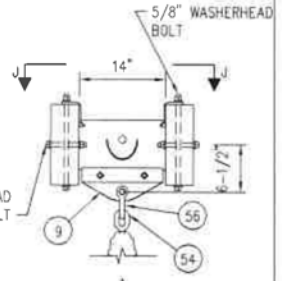


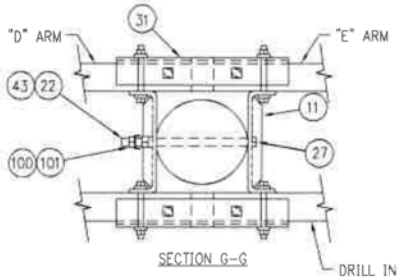


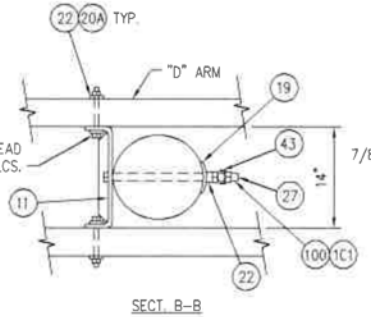


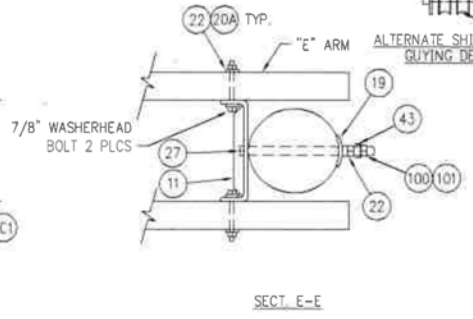


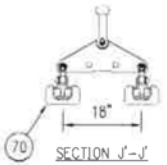


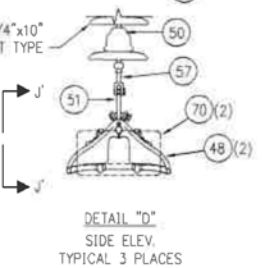


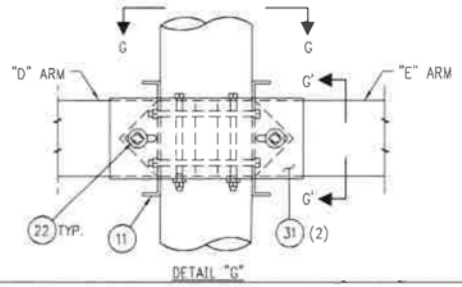


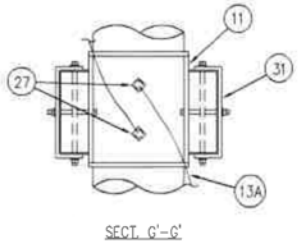












REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	6/27/06	CSM	JRW	ADDED CLEVIS EYE EXTENSION LINK AND RE-ISSUED FOR CONSTRUCTION
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

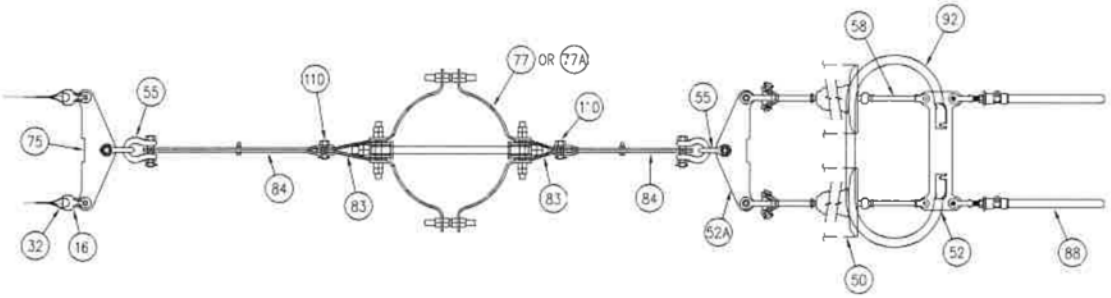
VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

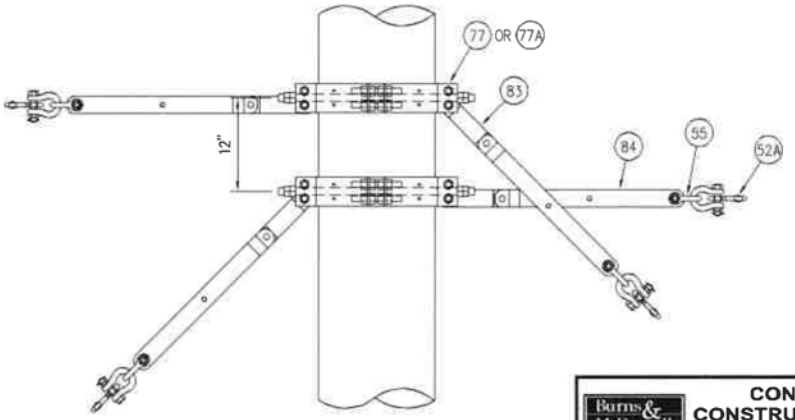
ANGLE DEAD END POLE TOP DETAILS TYPE 'DE2' (7' TO 55')

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	6/06 DATE
DATE: 11/05	CHECKED BY: KAW		
DRAWING NUMBER: 345-6.1 PLOT: 1=1			2 REV.

FILE: N:\Velco\JOBS\345 KV LINE\Cad\STANDARD PLOTS\345KVA345-E1.dwg 02-07-2006 13:12:09 BMcD



SECTION C1-C1



CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	6/14/06	CSM	JRW	REVISED SECTION C1-C1 AND RE-ISSUED FOR CONSTRUCTION
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

ANGLE DEAD END
POLE TOP DETAILS–COND. & GUY ATTACH.
TYPE 'DE2' (7' TO 55')

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	6/06 DATE
DATE: 11/05	CHECKED BY: KAW		
DRAWING NUMBER: 345-6.2 PLOT: Q			2 REV.

FILE: N:\Work\345 MH-NH EPS\cad\STANDARD POLES\345KV\345-6.2.dwg 02-01-2006 11:12 (DW BMcD)

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
1		3	POLE, WOOD		
4		1	CROSSARM, WOOD, 345KV, LAM, ASSEMBLY 0000530 2 5-1/8"x9"x42'-4"(TYPE D) 0000490 2 5-1/8"x9"x29'-4"(TYPE E)	HUGHES	
9	0203410	3	SPACER FITTING 5-1/8"x9" DBL CROSSARM, 14" SEPERATION, ADJUSTABLE	HUGHES	3414.10WV-140
11		4	PLATE, POLE, ARM F/5-1/8"x9" DBL X-ARM, 14" SEPERATION, W/2 7/8" WASHERHEAD BOLTS	HUGHES	A2173-A
12		1500	GUY STRAND, 1/2"EHS-7 STRAND (FT)		
13A		470	BONDING WIRE, #2 COPPER, SOLID (FT)		
14		5	PLATE,POLE EYE, 7/8"BOLT,6"BOLT SP,SGL EYE,7/8" PIN	MACLEAN	EPR-77S-7
16	0201520	18	THIMBLE CLEVIS, 20K	MACLEAN	CT-88H
19		6	WASHER, SQ, CURVED, 4"x4",FOR 7/8" BOLT	JOSLYN	P144B
20	0204650	2	WASHER, ROUND, 2", FOR 3/4" BOLT	HUGHES	RW2-70
20A		4	WASHER, ROUND, 3", FOR 7/8" BOLT	HUGHES	RW3-80
21		14	WASHER RND 6" FOR 1" ANCHOR ROD	JOSLYN	P65A-1
22		18	WASHER, COIL, DOUBLE SPRING, FOR/7/8" BOLT	HUGHES	SLW2-80
23	0200110	2	WASHER, COIL, DOUBLE SPRING, FOR/3/4" BOLT	HUGHES	SLW2-70
25		2	BOLT, DBL ARM, EYE BOLT, W/2 NUTS, 3/4"xXX"	JOSLYN	J96XX
27		10	BOLT, MACHINE, 7/8"xXX", W/NUT	HUGHES	B8XX
31	0000040	2	PLATE, CROSSARM SPLICE, 345KV, 2'-0", W/2 BOLTS	HUGHES	A1956.1
32	0203860	32	GUY GRIP, DEADEND, GALV, 1/2" BLUE 7W	HELICAL	HG212-1/2
33A		1	CONNECTOR, GROUND CLAMP, BRONZE FOR OPTICAL WIRE SUSPENSION CLAMP, SX-48/33/520	ANDERSON	GTCL-23A
34A		2	L-TAP, 3/8" GALV. TO #2 SOLID CU	HELICAL	
35A		3	L-TAP, 1/2" GALV. TO #2 SOLID CU	HELICAL	
36		1	L-TAP, #2 SOLID CU TO #2 SOLID CU	HELICAL	
43	0204530	6	CLIP, GRND WIRE BONDING, #2 CU TO 7/8" BOLT	HUGHES	2727.8
44		14	CLAMP, BONDING, GUY-GROUND, FOR #2 CU TO 1/2"-7 STRAND	CHANCE	6484
46	0100050	1	CLAMP, SHIELD WIRE, SUSP. 3/8"EHS-7 STRAND (.20-.46) W/O FITTING	MACLEAN	FS-46-N
46E		1	CLAMP ASSEMBLY, OPTICAL WIRE, DBL. SUSP. W/2 CLEVIS EYE, 1 YOKE PLATE, 1 Y-CLEVIS CLEVIS, SX-48/33/520	ALCOA	OSPSS4 ACFS-120-15-23-RYCE
48	0101850	6	CLAMP, COND, FORMULA, SUSPENSION, 1.2"MAX DIA, 15"L, 23K, W/90° Y-CLEVIS EYE FITTING F/ 954MCM 45/7 ACSR, CORONA FREE	MACLEAN	
50		267	INSULATOR, SUSP, 30K M&E, 5-3/4"x10", BALL & SOCKET, GRAY	LAPP	5960A-70
51		4	PLATE, YOKE, TRI, 18" SPCG, 15/16" HOLES, 40K ULT, 5/8" THICK	MACLEAN	ASM-6229-3
52	0204130	6	PLATE, YOKE, DOGBONE, 18" SPCG, 15/16" HOLES, 40K ULT, 5/8" THICK, GALV. W/CORONA RING	MACLEAN	M6606-4A
52A		6	MOUNTING HOLES YOKE PLATE TRI 18" SP 1-1/16" HOLES, 50K ULT, 3/4" THICK	HUBBELL	YPD-50-18549-1
54	0201600	3	OVAL-EYE BALL, GALV, FORGED STEEL, 30K,	ANDERSON	BE-30
55		24	3-23/32" LONG SHACKLE, ANCHOR, BNK, 80K 1-1/2" W, W/1"	MACLEAN	ASH-78-BC
56	0206010	4	BOLT, NUT COTTER SHACKLE, ANCHOR, BNK, 35K, W/ 3/4" BOLT NUT	ANDERSON	AS-35-BNK
57	0207860	3	& COTTER KEY SOCKET, CLEVIS, 4-1/2" L, 13/16"W, 2"D, 5/8" P, 30K	MACLEAN	SCL-55B
58		12	SOCKET CLEVIS, HOT LINE, 35K, 10" L	MACLEAN	SCHL-55A
60		12	BALL Y-CLEVIS, HOT LINE, 35K, 10-1/8" L	MACLEAN	YCBHL-65A
65A		2	GROUND ROD, COPPER CLAD, 3/4" X 10'	BLACKBURN	7510
66A		2	EXOTHERMIC WELD, #2 SOLID CU TO 3/4" CU ROD	ERICO/CADWELD	
67A		60	STAPLE, GROUND WIRE, COPPERCLAD, 1-1/2"x3/8", ROLLED POINT	CHANCE	9167
70	0202550	6	WEIGHT, HOLD DOWN,150#, W/ HARDWARE, FOR FORMULA CLAMP 954MCM ACSR 45/7	MACLEAN	ASM-389-150
71	0205180	14	ANCHOR, LOG, 8"x8"x8'		

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
72		14	ANCHOR ROD, 1"x10'-0" LONG, HOT DIP GALV, THIMBLE EYE	CHANCE	5340
73	0205950	14	GUY MARKER, FULL RND, YEL, 84"x 1.5", 3/16-1/2" W/PIGTAIL POLYETHYLENE	CHANCE	B4FRPM-YEL
75		6	PLATE, YOKE, TRI, GUYING, 3/4" THICK, 50K	HUGHES	3341.1C
77		AR	POLE BAND, HEAVY DUTY FOR 15"-19" DIA. POLES	HUGHES	3112.8
77A		AR	POLE BAND, HEAVY DUTY FOR 17"-21" DIA. POLES	HUGHES	3112.9
83		12	CONNECTING LINK 45K PAIR	HUGHES	3157
84		12	LINK CLEVIS, GUYING AND CONDUCTOR	HUGHES	1906-24
88		12	COMPRESSION DEADEND W/ADJUSTABLE CLEVIS	ALCOA	C43648
90	0101950	6	FITTING 954MCM 45/7 ACSR SPACER, CONDUCTOR, 18" BUNDLE, 1.141 to 1.196"	PLP	SU-MS-3850
91		3	ANCHOR, POLE, 4-SECTION, W/ 7/8"xXX" THREADED RODS, W/4 NUTS, 4 LOCKNUTS & LAG SCREWS	HUGHES	A1895-3-XX
92	0202770	6	CORONA RING	MACLEAN	ASM-516-5
93		1	CLEVIS, Y-CLEVIS, 90° TWIST, 30K	ANDERSON	YCC-30-90
100		6	NUT, SQUARE, 7/8"	HUGHES	N80
101		6	LOCKNUT, SQUARE, 7/8"	HUGHES	MF80
110		12	1"x4" HIGH STRENGTH BOLT W/COTTOR PIN	HUGHES	AB104-1-4/4D
			MATERIAL REQUIRED FOR ALTERNATE SHIELD WIRE GUYING		
17	0203470	1	PLATE, GUY, DBL, ASSEMBLY, INCLUDES: 2 LINKS (#3157); 2 ROLLERS (#28083); 1 BOLT 3/4"x3" BNK; 1 BOLT 1"x4" BNK.	HUGHES	
17B		1	CLEVIS, EYE, EXTENSION LINK	ANDERSON	CEEL-093-06.5
			MATERIAL USED AS REQUIRED		
68	0204390	AR	POLE ROOF, NON METALLIC	OSMOSE	70-110-020-016

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	6/27/06	CSM	JRW	ADDED MARK 17B, REVISED DEADEND ASSBLY MATS AND RE-ISSUED FOR CONSTRUCTION
0	3/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO
VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

ANGLE DEAD END
BILL OF MATERIALS
TYPE 'DE2' (7° TO 55°)

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	6/06
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-6.3 PLOT: 1=1			2 REV.

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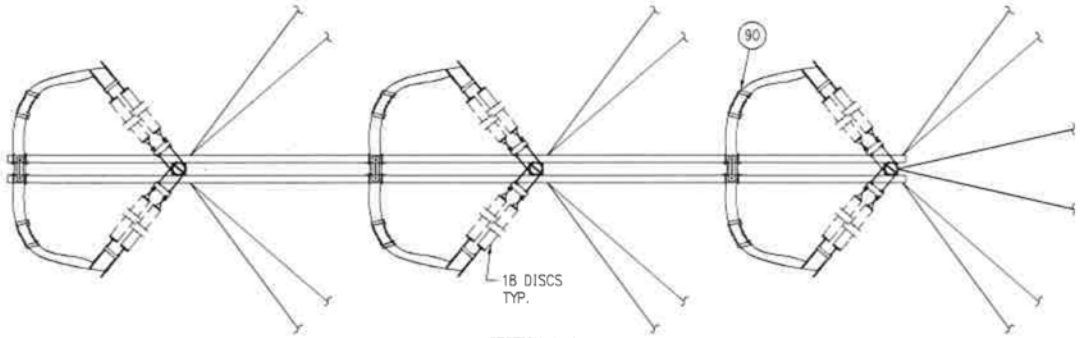
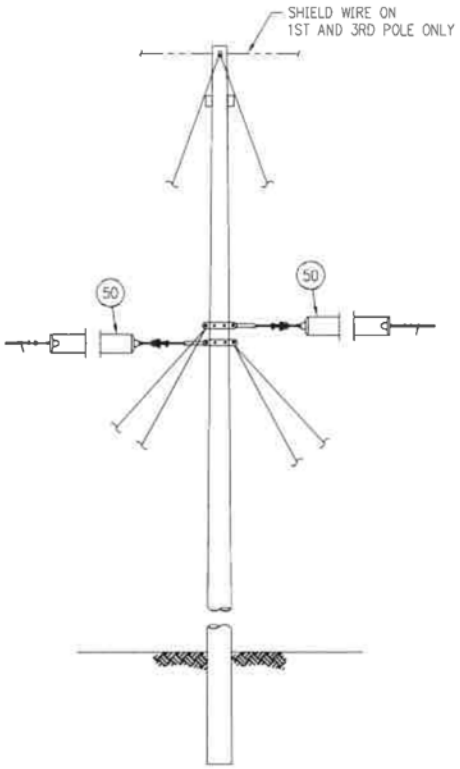
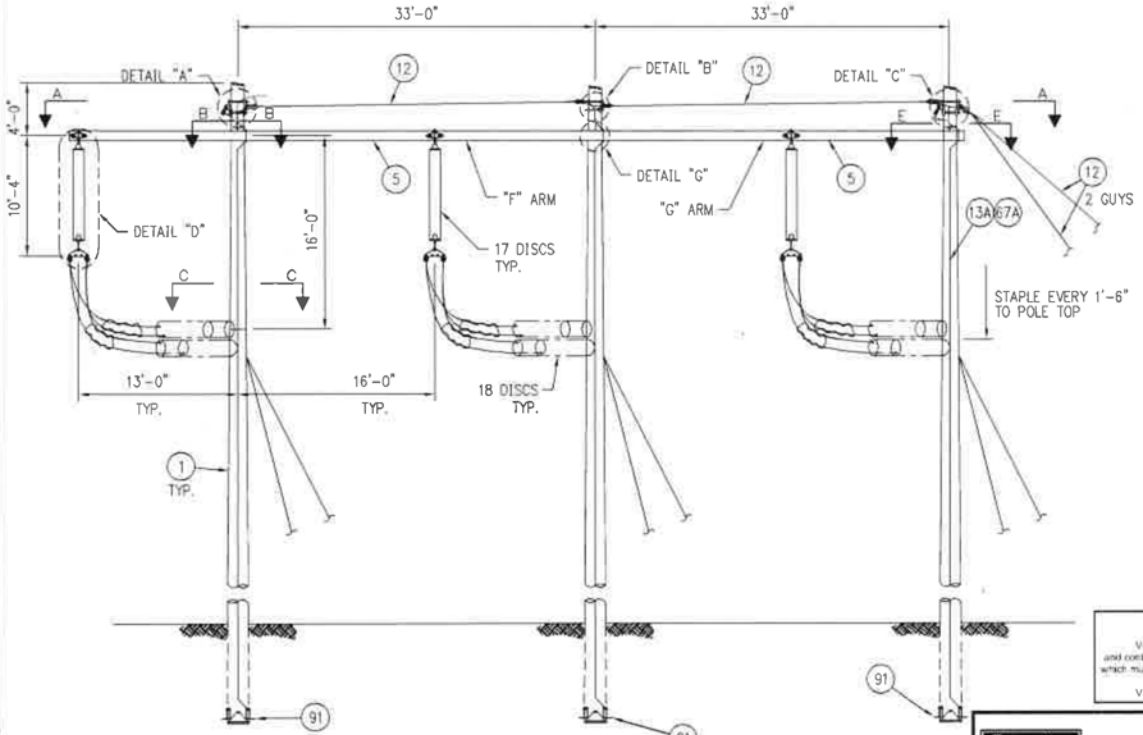


SECTION A-A



SIDE ELEVATION



ELEVATION

FOR ANCHOR AND GUY GROUNDING DETAILS, SEE DWG. #345-10.0 & #345-10.1
FOR POLE GUYING DETAILS, SEE DWG. #345-10.2
FOR GROUNDING DETAILS, SEE DWG. #345-11.0
FOR FOUNDATION DETAILS, SEE DWG. #345-FDN-1 THRU FDN-4

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

ANGLE DEAD END STRUCTURE TYPE 'DE3' (55° TO 75°)

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-7.0 PLOT: 1=1			1 REV.

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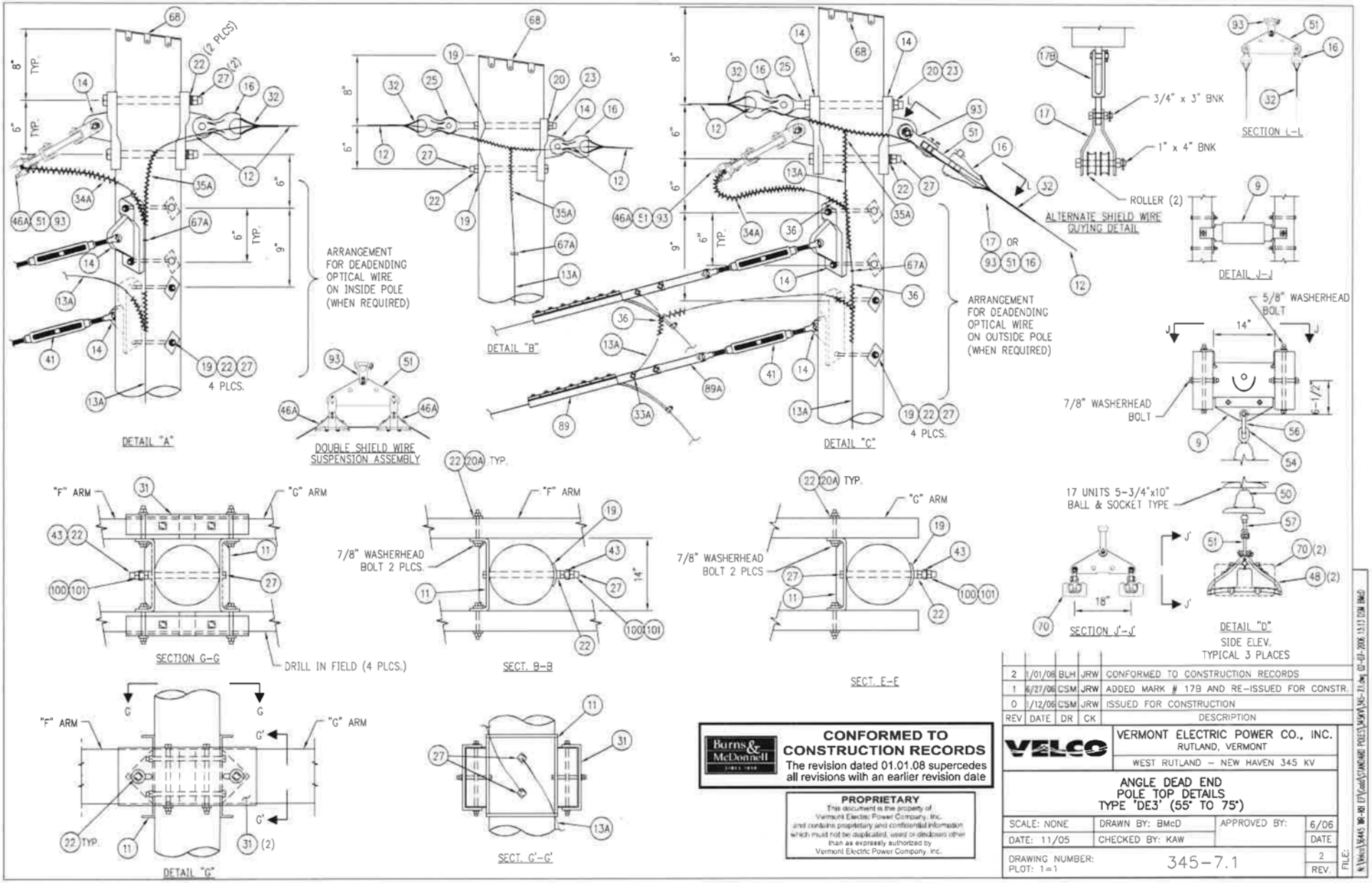

REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	6/27/06	CSM	JRW	ADDED MARK # 17B AND RE-ISSUED FOR CONSTR.
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

VELCO — VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

ANGLE DEAD END POLE TOP DETAILS TYPE "DE3" (55° TO 75°)

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	6/06
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-7.1		2 REV.

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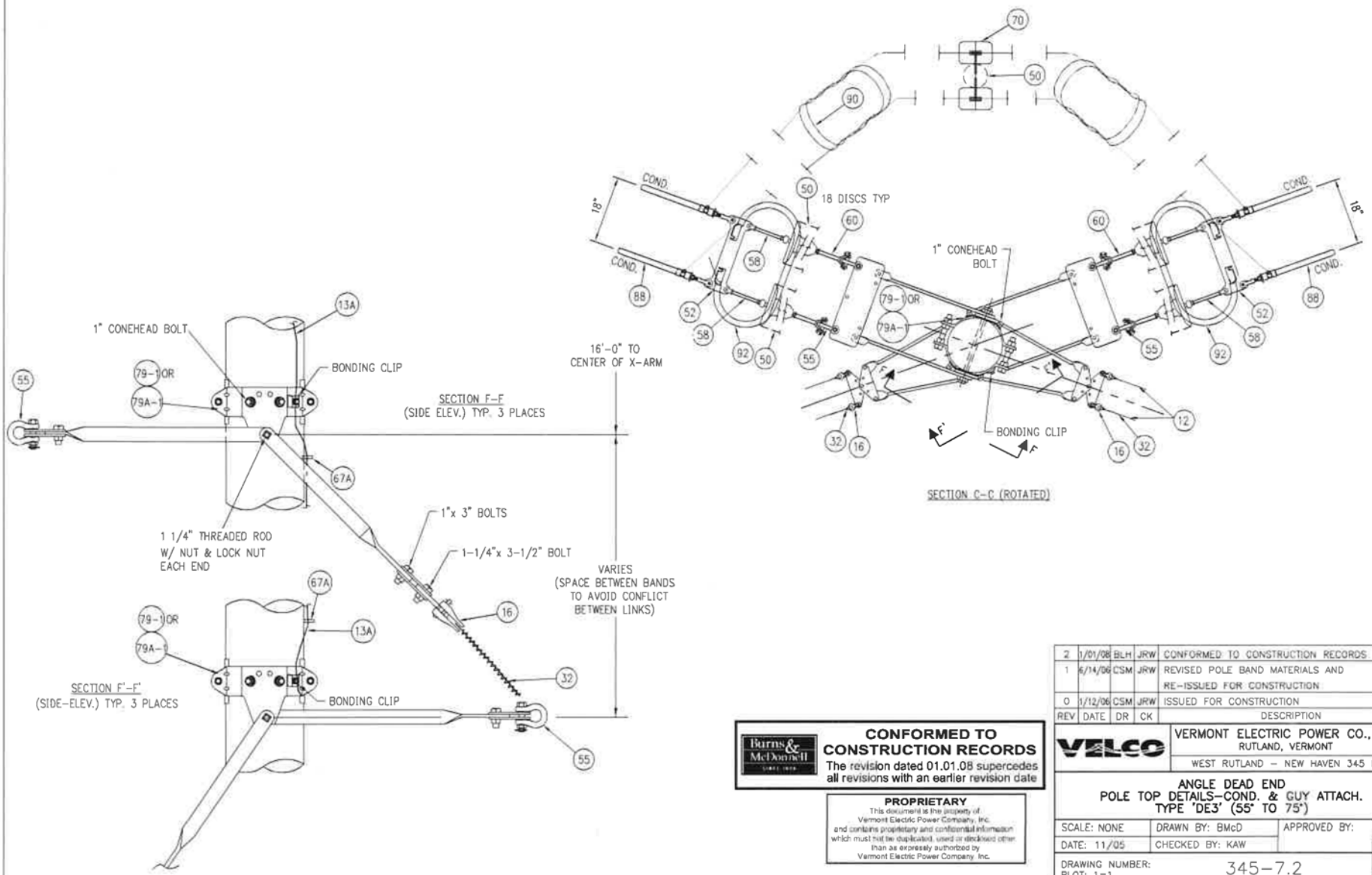


REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	6/14/06	CSM	JRW	REVISED POLE BAND MATERIALS AND RE-ISSUED FOR CONSTRUCTION
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

VELCO
VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

ANGLE DEAD END POLE TOP DETAILS–COND. & GUY ATTACH. TYPE 'DE3' (55° TO 75°)

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	6/06 DATE
DATE: 11/05	CHECKED BY: KAW		
DRAWING NUMBER: PLOT: 1=1	345–7.2		2 REV.

FILE: S:\Velco\345 kV-WR EPV\cad\STANDARD PLOTS\345KV_345-7.2.dwg 02-01-2008 13:13 (DW Mod)

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURE	CATALOG NUMBER
1		3	POLE, WOOD		
5	0000480	1	CROSSARM, WOOD, 345KV, LAM, ASSEMBLY (2 5-1/8"x9"x46'-4"(TYPE F) 2 5-1/8"x9"x33'-4"(TYPE G)	HUGHES	
9	0203410	3	SPACER FITTING 5-1/8"x9" DBL CROSSARM, 14" SEPERATION, ADJUSTABLE	HUGHES	3414.10WV-140
11		4	PLATE, POLE, ARM F/5-1/8"x9" DBL X-ARM, 14" SEPERATION, W/2 7/8" WASHERHEAD BOLTS	HUGHES	A2173-A
12		1500	GUY STRAND, 1/2"EHS-7 STRAND (FT)		
13A		470	BONDING WIRE, #2 COPPER, SOLID (FT)		
14		7	PLATE,POLE EYE,7/8"BOLT,6"BOLT SP,SGL EYE,7/8" PIN	MACLEAN	EPR-77S-7
16	0201520	18	THIMBLE CLEVIS, 20K	MACLEAN	CT-88H
19		10	WASHER, SQ, CURVED, 4"x4" FOR 7/8" BOLT	JOSLYN	P144B
20	0204650	2	WASHER, ROUND, 2", FOR 3/4" BOLT	HUGHES	RW2-70
20A		4	WASHER, ROUND, 3", FOR 7/8" BOLT	HUGHES	RW3-80
21		14	WASHER RND 6" FOR 1" ANCHOR ROD	JOSLYN	P85A-1
22		22	WASHER, COIL, DOUBLE SPRING, FOR/7/8" BOLT	HUGHES	SLW2-80
23	0200110	2	WASHER, COIL, DOUBLE SPRING, FOR/3/4" BOLT	HUGHES	SLW2-70
25		2	BOLT, DBL ARM, EYE BOLT, W/2 NUTS, 3/4"xXX"	JOSLYN	J96XX
27		14	BOLT, MACHINE, 7/8"xXX", W/NUT	HUGHES	B8XX
31	0000040	2	PLATE, CROSSARM SPLICE, 345KV 2'-0", W/2 BOLTS	HUGHES	A1956.1
32	0203860	32	GUY GRIP, DEADEND, GALV, 1/2" BLUE 7W	HELICAL	HG212-1/2
33A		2	CONNECTOR, GROUND CLAMP, BRONZE FOR OPTICAL WIRE SUSPENSION CLAMP, SX-48/33/520	ANDERSON	GTCL-23A
34A		1	L-TAP, 3/8" GALV. TO #2 SOLID CU	HELICAL	
35A		3	L-TAP, 1/2" GALV. TO #2 SOLID CU	HELICAL	
36		2	L-TAP, #2 SOLID CU TO #2 SOLID CU	HELICAL	
41		2	TURNBUCKLE, CLEVIS-CLEVIS, 3/4" x 9", 28K	HUGHES	AS2545-A
43	0204530	6	CLIP, GRND WIRE BONDING, #2 CU TO 7/8" BOLT	HUGHES	2727.8
44		14	CLAMP, BONDING, GUY-GROUND, FOR #2 CU TO 1/2"-7 STRAND	CHANCE	6484
46A		2	CLAMP, SHIELD WIRE, SUSP. W/ CLEVIS EYE 3/8"EHS-7 STRAND	MACLEAN	FS-46-C
48	0101850	6	CLAMP, COND, FORMULA, SUSPENSION, 1.2"MAX DIA, 15"L, 23K, W/90° Y-CLEVIS EYE FITTING F/ 954MCM 45/7ACSR CORONA FREE	MACLEAN	ACFS-120-15-23-RYCE
50		267	INSULATOR, SUSP, 30K M&E, 5-3/4"x10", BALL & SOCKET, GRAY	LAPP	5960A-70
51		5	PLATE, YOKE, TRI, 18" SPCG, 15/16" HOLES, 40K ULT, 5/8" THICK	MACLEAN	ASM-6229-3
52	0204130	6	PLATE, YOKE, DOGBONE, 18" SPCG, 15/16" HOLES, 40K LT, 5/8" THICK, GALV. W/CORONA RING	MACLEAN	M6606-4A
54	0201600	3	MOUNTING HOLES OVAL-EYE BALL, GALV, FORGED STEEL, 30K,	ANDERSON	BE-30
55		12	3-23/32" LONG SHACKLE, ANCHOR, BNK, 80K, 1-1/2" W, W/1"	MACLEAN	ASH-78-BC
56	0206010	5	BOLT NUT & COTTER SHACKLE, ANCHOR, BNK, 35K, W/ 3/4" BOLT NUT	ANDERSON	AS-35-BNK
57	0207860	3	& COTTER KEY SOCKET, CLEVIS, 4-1/2" L, 13/16"W, 2"D, 5/8"P, 30K	MACLEAN	SCL-55B
58		12	SOCKET CLEVIS, HOT LINE, 35K, 10"L	MACLEAN	SCHL-55A
60		12	BALL Y-CLEVIS, HOT LINE, 35K, 10-1/8"L	MACLEAN	YCBHL-65A
65A		2	GROUND ROD, COPPER CLAD, 3/4" X 10'	BLACKBURN	7510
66A		2	EXOTHERMIC WELD, #2 SOLID CU TO 3/4" CU ROD	ERICO/CADWELD	
67A		60	STAPLE, GROUND WIRE, COPPERCLAD, 1-1/2"x3/8", ROLLED POINT	CHANCE	9167
70	0202550	6	WEIGHT, HOLD DOWN,150#, W/ HARDWARE, FOR FORMULA CLAMP 954kCM ACSR 45/7,	MACLEAN	ASM-389-150
71	0205180	14	ANCHOR, LOG, 8"x8"x8'		
72		14	ANCHOR ROD, 1"x10'-0" LONG, HOT DIP GALV, THIMBLE EYE	CHANCE	5340

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURE	CATALOG NUMBER
73	0205950	14	GUY MARKER, FULL RND, YEL, 84"x 1.5", 3/16-1/2" W/PIGTAIL POLYETHYLENE	CHANCE	84FRPM-YEL
79-1		AR	POLE BAND, EXTRA HEAVY DUTY (SPECIAL NO. 3340 POLE BAND), ASSEMBLY INCLUDES: 1 BONDING CLIP (#2727.8) W/LOCK NUT, 2 TWISTED LINKS (#B1784.1A), 2 TWISTED LINKS (#3341.1A), 1 DOUBLE YOKE PLATE (#3341.1B), 1 YOKE PLATE (#3341.1C), 1 DOUBLE YOKE PLATE (B1784.1B) (POLE DIA. 12"-17")	HUGHES	B1784-A.6
79A-1		AR	POLE BAND, EXTRA HEAVY DUTY (SPECIAL NO. 3340 POLE BAND), ASSEMBLY INCLUDES: 1 BONDING CLIP (#2727.8) W/LOCK NUT, 2 TWISTED LINKS (#B1784.1A), 2 TWISTED LINKS (#3341.1A), 1 DOUBLE YOKE PLATE (#3341.1B), 1 YOKE PLATE (#3341.1C), 1 DOUBLE YOKE PLATE (B1784.1B) (POLE DIA. 17"-21")	HUGHES	B1784-A.7
88		12	COMPRESSION DEADEND W/ADJUSTABLE CLEVIS FITTING 954MCM45/7ACSR	ALCOA	C43648
89		2	BOLTED DEAD END, OPTICAL WIRE, SX-48/33/520	ALCOA	ODE47/34/520
89A		2	LINK EXTENSION, OPTICAL WIRE, 5" C-C	ALCOA	ODELP05
90	0101950	6	SPACER, CONDUCTOR, 18" BUNDLE, 1.141 to 1.196"	PLP	SU-MS-3850
91		3	ANCHOR POLE, 4-SECTION, W/ 7/8"xXX" THREADED RODS, W/ 4 NUTS, 4 LOCKNUTS & LAG SCREWS	HUGHES	A1895-3-XX
92	0202770	6	CORONA RING	MACLEAN	ASM-516-5
93		2	CLEVIS Y-CLEVIS, 90° TWIST, 30K	ANDERSON	YCC-30-90
100		6	NUT, SQUARE, 7/8"	HUGHES	N80
101		6	LOCKNUT, SQUARE, 7/8"	HUGHES	MF80

MATERIAL REQUIRED FOR ALTERNATE SHIELD WIRE GUYING

17	0203470	1	PLATE, GUY, DBL, ASSEMBLY, INCLUDES: 2 LINKS (#3157); 2 ROLLERS (#28083); 1 BOLT 3/4"x3" BNK; 1 BOLT 1"x4" BNK		
17B		1	CLEVIS, EYE, ESTENSION LINK	ANDERSON	CEEL-093-06.5

MATERIAL USED AS REQUIRED

68	0204390	AR	POLE ROOF, NON METALLIC	OSMOSE	70-110-020-016

REV	DATE	DR	CK	DESCRIPTION
2	1/01/08	BLH	JRW	CONFORMED TO CONSTRUCTION RECORDS
1	6/27/06	CSM	JRW	ADDED MARK 17B, REVISED QTY FOR MARK 19, REVISED MATERIAL FOR MARK 20A , UPDATED BAND MATERIALS AND RE-ISSUED FOR CONSTR.
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS

The revision dated 01.01.08 supercedes all revisions with an earlier revision date

VELCO

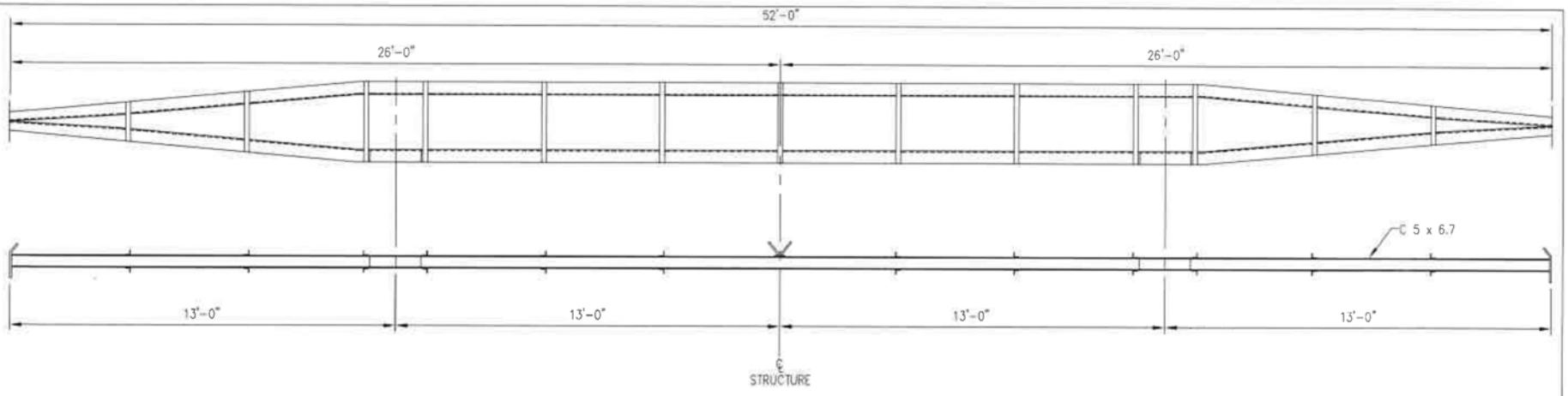
VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT

WEST RUTLAND – NEW HAVEN 345 KV

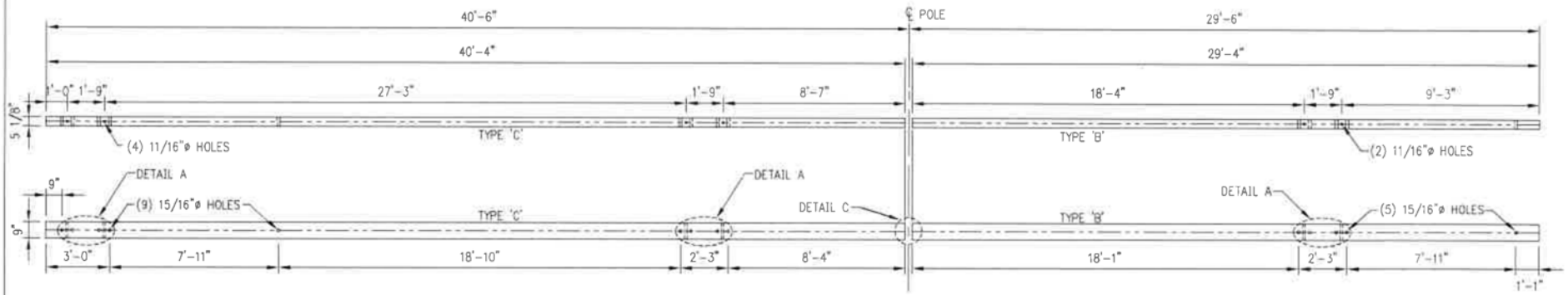
ANGLE DEAD END BILL OF MATERIALS TYPE 'DE3' (55° TO 75°)

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-7.3 PLOT: 1=1			2 REV.

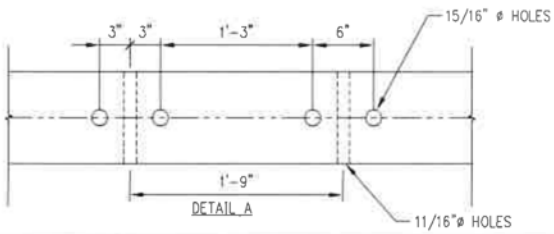
FILE: N:\Proj\345 MK-III-B\Dgn\345-7.3.dgn 02-07-2008 11:11:09 BMcD

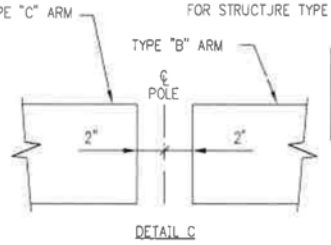


CROSSARM TYPE 'A' (A588 WEATHERING STEEL)
FOR STRUCTURE TYPE 'A' (DWG. #345-1.0)



CROSSARM TYPE 'C' & 'B'
FOR STRUCTJRE TYPE 'SA1' (DWG. #345-2.0)





Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	JAH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

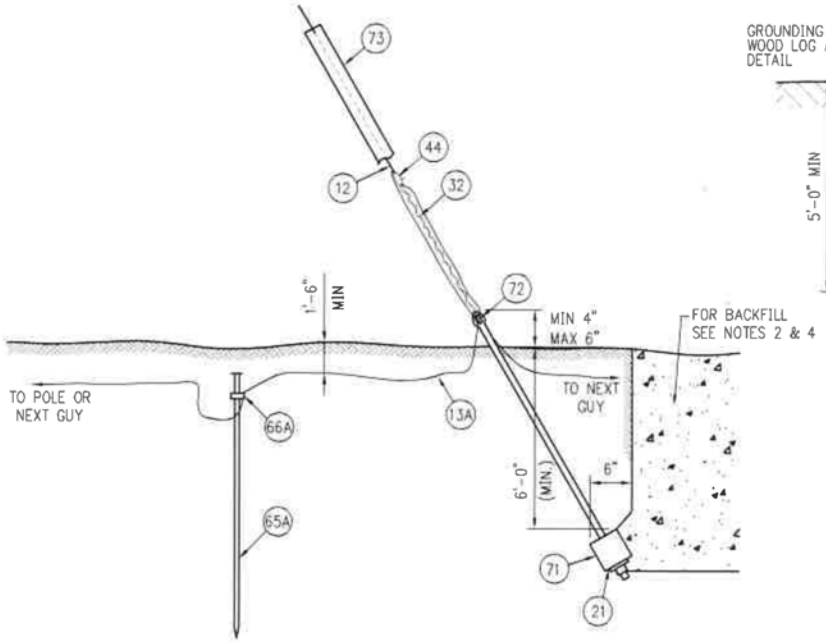
VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

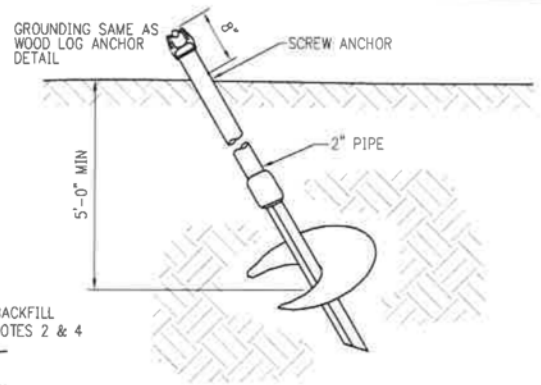
CROSSARM DETAILS

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-9.0		1 REV.

FILE: DWG 11x17 2006-07-20 C:\VAULT\345 kV\DRAWINGS\345-09-0.dwg

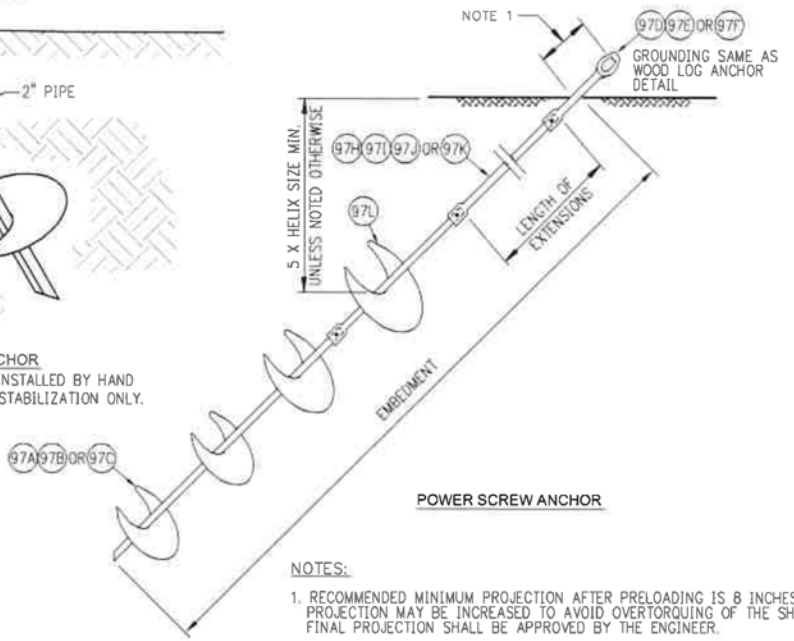


WOOD LOG ANCHOR



SWAMP ANCHOR

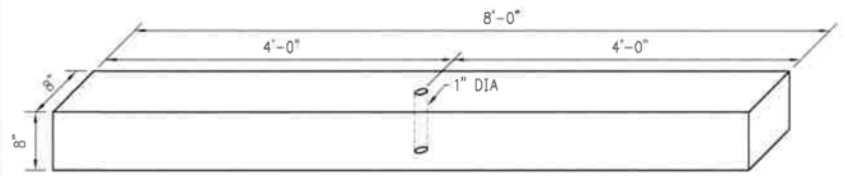
SWAMP ANCHORS TO BE INSTALLED BY HAND
& USED FOR STRUCTURE STABILIZATION ONLY.



POWER SCREW ANCHOR

NOTES:

1. RECOMMENDED MINIMUM PROJECTION AFTER PRELOADING IS 8 INCHES. PROJECTION MAY BE INCREASED TO AVOID OVERTORQUING OF THE SHAFT. FINAL PROJECTION SHALL BE APPROVED BY THE ENGINEER.
2. CONTRACTOR SHALL INSTALL SCREW ANCHORS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.



8" x 8" x 8'-0" (71)

NOTES:

1. FOR INDIVIDUAL STRUCTURE GUYING AND GROUNDING DETAILS, SEE DRAWINGS #345-10.2 AND #345-11.0
2. SET ANCHOR LOG FIRMLY AGAINST UNDERCUT SOIL AND COMPACT IN 8" LIFTS TO 90% OF SURROUNDING EARTH.
3. WHEN BACKFILLING ANCHOR HOLES, A 1000 LB TENSION SHALL BE MAINTAINED ON ANCHOR ROD DURING BACKFILLING OPERATION.
4. BACKFILL IN AREAS OF SOFT EARTH SHALL BE FRACTURED ROCK 6" OR OVER.
5. WHEREVER POSSIBLE, THE GROUND WIRE SHALL BE MADE CONTINUOUS THRU JOINTS.

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS

The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	JAH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

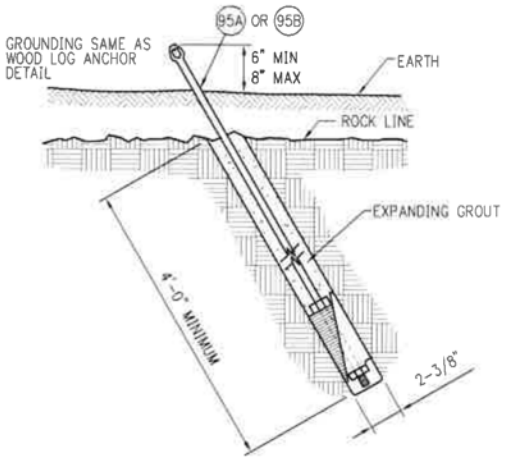
VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345

ANCHOR AND GUY GROUNDING DETAILS

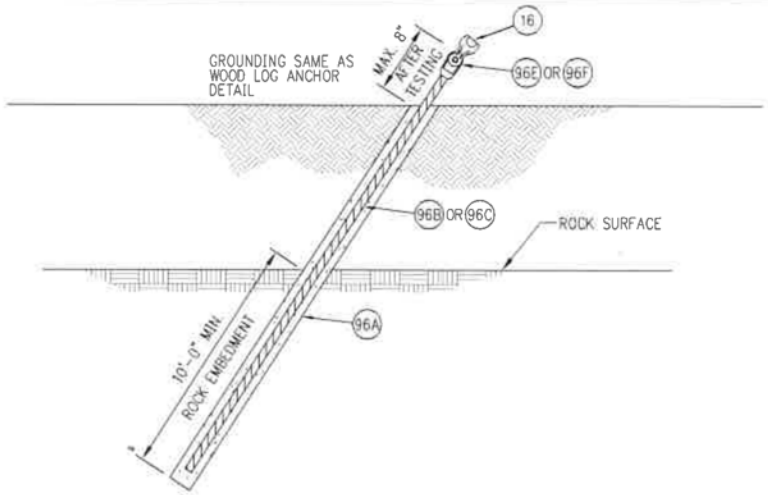
SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-10.0 PLOT: 1=1			1 REV.

FILE: N:\Velco\345kV BF-HH EPC\cad\STANDARD POLES\345kV\345-10.0.dwg 09-20-2005 16:27:6



EXPANDING ROCK ANCHOR

NOTES:
1. ROCK ANCHORS TO BE INSTALLED BY TWO MEN & A 4' BAR MINIMUM.
2. ALL GROUT TO BE FRESHLY MIXED APPROVED EXPANDING GROUT.
3. ALL GROUT INSTALLATION TO BE THOROUGHLY RODDED TO PREVENT VOIDS.



GROUTED ROCK ANCHOR

NOTES:
1. ANCHOR CAPACITY FOR ROCK ANCHORS WITH #6 REBAR AND #8 REBAR ARE 20 AND 40 KIPS RESPECTIVELY.
2. DRILL HOLE DIAMETER TO BE DETERMINED BY CONTRACTOR. MINIMUM BOND AREA FOR #6 REBAR AND #8 REBAR SHALL BE 10 SQUARE FEET AND 20 SQUARE FEET RESPECTIVELY.
3. ALL-THREAD RODS AND GROUT SHALL BE INSTALLED PER MANUFACTURES RECOMMENDATION.
4. WILLIAMS FORM CONTACT INFO.
   WILLIAMS FORM ENGINEERING CORP.
   280 ANN STREET
   GRAND RAPIDS, MI 49504
   PHONE : (616) 365-9220

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	JAH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

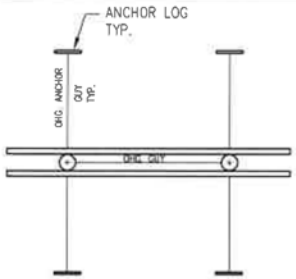
VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345KV

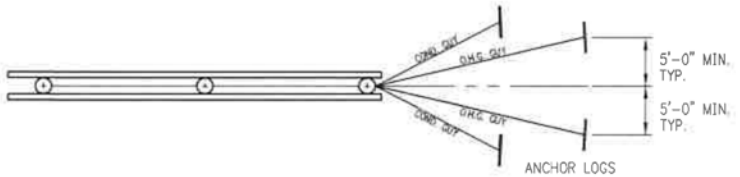
ROCK ANCHOR DETAILS

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-10.1		1 REV.

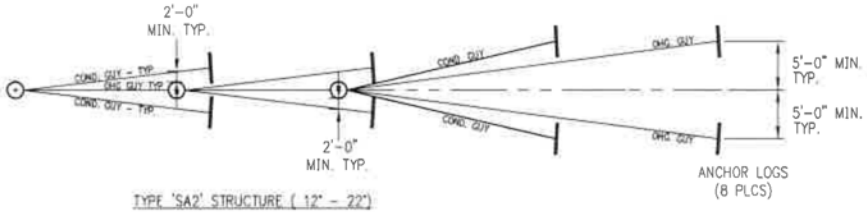
FILE: K:\Work\345KV WO-HV EPV\cad\STANDARD PDFS\345KV\345-10.1.dwg 09-20-2005 15:27 6



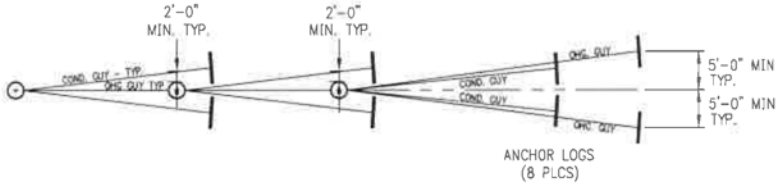
TYPE 'A' STRUCTURE (TANGENT)
WITH DEAD-END SHIELD WIRE



TYPE 'SA1' STRUCTURE (2 1/2° - 12°)

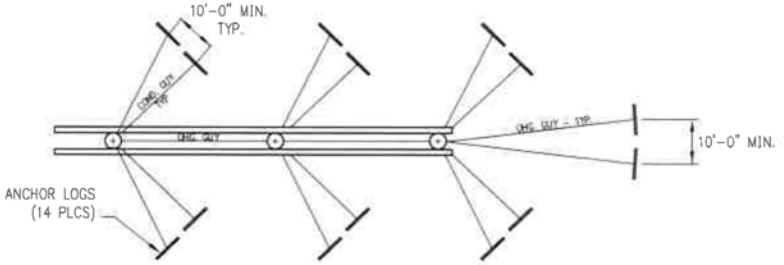


TYPE 'SA2' STRUCTURE (12° - 22°)

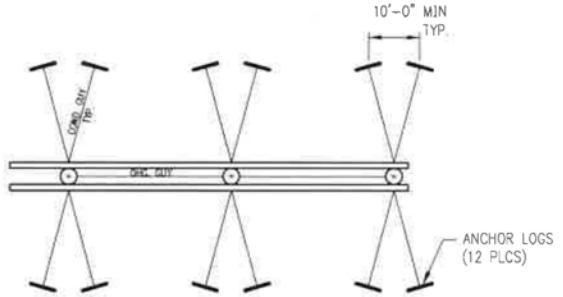


TYPE 'SA3' STRUCTURE (22° - 35°)

NOTES:
1. FOR ANCHOR DETAILS, SEE DWG. #345-10.0 & #345-10.1
2. FOR METHOD OF GUY GROUNDING, SEE DWG. #345-11.0



TYPE 'DE2' (35° - 55°)
TYPE 'DE3' (55° - 75°)
TYPE 'DE4' (75° - 90°)



TYPE 'DE1' STRUCTURE (DEADEND)

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

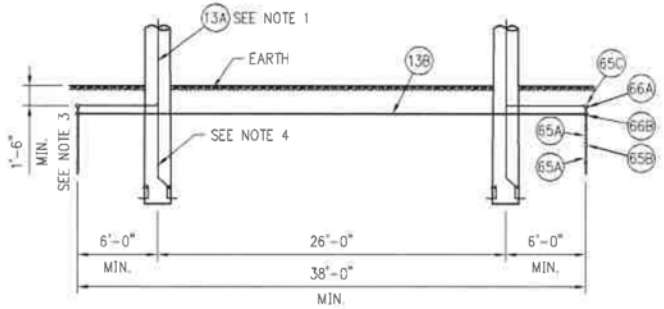
REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	JAH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO
VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

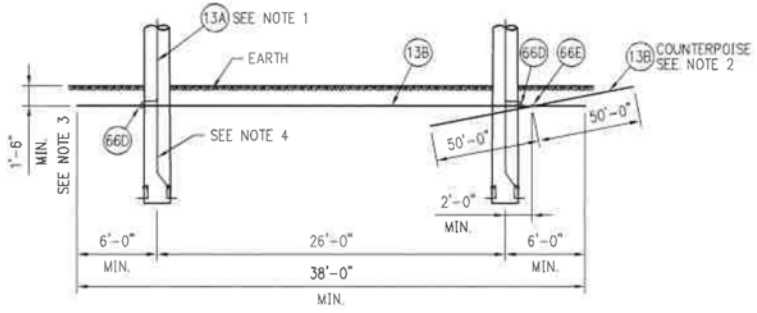
METHOD OF POLE GUYING

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-10.2 PLOT: 1=1			1 REV.

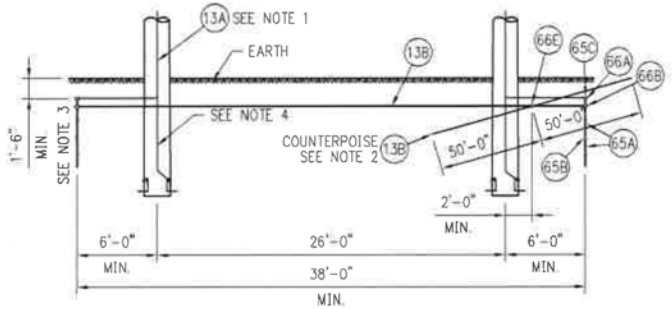
FILE: K:\Velco\345 kV\NH-EPV\cad\STANDARD POLES\345-10.2.dwg 02-FEB-2006 13:13 CSM BMcD



TYPE A
GROUND RODS



TYPE B
COUNTERPOISE



TYPE C
GROUND RODS & COUNTERPOISE

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURE	CATALOG NUMBER
			TYPE A		
13A		N/A	BONDING WIRE, #2 COPPER, SOLID (FT)		
13B		38	GROUND WIRE, 7 NO. 8 COPPERWELD (FT)		
65A		4	GROUND ROD, COPPER CLAD, 3/4" x 10'	BLACKBURN	7510
65B	0202330	2	COUPLER, GROUND ROD, BRONZE 3/4"	E&J DEMARK	GRC-34B
65C	0202340	AR	DRIVE HEAD, GROUND ROD, 3/4"	E&J DEMARK	DH-34
66A		2	EXOTHERMIC WELD, #2 SOLID CU TO 3/4" CU ROD	ERICO/CADWELD	
66B		2	EXOTHERMIC WELD, 7 NO. 8 COPPERWELD TO 3/4" CU ROD	ERICO/CADWELD	
			TYPE B		
13A		N/A	BONDING WIRE, #2 COPPER, SOLID (FT)		
13B		138	GROUND WIRE, 7 NO. 8 COPPERWELD (FT)		
66D		2	EXOTHERMIC WELD, #2 SOLID CU TO 7 NO. 8 COPPERWELD	ERICO/CADWELD	
66E		1	EXOTHERMIC WELD, 7 NO. 8 COPPERWELD TO 7 NO. 8 COPPERWELD	ERICO/CADWELD	
			TYPE C		
13A		N/A	BONDING WIRE, #2 COPPER, SOLID (FT)		
13B		138	GROUND WIRE, 7 NO. 8 COPPERWELD (FT)		
65A		4	GROUND ROD, COPPER CLAD, 3/4" x 10'	BLACKBURN	7510
65B	0202330	2	COUPLER, GROUND ROD, BRONZE 3/4"	E&J DEMARK	GRC-34B
65C	0202340	AR	DRIVE HEAD, GROUND ROD, 3/4"	E&J DEMARK	DH-34
66A		2	EXOTHERMIC WELD, #2 SOLID CU TO 3/4" CU ROD	ERICO/CADWELD	
66B		2	EXOTHERMIC WELD, 7 NO. 8 COPPERWELD TO 3/4" CU ROD	ERICO/CADWELD	
66E		1	EXOTHERMIC WELD, 7 NO. 8 COPPERWELD TO 7 NO. 8 COPPERWELD	ERICO/CADWELD	

NOTES:

1. BONDING WIRE QUANTITY FOR STRUCTURE SHALL BE AS INDICATED ON STRUCTURE DRAWING.
2. COUNTERPOISE GROUND WIRE SHALL BE 100 FOOT IN LENGTH AND SHALL BE BURIED A MINIMUM OF 1'-6" BELOW GRADE PARALLEL TO THE RIGHT-OF-WAY.
3. INCREASE DEPTH TO 3'-0" IN AREAS WHERE FARMING/PLOWING COULD OCCUR.
4. EXTEND GROUND WIRE TO BASE OF POLE AND ATTACH TO ANCHOR PLATE GROUND LUG.

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	JAH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

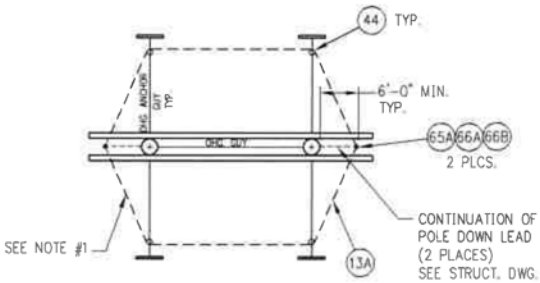
VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

2-POLE GROUNDING DETAILS TYPE A, B & C

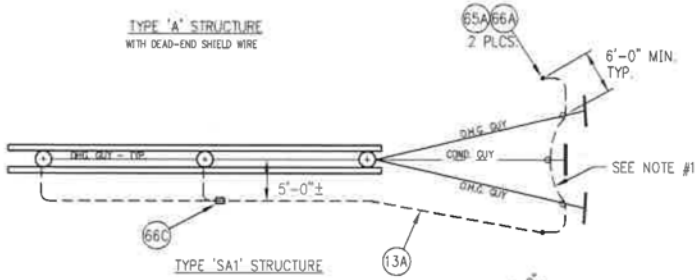
SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-11.0 PLOT: 1=1			1 REV.

FILE: K:\Velco\345kV-HH EP\Cadd\STANDARD POLES\345KV\345-11.0.dwg 05-20-2005 15:30

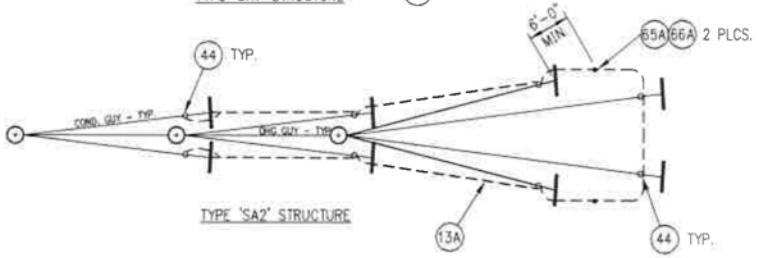
NOTES:
1. - - - DENOTES CONTINUOUS GROUNDING WIRE BURIED 1'-6" MIN. BELOW GRADE
2. GROUND RODS TO BE DRIVEN IN UNDISTURBED EARTH AT A MIN. DISTANCE OF 6'-0" FROM POLES AND ANCHORS.
3. FOR GROUNDING DETAILS, ITEM DESCRIPTION & QUANTITY SEE DWG. #345-10.0 & SPECIFIC STRUCTURE B/M.
4. LOCATION OF BURIED COUNTERPOISE TO STRUCTURE GROUND CONNECTION TO BE AS REQUIRED BY FIELD CONDITIONS.



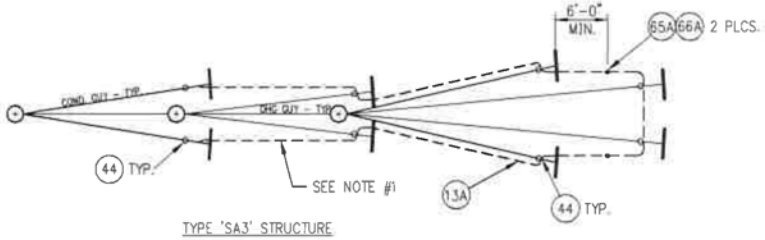
TYPE 'A' STRUCTURE
WITH DEAD-END SHIELD WIRE



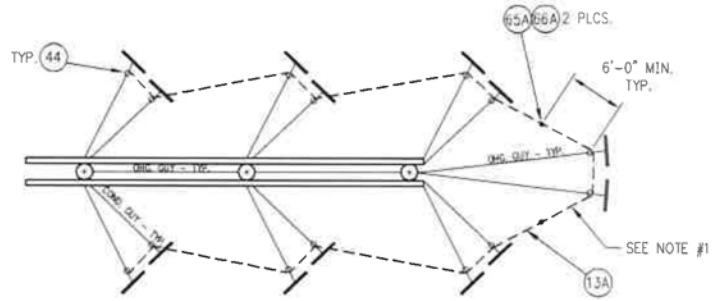
TYPE 'SA1' STRUCTURE



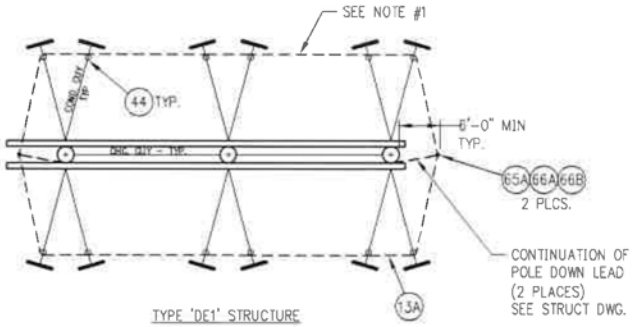
TYPE 'SA2' STRUCTURE



TYPE 'SA3' STRUCTURE



TYPE 'DE2', 'DE3', & 'DE4' STRUCTURES



TYPE 'DE1' STRUCTURE

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS
The revision dated 01.01.08 supercedes all revisions with an earlier revision date

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	JAH	JRW	CONFORMED TO CONSTRUCTION RECORDS
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

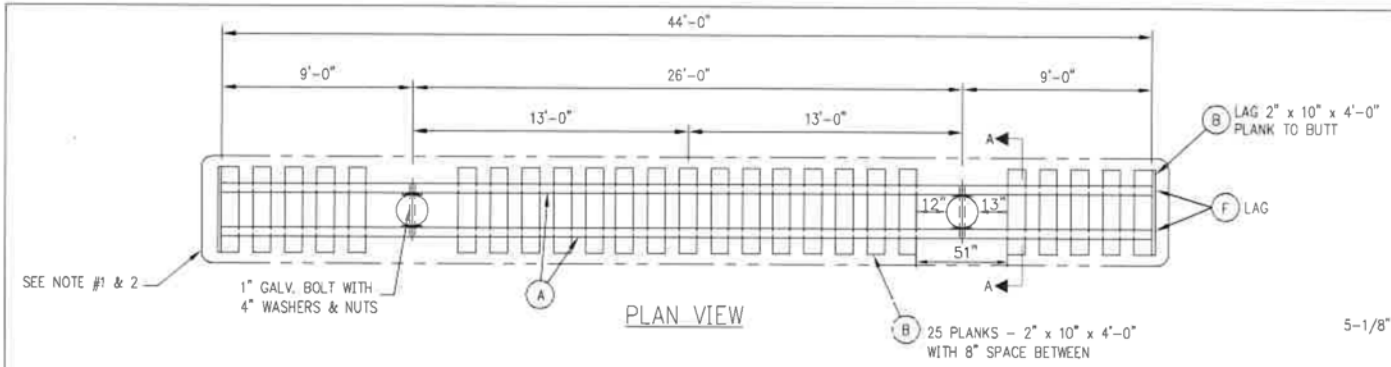
VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT

WEST RUTLAND – NEW HAVEN 345 KV

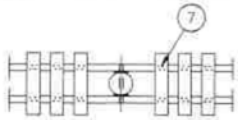
METHOD OF POLE AND GUY GROUNDING

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-11.1		1 REV.

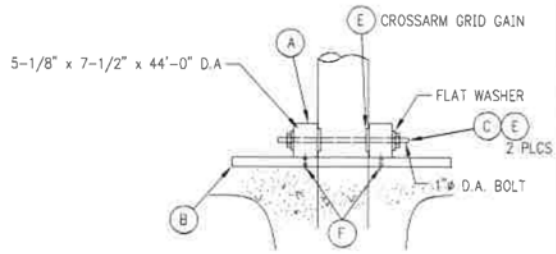
FILE: N:\Projects\345 MV-HU EFI\Cadd\STANDARD PLOTS\VSWA MS-11.dwg 02-07-2008 13:13:09 BMcD



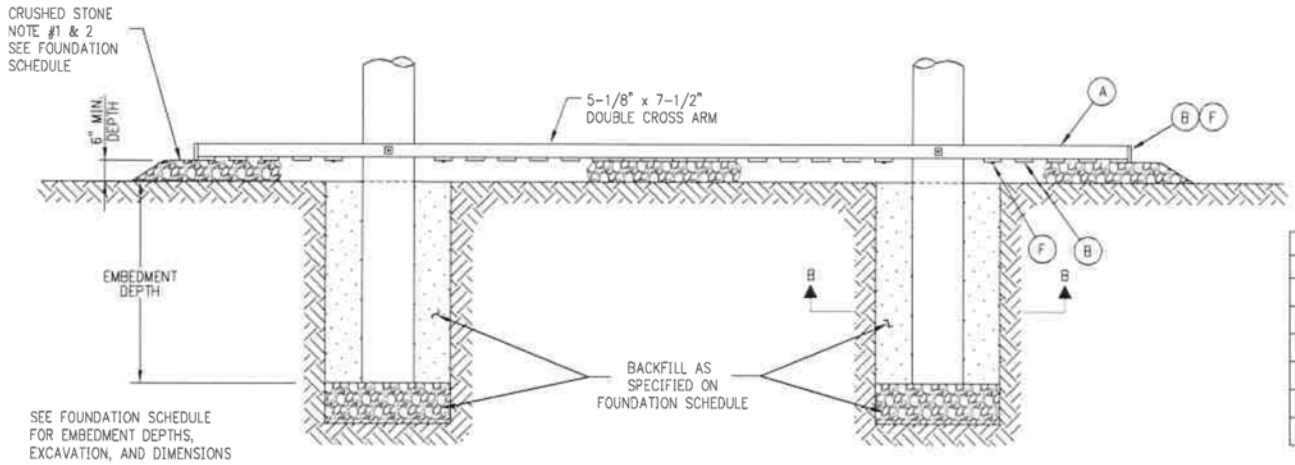
PLAN VIEW



SECTION B-B



SECT. A-A



ELEVATION VIEW

BILL OF MATERIALS

MARK	MNF	MNF #	QUAN.	DESCRIPTION
A	HUGHES		2	CROSSARM, LAMINATED, 5-1/8"x 7-1/2"x 44'-0"
B	HUGHES		27	PLANK, WOOD, 2"x 10"x 4' TREATED
C	HUGHES	TR10XX-F	2	BOLT, DBL. ARMING, 1"x XX" w/ 2 NUTS
D	HUGHES	SW4-100	4	WASHER, FLAT, SQ, 4" x 1/4" F/1" BOLT
E	HUGHES	1262-B	4	GRID GAIN, 6-3/4"x 4"x 9/16" w/ 1-1/16" HOLE
F	JOSLYN	J8723	216	LAG SCREW, 1/4"x 3", GIMLET POINT

NOTES:

1. SET BOG SHOE ON TOP OF GROUND ON CRUSHED STONE MAT.
2. STONE SURFACE TO EXTEND BEYOND PLANKS.
3. CROSS MEMBERS TO BE 5-1/8" x 7-1/2" x DOUBLE CROSS ARM.
4. BOG SHOE MAY BE INSTALLED AT OR JUST BELOW GRADE IN AREAS WHERE MOWING OCCURS OR AT LAND OWNER REQUEST

Burns & McDonnell

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0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

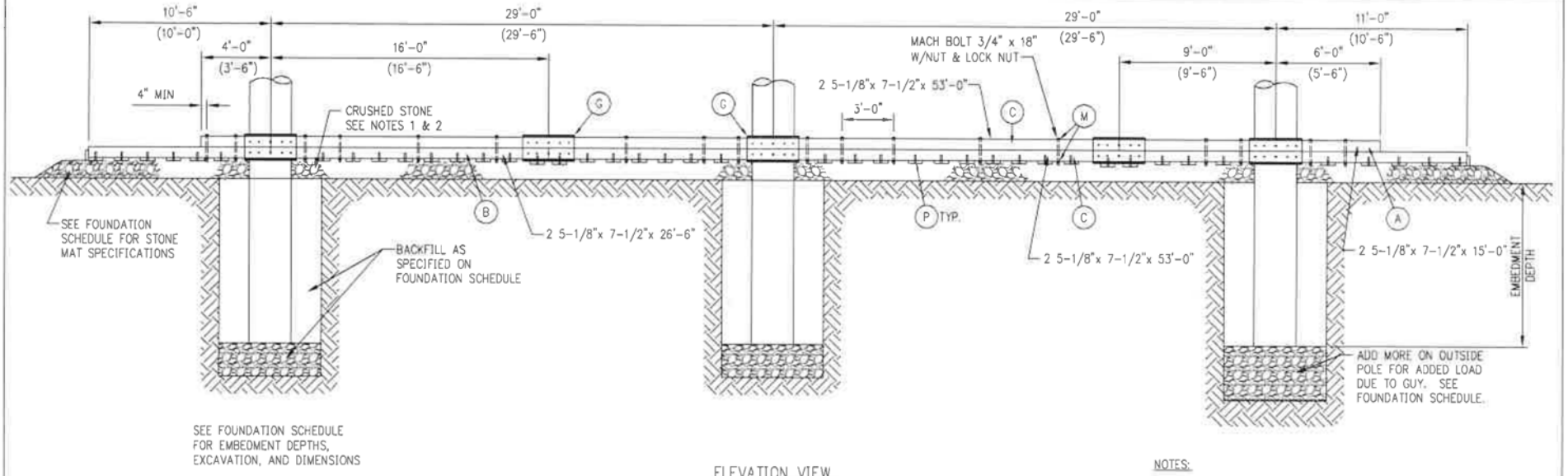
VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

FOUNDATIONS AND BOG SHOE PLATFORM FOR 2 POLE STRUCTURE

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-13.0		1 REV

FILE: 0960 001 01 [illegible] 345-13.0 [illegible]



ELEVATION VIEW

NOTES:

1. SET BOG SHOE ON TOP OF GROUND ON CRUSHED STONE MAT.
2. STONE SURFACE TO EXTEND BEYOND PLANKS.
3. CROSSARM MEMBERS TO BE 5-1/8" x 7-1/2" x SPECIFIED LENGTHS.
4. ALL WOOD MEMBERS TO BE DRILLED IN FIELD.
5. 5-1/8" x 7-1/2" CROSSARMS TO BE BOLTED TOGETHER WITH 3/4" BOLTS ON 4'-6" CENTERS, EXCEPT AS INDICATED.
6. DIMENSIONS IN PARENTHESES ARE FOR A 29'-6" POLE SPACING.
7. BOG SHOE MAY BE INSTALLED AT OR JUST BELOW GRADE IN AREAS WHERE MOWING OCCURS OR AT LAND OWNER REQUEST

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
A		2	CROSSARM, WOOD, LAM, 5-1/8"x7-1/2"x15'-0"	HUGHES	
B		2	CROSSARM, WOOD, LAM, 5-1/8"x7-1/2"x26'-6"	HUGHES	
C		4	CROSSARM, WOOD, LAM, 5-1/8"x7-1/2"x53'-0"	HUGHES	
D		23	PLANK, WOOD, TREATED, 2"x 10"x 5'-0"		
E		21	PLANK, WOOD, TREATED, 2"x 10"x 6'-0"		
G		10	PLATE, SPLICE & CROSSARM ATTACHMENT TO POLE, CHANNEL, STEEL, MC 18" x4" x42.7, 3'-0" LONG, WITH 8 3/4" HOLES AND 2 15/16" HOLES, PER VELCO DWG #345-14.1		
H		32	BOLT, MACHINE, GALV, 5/8" x8"	HUGHES	B68-4
I		36	BOLT, MACHINE, GALV, 3/4" x18"	HUGHES	B718-6
F		48	SCREW, LAG, 5/8" x5", FETTER DRIVE REG. POINT	JOSLYN	J8765
J		6	ROD, THREADED, GALV, 7/8" xXX", W/ 2 NUTS	HUGHES	TR8XX-F
K		12	GAIN, GRID, 6-3/4" x4", W/ HOLE F/7/8" BOLT	HUGHES	1261-A
L		32	WASHER, SQUARE, FLAT, 3"x3"x1/4", W/HOLE F/5/8" BOLT	HUGHES	SW3-60
M		72	WASHER, SQUARE, FLAT, 3"x3"x1/4", W/HOLE F/3/4" BOLT	HUGHES	SW3-70
N		32	NUT, LOCK, SQ., GALV., FOR 5/8" BOLT	HUGHES	MF60
O		12	NUT, LOCK, SQ., GALV., FOR 7/8" BOLT	HUGHES	MF80
P		352	SCREW, LAG, 1/4"x3", GIMLET POINT	JOSLYN	J872J

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0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

BOG SHOE PLATFORM FOR 3 POLE STRUCTURE 29'-0" & 29'-6" POLE SPACING

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: 345-14.0 PLOT: 1=1			1 REV.

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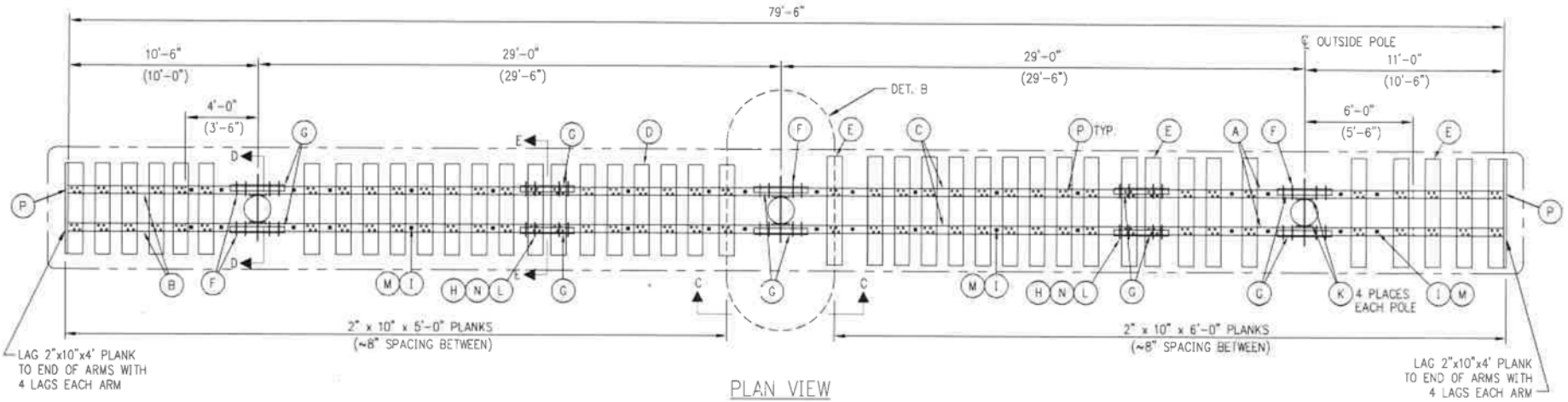
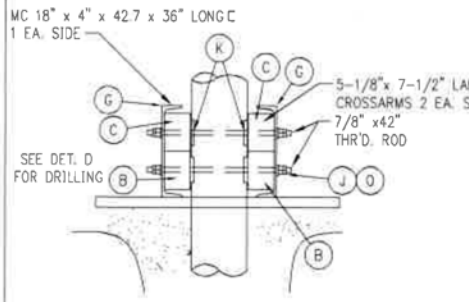
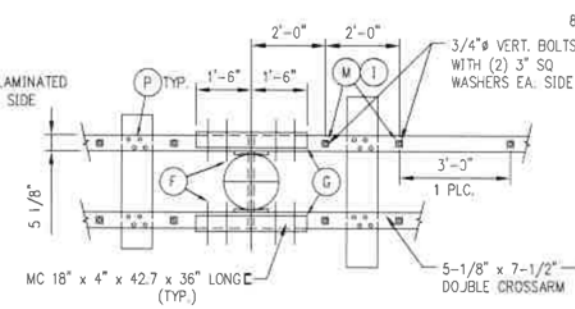


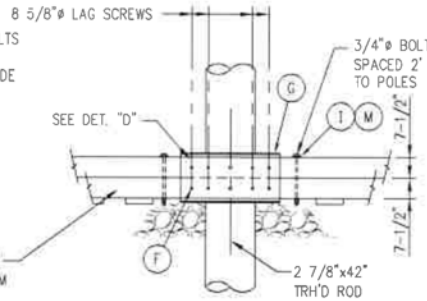
PLAN VIEW



SECT. D-D



DET. B



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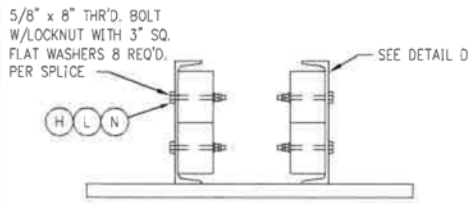

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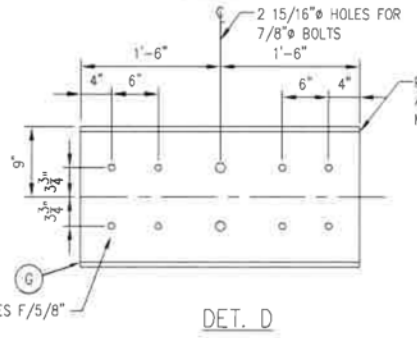

DET. D

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Burns & McDonnell

REV	DATE	DR	CK	DESCRIPTION
1	1/01/08	JAH	JRW	ISSUED FOR CONSTRUCTION
0	1/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345 KV

BOG SHOE PLATFORM FOR 3 POLE STRUCTURE 29'-0" & 29'-6" POLE SPACING

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 11/05	CHECKED BY: KAW		DATE
DRAWING NUMBER: PLOT: 1=1	345-14.1		1 REV.

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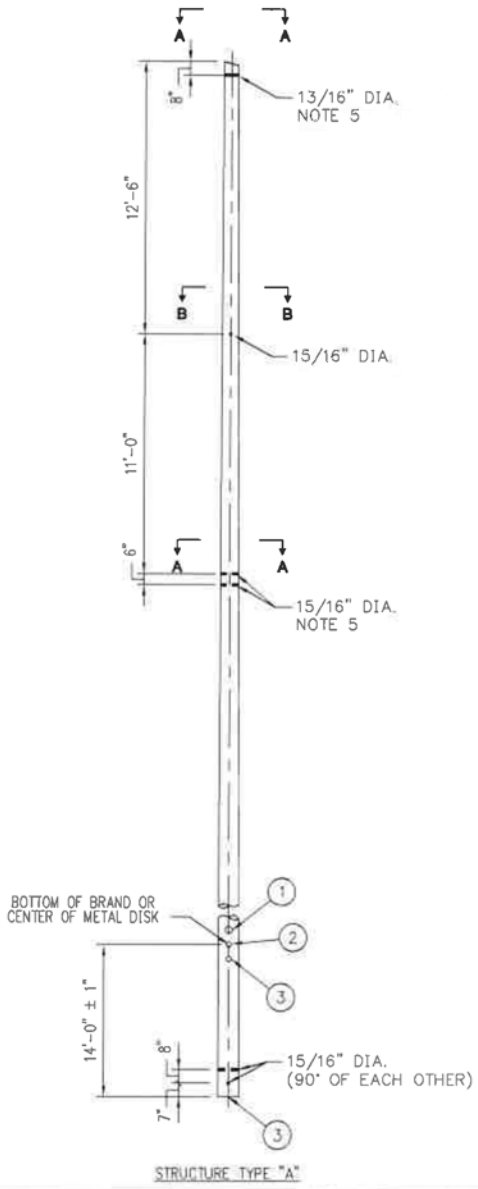
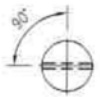
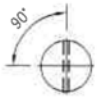


STRUCTURE TYPE "A"



DETAIL A



DETAIL B

NOTES:

1. POLES AND TREATMENT SHALL CONFORM TO RUS SPECIFICATIONS ON WOOD POLES.
2. ALL POLES TREATED FULL LENGTH MUST BE BORED (EXCEPT WHERE OTHERWISE SPECIFIED) AND ROOFED BEFORE TREATMENT.
3. PROVIDE SLOPED ROOFS AT AN ANGLE OF 15°.
4. POLES IN EACH STRUCTURE SHALL BE MATCHED IN SIZE, STRENGTH AND STRAIGHTNESS.
5. THRU BOLT HOLES MUST BE PARALLEL AND IN THE SAME PLANE.

(1) MANUFACTURES MARK AND DATE OF TREATMENT. (IF INSURED WARRANTED, BRAND "IW")

(2) BRAND WITH SPECIES, PRESERVATIVE CODE AND RETENTION.

(3) BRAND WITH PROPER LENGTH AND CLASS.

Burns & McDonnell

CONFORMED TO CONSTRUCTION RECORDS

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REV	DATE	DR	CK	DESCRIPTION
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0	11/12/06	CSM	JRW	ISSUED FOR CONSTRUCTION

VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN

345KV STRUCTURE POLE DRILLING GUIDE TYPE "A"

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE:	CHECKED BY:		DATE
DRAWING NUMBER: PLOT: 1=1	345-DG		1 REV.

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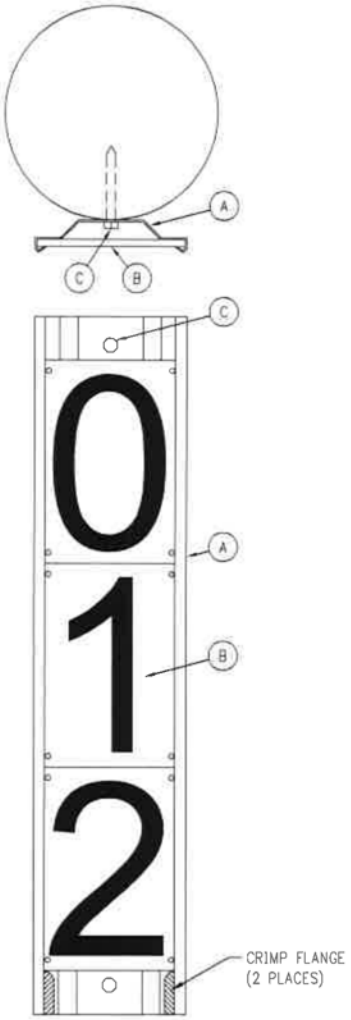
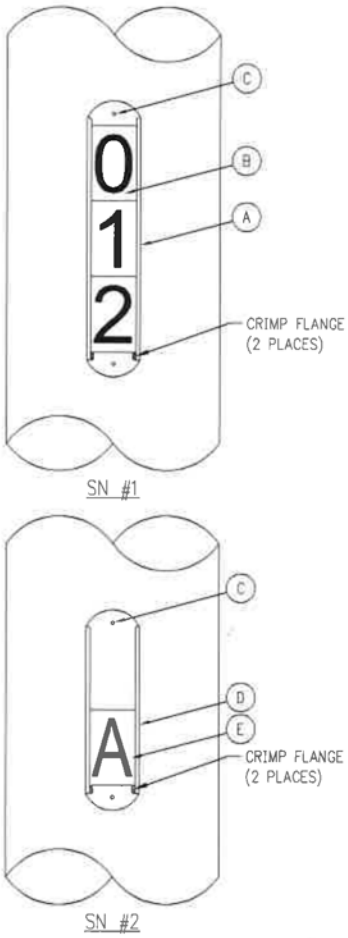


AERIAL PATROL SIGN



STRUCTURE NUMBER SIGNS

BILL OF MATERIALS

MARK	STOCK NO.	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
			AERIAL PATROL SIGN		
A		2	BRACKET, SIGN MOUNTING, 3 6" CHARACTERS, VERTICAL	TECH PRODUCTS	AHE603VP
B		6	CHARACTER, NUMBER, 6", BLACK W/ YELLOW BACKGROUND	TECH PRODUCTS	EL6KYxxx
C		4	LAG SCREW, 1/4" x 2" W/ NEOPRENE BACKED STEEL WASHER	JOSLYN	J26486.1
			STRUCTURE NUMBER SIGNS		
A		1	HOLDER, TAG, ALUMINUM, 3 2" CHARACTERS, VERTICAL	TECH PRODUCTS	AH203VP
B		3	CHARACTER, NUMBER, 2" BLACK W/ YELLOW BACKGROUND	TECH PRODUCTS	EL2KYxxx
C		AR	NAIL, ALUMINUM, SPIRAL SHANK	TECH PRODUCTS	NALSP15
D		AR	HOLDER, TAG, ALUMINUM, 2 2" CHARACTERS, VERTICAL	TECH PRODUCTS	AH202VP
E		AR	CHARACTER, LETTER, 2" BLACK W/ YELLOW BACKGROUND	TECH PRODUCTS	EL2KYx

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VELCO

VERMONT ELECTRIC POWER CO., INC.
RUTLAND, VERMONT
WEST RUTLAND – NEW HAVEN 345KV

AERIAL PATROL &
STRUCTURE NUMBER SIGNS

SCALE: NONE	DRAWN BY: BMcD	APPROVED BY:	
DATE: 1/06	CHECKED BY: JRW		DATE
DRAWING NUMBER: PLOT: 1=1	345–SIGN		1 REV

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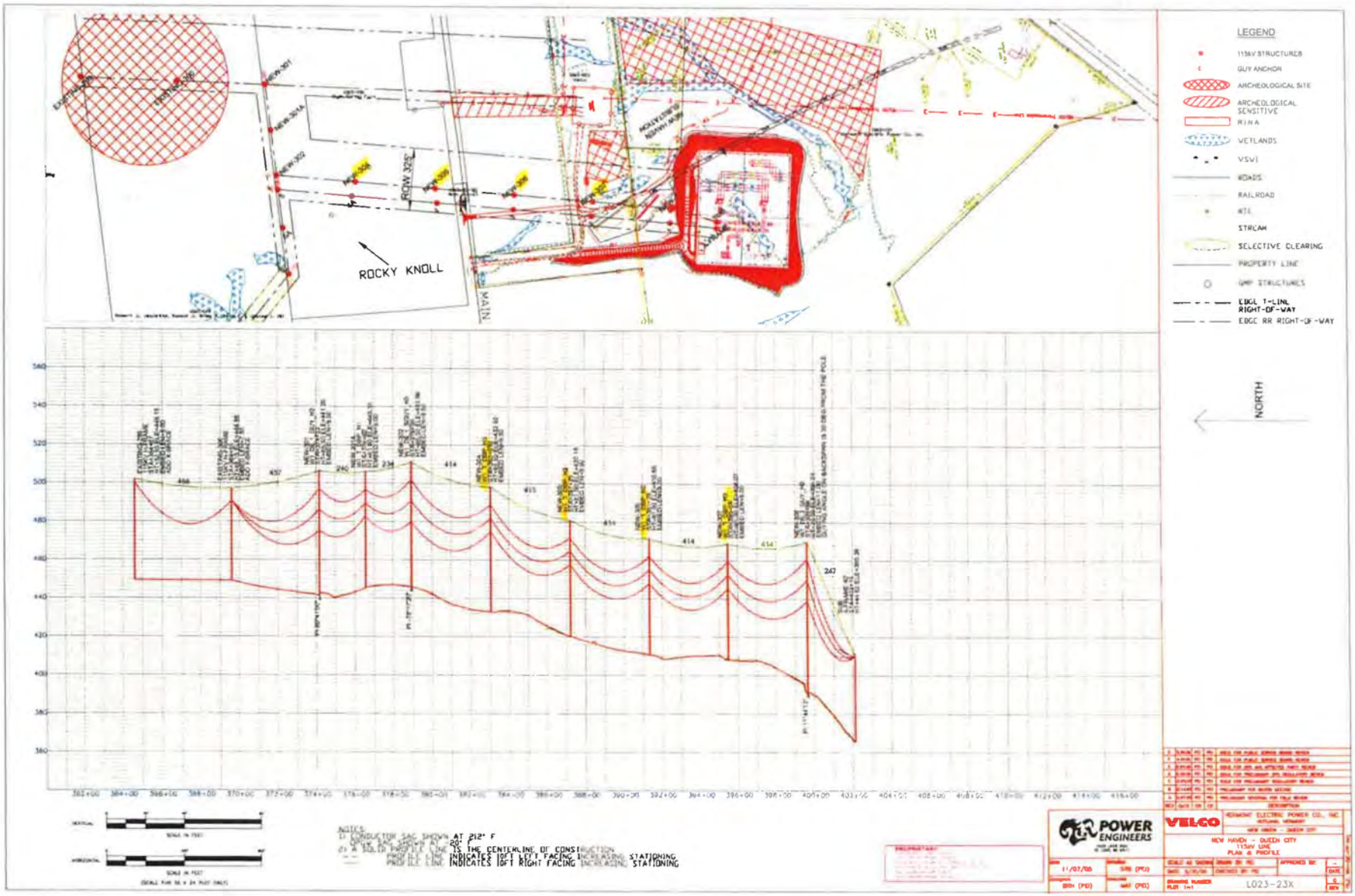
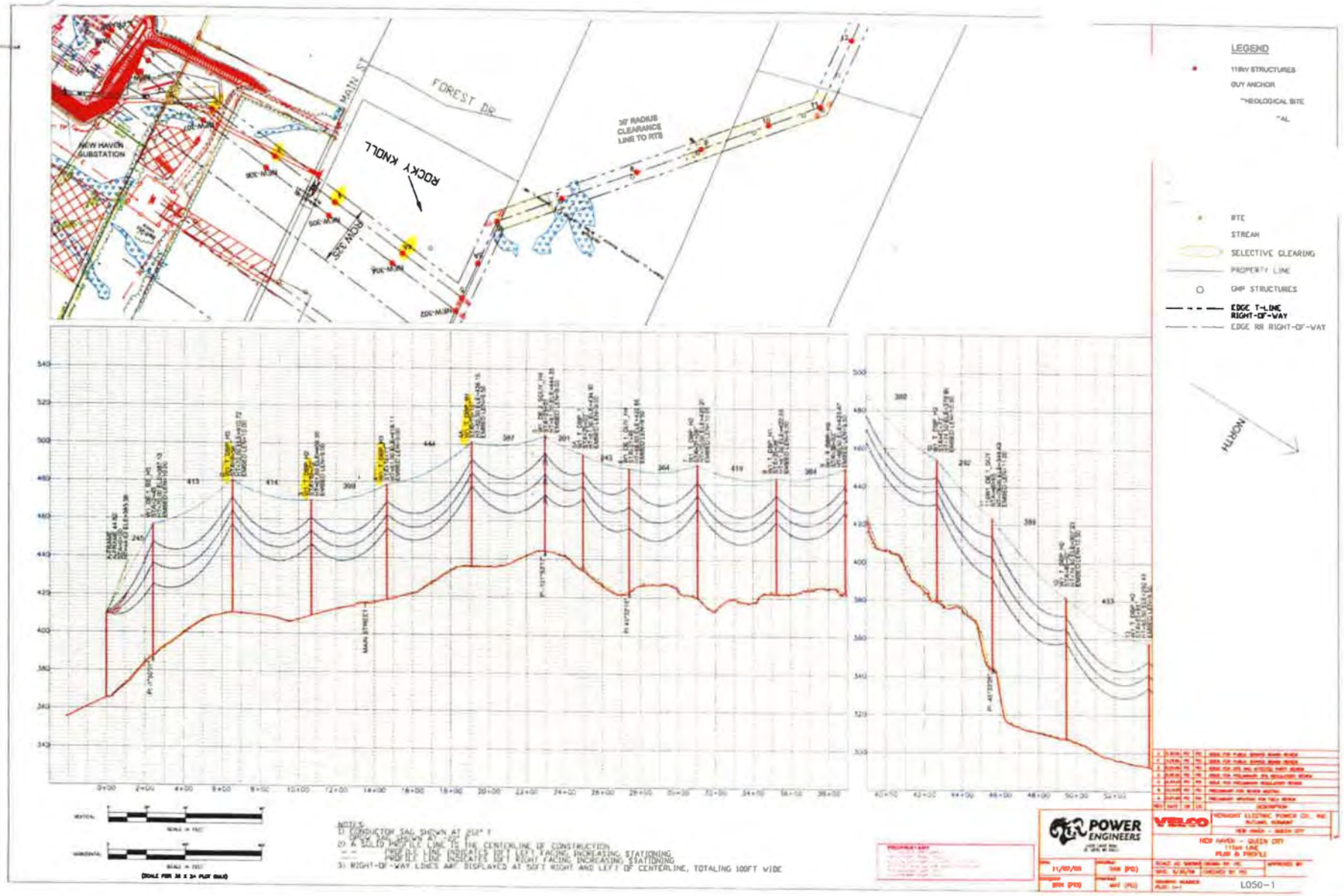
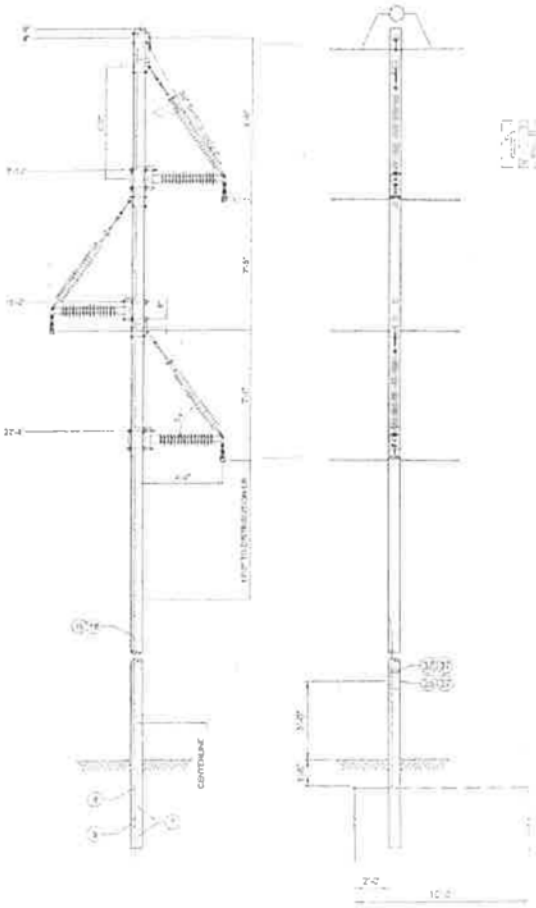
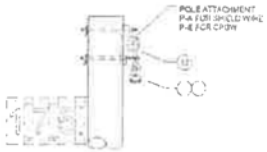
00708

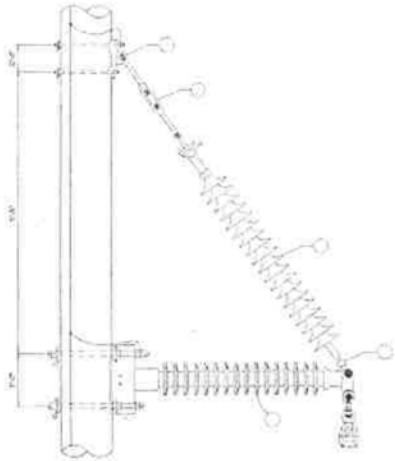

ROCKY KNOLL
ROW 325'
MAIN
LEGEND
115kV STRUCTURES
GUY ANCHOR
ARCHEOLOGICAL SITE
ARCHEOLOGICAL SENSITIVE
RINA
WETLANDS
VSVI
ROADS
RAILROAD
RTE
STREAM
SELECTIVE CLEARING
PROPERTY LINE
GMP STRUCTURES
EDGE T-LINE RIGHT-OF-WAY
EDGE RR RIGHT-OF-WAY
NORTH
NOTES
1) CONDUCTOR SAG SHOWN AT 212° F
2) GROUND SAG SHOWN AT 20°
3) A SOLID PROFILE LINE IS THE CENTERLINE OF CONSTRUCTION
PROFILE LINE INDICATES 10FT LEFT FACING INCREASING STATIONING
PROFILE LINE INDICATES 10FT RIGHT FACING INCREASING STATIONING
POWER ENGINEERS
VELCO
NEW HAVEN - QUEEN CITY
115kV LINE
PLAN & PROFILE
11/07/08
L023-23X


NEW HAVEN SUBSTATION
MAIN ST
FOREST DR
ROCKY KNOLL
30' RADIUS CLEARANCE LINE TO RTE
LEGEND
STREAM
SELECTIVE CLEARING
PROPERTY LINE
EDGE T-LINE RIGHT-OF-WAY
EDGE RR RIGHT-OF-WAY
NORTH
MAIN STREET
POWER ENGINEERS
VELCO
L050-1

00710







ITEM	QTY		DESCRIPTION		
POLE	1		WOOD POLE SEE PLAN AND PROFILE	1	1
INSULATOR	2	344-0039	PLATFORM CENTERLINE POST 5 HOLE 13 KV	2	2
	3	344-0041	SPACER-ANCHOR SECTION GALV	4	4
	4	344-0042	LINE-GUY TO SECTION 2 HOLE 15 KV 5-1/2 IN	3	3
	5	344-0178	BOLT-CLEVIS THRU CONDUCTOR 5/8" DIA 12" LG GALV	3	3
	6	344-0181	CLEVIS SOCKET GALV	3	3
	7	344-0182	INSULATOR POST TYPE HOLE CONF 2H SOLID	3	3
GROUNDING	8	347-0001	CLIP BONDING GROUND 5/8" DIA GALV	1	
	9	347-0001	CLIP-BONDING GROUND 5/8" DIA GALV	1	1
	10	347-0001	CLIP-BONDING GROUND 5/8" DIA GALV	4	4
	11	347-0001	CLIP-BONDING GROUND 5/8" DIA GALV	2	
	12	347-0001	CLIP-BONDING GROUND 5/8" DIA GALV	3	
	13	347-0001	CLIP-BONDING GROUND 5/8" DIA GALV	2	
	14	347-0001	CLIP-BONDING GROUND 5/8" DIA GALV	4	
	15	347-0001	CLIP-BONDING GROUND 5/8" DIA GALV	22	22
	16	347-0001	CLIP-BONDING GROUND 5/8" DIA GALV	30	30
	17	347-0001	CLIP-BONDING GROUND 5/8" DIA GALV	1	1
	18	347-0001	CLIP-BONDING GROUND 5/8" DIA GALV	2	2
	19	347-0001	CLIP-BONDING GROUND 5/8" DIA GALV	1	1
HARDWARE	20	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV	4	4
	21	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV		
	22	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV	2	
	23	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV		
	24	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV	1	1
	25	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV		1
	26	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV		2
	27	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV		1
	28	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV		2
	29	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV		3
	30	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV	1	1
	31	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV	4	4
	32	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV	2	2
	33	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV	2	2
	34	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV	3	3
LABEL	35	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV	1	1
	36	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV	1	1
	37	344-0001	CLIP-BONDING GROUND 5/8" DIA GALV	2	2

BOLT LENGTH BASED ON SLOPE OF POLE

SPAN LENGTH LIMITS (FT)		
SPLICING CLEARANCE	1272 ACSR	1272 ACSR WITH 1/8 477 ACSR

NOTES
1) TYPICAL LAYOUT OF THE "W1-T-DBP" STRUCTURE

PRELIMINARY

ISSUED FOR REVIEW AND COMMENTS

POWER ENGINEERS

VELCO

115-SP3DBP-1.0

00711

APPENDIX D –
ARK ENGINEERING DESIGN DRAWINGS

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA

CHA

VERMONT GAS SYSTEMS, INC.
ADDISON NATURAL GAS PROJECT
ZINC RIBBON INSTALLATION DRAWINGS
CHITTENDON & ADDISON COUNTIES, VERMONT

PROJECT DRAWING LISTING			
DRAWING NO.	SHEETS	REV	TITLE
12144-100	1	C	COVER SHEET
12144-200	1	C	SINGLE STRAND ZINC RIBBON INSTALLATION SECTION VIEW
12144-201	1	C	SINGLE STRAND ZINC RIBBON AND SSD WIRING DETAILS
12144-202	1	C	ZINC RIBBON CROSSING PIPELINE DETAILS
12144-203	2	C	ZINC RIBBON INSTALLATION LOCATIONS
12144-204	1	C	SSD AND COUPON TEST STATION LOCATIONS
12144-300	1	C	CABLE TO PIPELINE CONNECTION DETAILS
12144-301	1	C	CABLE SPLICE INSTALLATION DETAILS
12144-302	1	C	SOLID STATE DECOUPLER (SSD) INSTALLATION DETAILS
12144-303	1	C	COUPON TEST STATION WIRING DETAILS
12144-304	1	C	CATTLE GUARD INSTALLATION DETAIL
12144-400	1	C	MATERIALS LIST

ISSUED FOR CONSTRUCTION

CLIENT: CHA
SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT
PROJECT NO.: 12-E-144-AC

ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE MA
02184 U.S.A.

TITLE: COVER SHEET

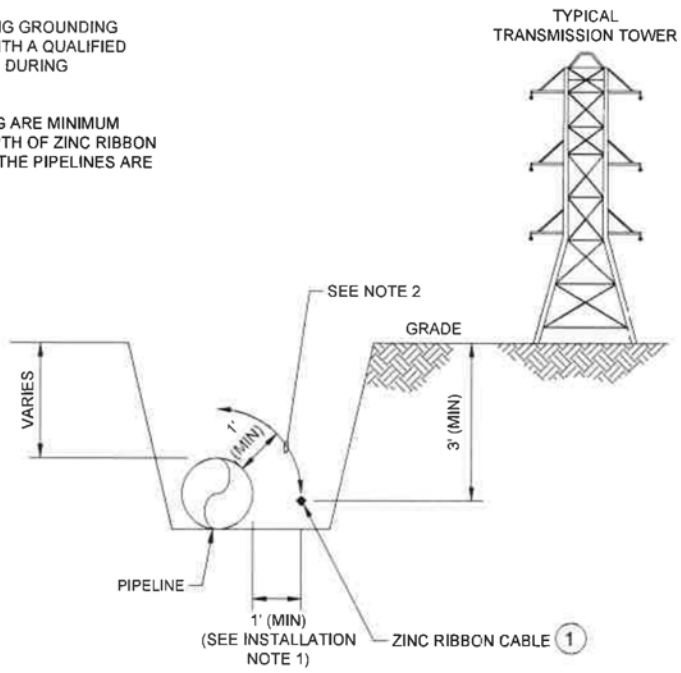
DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-100	C
APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
RFA	5/16/16	NTS	12144-100-1-RC	1 OF 1

00713

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA

SAFETY NOTES:

1. THE PIPELINE AND APPURTENANCES AT OR NEAR THESE LOCATIONS CAN POSSESS POTENTIALLY LETHAL ELECTRICAL SHOCK HAZARDS UNTIL ALL GROUNDING IS INSTALLED.
2. PROCEDURES FOR CONSTRUCTING GROUNDING SYSTEMS SHALL BE REVIEWED WITH A QUALIFIED SAFETY ENGINEER PRIOR TO AND DURING CONSTRUCTION ACTIVITIES.
3. ZINC RIBBON DEPTH AND SPACING ARE MINIMUM REQUIREMENTS. ADDITIONAL DEPTH OF ZINC RIBBON AND ADDITIONAL SPACING FROM THE PIPELINES ARE ACCEPTABLE.



CROSS SECTION 'B'

ZINC RIBBON CABLE INSTALLATION
SINGLE STRAND
IN SAME TRENCH

INSTALLATION NOTES:

1. HORIZONTAL DISTANCE FROM PIPELINE TO ZINC RIBBON CAN VARY BETWEEN 1' AND 25' FOR SAME TRENCH INSTALLATION.
2. ZINC RIBBON CAN BE INSTALLED BETWEEN 12:00 O'CLOCK AND 3:00 O'CLOCK AT A MINIMUM OF 1' SEPARATION FROM THE PIPELINE.

CAUTION:
ZINC RIBBON MUST NOT TOUCH PIPE.

ISSUED FOR CONSTRUCTION

CLIENT: CHA
SITE: VERMONT GAS SYSTEMS, INC.
ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

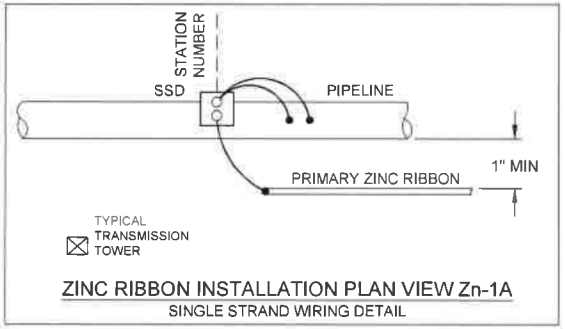
TITLE: SINGLE STRAND ZINC RIBBON INSTALLATION SECTION VIEW

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-200	C

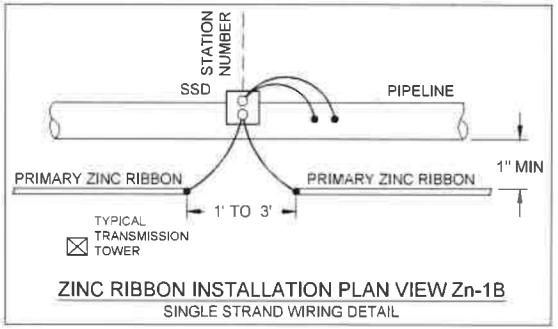
PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	RFA	5/16/16	NTS	12144-200-1-RC	1 OF 1

00714

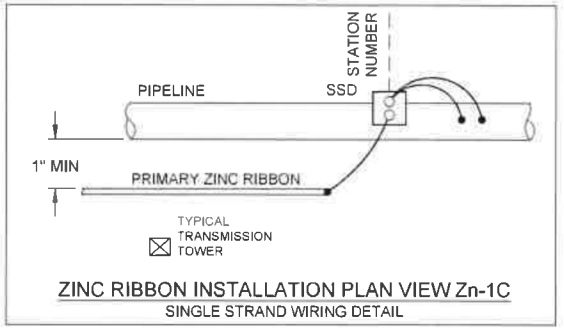
REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA



ZINC RIBBON INSTALLATION PLAN VIEW Zn-1A
SINGLE STRAND WIRING DETAIL



ZINC RIBBON INSTALLATION PLAN VIEW Zn-1B
SINGLE STRAND WIRING DETAIL



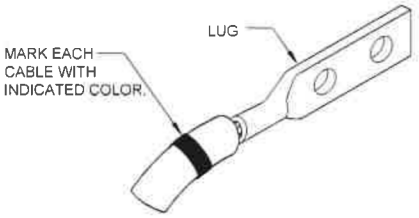
ZINC RIBBON INSTALLATION PLAN VIEW Zn-1C
SINGLE STRAND WIRING DETAIL

SOLID STATE DECOUPLER (SSD) WIRING AND LABELING SCHEDULE

CONNECTIONS TO	CABLE SIZE & INSULATION	SSD TERMINAL	LOCATION	TAPE COLOR
PRIMARY DOWNSTREAM ZINC RIBBON	#2 AWG HMWPE	POSITIVE	BETWEEN TRANSMISSION TOWER & PIPE	RED
PRIMARY UPSTREAM ZINC RIBBON	#2 AWG HMWPE	POSITIVE	BETWEEN TRANSMISSION TOWER & PIPE	GREEN
PIPE	#6 AWG HMWPE	NEGATIVE	TOP	NONE
PIPE	#6 AWG HMWPE	NEGATIVE	TOP	NONE

NOTES:

1. INSTALL SSD'S AT STATION NUMBERS INDICATED IN TABLE ON DRAWING 12144-204.
2. INSTALL ZINC RIBBON CABLE WITH ENDS AT STATION NUMBERS INDICATED IN TABLE ON DRAWING 12144-203. REFERENCE DRAWINGS 12144-300 & 301 FOR WELD DETAILS
3. INSTALL PRIMARY ZINC RIBBON CABLE BETWEEN PIPELINE AND TRANSMISSION TOWER.
4. LABEL #2 AWG CABLE WITH TAPE COLOR SHOWN IN TABLE. WRAP TAPE WITHIN 6" OF LUG.
5. REFERENCE DRAWING 12144-202 FOR ALL FOREIGN PIPELINE AND FOREIGN UTILITY CROSSINGS.



CABLE TAPE DETAIL

CAUTION:
ZINC RIBBON MUST NOT TOUCH PIPE.

ISSUED FOR CONSTRUCTION

CLIENT: CHA
SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE MA
02184 U.S.A.

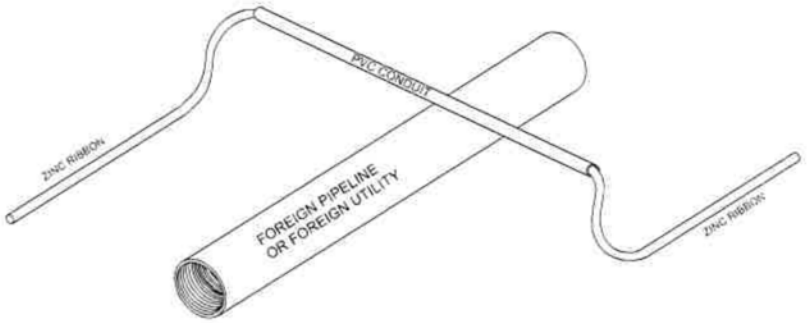
TITLE: SINGLE STRAND ZINC RIBBON AND SSD WIRING DETAILS

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-201	C

PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	RFA	5/16/16	NTS	12144-201-1-RC	1 OF 1

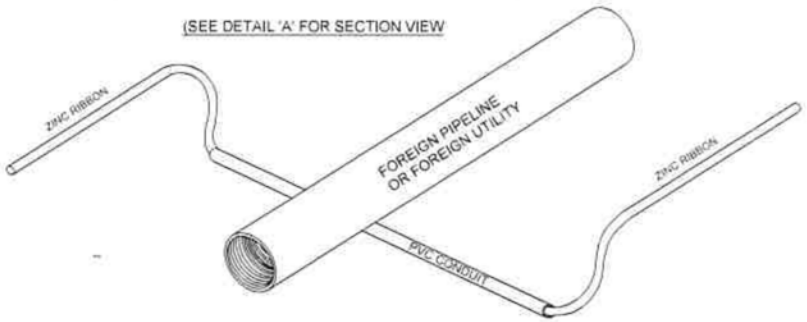
00715

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA



ZINC RIBBON CROSSING ABOVE FOREIGN PIPELINE OR FOREIGN UTILITY

(SEE DETAIL 'A' FOR SECTION VIEW

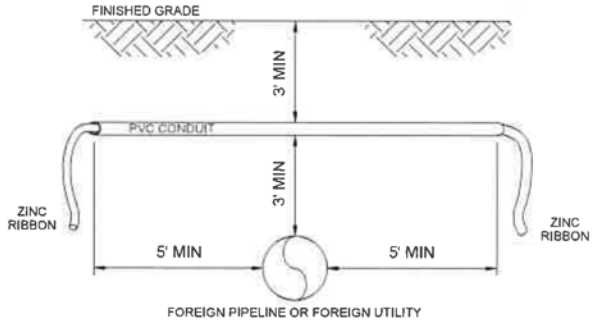


ZINC RIBBON CROSSING BELOW FOREIGN PIPELINE OR FOREIGN UTILITY

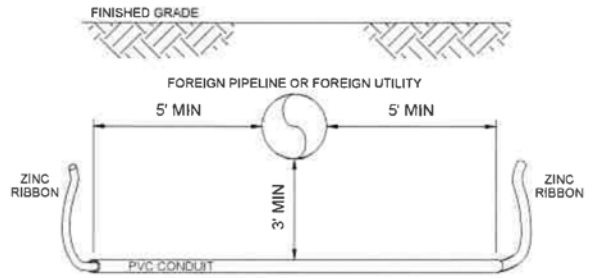
(SEE DETAIL 'B' FOR SECTION VIEW)

NOTES:

1. WHERE ZINC RIBBON CROSSES A FOREIGN PIPELINE OR FOREIGN UTILITY INSTALL ZINC RIBBON IN 2" PVC CONDUIT FOR A MINIMUM OF 5' ON BOTH SIDES OF THE CROSSING.
2. AT ALL FOREIGN PIPELINE AND FOREIGN UTILITY CROSSINGS, MAINTAIN A MINIMUM OF 3' SEPARATION BETWEEN ZINC RIBBON AND UTILITY, AND A MINIMUM OF 3' BETWEEN ZINC RIBBON AND FINISHED GRADE WHERE NECESSARY, INSTALL ZINC RIBBON BELOW UTILITY TO MAINTAIN CLEARANCES.
3. PRIMARY ZINC RIBBON SHOULD BE INSTALLED BETWEEN TRANSMISSION TOWER AND PIPELINE.
4. ZINC RIBBON TO REMAIN CONTINUOUS THROUGH PVC PIPING.



DETAIL 'A'



DETAIL 'B'

CAUTION:
ZINC RIBBON MUST NOT TOUCH PIPE.

ISSUED FOR CONSTRUCTION

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECHNICAL SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE MA
02184 U.S.A.

TITLE: ZINC RIBBON CROSSING PIPELINE DETAILS

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-202	C

PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	RFA	5/16/16	NTS	12144-202-1-RC	1 OF 1

00716

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA

ZINC RIBBON INSTALLATION LOCATION AND REQUIRED MATERIALS

SECTION NO.	STATION NO. START	STATION NO. END	DISTANCE FROM START TO END (FT)	NUMBER OF STRANDS	TOTAL LENGTH OF ZINC RIBBON (FT)	NUMBER OF SSD'S	#2 AWG COPPER CABLE SSD TO ZINC RIBBON (FT)	#6 AWG COPPER CABLE SSD TO PIPE (FT)	#6 AWG CABLE TO PIPELINE EXOTHERMIC WELD CONNECTIONS	ZINC RIBBON TO #2 COPPER EXOTHERMIC WELD CONNECTIONS	SSD PEDESTALS
3	451+25	457+05	580	1	580	2	50	200	4	2	2
4	612+60	623+60	1,100	1	1,100	2	50	200	4	2	2
5	700+68	718+87	1,790	1	1,790	2	50	200	4	2	2
6	801+10	819+83	1,860	1	1,860	2	50	200	4	2	2
7	847+85	863+75	1,590	1	1,590	2	50	200	4	2	2
8	888+00	892+75	475	1	475	2	50	200	4	2	2
8A	893+75	906+82	1,425	1	1,425	2	50	200	4	2	2
9A	1040+90	1046+50	560	1	560	2	50	200	4	2	2
9B	1048+70	1063+10	1,440	1	1,440	2	50	200	4	2	2
10	1258+00	1267+25	925	1	925	2	50	200	4	2	2
11	1308+00	1320+40	1,240	1	1,240	2	50	200	4	2	2
12	1379+00	1390+10	1,110	1	1,110	2	50	200	4	2	2
13	1424+50	1437+00	1,250	1	1,250	2	50	200	4	2	2
14	1477+40	1490+73	770	1	770	2	50	200	4	2	2
15	1517+95	1551+35	3,340	1	3,340	3	100	300	6	4	3
17	1580+00	1588+00	800	1	800	2	50	200	4	2	2
18	1641+60	1656+70	1,510	1	1,510	2	50	200	4	2	2

ZINC RIBBON CABLE BASED ON 2,000 FOOT REEL. REFERENCE DRAWING 12144-301 DETAIL B FOR ZINC RIBBON TO ZINC RIBBON EXOTHERMIC WELD WHERE ZINC RIBBON MUST BE SPLICED.

NOTES:
1. NOTE EQUATION CHANGE: 715+71BK = 716+00AHD FOR SECTION 5.
2. NOTE EQUATION CHANGE: 812+83BK = 812+96AHD FOR SECTION 6.
3. NOTE EQUATION CHANGE: 896+87BK = 896+97AHD FOR SECTION 8A.
4. NOTE EQUATION CHANGE: 903+06BK = 901+77AHD FOR SECTION 8A.
5. NOTE EQUATION CHANGE: 1478+87BK = 1484+50AHD FOR SECTION 14.

ISSUED FOR CONSTRUCTION

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECH. SERVICES, INC. 638 GRANITE STREET SUITE 200 BRAINTREE, MA 02184 U.S.A.

TITLE: ZINC RIBBON INSTALLATION LOCATIONS

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-203	C

PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	RFA	5/16/16	NTS	12144-203-1-RC	1 OF 2

00717

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA

ZINC RIBBON INSTALLATION LOCATION AND REQUIRED MATERIALS

SECTION NO.	STATION NO. START	STATION NO. END	DISTANCE FROM START TO END (FT)	NUMBER OF STRANDS	TOTAL LENGTH OF ZINC RIBBON (FT)	NUMBER OF SSD'S	#2 AWG COPPER CABLE SSD TO ZINC RIBBON (FT)	#6 AWG COPPER CABLE SSD TO PIPE (FT)	#6 AWG CABLE TO PIPELINE EXOTHERMIC WELD CONNECTIONS	ZINC RIBBON TO #2 COPPER EXOTHERMIC WELD CONNECTIONS	SSD PEDESTALS
19	1712+80	1718+00	520	1	520	2	50	200	4	2	2
20	1718+59	1724+01	580	1	580	2	50	200	4	2	2
21	1798+60	1846+00	4,740	1	4,740	4	150	400	8	6	4
22	1873+25	1881+00	775	1	775	2	50	200	4	2	2
22A	1882+75	1888+85	610	1	610	2	50	200	4	2	2
23	1918+11	1939+29	2,118	1	2,118	3	100	300	6	4	3
24	1976+29	1985+59	930	1	930	2	50	200	4	2	2
25	2080+10	2126+90	4,690	1	4,690	4	150	400	8	6	4
26	2129+05	2132+90	385	1	385	2	50	200	4	2	2
				TOTAL	37,113	58	1,600	5,800	116	64	58

ZINC RIBBON CABLE BASED ON 2,000 FOOT REEL. REFERENCE DRAWING 12144-301 DETAIL B FOR ZINC RIBBON TO ZINC RIBBON EXOTHERMIC WELD WHERE ZINC RIBBON MUST BE SPLICED.

NOTES:

6. NOTE EQUATION CHANGE: 1713 29BK 1713 00AHD FOR SECTION 19.
7. NOTE EQUATION CHANGE: 1719 72BK 1719 34AHD FOR SECTION 20.
8. NOTE EQUATION CHANGE: 1830 30BK 1830 44AHD FOR SECTION 21.
9. NOTE EQUATION CHANGE: 1877 11BK 1877 27AHD FOR SECTION 22.
10. NOTE EQUATION CHANGE: 2087 93BK 2088 03AHD FOR SECTION 25.

ISSUED FOR CONSTRUCTION

ARK. Design-Build Technical Services, Inc.

SIZE	DWG. NO.	REV
B	12144-203	C

SCALE	CAD FILE NAME	SHEET
NTS	12144-203-2-RC	2 OF 2

00718

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/14	RFA
C	CLIENT REVISIONS	5/16/16	RFA

CATTLE GUARD REQUIRED AT THIS LOCATION

SSD LOCATIONS

SECTION NO.	SSD STATION NO.	SSD WIRING DETAIL
3	451+25	ZN-1A
	457+05	ZN-1C
4	612+60	ZN-1A
	623+60	ZN-1C
5	700+68	ZN-1A
	718+87	ZN-1C
6	801+10	ZN-1A
	819+83	ZN-1C
7	847+85	ZN-1A
	863+75	ZN-1C
8	888+00	ZN-1A
	892+75	ZN-1C
8A	893+75	ZN-1A
	906+82	ZN-1C
9A	1040+90	ZN-1A
	1046+50	ZN-1C
9B	1048+70	ZN-1A
	1063+10	ZN-1C
10	1258+00	ZN-1A
	1267+25	ZN-1C
11	1308+00	ZN-1A
	1320+40	ZN-1C
12	1379+00	ZN-1A
	1390+10	ZN-1C
13	1424+50	ZN-1A
	1437+00	ZN-1C
14	1477+40	ZN-1A
	1490+73	ZN-1C
15	1517+95	ZN-1A
	1531+50	ZN-1B
	1551+35	ZN-1C

SSD LOCATIONS

SECTION NO.	SSD STATION NO.	SSD WIRING DETAIL
17	1580+00	ZN-1A
	1588+00	ZN-1C
18	1641+60	ZN-1A
	1656+70	ZN-1C
19	1712+80	ZN-1A
	1718+00	ZN-1C
20	1718+59	ZN-1A
	1724+01	ZN-1C
21	1798+60	ZN-1A
	1816+50	ZN-1B
	1831+50	ZN-1B
	1846+00	ZN-1C
22	1873+25	ZN-1A
	1881+00	ZN-1C
22A	1882+75	ZN-1A
	1888+85	ZN-1C
23	1918+11	ZN-1A
	1928+70	ZN-1B
	1939+29	ZN-1C
24	1976+29	ZN-1A
	1985+59	ZN-1C
25	2080+10	ZN-1A
	2095+80	ZN-1B
	2111+40	ZN-1B
	2126+90	ZN-1C
26	2129+05	ZN-1A
	2132+90	ZN-1C

COUPON TEST STATION LOCATIONS

COUPON TEST STATION NO.	STATION NO.
1	67+40
2	1071+00
3	1513+10
4	1568+00
5	1916+00
6	1940+00
7	1970+00
8	2172+50

ISSUED FOR CONSTRUCTION

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECH. SERVICES, INC. 638 GRANITE STREET SUITE 200 BRAINTREE, MA 02184 U.S.A.

TITLE: SSD LOCATIONS

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-204	C

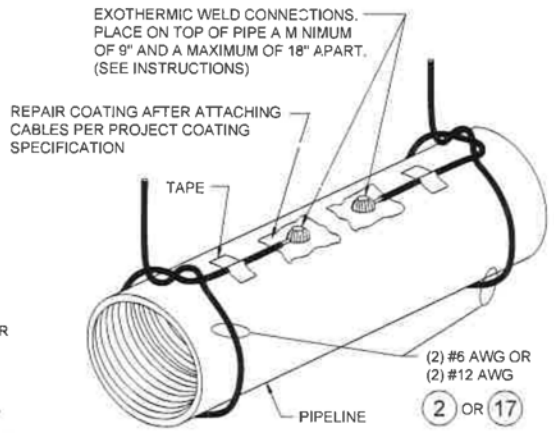
PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	RFA	5/16/16	NTS	12144-204-1-RC	1 OF 1

00719

EXOTHERMIC WELD INSTRUCTIONS:

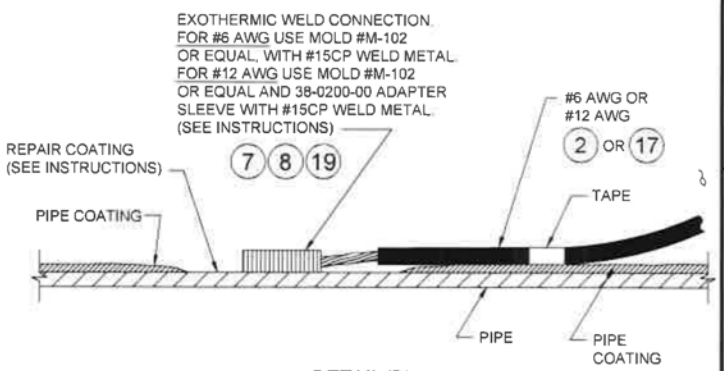
1. FIRST DETERMINE IF THE PIPELINE IS SUITABLE FOR EXOTHERMIC WELDING BY CONDUCTING THE FOLLOWING TESTS:
   - A) DETERMINE THAT THE PIPELINE SMYS (SPECIFIED MINIMUM YIELD STRENGTH) IS 80,000 PSI.
   - B) DETERMINE THAT PIPELINE WALL THICKNESS IS ⅛" (0.125") OR GREATER.
   - C) PERFORM ULTRASONIC TESTING TO PIPELINE TO DETERMINE THAT NO SURFACE OR INTERNAL DEFECTS EXIST.
2. FOR EACH CABLE TO PIPELINE CONNECTION (EXOTHERMIC WELD), REMOVE A 3"X3" MAX AREA OF PIPELINE COATING AT THE 12:00 O'CLOCK POSITION ON THE PIPELINE AND BRUSH UNTIL SHINY. ANY ADJACENT CABLE CONNECTIONS SHALL BE NO CLOSER THAN 9" AND NO FURTHER THAN 18".
3. PREPARE PIPELINE SURFACE AS SPECIFIED BY PIPELINE COATING MANUFACTURER.
4. DETAIL "A" SHOWS POSSIBLE METHOD OF CABLE STRAIN RELIEF FOR NEW PIPE INSTALLATIONS. THIS METHOD IS NOT A REQUIREMENT. OTHER MEANS OF STRAIN RELIEF MAY BE USED.
5. STRIP BACK ANY CABLE INSULATION 1"-2" AND TAPE CABLE TO PIPE.
6. ENSURE THAT THE PIPELINE WELD AREA AND CABLE ARE CLEAN AND DRY PRIOR TO WELDING.
7. USE SPECIFIC WELD MOLD AND WELD METAL AS INDICATED IN DRAWING MATERIALS LIST.
8. IF INDICATED, USE COPPER HEAT SLEEVE ON CABLE END TO BE WELDED.
9. USE ONLY A 15 GRAM MELDING CHARGE. DO NOT EXCEED.
10. PLACE THE METAL RETAINER DISK IN THE SPECIFIED WELD MOLD AND DUMP (DO NOT POUR) WELD METAL POWDER ONTO THE DISK. MAKE SURE THAT ALL OF THE FINE STARTING POWDER IS IN THE MOLD. IF ANY POWDER REMAINS IN THE CARTRIDGE BOTTOM, SQUEEZE OUT INTO MOLD AND BREAK UP.
11. CLOSE MOLD LID.
12. REPLACE CAP ON EMPTY WELD METAL CARTRIDGE AND PLACE BACK INTO CARTRIDGE PACK BOX UPSIDE DOWN TO KEEP THE REMAINING CARTRIDGES UPRIGHT.
13. LAY THE CABLE END ON THE PREPARED PIPE SURFACE USING A SPRING LOADED CHAIN CLAMP TO HOLD CRUCIBLE TIGHT TO PIPELINE.
14. USING EYE AND HAND PROTECTION, STAND ON THE OPPOSITE SIDE OF THE CRUCIBLE FROM THE TOUCH HOLE AND IGNITE POWDER WITH SPARK FROM FLINT GUN. CAUTION: POWDER WILL FLASH WHEN IGNITED.

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA

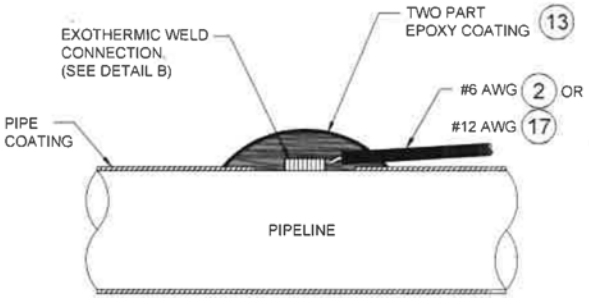


DETAIL 'A'
CABLE TO PIPELINE ATTACHMENT DETAIL

15. WHEN WELD HAS SET, REMOVE WELD MOLD AND TEST CONNECTION BY RAPPING SHARPLY WITH A SLAG HAMMER. IF THERE IS ANY INDICATION THAT A COMPLETE WELD HAS NOT BEEN ACHIEVED, REMOVE THE WELD AND RE-APPLY.
16. IF WELD IS GOOD, REMOVE ANY SLAG WITH HAMMER AND CLEAN USING A WIRE BRUSH.
17. AFTER COMPLETING THE EXOTHERMIC WELD CONNECTION TO THE PIPELINE, ALL COATING DAMAGE IS TO BE CLEANED AND COATED WITH 20 MILS MINIMUM OF TWO PART EPOXY COATING OR VERMONT GAS APPROVED EQUAL.
18. REFER TO VERMONT GAS REPAIR SPECIFICATIONS AND PRODUCT DATA SHEET TO DETERMINE IF REPAIR IS ACCEPTABLE.



DETAIL 'B'
EXOTHERMIC WELD CONNECTION



DETAIL 'C'
CORROSION PROTECTION SEAL

ISSUED FOR CONSTRUCTION

CLIENT: CHA
SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

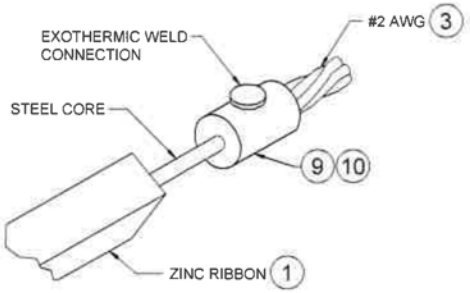
ARK ENGINEERING & TECH. SERVICES, INC. 639 GRANITE STREET SUITE 200 BRAINTREE, MA 02184 U.S.A.

TITLE: CABLE TO PIPELINE CONNECTION DETAILS

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-300	C
PROJECT NO. 12-E-144-AC	APPROVED BY RFA	DATE 5/16/16	SCALE NTS	CAD FILE NAME 12144-300-1-RC	SHEET 1 OF 1

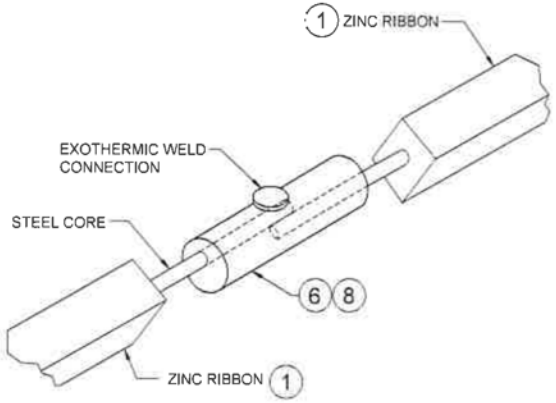
00720

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA



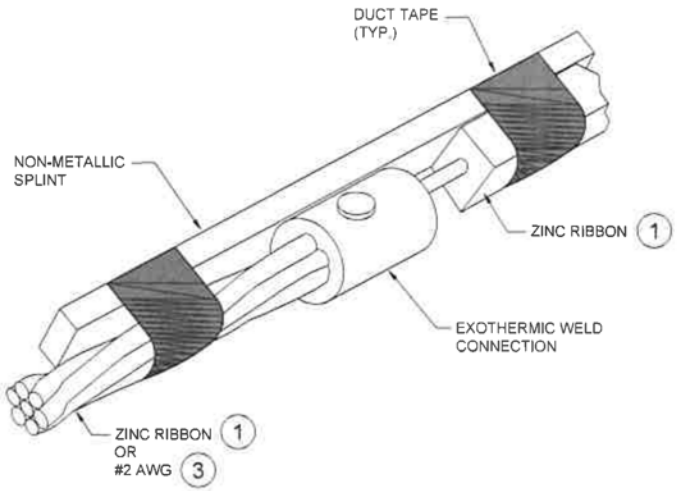
DETAIL 'A'

ZINC RIBBON CABLE TO #2 AWG STRANDED COPPER CABLE EXOTHERMIC WELD INSTALLATION



DETAIL 'B'

ZINC RIBBON CABLE TO ZINC RIBBON CABLE IN-LINE EXOTHERMIC WELD INSTALLATION



DETAIL 'C'

NON-METALLIC SPLINT INSTALLATION

DETAIL	MOLD	WELD METAL
'A'	M-11638	32CP
'B'	M-7233	15CP

NOTES:

1. ALL EXOTHERMIC WELD CONNECTIONS ARE TO BE SEALED WITH ROYSTON "SPLICE RIGHT" SPLICE KIT (ITEM #14), OR VERMONT GAS APPROVED ALTERNATIVE.
2. FOR ALL ZINC RIBBON EXOTHERMIC WELD CONNECTIONS, USE A NON-METALLIC SPLINT TO REINFORCE WELD. WRAP DUCT TAPE AROUND SPLINT AND ZINC RIBBON FOR ADDED SUPPORT. (SEE DETAIL C)
3. INSTALL ZINC RIBBON FROM STATION NO. START TO STATION NO. END. REFERENCE DRAWINGS 12144-201 FOR SSD WIRING AND TAPING DETAILS.
4. ZINC RIBBON BASED ON 2,000 FOOT REEL. REFERENCE DETAIL B FOR ZINC RIBBON TO ZINC RIBBON EXOTHERMIC WELD WHERE ZINC RIBBON MUST BE SPLICED.

ISSUED FOR CONSTRUCTION

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

TITLE: CABLE SPLICE INSTALLATION DETAILS

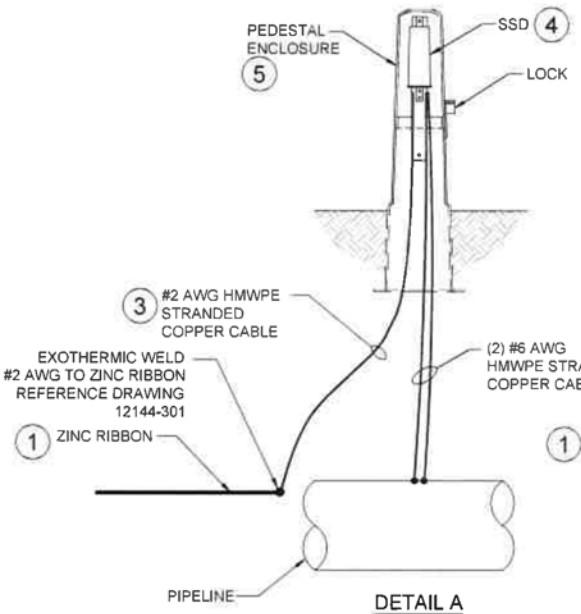
DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-301	C

PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	RFA	5/16/16	NTS	12144-301-1-RC	1 OF 1

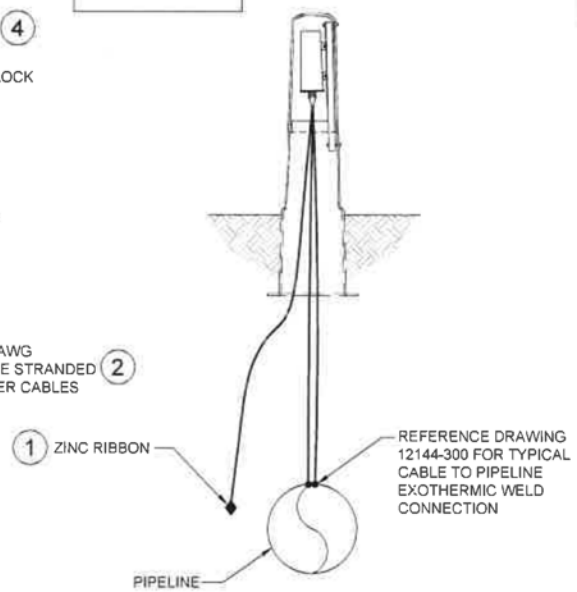
00721

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA

SSD POLARITY:
NEG: PIPELINE
POS: ZINC RIBBON

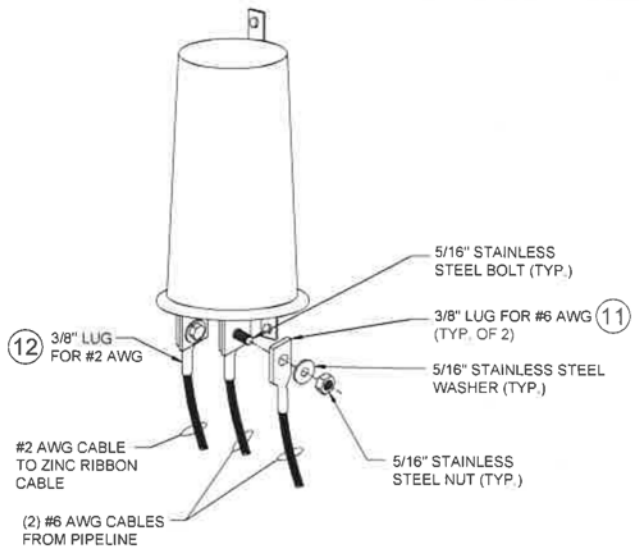


DETAIL A
FRONT VIEW

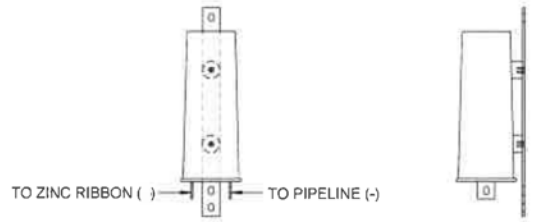


DETAIL B
SIDE VIEW

SSD INSTALLATION DETAILS



CABLE TO SSD TERMINAL CONNECTION DETAIL



FRONT VIEW

SIDE VIEW

SOLID STATE DECOUPLING DEVICE (SSD)

NOTES:

1. SSD IS TO BE MOUNTED INSIDE THE FIBERGLASS PEDESTAL. ALL COPPER CABLES ARE TO PASS THROUGH BOTTOM OF PEDESTAL.
2. INSTALL PEDESTAL AS CLOSE AS POSSIBLE TO PIPING CONNECTIONS TO REDUCE LEAD LENGTHS.
3. WIRING ON THIS SHEET DEPICTS Zn-1C CONFIGURATION. REFERENCE DRAWING 12144-201 FOR SPECIFIC WIRING DETAILS.

ISSUED FOR CONSTRUCTION

CLIENT: CHA
SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

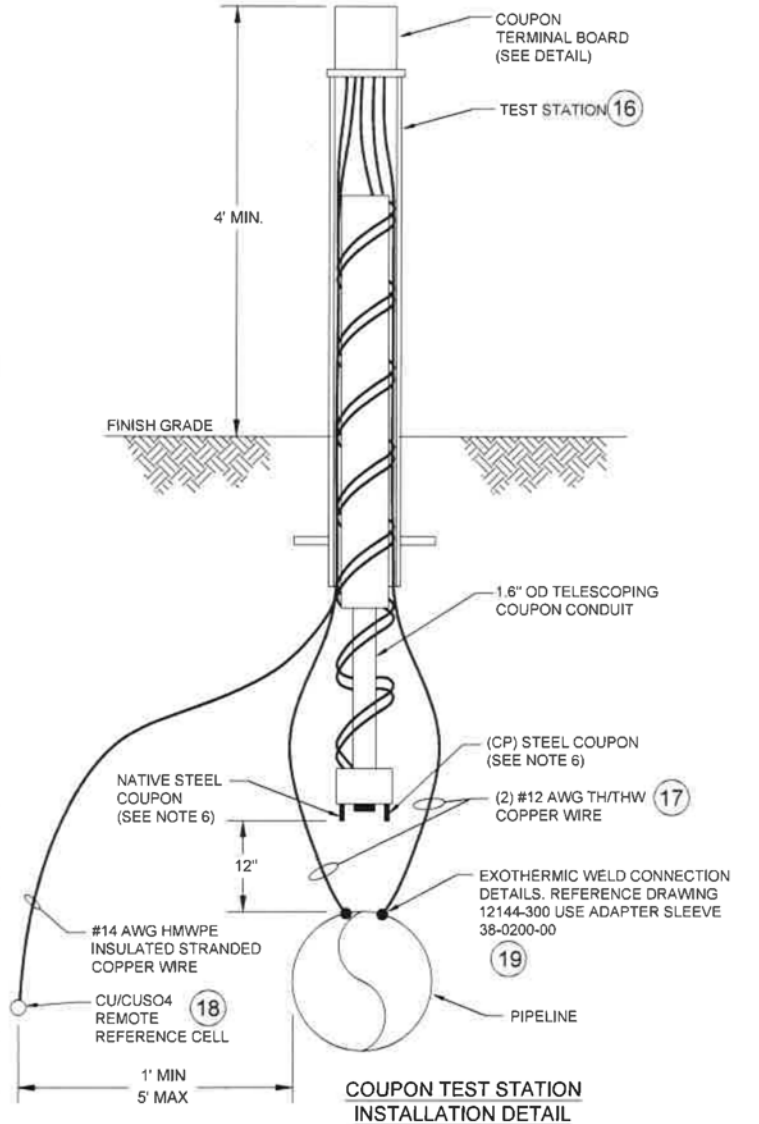
ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

TITLE: SOLID STATE DECOUPLER (SSD) INSTALLATION DETAILS

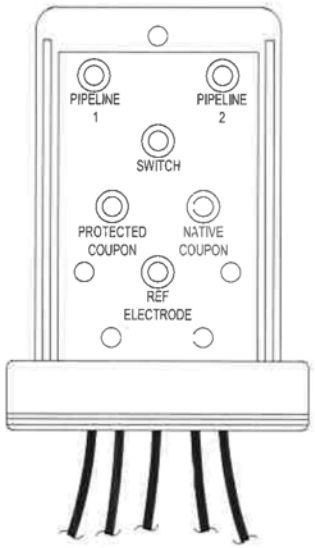
DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-302	C

PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	RFA	5/16/16	NTS	12144-302-1-RC	1 OF 1

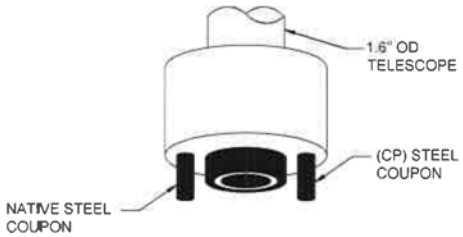
00722



COUPON TEST STATION
INSTALLATION DETAIL



COUPON TEST STATION
TERMINAL BOARD



AC COUPON DETAIL

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA

NOTES:

1. TEST STATION TO BE INSTALLED DIRECTLY ABOVE BURIED PIPE. COUPON TO BE 12" FROM TOP OF PIPE.
2. COUPON TEST STATION INCLUDES TERMINAL BOARD, COVER, TELESCOPING BODY, TWO COUPONS AND INTERNAL WIRING. (ITEM 15)
3. INSTALL CU/CUS04 PERMANENT REMOTE REFERENCE ELECTRODE HORIZONTALLY A MINIMUM OF 1 FOOT AND A MAXIMUM OF 5 FEET FROM THE PIPE AT THE 9 O'CLOCK POSITION.
4. COUPONS TO HAVE 1.44 SQUARE INCH SURFACE AREA.
5. REFERENCE DRAWING 12144-204 FOR TEST STATION LOCATIONS.
6. SOIL PLACED AROUND AND BENEATH COUPON SHOULD BE NATIVE AND FREE OF FOREIGN MATERIAL AND ROCKS.
7. REFERENCE CP SYSTEM DESIGN DRAWINGS FOR COUPON TEST STATION LOCATIONS.

CONNECTIONS:		QUANTITY	CABLE/WIRE SIZE	COLOR
TEST STATION	PIPE/DEVICE			
PIPELINE 1	PIPELINE	1	#12	BLACK
PIPELINE 2	PIPELINE	1	#12	BLACK
NATIVE COUPON	NATIVE COUPON	1	#12	ORANGE
PROTECTED COUPON	CP COUPON	1	#12	BLUE
REFERENCE ELECTRODE	PERMANENT REFERENCE ELECTRODE	1	#14	YELLOW

ISSUED FOR CONSTRUCTION

CLIENT: CHA
SITE: VERMONT GAS SYSTEMS, INC.
ADDISON NATURAL GAS PROJECT

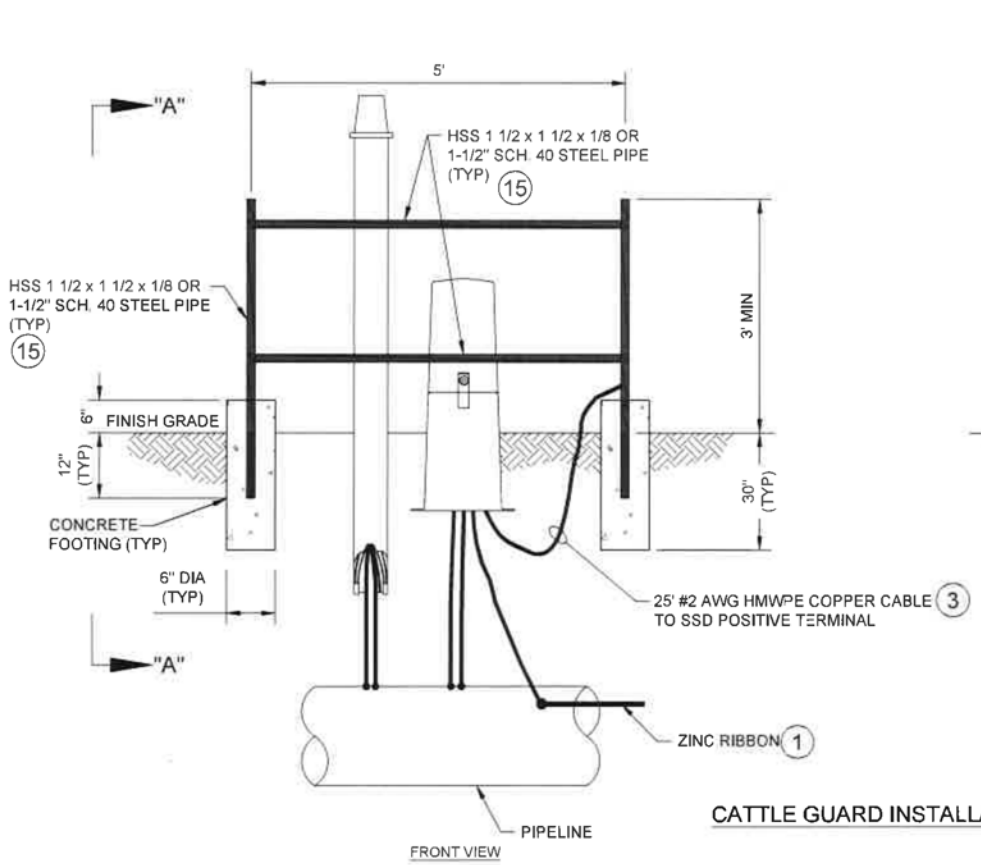
ARK ENGINEERING & TECHNICAL SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

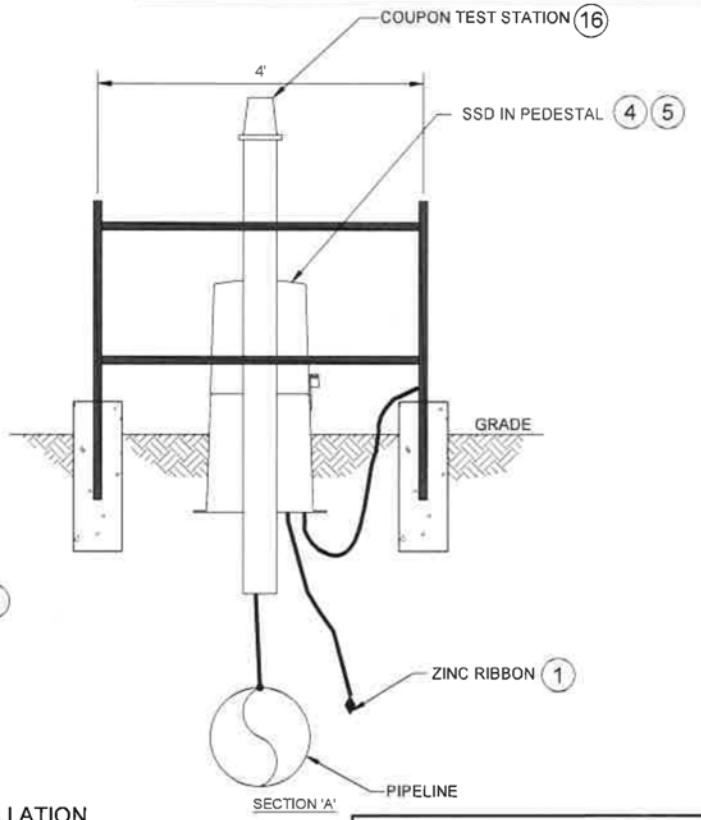
TITLE: COUPON TEST STATION WIRING DETAILS

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-303	C
PROJECT NO. 12-E-144-AC	APPROVED BY RFA	DATE 5/16/16	SCALE NTS	CAD FILE NAME 12144-303-1-RC	SHEET 1 OF 1

00723

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA





CATTLE GUARD INSTALLATION

ISSUED FOR CONSTRUCTION

NOTES:

1. REFERENCE DRAWING 12144-201 & 303 FOR WIRING DETAILS.
2. VERMONT GAS TO DETERMINE SSD AND COUPON TEST STATION LOCATIONS REQUIRING CATTLE GUARD. CATTLE GUARD TO PROTECT SSD AND COUPON TEST STATION.

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC.
ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

TITLE: CATTLE GUARD INSTALLATION DETAIL

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-304	C

PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	RFA	5/16/16	NTS	12144-304-1-RC	1 OF 1

00724

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/1/15	RFA
C	CLIENT REVISIONS	5/16/16	RFA

ITEM	QUANTITY	DESCRIPTION
1	37,200'	ZINC RIBBON ANODE, HIGH GRADE ELECTROLYTIC ZINC, 99 99% PURE. CONFORMS IN COMPOSITION TO ASTM B-418-73 TYPE II; 5/8" X 7/8" CROSS SECTION WITH 0 135" DIAMETER GALVANIZED STEEL CORE CABLE; NOMINAL WEIGHT OF 1 2 POUNDS PER FOOT. PLATT BROS. PP2, 1-1017P
2	5,000'	#6 AWG HMWPE INSULATED STRANDED COPPER CABLE. SOFT-DRAWN, COMMERCIALLY PURE COPPER, ASTM B8, CLASS B STRANDING.
3	1,600'	#2 AWG HMWPE INSULATED STRANDED COPPER CABLE. SOFT-DRAWN, COMMERCIALLY PURE COPPER, ASTM B8, CLASS B STRANDING.
4	58	SSD (SOLID STATE DECOUPLER), -3V/+1V BLOCKING VOLTAGE, 5KA FAULT CURRENT RATING (30 CYCLES) AT 50/60HZ, 100KA LIGHTNING SURGE CURRENT RATING (4 X 10 WAVEFORM) DAIRYLAND ELECTRICAL INDUSTRIES, P/N SSD-3/1-5 0-100
5	58	SSD PEDESTAL, FIBERGLASS CASE. 6" X 6" X 42" HIGH, WITH STAINLESS STEEL BACK-PLATES FOR MOUNTING THE SOLID STATE DECOUPLING DEVICE. DAIRYLAND ELECTRICAL INDUSTRIES. P/N PEDESTAL - 42".
6	1	EXOTHERMIC WELD MOLD, THERMOWELD P/N M-7233. HANDLE CLAMP AND FLINT IGNITOR ARE INCLUDED. USED FOR ZINC RIBBON TO ZINC RIBBON IN-LINE SPLICE CONNECTIONS. USE #15CP WELD METAL.
7	3	EXOTHERMIC WELD MOLD, THERMOWELD P/N M102. HANDLE CLAMP AND FLINT IGNITOR ARE INCLUDED. USED FOR EXOTHERMIC WELD CONNECTION OF #6 & #12 AWG STRANDED CABLE TO PIPE. USES 15CP WELD METAL.
8	7 BOXES	EXOTHERMIC WELD METAL, THERMOWELD P/N #15CP. BONDS #6 AND #12 AWG CABLE TO PIPELINE. ALSO USED FOR ZINC RIBBON TO ZINC RIBBON. 20 SHOTS PER BOX.
9	2	EXOTHERMIC WELD MOLD, THERMOWELD P/N M-11638. HANDLE CLAMP AND FLINT IGNITOR ARE INCLUDED. USED FOR IN-LINE SPLICE OF ZINC RIBBON TO #2 AWG CABLE. USE #32CP WELD METAL.
10	7 BOXES	EXOTHERMIC WELD METAL, THERMOWELD P/N #32CP. USED FOR #2 AWG CABLE TO ZINC RIBBON CONNECTIONS. 10 SHOTS PER BOX.
11	116	BURNDY YAZ6C-TC38 COMPRESSION LUG. THESE LUGS WILL CONNECT THE #6 AWG COPPER CABLE TO THE SOLID STATE DECOUPLING DEVICES. TWO LUGS PER SSD.
12	64	BURNDY YAZ2C-TC38 COMPRESSION LUG. THESE LUGS WILL CONNECT THE #2 AWG COPPER CABLE TO THE SOLID STATE DECOUPLING DEVICES. ONE OR TWO LUGS PER SSD.
13	58 TUBES	TWO PART EPOXY: SPECIALTY POLYMER COATINGS, INC SP-2888 (OR APPROVED EQUAL). USED FOR REPAIRING PIPE COATING AT #6 AWG CONNECTIONS TO PIPE. APPLY 20 MILS THICK MIN. 50ML TUBE WILL REPAIR TWO #6 EXOTHERMIC WELDS TO PIPE.
14	85 KITS	ROYSTON SPLICE RIGHT KIT (OR APPROVED EQUAL). INSULATION KIT FOR EXOTHERMIC WELD SPLICE CONNECTIONS.
15	4 (MIN.)	CATTLE GUARD, 5' X 4' X 3' MIN. ABOVE GRADE. CONSTRUCTED OF HOLLOW STEEL SECTION (HSS) 1 1/2 x 1 1/2 x 1/8 THICK OR 1 5" DIAMETER SCH. 40 STEEL PIPE, ANCHORED AT ALL FOUR CORNERS 30" DEEP X 6" DIAMETER CONCRETE FOOTINGS. CATTLE GUARD TO BE COATED WITH 6 MIL OF YELLOW POWDER COAT PER MANUFACTURER SPECIFICATION.
16	8	TEST STATION, DUAL COUPON (STEEL PIN) ON TELESCOPING 7' YELLOW CONDUIT. BINGHAM AND TAYLOR P/N CTS 1.4. COUPON SURFACE AREA OF 1.44 SQUARE INCHES.
17	400'	COPPER CABLE #12 AWG STRANDED, BLACK PVC INSULATED, TYPE TW/THW, 600V RATED, SUITABLE FOR WET OR DRY LOCATIONS, TEMP RANGE -25°C TO 75°C. ASTM B-1, B-3 & B-8 COMPLIANT FOR COPPER CONDUCTORS. RCHS COMPLIANT. USED FOR CONNECTIONS FROM TEST STATIONS TO PIPE.
18	8	PERMANENT REFERENCE ELECTRODE (CU/CUS04) FOR REMOTE USE AT COUPON TEST STATIONS. ELECTROCHEMICAL DEVICES INC P/N: MODEL UL-CUG-SW. INCLUDES 50 FT OF #14 AWG YELLOW HMWPE WIRE. PREPACKAGED REFERENCE ELECTRODE.
19	20	ADAPTER SLEEVE FOR USE WITH THERMOWELD TYPE CS-32, MOLD # M-102 (THERMOWELD OR EQUAL). P/N 38-0200-00 (THERMOWELD OR EQUAL). USED FOR EXOTHERMIC WELD CONNECTION OF #12 AWG STRANDED COPPER CABLE TO PIPE.

NOTE:

ARK ENGINEERING CAN PROVIDE ALL MATERIALS LISTED ABOVE AND INSTALLATION SERVICES. PLEASE CALL 1-800-469-3436 FOR A MATERIAL OR INSTALLATION QUOTATION.

ISSUED FOR CONSTRUCTION

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

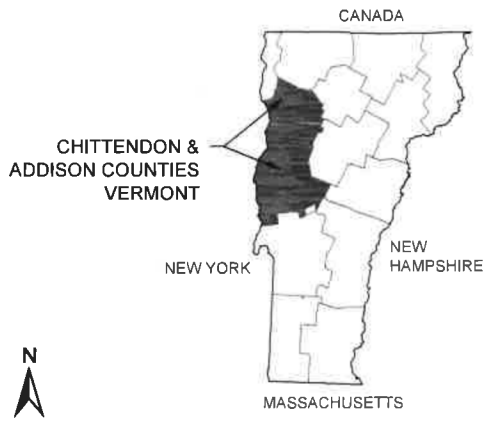
ARK ENGINEERING & TECH. SERVICES, INC. 639 GRANITE STREET SUITE 200 BRAINTREE, MA 02184 U.S.A.

TITLE: MATERIALS LIST

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-400	C
PROJECT NO. 12-E-144-AC	APPROVED BY RFA	DATE 5/16/16	SCALE NTS	CAD FILE NAME 12144-400-1-RC	SHEET 1 OF 1

00725

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/3/15	RFA



CHA

VERMONT GAS SYSTEMS, INC.
ADDISON NATURAL GAS PROJECT
VALVES: WILLISTON M & R
MLV-2, MLV-3, MLV-4,
MLV-5/ PLANK ROAD M & R, MLV-6,
COLCHESTER LAUNCHER,
MIDDLEBURY M & R
AC MITIGATION SYSTEM DESIGN
VALVE SITE GROUNDING INSTALLATION DRAWINGS
CHITTENDON & ADDISON COUNTIES, VERMONT

PROJECT DRAWING LISTING

DRAWING NO.	SHEETS	REV	TITLE
12144-101	1	B	COVER SHEET
12144-205	1	A	GROUNDING PLAN - WILLISTON M & R
12144-206	1	A	GROUNDING PLAN - MLV-2
12144-207	1	B	GROUNDING PLAN - MLV-3
12144-208	1	A	GROUNDING PLAN - MLV-4
12144-209	1	A	GROUNDING PLAN - MLV-5/PLANK ROAD M & R
12144-210	1	A	GROUNDING PLAN - MLV-6
12144-211	1	A	GROUNDING PLAN - COLCHESTER LAUNCHER
12144-212	1	A	GROUNDING PLAN - MIDDLEBURY M & R
12144-305	1	A	GROUND LOOP SPLICE CONNECTION DETAILS
12144-306	1	A	CABLE TO PIPELINE CONNECTION DETAILS
12144-307	1	A	SOLID STATE DECOUPLER (SSD) INSTALLATION DETAILS
12144-308	1	A	FENCE & GATE CLAMP CONNECTION DETAILS
12144-309	1	A	GROUND ROD INSTALLATION DETAILS - DRILL PROCEDURE
12144-401	2	B	MATERIALS LIST

CLIENT: CHA
SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT
PROJECT NO.: 12-E-144-AC

ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

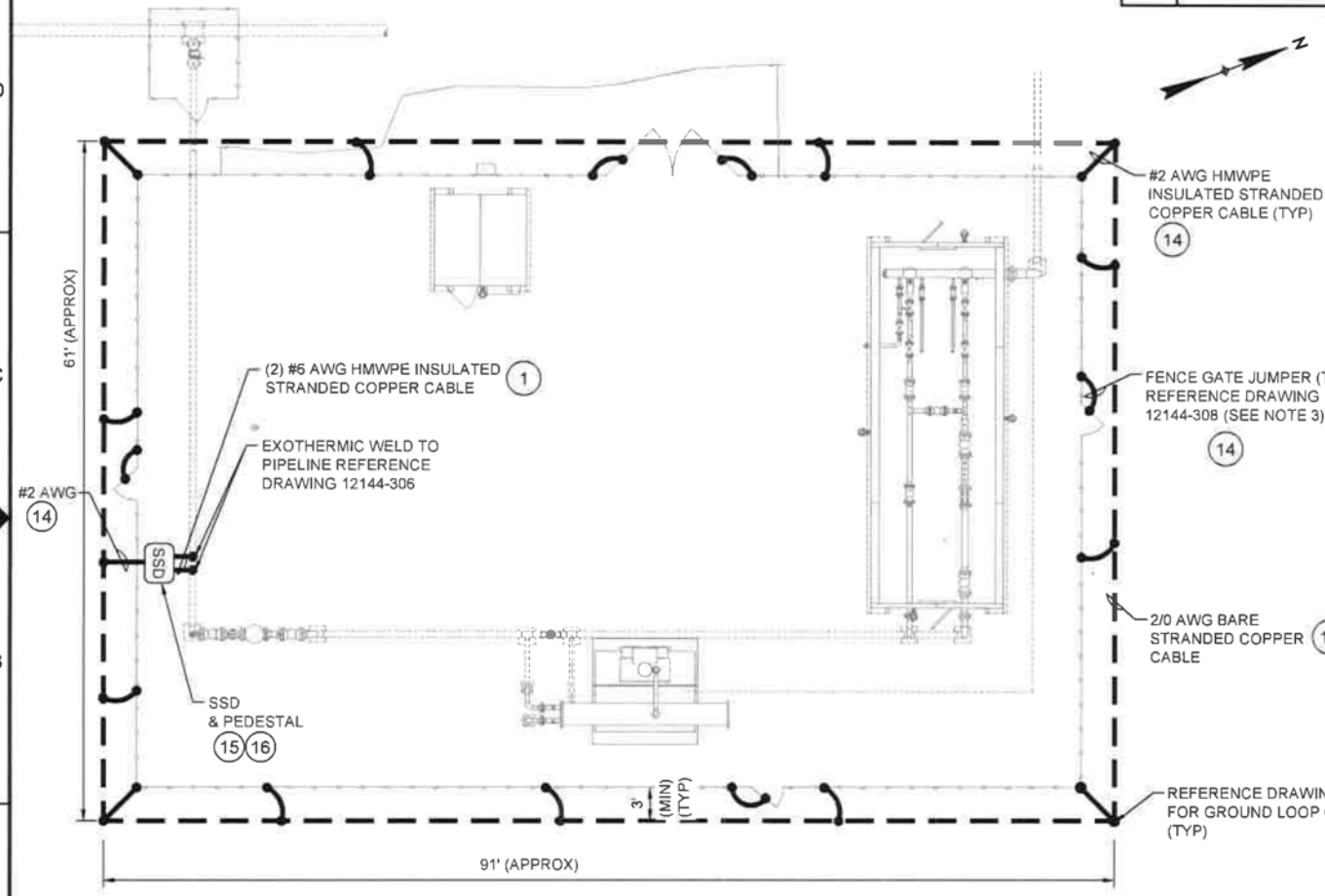
TITLE: COVER SHEET

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-101	B

APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
JM	9/30/13	NTS	12144-101-1-RB	1 OF 1

00726

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM



NOTES:

1. INSTALL 6" LAYER OF CRUSHED ROCK EXTENDING 4' OUTSIDE OF PERIMETER FENCE AND GATE SWING AREAS.
2. ALL PIPING LOCATIONS AND DIMENSIONS ARE APPROXIMATE. FIELD VERIFY BEFORE ORDERING MATERIALS.
3. ALL FENCE GATES ARE TO BE ELECTRICALLY BONDED TO FENCE POST. REFERENCE DRAWING 12144-308 FOR DETAILS.
4. REFERENCE DRAWING 12144-305 FOR EXOTHERMIC WELDS TO COPPER CABLE GROUND LOOP.
5. 2/0 BARE COPPER GROUND LOOP TO BE INSTALLED 3' OUTSIDE PERIMETER FENCE A MINIMUM OF 18" DEEP BELOW NATURAL GRADE.

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

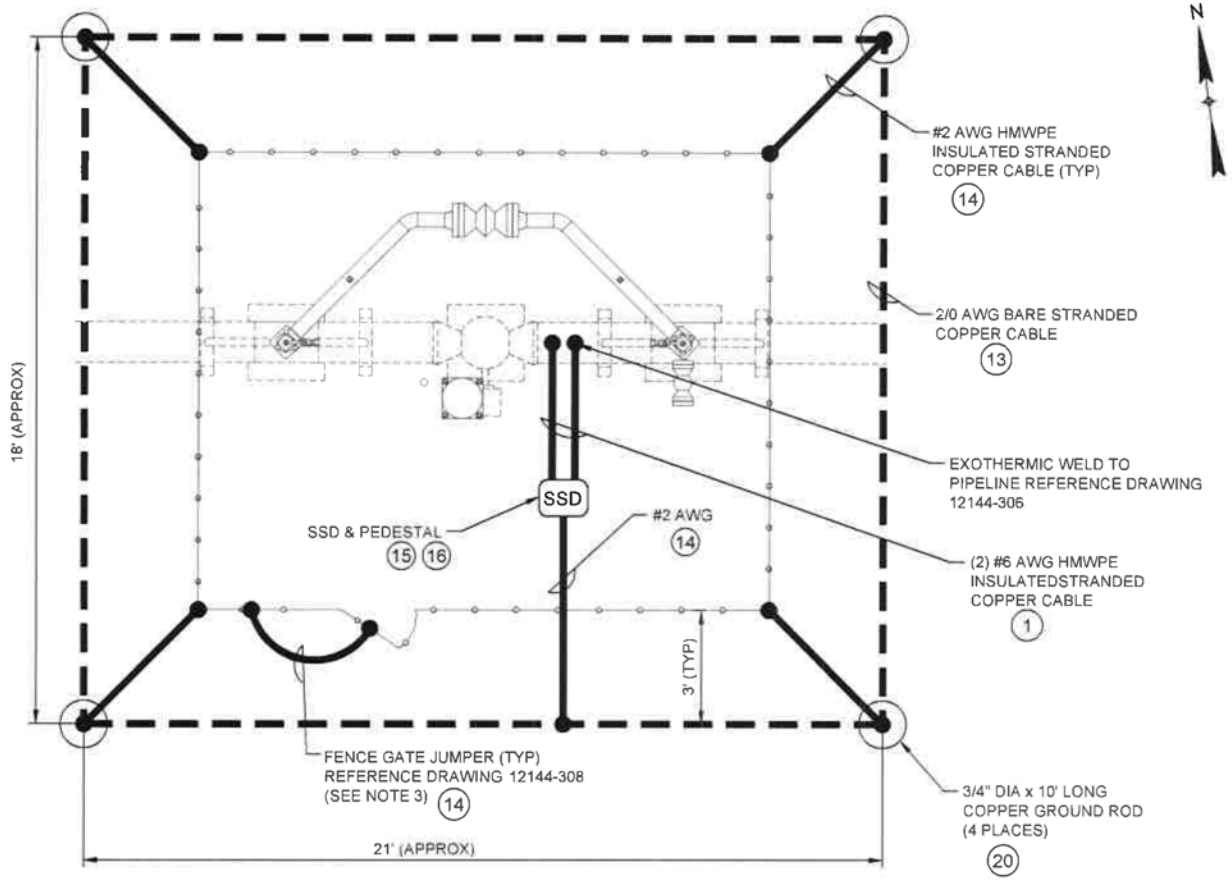
ARK ENGINEERING & TECH. SERVICES, INC. 639 GRANITE STREET SUITE 200 BRAINTREE, MA 02184 U.S.A.

TITLE: GROUNDING PLAN - WILLISTON M & R

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-205	A
PROJECT NO. 12-E-~44-AC	APPROVED BY JM	DATE 9/30/13	SCALE NTS	CAD FILE NAME 12144-205-1-RA	SHEET 1 OF 1

00727

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM



NOTES:

1. INSTALL 6" LAYER OF CRUSHED ROCK EXTENDING 4' OUTSIDE OF PERIMETER FENCE AND GATE SWING AREAS.
2. ALL PIPING LOCATIONS AND DIMENSIONS ARE APPROXIMATE. FIELD VERIFY BEFORE ORDERING MATERIALS.
3. ALL FENCE GATES ARE TO BE ELECTRICALLY BONDED TO FENCE POST. REFERENCE DRAWING 12144-308 FOR DETAILS.
4. REFERENCE DRAWING 12144-305 FOR EXOTHERMIC WELDS TO COPPER CABLE GROUND LOOP.
5. 2/0 BARE COPPER GROUND LOOP TO BE INSTALLED 3' OUTSIDE PERIMETER FENCE A MINUMUM OF 18" BELOW NATURAL GRADE.
6. IF GROUND RODS REQUIRE DRILLING, REFERENCE DWG. 12144-309 FOR DRILLING PROCEDURE.
7. GROUND RODS TO BE INSTALLED AT EACH CORNER OF GROUND LOOP.

LEGEND

⊙ GROUND ROD

CLIENT: GHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECH. SERVICES, INC. 639 GRANITE STREET SUITE 200 BRAINTREE, MA 02184 U.S.A.

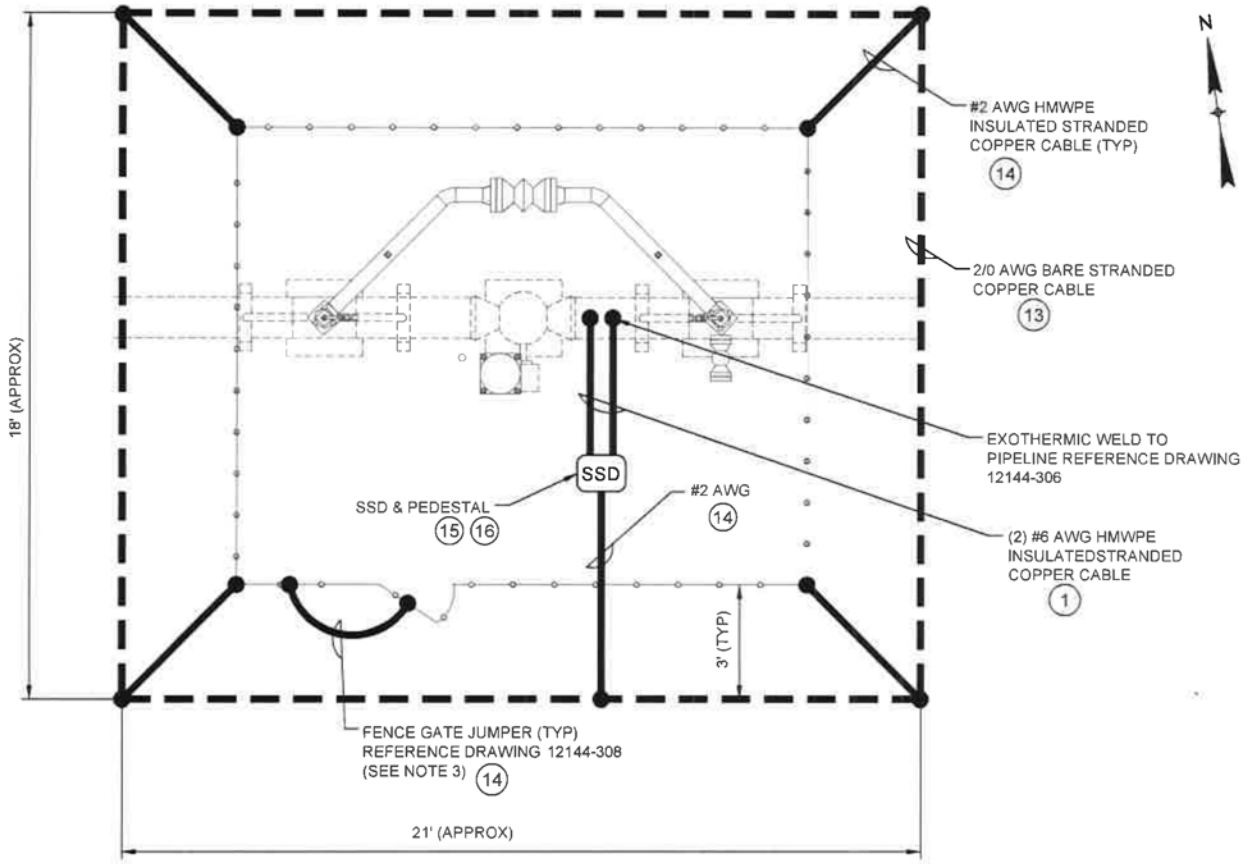
TITLE: GROUNDING PLAN - MLV-2

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-206	A

PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	JM	9/30/13	NTS	12144-206-1-RA	1 OF 1

00728

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/3/15	RFA



NOTES:

1. INSTALL 6" LAYER OF CRUSHED ROCK EXTENDING 4' OUTSIDE OF PERIMETER FENCE AND GATE SWING AREAS.
2. ALL PIPING LOCATIONS AND DIMENSIONS ARE APPROXIMATE. FIELD VERIFY BEFORE ORDERING MATERIALS.
3. ALL FENCE GATES ARE TO BE ELECTRICALLY BONDED TO FENCE POST. REFERENCE DRAWING 12144-308 FOR DETAILS.
4. REFERENCE DRAWING 12144-305 FOR EXOTHERMIC WELDS TO COPPER CABLE GROUND LOOP.
5. 2/0 BARE COPPER GROUND LOOP TO BE INSTALLED 3' OUTSIDE PERIMETER FENCE A MINUMUM OF 18" BELOW NATURAL GRADE.

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECHNICAL SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

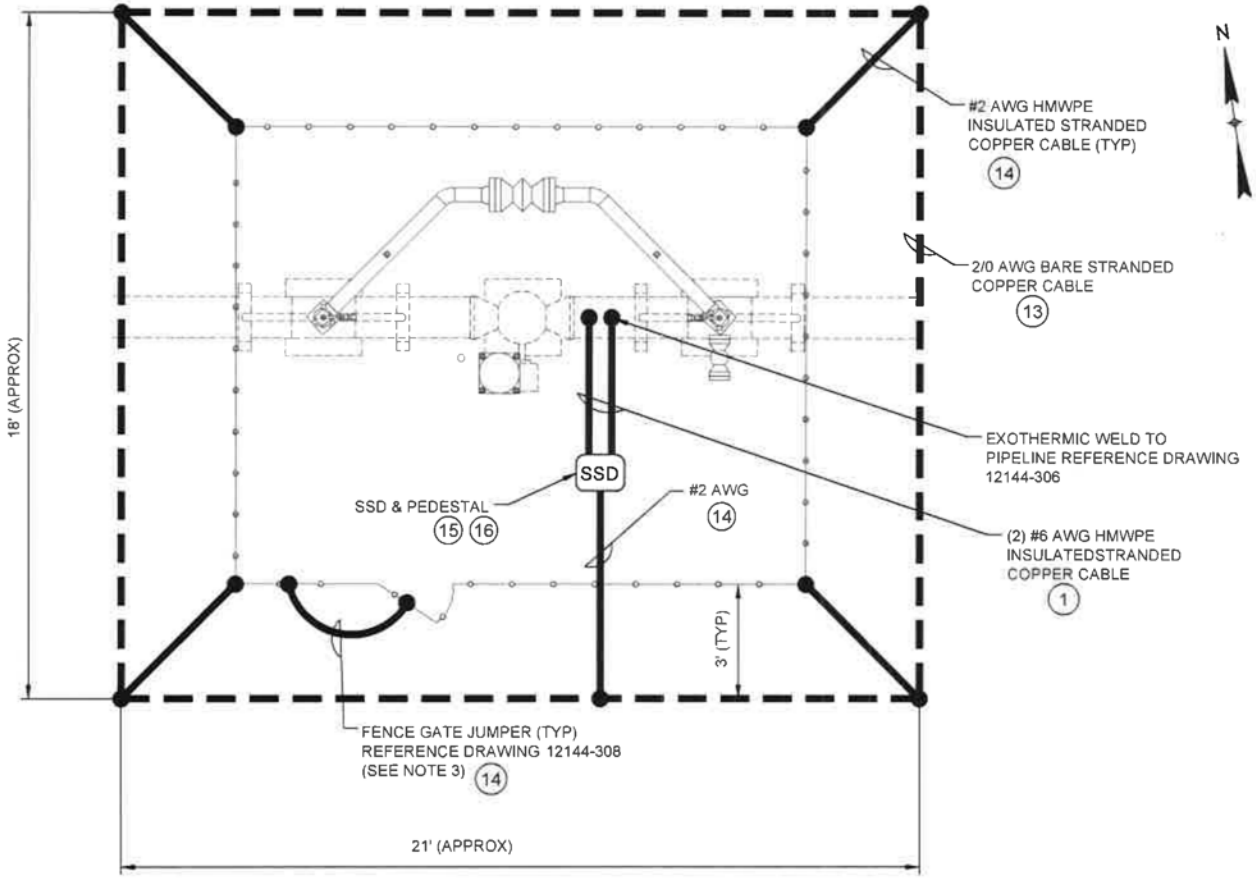
TITLE: GROUNDING PLAN - MLV-3

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-207	B

PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	JM	9/30/13	NTS	12144-207-1-RB	1 OF 1

00729

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM



N

NOTES:

1. INSTALL 6" LAYER OF CRUSHED ROCK EXTENDING 4' OUTSIDE OF PERIMETER FENCE AND GATE SWING AREAS.
2. ALL PIPING LOCATIONS AND DIMENSIONS ARE APPROXIMATE. FIELD VERIFY BEFORE ORDERING MATERIALS.
3. ALL FENCE GATES ARE TO BE ELECTRICALLY BONDED TO FENCE POST. REFERENCE DRAWING 12144-308 FOR DETAILS.
4. REFERENCE DRAWING 12144-305 FOR EXOTHERMIC WELDS TO COPPER CABLE GROUND LOOP.
5. 2/0 BARE COPPER GROUND LOOP TO BE INSTALLED 3' OUTSIDE PERIMETER FENCE A MINUMUM OF 18" BELOW NATURAL GRADE.

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC.
ADDISON NATURAL GAS PROJECT

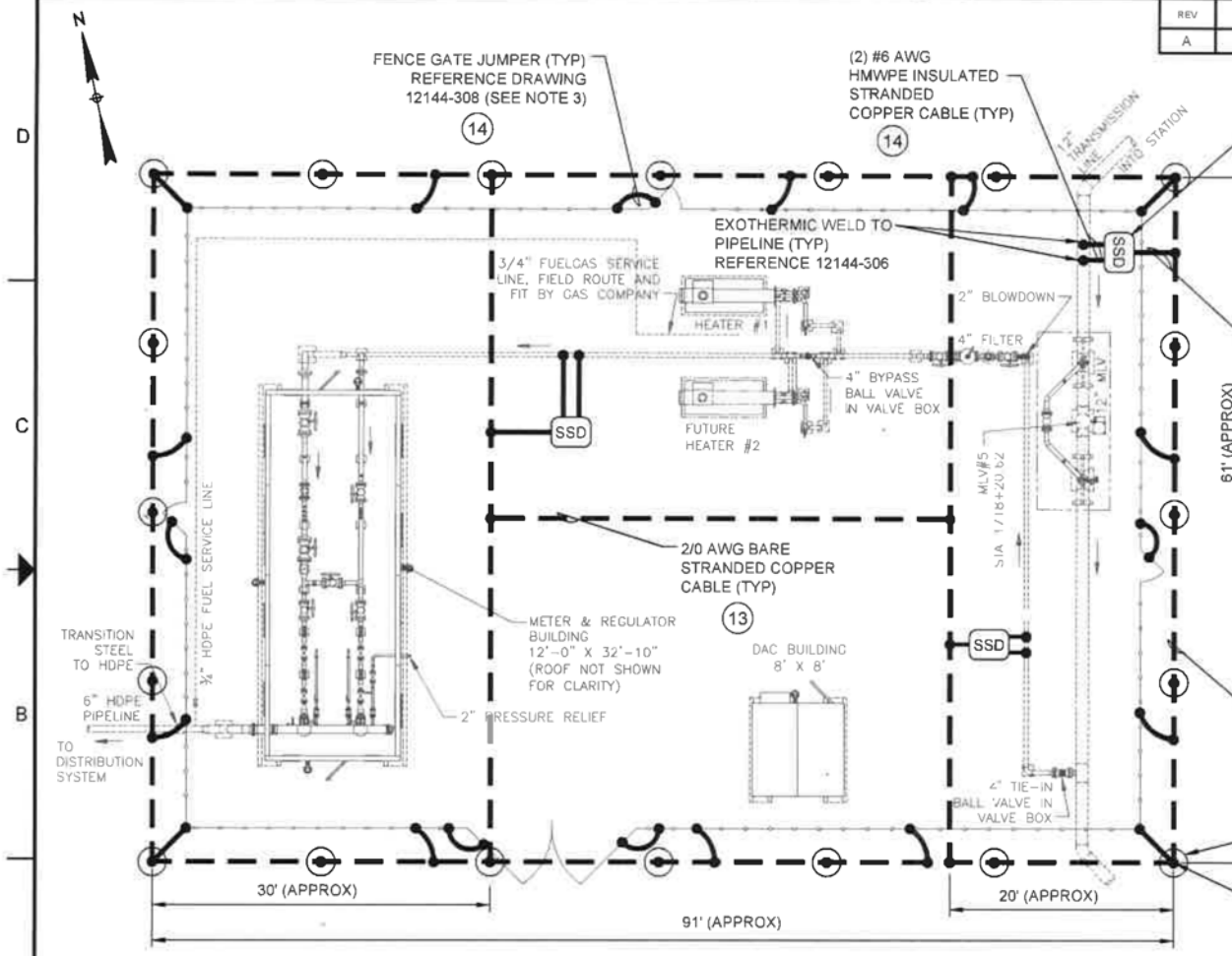
ARK ENGINEERING & TECHNICAL SERVICES, INC.
ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

TITLE: GROUNDING PLAN - MLV-4

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-208	A
PROJECT NO. 12-E-~44-AC	APPROVED BY JM	DATE 9/30/13	SCALE NTS	CAD FILE NAME 12144-208-1-RA	SHEET 1 OF 1

00730

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM



NOTES:

1. INSTALL 6" LAYER OF CRUSHED ROCK EXTENDING 4' OUTSIDE OF PERIMETER FENCE AND GATE SWING AREAS.
2. ALL PIPING LOCATIONS AND DIMENSIONS ARE APPROXIMATE. FIELD VERIFY BEFORE ORDERING MATERIALS.
3. ALL FENCE GATES ARE TO BE ELECTRICALLY BONDED TO FENCE POST. REFERENCE DRAWING 12144-308 FOR DETAILS.
4. REFERENCE DRAWING 12144-305 FOR EXOTHERMIC WELDS TO COPPER CABLE GROUND LOOP.
5. 2/0 BARE COPPER GROUND LOOP TO BE INSTALLED 3' OUTSIDE PERIMETER FENCE A MINIMUM OF 18" DEEP BELOW NATURAL GRADE.
6. IF GROUND RODS REQUIRE DRILLING, REFERENCE DRAWING 12144-309 FOR DRILLING PROCEDURE.
7. GROUND RODS TO BE INSTALLED EVERY 15' ON OUTER GROUND LOOP.

LEGEND

⊙ GROUND ROD

CLIENT: GHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

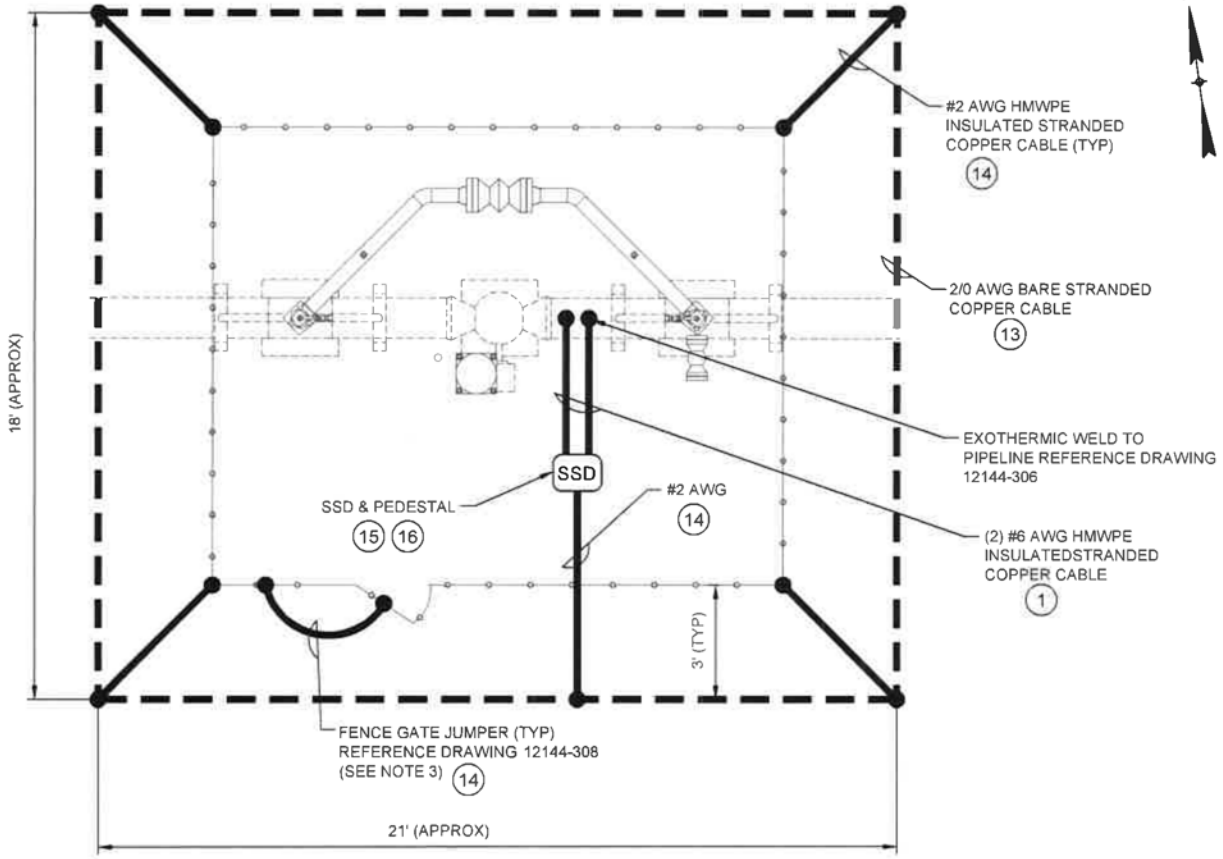
ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

TITLE: GROUNDING PLAN - MLV-5/PLANK ROAD M & R

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-209	A
PROJECT NO. 12-E-144-AC	APPROVED BY JM	DATE 9/30/13	SCALE NTS	CAD FILE NAME 12144-209-1-RA	SHEET 1 OF 1

00731

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM



NOTES:

1. INSTALL 6" LAYER OF CRUSHED ROCK EXTENDING 4' OUTSIDE OF PERIMETER FENCE AND GATE SWING AREAS.
2. ALL PIPING LOCATIONS AND DIMENSIONS ARE APPROXIMATE. FIELD VERIFY BEFORE ORDERING MATERIALS.
3. ALL FENCE GATES ARE TO BE ELECTRICALLY BONDED TO FENCE POST. REFERENCE DRAWING 12144-308 FOR DETAILS.
4. REFERENCE DRAWING 12144-305 FOR EXOTHERMIC WELDS TO COPPER CABLE GROUND LOOP.
5. 2/0 BARE COPPER GROUND LOOP TO BE INSTALLED 3' OUTSIDE PERIMETER FENCE A MINUMUM OF 18" BELOW NATURAL GRADE.

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

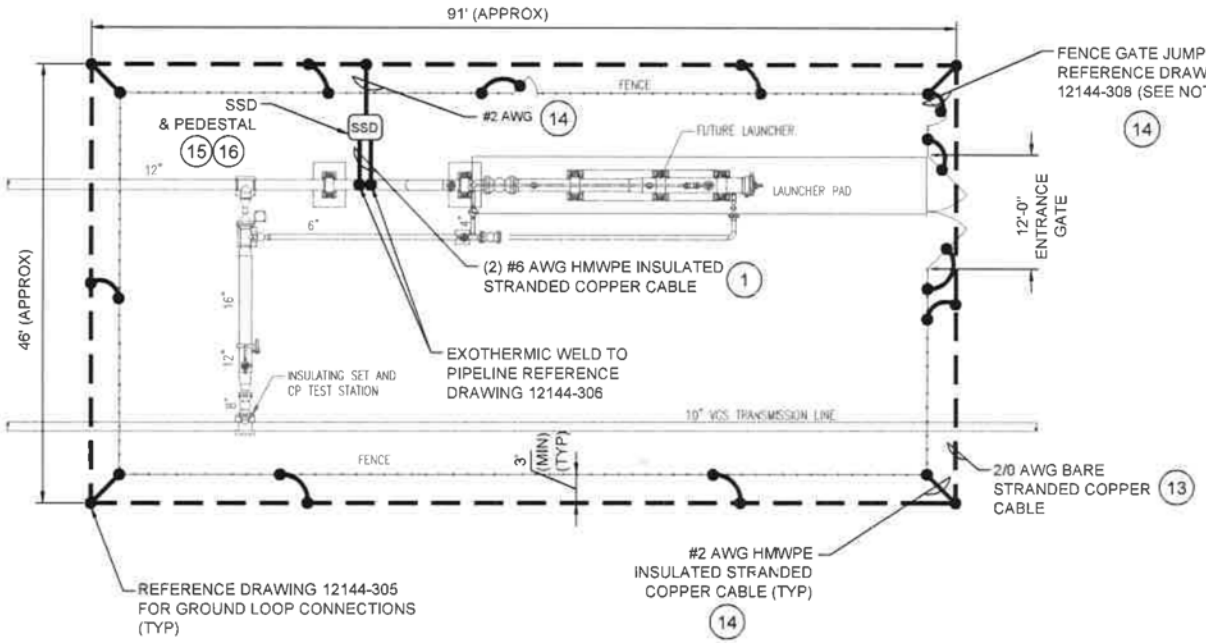
ARK ENGINEERING & TECH. SERVICES, INC. 639 GRANITE STREET SUITE 200 BRAINTREE, MA 02184 U.S.A.

TITLE: GROUNDING PLAN - MLV-6

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-210	A
PROJECT NO. 12-E-144-AC	APPROVED BY JM	DATE 9/30/13	SCALE NTS	CAD FILE NAME 12144-210-1-RA	SHEET 1 OF 1

00732

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM



NOTES:

1. INSTALL 6" LAYER OF CRUSHED ROCK EXTENDING 4' OUTSIDE OF PERIMETER FENCE AND GATE SWING AREAS.
2. ALL PIPING LOCATIONS AND DIMENSIONS ARE APPROXIMATE. FIELD VERIFY BEFORE ORDERING MATERIALS.
3. ALL FENCE GATES ARE TO BE ELECTRICALLY BONDED TO FENCE POST. REFERENCE DRAWING 12144-308 FOR DETAILS.
4. REFERENCE DRAWING 12144-305 FOR EXOTHERMIC WELDS TO COPPER CABLE GROUND LOOP.
5. 2/0 BARE COPPER GROUND LOOP TO BE INSTALLED 3' OUTSIDE PERIMETER FENCE A MINIMUM OF 18" DEEP BELOW NATURAL GRADE.

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

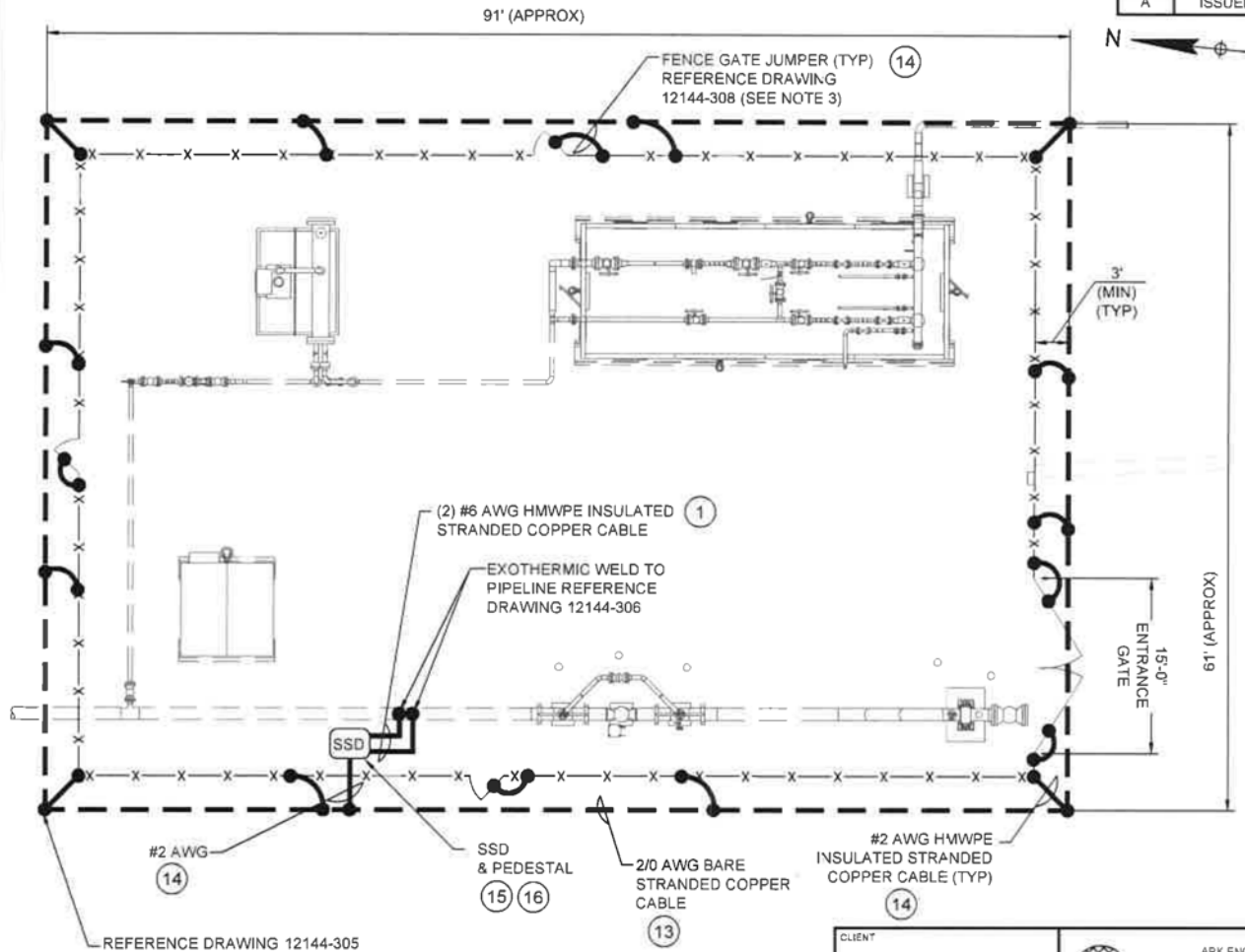
ARK ENGINEERING & TECHNICAL SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

TITLE: GROUNDING PLAN - COLCHESTER LAUNCHER

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-211	A
PROJECT NO. 12-E-144-AC	APPROVED BY JM	DATE 9/30/13	SCALE NTS	CAD FILE NAME 12144-211-1-RA	SHEET 1 OF 1

00733

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM



NOTES:

1. INSTALL 6" LAYER OF CRUSHED ROCK EXTENDING 4' OUTSIDE OF PERIMETER FENCE AND GATE SWING AREAS.
2. ALL PIPING LOCATIONS AND DIMENSIONS ARE APPROXIMATE. FIELD VERIFY BEFORE ORDERING MATERIALS.
3. ALL FENCE GATES ARE TO BE ELECTRICALLY BONDED TO FENCE POST. REFERENCE DRAWING 12144-308 FOR DETAILS.
4. REFERENCE DRAWING 12144-305 FOR EXOTHERMIC WELDS TO COPPER CABLE GROUND LOOP.
5. 2/0 BARE COPPER GROUND LOOP TO BE INSTALLED 3' OUTSIDE PERIMETER FENCE A MINIMUM OF 18" DEEP BELOW NATURAL GRADE.

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC.
ADDISON NATURAL GAS PROJECT

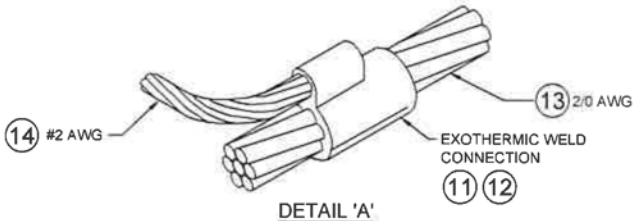
ARK ENGINEERING & TECH. SERVICES INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

TITLE: GROUNDING PLAN - MIDDLEBURY M & R

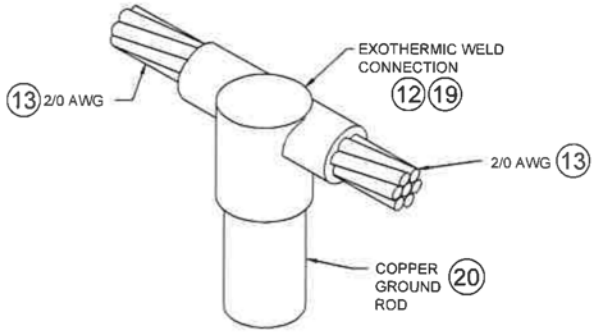
DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-212	A
PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	JM	9/30/13	NTS	12144-212-1-RA	1 OF 1

00734

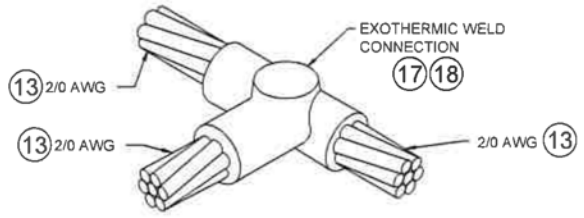
REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM



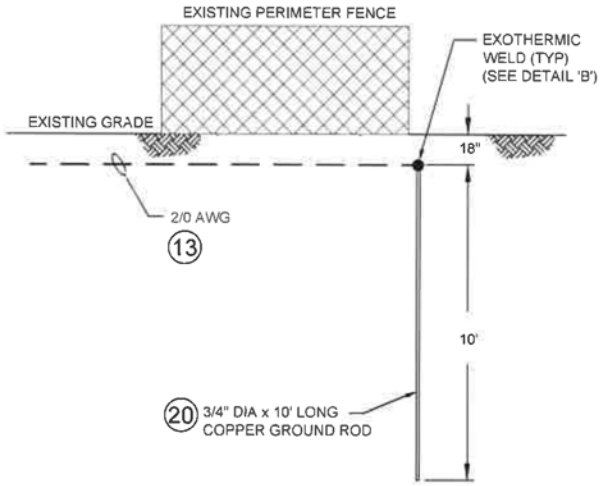
DETAIL 'A'
BARE 2/0 AWG STRANDED COPPER CABLE TO #2 AWG STRANDED COPPER CABLE EXOTHERMIC WELD INSTALLATION



DETAIL 'B'
BARE 2/0 AWG STRANDED COPPER CABLE TO COPPER GROUND ROD EXOTHERMIC WELD INSTALLATION



DETAIL 'C'
BARE 2/0 AWG STRANDED COPPER CABLE RUN WITH BARE 2/0 AWG STRANDED COPPER CABLE TAP EXOTHERMIC WELD INSTALLATION



GROUND ROD CONNECTIONS DETAIL
SIDE VIEW

NOTES:

1. ALL EXOTHERMIC WELD CONNECTIONS ARE TO BE SEALED WITH ROYSTON "SPLICE RIGHT" SPLICE KIT, OR VERMONT GAS APPROVED ALTERNATIVE.
2. REFERENCE DRAWING 12144-206, -207 & -209 FOR LOCATIONS AND QUANTITIES OF GROUND RODS.
3. IF GROUND RODS REQUIRE DRILLING, REFERENCE DRAWING 12144-309 FOR DRILLING PROCEDURE.

NOTES - 2/0 AWG COPPER CABLE TO COPPER GROUND ROD EXOTHERMIC WELD:

1. SEAL BOTTOM OF EXOTHERMIC WELD MOLD WITH WELD PUTTY PRIOR TO EXOTHERMIC WELD PROCESS TO PREVENT LEAKAGE.
2. IF GROUND ROD END IS MUSHROOMED DURING INSTALLATION AND CANNOT ACCEPT THE EXOTHERMIC MOLD, THE END MAY REQUIRE REMOVAL PRIOR TO EXOTHERMIC WELD PROCESS.
3. GROUND RODS MUST BE CLEAN, SHINY AND DRY TO HELP ENSURE A GOOD WELD.
4. INSTALL ROYSTON SPLICE RIGHT KIT ON 2/0 AWG COPPER CABLE TO GROUND ROD EXOTHERMIC CONNECTION.

DETAIL	MOLD	WELD METAL
'A'	TYPE CC-6 M-8306	(2) #45
'B'	TYPE CR-2 M2005	(2) #45
'C'	TYPE CC-2 M-232	#90

CLIENT: CHA
SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

TITLE: GROUND LOOP SPLICE CONNECTION DETAILS

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-305	A

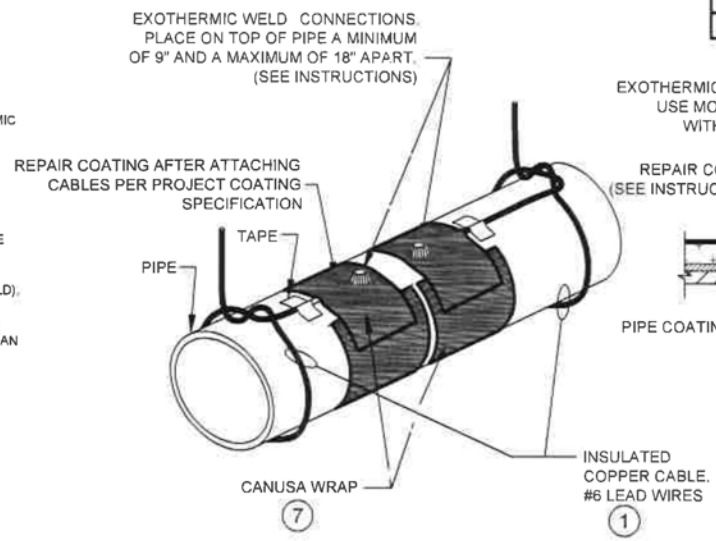
PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	JM	9/30/13	NTS	12144-305-1-RA	1 OF 1

00735

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM

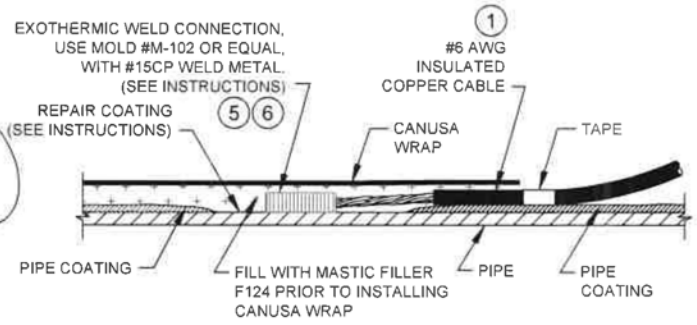
EXOTHERMIC WELD INSTRUCTIONS:

1. FIRST DETERMINE IF THE PIPELINE IS SUITABLE FOR EXOTHERMIC WELDING BY CONDUCTING THE FOLLOWING TESTS:
   A) DETERMINE THAT THE PIPELINE SYMS (SPECIFIED MINIMUM YIELD STRENGTH) IS 60,000 PSI.
   B) DETERMINE THAT PIPELINE WALL THICKNESS IS ⅛" (0.125") OR GREATER.
   C) PERFORM ULTRASONIC TESTING TO PIPELINE TO DETERMINE THAT NO SURFACE OR INTERNAL DEFECTS EXIST.
2. FOR EACH CABLE TO PIPELINE CONNECTION (EXOTHERMIC WELD), REMOVE A 3"X3" MAX AREA OF PIPELINE COATING AT THE 12:00 O'CLOCK POSITION ON THE PIPELINE AND BRUSH UNTIL SHINY. ANY ADJACENT CABLE CONNECTIONS SHALL BE NO CLOSER THAN 9" AND NO FURTHER THAN 18".
3. USING A FILE, PREPARE A CROSSHATCH PATTERN IN THE AREA WHERE THE WELD CONNECTION WILL SIT.
4. PROVIDE CABLE STRAIN RELIEF BY WRAPPING CABLE ONCE AROUND THE PIPE AS SHOWN IN CABLE CONNECTION DETAIL. (SEE ABOVE)
5. STRIP BACK ANY CABLE INSULATION 1"-2" AND TAPE CABLE TO PIPE.
6. ENSURE THAT THE PIPELINE WELD AREA AND CABLE ARE CLEAN AND DRY PRIOR TO WELDING.
7. USE SPECIFIC WELD MOLD AND WELD METAL AS INDICATED IN DRAWING MATERIAL LIST.
8. IF INDICATED, USE COPPER HEAT SLEEVE ON CABLE END TO BE WELDED.
9. USE ONLY A 15 GRAM MELDING CHARGE. DO NOT EXCEED.
10. PLACE THE METAL RETAINER DISK IN THE SPECIFIED WELD MOLD AND DUMP (DO NOT POUR) WELD METAL POWDER ONTO THE DISK. MAKE SURE THAT ALL OF THE FINE STARTING POWDER IS IN THE MOLD. IF ANY POWDER REMAINS IN THE CARTRIDGE BOTTOM, SQUEEZE OUT INTO MOLD AND BREAK UP.
11. CLOSE MOLD LID.
12. REPLACE CAP ON EMPTY WELD METAL CARTRIDGE AND PLACE BACK INTO CARTRIDGE PACK BOX UPSIDE DOWN TO KEEP THE REMAINING CARTRIDGES UPRIGHT.
13. LAY THE CABLE END ON THE CROSSHATCHED PIPE SURFACE USING A SPRING LOADED CHAIN CLAMP TO HOLD CRUCIBLE TIGHT TO PIPELINE.
14. USING EYE AND HAND PROTECTION, STAND ON THE OPPOSITE SIDE OF THE CRUCIBLE FROM THE TOUCH HOLE AND IGNITE POWDER WITH SPARK FROM FLINT GUN. CAUTION: POWDER WILL FLASH WHEN IGNITED.

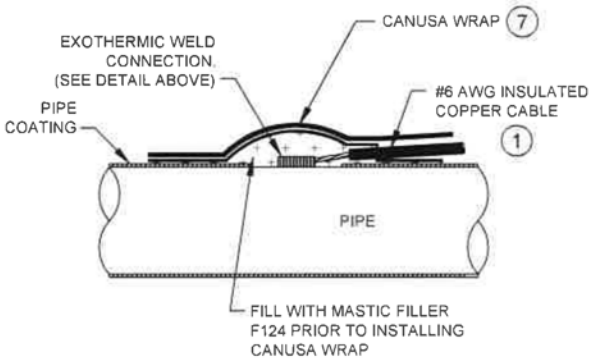


CABLE TO PIPELINE ATTACHMENT DETAIL

15. WHEN WELD HAS SET, REMOVE WELD MOLD AND TEST CONNECTION BY RAPPING SHARPLY WITH A SLAG HAMMER. IF THERE IS ANY INDICATION THAT A COMPLETE WELD HAS NOT BEEN ACHIEVED REMOVE THE WELD AND RE-APPLY.
16. IF WELD IS GOOD, REMOVE ANY SLAG WITH HAMMER AND CLEAN USING A WIRE BRUSH.
17. ONCE THE WELD CONNECTION AND AREA HAVE BEEN CLEANED REPAIR WITH FULL CIRCUMFERENCE CUNUSA WRAP REFER TO VERMONT GAS SPECIFICATIONS TO DETERMINE IF REPAIR IS ACCEPTABLE.



EXOTHERMIC WELD CONNECTION

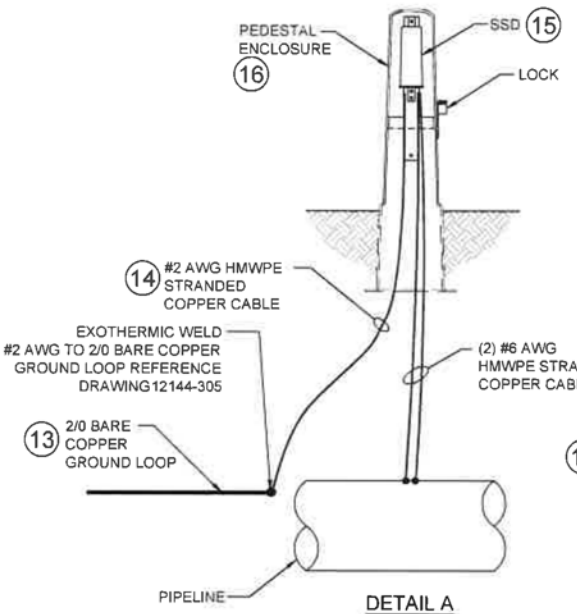


CORROSION PROTECTION SEAL

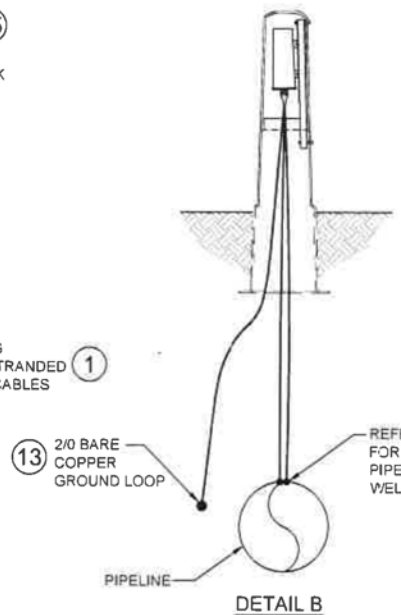
CLIENT: CHA SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT	ARK ENGINEERING & TECHNICAL SERVICES, INC. — ARK ENGINEERING & TECH. SERVICES INC. 639 GRANITE STREET SUITE 200 BRAINTREE, MA 02184 U.S.A.	TITLE: CABLE TO PIPELINE CONNECTION DETAILS			
	DRAWN BY: JRW	DATE: 6/18/13	SIZE: B	DWG. NO.: 12144-306	REV: A
PROJECT NO.: 12-E-144-AC	APPROVED BY: JM	DATE: 9/30/13	SCALE: NTS	CAD FILE NAME: 12144-306-1-RA	SHEET: 1 OF 1

00736

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM

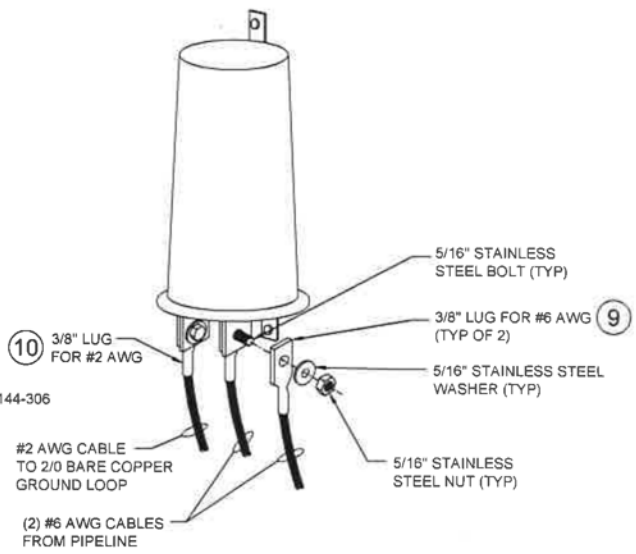


DETAIL A
FRONT VIEW



DETAIL B
SIDE VIEW

SSD INSTALLATION DETAILS



CABLE TO SSD TERMINAL CONNECTION DETAIL

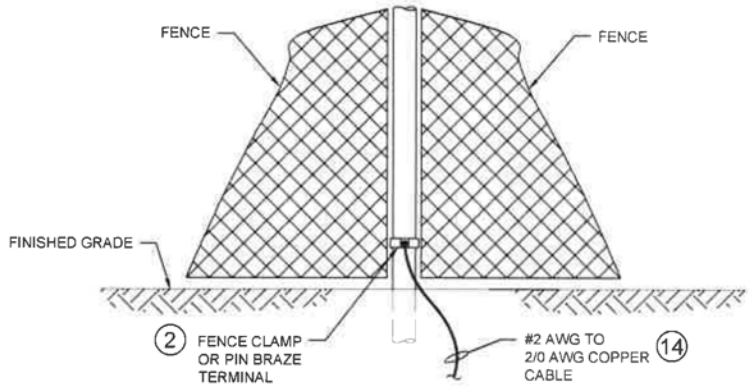
NOTES:

1. SSD IS TO BE MOUNTED INSIDE THE FIBERGLASS PEDESTAL. ALL COPPER CABLES ARE TO PASS THROUGH BOTTOM OF PEDESTAL.
2. INSTALL PEDESTAL AS CLOSE AS POSSIBLE TO PIPING CONNECTIONS TO REDUCE LEAD LENGTHS.
3. LOCATE SSD & PEDESTAL IN A SERVICEABLE LOCATION. COORDINATE WITH VERMONT GAS PERSONNEL.

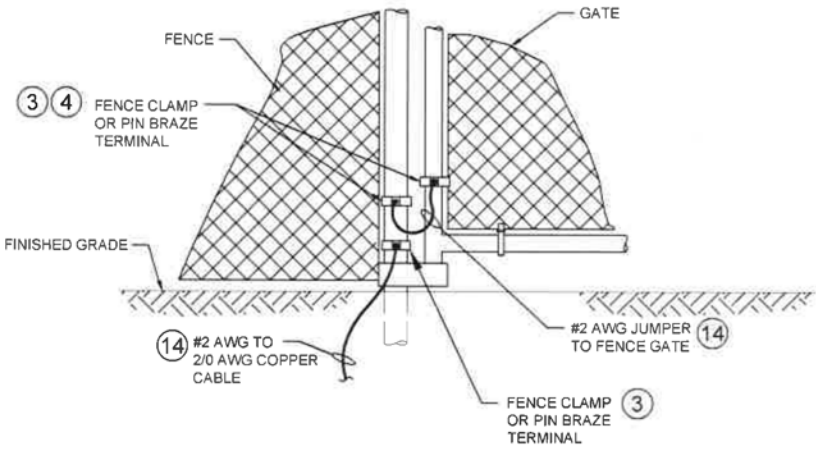
CLIENT: CHA SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT	ARK ENGINEERING & TECH. SERVICES, INC. 639 GRANITE STREET SUITE 200 BRAINTREE, MA 02184 U.S.A.	TITLE: SOLID STATE DECOUPLER (SSD) INSTALLATION DETAILS		
	DRAWN BY: JRW	DATE: 6/18/13	SIZE: B	DWG. NO.: 12144-307 REV: A
PROJECT NO.: 12-E-144-AC	APPROVED BY: JM	DATE: 9/30/13	SCALE: NTS	CAD FILE NAME: 12144-307-1-RA SHEET: 1 OF 1

00737

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM



DETAIL 'A'
FENCE TO GROUND LOOP

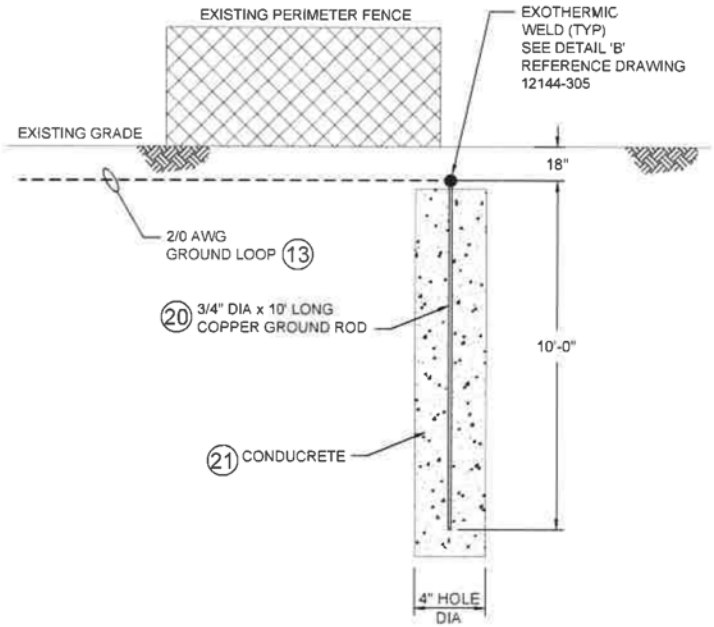


DETAIL 'B'
FENCE AND GATE TO GROUND LOOP

CLIENT: CHA SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT	ARK ENGINEERING & TECHNICAL SERVICES, INC. ARK ENGINEERING & TECH. SERVICES, INC. 639 GRANITE STREET SUITE 200 BRAINTREE, MA 02184 U.S.A.	TITLE: FENCE AND GATE CLAMP CONNECTION DETAILS			
	DRAWN BY: JRW	DATE: 6/18/13	SIZE: B	DWG. NO.: 12144-308	REV: A
PROJECT NO.: 12-E-144-AC	APPROVED BY: JM	DATE: 9/30/13	SCALE: NTS	CAD FILE NAME: 12144-308-1-RA	SHEET: 1 OF 1

00738

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM



ALTERNATE GROUND ROD INSTALLATION - DRILL PROCEDURE
SIDE VIEW

BARE 2/0 AWG STRANDED COPPER GROUND LOOP & 10' COPPER GROUND ROD CONNECTIONS

NOTES - GROUND ROD:

1. IF GROUND RODS ARE POINTED AT ONE END AND MISSHAPEN, CUT OFF 1/2" OF GROUND ROD, FILE SMOOTH TO PREVENT CRACKING.
2. DRILL HOLE NOT BE MORE THAN 11.5' DEEP TO PREVENT GROUND ROD FROM SINKING AND STRAINING CONNECTION TO GROUND LOOP.
3. IF HOLE IS DRY, BACK FILL WITH DRY CONDUCRETE. TWO (2) 55 LB. BAGS OF DM-100 REQUIRED PER HOLE.
4. IF HOLE IS WET, CONDUCRETE MUST BE PUMPED INTO HOLE WITH TREMIE PIPE. CONDUCRETE IS TO BE MIXED AT A RATIO 4.2 GALLONS PER 55 LB. BAG OF CONDUCRETE. TWO (2) 55 LB. BAGS OF DM-100 REQUIRED PER HOLE.
5. CONDUCRETE QUANTITY TO BE DETERMINED BASED ON NUMBER OF HOLES REQUIRING DRILLING.

CLIENT: CHA
SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

TITLE: GROUND ROD INSTALLATION DETAILS DRILL PROCEDURE

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-309	A
PROJECT NO. 12-E-144-AC	APPROVED BY JM	DATE 9/30/13	SCALE NTS	CAD FILE NAME 12144-309-1-RA	SHEET 1 OF 1

00739

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/3/15	RFA

ITEM	WILLISTON M&R	MLV-2	MLV-3	MLV-4	MLV-5/ PLANK RD. M&R	MLV-6	COLCHESTER LAUNCHER	MIDDLEBURY M&R	TOTAL	DESCRIPTION
1	50'	50'	50'	50'	150'	50'	50'	50'	500'	#6 AWG HMWPE INSULATED STRANDED COPPER CABLE. SOFT-DRAWN, COMMERCIALLY PURE COPPER, ASTM B8, CLASS B STD.
2	13	4	4	4	14	4	10	12	65	FENCE CLAMP, LINE POST TO #2 AWG STRANDED CABLE. CONTRACTOR TO COORDINATE WITH FENCE CONTRACTOR ON POST SIZE. (TYPICALLY 2 1/2" DIAMETER.)
3	6	1	1	1	5	1	4	5	24	FENCE CLAMP, DRIVE GATE POST TO #2 AWG STRANDED CABLE. CONTRACTOR TO COORDINATE WITH FENCE CONTRACTOR ON POST SIZE. (TYPICALLY 4" DIAMETER.)
4	6	1	1	1	5	1	4	5	24	FENCE CLAMP, GATE SUPPORT POST TO #2 AWG CABLE JUMPER. CONTRACTOR TO COORDINATE WITH FENCE CONTRACTOR ON POST SIZE. (TYPICALLY 2" DIAMETER.)
5	1	1	1	1	1	1	1	1	8	EXOTHERMIC WELD MOLD, THERMOWELD P/N TYPE CS-32, M-102 (OR EQUAL). HANDLE CLAMP AND FLINT IGNITOR ARE INCLUDED. USED FOR EXOTHERMIC WELD CONNECTION OF #6 AWG STRANDED COPPER CABLE TO PIPELINE. USE 15CP WELD METAL.
6	1 BOX	1 BOX	1 BOX	1 BOX	1 BOX	1 BOX	1 BOX	1 BOX	8 BOXES	EXOTHERMIC WELD METAL. THERMOWELD P/N 15CP (OR EQUAL). BONDS #6 AWG STRANDED COPPER CABLE TO PIPELINE. 20 SHOTS PER BOX.
7	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1 ROLL	PIPELINE COATING REPAIR: COVER EXOTHERMIC WELD WITH F124 MASTIC FILLER PRIOR TO WRAPPING PIPE WITH CANUSA WRAP P/N CPS K60 OR APPROVED EQUAL. USED FOR REPAIRING PIPE COATING AT #6 AWG CONNECTIONS TO PIPE.
8	15	6	6	6	40	6	12	13	108	ROYSTON SPLICERIGHT KIT (OR APPROVED EQUAL). INSULATION KIT FOR EXOTHERMIC WELD SPLICE CONNECTIONS.
9	2	2	2	2	6	2	2	2	20	BURNDY YAZ6C-TC38 COMPRESSION LUG. THESE LUGS WILL CONNECT THE #6 AWG COPPER CABLE TO THE SOLID STATE DECOUPLING DEVICES. TWO LUGS PER SSD.
10	1	1	1	1	3	1	1	1	10	BURNDY YAZ2C-TC38 COMPRESSION LUG. THESE LUGS WILL CONNECT THE #2 AWG COPPER CABLE TO THE SOLID STATE DECOUPLING DEVICES. ONE OR TWO LUGS PER SSD.
11	1	1	1	1	1	1	1	1	8	EXOTHERMIC WELD MOLD, THERMOWELD TYPE CC-6, MOLD# M-8306 (OR EQUAL). HANDLE CLAMP AND FLINT IGNITOR ARE INCLUDED. USED FOR EXOTHERMIC WELD CONNECTION OF 2/0 AWG COPPER GROUND LOOP TO #2 AWG STRANDED COPPER CABLE. USE TWO (2) #45 SHOTS
12	2 BOXES	1 BOX	1 BOX	1 BOX	4 BOXES	1 BOX	2 BOXES	2 BOXES	15 BOXES	EXOTHERMIC WELD METAL. THERMOWELD P/N 45 (OR EQUAL). BONDS 2/0 AWG COPPER GROUND LOOP TO #2 AWG STRANDED COPPER CABLE OR TO GROUND RODS. 20 SHOTS PER BOX.
13	315'	90'	90'	90'	475'	90'	300'	325'	1,795'	2/0 AWG BARE STRANDED COPPER CABLE. THE CABLE WILL BE BURIED IN A LOOP AROUND THE BOUNDARY FENCE.

NOTE:

ARK ENGINEERING CAN PROVIDE ALL MATERIALS LISTED ABOVE AND INSTALLATION SERVICES. PLEASE CALL 1-800-469-3436 FOR A MATERIAL OR INSTALLATION QUOTATION.

CLIENT: CHA

SITE: VERMONT GAS SYSTEMS, INC. ADDISON NATURAL GAS PROJECT

ARK ENGINEERING & TECH. SERVICES, INC.
639 GRANITE STREET
SUITE 200
BRAINTREE, MA
02184 U.S.A.

TITLE: MATERIALS LIST

DRAWN BY	DATE	SIZE	DWG. NO.	REV
JRW	6/18/13	B	12144-401	B

PROJECT NO.	APPROVED BY	DATE	SCALE	CAD FILE NAME	SHEET
12-E-144-AC	JM	9/30/13	NTS	12144-401-1-RB	1 OF 2

00740

REV	DESCRIPTION	DATE	APPROVED
A	ISSUED FOR CONSTRUCTION - ECO 2014-025	6/27/14	JM
B	REVISED PER ECO 2015-017	4/3/15	RFA

ITEM	WILLISTON M&R	MLV-2	MLV-3	MLV-4	MLV-5/ PLANK RD. M&R	MLV-6	COLCHESTER LAUNCHER	MIDDLEBURY M&R	TOTAL	DESCRIPTION
14	155'	45'	45'	45'	175'	45'	100'	125'	735'	COPPER CABLE, #2 AWG HMWPE INSULATED, STRANDED, SOFT-DRAWN. COMMERCIALLY PURE COPPER, ASTM B8, CLASS B STD. USED FOR CONNECTIONS TO GROUND LOOP AND FENCE GATE JUMPERS.
15	1	1	1	1	3	1	1	1	10	SSD (SOLID STATE DECOUPLER), SYMETRICAL BLOCKING VOLTAGE, 2KA FAULT CURRENT RATING (30 CYCLES) AT 50/60HZ, 100KA LIGHTNING SURGE CURRENT RATING (4 X 10 WAVEFORM). DAIRYLAND ELECTRICAL INDUSTRIES, P/N SSD-2/2-2.0-100.
16	1	1	1	1	3	1	1	1	10	SSD PEDESTAL. FIBERGLASS CASE: 6" X 6" X 42" HIGH, WITH STAINLESS STEEL BACK-PLATES FOR MOUNTING THE SOLID STATE DECOUPLING DEVICE. DAIRYLAND ELECTRICAL INDUSTRIES. P/N PEDESTAL - 42".
17	-	-	-	-	1	-	-	-	2	EXOTHERMIC WELD MOLD. THERMOWELD TYPE CC-2, MOLD# M-232 (OR EQUAL). USED FOR 2/0 AWG STRANDED COPPER CABLE TO 2/0 AWG STRANDED COPPER CABLE 'T' SPLICE.
18	-	-	-	-	1 BOX	-	-	-	2 BOXES	EXOTHERMIC WELD METAL, THERMOWELD P/N 90 (OR EQUAL). BONDS 2/0 AWG 2/0 AWG STRANDED COPPER CABLE TO 2/0 AWG STRANDED COPPER CABLE. 10 SHOTS PER BOX.
19	-	1	-	-	1	-	-	-	3	EXOTHERMIC WELD MOLD. THERMOWELD TYPE CR-2, MOLD# M-2005 (OR EQUAL). USED FOR 2/0 AWG STRANDED COPPER CABLE TO 3/4" DIAMETER COPPER GROUND ROD. USE TWO (2) #45 SHOTS.
20	-	4	-	-	20	-	-	-	28	COPPER GROUND RODS - 3/4" DIAMETER x 10' LONG P/N 7510 (GALVIN INDUSTRIES). ONE ROD WILL BE ATTACHED AND DRIVEN AT THE LOCATION SPECIFIED. THEY WILL EACH BE ATTACHED TO THE GROUND LOOP CABLE.
21	-	TBD	-	-	TBD	-	-	-	TBD	DM100 CONDUCRETE - 55 POUND BAGS. FOUR (4) BAGS PER DRILLED HOLE. TOTAL QUANTITY TO BE DETERMINED BASED ON NUMBER OF GROUND RODS REQUIRING DRILLING

ARK ENGINEERING & TECHNICAL SERVICES, Inc.

SIZE	DWG. NO.	REV
B	12144-401	B
SCALE: NTS	CAD FILE NAME: 12144-401-2-RB	SHEET: 2 OF 2

00741

STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Investigation Pursuant to 30 V.S.A. §§ 30 and 209 regarding the alleged failure of Vermont Gas Systems, Inc., to comply with the certificate of public good in docket 7970 by burying the pipeline at less than required depth in New Haven, Vermont	Docket No. 17-3550-INV

30(b)(6) DEPOSITION
- of -
MICHELS CORPORATION,
BY AND THROUGH ITS CORPORATE DESIGNEE,
CARL BUBOLZ

taken on behalf of the Intervenors on Tuesday, December 19, 2017, at the offices of Vermont Department of Public Service, 112 State Street, Montpelier, Vermont, commencing at 10:04 AM.

COURT REPORTER: JOHANNA MASSÉ, RMR, CRR

APPEARANCES:

ON BEHALF OF THE INTERVENORS:

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ON BEHALF OF VERMONT DEPARTMENT OF PUBLIC SERVICE:

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Vermont Department of Public Service
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(802) 828-3785 | jake.clark@vermont.gov

ON BEHALF OF THE WITNESS (VIA TELEPHONE):

ANDREW SIMON, ESQUIRE
Michels Corporation
817 Main Street, P. O. Box 128
Brownsville, Wisconsin 53006
(920) 583-1461 | asimon@michels.us

ALSO PRESENT:

LISA BARRETT
JANE PALMER
RACHEL SMOLKER
JOHN ST. HILAIRE

I N D E X

MICHELS CORPORATION,
BY AND THROUGH ITS CORPORATE DESIGNEE,
CARL BUBOLZ PAGE
EXAMINATION BY MR. DUMONT 5

E X H I B I T S

NUMBER DESCRIPTION PAGE
1 Subpoena 10
2 Michels Document Production, Michels 0003-0032 24

(The original exhibits were included with the original transcript.)

TUESDAY, DECEMBER 19, 2017

10:04 AM

(Deposition Exhibit No. 1 was marked for identification prior to the commencement of the proceedings.)

MR. DUMONT: Why don't we go around and say who's in the room. At this end, myself, James Dumont, present for intervenors in Docket No. 17-3550-INV. With me are Lisa Barrett, Jane Palmer, and Rachel Smolker.

And we'll turn to you next, Mr. Clark.

MR. CLARK: This is Jacob Clark on behalf of the Department of Public Service.

MS. BOUFFARD: I'm Debra Bouffard for Vermont Gas Systems, Incorporated, and here with me today is John St. Hilaire.

MR. DUMONT: And our court reporter is Johanna Massé, M-A-S-S-E.

So who do you have in the room at that end?

MR. SIMON: This is Andrew Simon, corporate counsel for Michels Corporation.

And, Carl, do you want to introduce yourself?

THE WITNESS: Carl Bubolz.

MR. DUMONT: And do we have a notary present?

MR. SIMON: Yes. I'm a notary.

MR. DUMONT: Okay. Is there anybody else present in the room?

MR. SIMON: No, sir.

MR. DUMONT: Okay.

MR. SIMON: If anyone steps in, of course I'll announce it, but right now no one's here. We expect perhaps Matt Westphal, one of our vice presidents, may or may not stop.

MR. DUMONT: So why don't we start by spelling Mr. Bubolz's last name and placing him under oath.

MICHELS CORPORATION,

by and through its corporate designee,

CARL BUBOLZ,

appearing via telephone and having been first duly sworn by Attorney Simon, testified as follows:

MR. SIMON: Spell your last name.

THE WITNESS: My last name is B-u-b-o-l-z.

EXAMINATION

BY MR. DUMONT:

Q. And how do you pronounce your last name?

A. "Boo-boles."

Q. Okay. Thank you. What's your position within the Michels Corporation?

A. I am a superintendent.

Q. What are your duties? What are your duties?
A. Generally over -- over the project.
Q. I'm sorry. Could you speak a little slower? Could you repeat that?
A. My duties would be the overall -- over the project I'm assigned to.
Q. And how long have you been a superintendent at the Michels Corporation?
A. I believe 11 years.
Q. Have you ever been in a deposition before?
A. Yes.
Q. How many times?
A. One.
Q. And what was that about?
A. It was an incident with a crane.
Q. What do you mean, "an incident with a crane"?
A. We -- there was an incident with a crane that -- that tipped on our project in 2007.
Q. So why was your deposition taken?
A. Because I was a superintendent on that project.
Q. And was there a workers' comp claim or a personal injury claim or some other claim?
A. It was a -- there was no injury. It was more of an other claim.

Q. Who made the claim?
A. The crane company.
Q. And who were you testifying on behalf of?
A. Michels.
Q. And had someone -- had Michels brought suit or had Michels been sued?
A. I believe -- I don't know. What does "brought suit" mean?
Q. So you're asking Mr. Simon a question. So that causes me to let you know that under the rules of our depositions you are the only person under oath, Mr. Bubolz. It's not appropriate for you to communicate in answering a question with anyone present in the room. I'm here --
A. Understood.
MR. SIMON: I think he was asking you a question.
A. I was. What does -- what does "brought suit" mean?
Q. Your question is what does "brought suit" mean?
A. Yes.
Q. Had Michels filed a lawsuit or had Michels had a lawsuit filed against it?
A. I believe they had a lawsuit against them.

Q. Michels had a lawsuit against Michels?
A. No. The crane company had a lawsuit against Michels.
Q. Okay. And that's -- you were a witness in the lawsuit between the crane company and Michels?
A. Yes.
Q. All right. Are you presently the sup- -- supervisor or superintendent -- is your title supervisor or superintendent?
A. Superintendent.
Q. Are you presently the superintendent of any project?
A. We are just finishing up a project, but every project I go on, I'm superintendent.
Q. What's the project you're superintendent of now?
A. We're working on a project for Enbridge.
Q. Where?
A. Superior, Wisconsin.
Q. How long have you been a superintendent for the Michels Corporation?
A. Eleven years.
Q. Okay. You were superintendent the entire time?
A. In the beginning I believe my title would have

been assistant superintendent on and off depending on the workload.

Q. So have you been with the Michels Corporation more than 11 years?

A. Yes.

Q. So before 11 years ago, what was your function? What was your title?

A. I've had several titles. When I started, I was a laborer.

Q. And then what?

A. Then I was an equipment operator. Then I was a foreman.

Q. What year did you start work for Michels?

A. 1996.

Q. What was your employment before that?

A. I started right out of high school.

Q. Where did you go to high school?

A. Horace Mann High School.

Q. Where is that?

A. North Fond du Lac.

Q. Can you spell that? Can you spell that town, please?

A. North Fond du Lac?

Q. Yes.

A. N-o-r-t-h F-o-n-d d-u L-a-c.

Q. Is that in Wisconsin?
A. Yes.
Q. Thank you. Do you have any education beyond high school?
A. I started with Michels right out of high school. I did not take any further education.
Q. Thank you. Have you looked at the subpoena that was served in this case?
A. Yes.
Q. Do you have a copy with you?
A. Yes.
Q. I'm treating the subpoena as Exhibit 1.
(Deposition Exhibit No. 1 was marked for identification.)
BY MR. DUMONT:
Q. The first part of the subpoena commands the presence of designated representative knowledgeable about (a) The identity and current telephone numbers, work addresses, and home addresses of each person who was present in or on September 19th, 2016, or September 20, 2016, on behalf of Michels Corporation as an employee, officer, agent, or contractee to install, construct, bury, supervise, or inspect the Vermont Gas Systems pipeline -- gas pipeline in the wetland or swamp area, or the wetland buffer area, in New Haven,

Vermont, nearby to the Monkton town line.

Does Michels keep records indicating -- including the home addresses of its employees?

A. I would be certain they did.

Q. Okay. Has that been provided to us?

A. Yes.

Q. In fact, I will represent -- have you seen the documents that were provided to us Bates stamped 1 through 32?

MR. SIMON: We have the documents printed. They're in front of the witness.

Q. For numerous employees on pages 1, 2, and 22, have the home addresses been withheld?

A. I see the last known addresses are listed.

Q. Is your last known address "Please contact" -- care of Mary Chevalier, 27554 390th Street?

A. No. That -- that says "Please contact through Michels."

Q. Is your home address 817 West Main Street, Brownsville?

A. No.

Q. The next person listed is Jolene Bubolz. What's her relation to you?

A. Jolene is my wife.

Q. Is her -- is her home address or -- last known

address or home address present on the discovery -- on the subpoena response?

A. The Michels last known address is on here, yes.

Q. Is that care of Mary Chevalier, 27554 390th Street?

A. Yes. That's what's listed on the page.

Q. Is that in fact her -- her home address, or is that a Michels address?

A. That was the last known Michels address. That is not her home address.

Q. So that's an address for -- Mary Chevalier works for Michels, correct?

A. No.

Q. Who is Mary Chevalier?

A. That would be my mother-in-law. That is where Jolene was having her mail sent.

Q. Okay. Do you know who was actually present at the site that's the subject of the subpoena on the 19th and the 20th of September?

A. I do from the time sheets listed.

Q. Other than the time sheets, is there any way to ascertain that?

A. No.

Q. Paragraph 1(b) of the subpoena states, "The

depth of the trench in which the Vermont Gas Systems pipeline was buried in the wetland or swamp area, or the wetland buffer area, of New Haven, Vermont, nearby to the Monkton town line." That's paragraph 1(b).

And paragraph 2 commands production of each of the documents listed in paragraph 1 or which contain evidence of the matters set forth in paragraphs 1(a) through 1(j).

So what documents in 2016 -- in September of 2016 did the Michels Corporation possess or did the Michels Corporation or its employees create with regard to the depth of the trench in which the pipeline was buried?

A. We would have not created any documents in regards to the depth of the trench.

Q. Would you have possessed -- you or your employees possessed any documents as to the depth of the trench?

A. Well, the time sheets have some notes about depth, and that is all.

Q. Were you present on the work site in New Haven on September 19th or 20th, 2016?

A. I visited the site frequently, but I -- I could not tell you the exact dates.

Q. Do you possess records or does the company

possess records that would tell us the exact date you were present?

A. No.

Q. Does the company possess records which tell us roughly the date you were present?

A. No.

Q. Does -- does --

A. I was on -- I was on-site all the time, but there were many crews working that I was tending to.

Q. How do you define "site" when you say you were on-site all of the time?

A. The project as a whole.

Q. All 41 miles?

A. Correct.

Q. Are there any documents that would show you were ever at the New Haven wetlands site?

A. I don't think so.

Q. What's your best recollection of the dates or date you were present at the New Haven site?

A. The recollection of the dates?

Q. Yes.

A. I could not tell you the exact dates I was present.

Q. Were you there in 2014?

A. Are you saying the year 2014?

Q. Yes.
A. No.
Q. Were you present in the year 2015?
A. No.
Q. Were you present in the year 2016?
A. Yes.
Q. Do you recall what month you were there?
A. Are you referring to only the New Haven site that we're talking about or the project as a whole?
Q. The New Haven site.
A. We were working at that site in September.
Q. Do you have any recollection what month you were present at the New Haven site in 2016?
A. I was definitely there in September.
Q. Would you have been there in October?
A. I don't recall.
Q. How many times were you present at the New Haven site where there was a wetland near the Monkton town line?
A. Many.
Q. And why were you there many times?
A. Because I was overseeing the project.
Q. What was it that you were overseeing at this particular site?
A. The work being performed.

Q. What aspect of the work?
A. All of it.
Q. So you told me a few minutes ago that the company possesses no records as to the depth of the trench in which the pipeline was buried. Was it part of your duties to oversee the depth of the trench in which the pipeline was buried?
A. Yes.
Q. How could you oversee that without creating any records?
A. It wasn't our responsibility to create records for the depth.
Q. Whose -- whose was it?
A. There was an on-site survey crew.
Q. Who was that?
A. I don't recall their name.
Q. Was that true for the entire 41-mile length of the pipeline construction?
A. Yes.
Q. Do you recall the name of any person, corporation, or entity that in your opinion had the responsibility to determine the depth of the trench along the entire pipeline?
A. I do not recall any of the names of the surveyor or their -- or the name of the company.

Q. Okay. You said you did not -- the company did not possess any records, if I heard you correctly. So if I understand what you're saying, you're saying another company had the responsibility to determine the depth of the trench, number one; number two, you were overseeing the depth of the trench, but you never saw the records that the surveyors created? Is that what you're saying?

A. Yes.

Q. So how could you oversee the depth of the trench if you didn't see the records that were being created by the surveyors whose job it was to determine the depth of the trench?

A. We didn't have to see the records to know that we had our coverage there because the surveyor was on-site and he would tell us that it was either good or not good.

Q. Was this true along the entire length of the pipeline that the Michels Corporation obtained no documentation of the depth of the trench?

MR. SIMON: Hold on. Object. That's beyond the scope of the subpoena. I'd encourage you to look back at the subpoena. We've already agreed to limit the scope of the questioning today to the specific area nearby the Monkton town line. We've been flexible in

allowing some broader questions, but on this one we're looking just at that area and encourage you to answer with regard to that area.

MR. DUMONT: Attorney Simon, you've chosen not to retain Vermont counsel. That's your choice. Michels Corporation is not an indigent litigant who doesn't have the ability to hire in-state counsel. For whatever reason you've chosen not to. You are not counsel of record for Michels in this proceeding.

Are you instructing the witness not to answer the question?

MR. SIMON: I'm instructing you to follow the scope of the subpoena.

MR. DUMONT: I've asked the question. The witness is under oath. I want an answer.

MR. SIMON: Can you repeat the question?

MR. DUMONT: Sure. I'm going to ask Ms. Massé to read it back.

(The record was read as follows: "Was this true along the entire length of the pipeline that the Michels Corporation obtained no documentation of the depth of the trench?")

BY MR. DUMONT:

Q. Please answer that.

A. I've only been looking at records for the --

for the swamp area.

Q. Is it your testimony you do not know whether the Michels Corporation obtained records of the depth of the trench along the entire length of the pipeline?

MS. BOUFFARD: Objection.

MR. DUMONT: Your objection's noted.

Q. Please answer.

A. That's correct.

Q. Who would know that?

A. There's none that I am aware of.

Q. Were you the superintendent -- were you the superintendent for the entire 41-mile-long project?

A. Yes.

Q. And there are none you're aware of?

A. That is correct.

Q. Paragraph 1(c) and 2 called for documents evidencing "The presence or absence of backfill or padding under the pipeline in the wetland or swamp area, or the wetland buffer area, of New Haven, Vermont, nearby to the Monkton town line."

So was the presence or absence of backfill within the scope of your duties as the superintendent?

A. Yes.

Q. Are there any records that were created at that time governing or pertaining to the presence or

absence of backfill or padding under the pipeline?

MS. BOUFFARD: I'm going to object to the form of the question just to make sure it's -- we're clear here what you mean by "at that time."

MR. DUMONT: In September of 2016.

MR. SIMON: Do you need the question repeated?

THE WITNESS: Yes.

A. Please repeat the question.

Q. Are there any records that were created in September of 2016 pertaining to the presence or absence of backfill or padding under the pipeline in the wetland or swamp area, or the wetland buffer area, of New Haven, Vermont, nearby to the Monkton town line?

A. No.

Q. You've been in this business a long time. When you hear the word "backfill," what does that mean to you?

A. Material that was excavated that will return to the trench.

Q. And what does "padding" mean to you?

A. Padding would be material free of rocks.

Q. Free of -- I think I heard what you said, but if you could repeat that, please.

A. I said rocks.

Q. Okay. Free of rocks. Okay. I thought that's

what you said, but I want to make sure we have a clear record.

In September of 2016, how did the Michels Corporation determine whether there was proper backfill or padding under the pipeline in the wetland or swamp area, or the wetland buffer area, of New Haven nearby to the Monkton town line?

A. It was visual.

Q. Visual by who?

A. By the crew on-site --

Q. Okay.

A. -- and the inspector on-site.

Q. Who was the inspector on-site?

A. I believe his name was Gordon.

Q. Gordon what?

A. He's got a last name I cannot pronounce.

Q. Give it your best shot.

A. Brushare [phonetic].

Q. Was he a Michels employee?

A. No.

Q. Who was -- who did he work for?

A. He worked for the inspection company.

Q. What was -- who was the -- what was the inspection company?

A. I believe it was Hatch Mott.

Q. Can you spell that?
A. No.
Q. Hatch Mott? Would it have been Mott MacDonald?
A. I could not answer that question. I don't know.
Q. Did the -- did the inspector provide any records to you?
A. No.
Q. So you said you were their superintendent for the entire 41-mile distance of the pipeline. As the superintendent, how did you determine that standards were satisfied as to the presence or absence of backfill or padding under the pipeline in the wetland or swamp area, or the wetland buffer area, of New Haven nearby to the Monkton town line?
A. Visual.
Q. But were you there? Did you -- did you do the visual inspection yourself?
A. I did look at the material. I was there. But not full time.
Q. So did you make any record when you were there?
A. No.
Q. When you were not there, how did you as

superintendent determine that the standards were satisfied?

A. There was a third-party inspector on-site full time that was there to make sure the standards were satisfied.

Q. I thought you said you were overseeing the project on behalf of Michels.

A. That's correct.

Q. How did you -- how did you determine that the standards were satisfied on behalf of your employer, Michels?

A. Visual.

Q. How did you determine them when you were not personally present?

A. Visual. It was a visual with the foreman on-site and the inspector on-site.

Q. Who was the foreman on-site?

A. Her name was Jolene.

Q. Your wife?

A. That is correct.

Q. How did she determine that the standards as to presence or absence of backfill or padding were satisfied?

A. Visual.

Q. Did she make any record that she provided to

you?

A. Only what's on the foreman sheet that was provided to you.

Q. And that's -- that's a sheet -- why don't we turn to that right now. And tell us what sheet you're referring to. And these have been numbered, so I'm treating this package that starts with Bates stamp Michels 0003 and ending with Bates stamp Michels 0032 as our Exhibit 2. We'll put a sticker on it later.

(Deposition Exhibit No. 2 was marked for identification.)

BY MR. DUMONT:

Q. Using the Michels Bates stamp number, what page number are you looking at?

A. 00819 -- or 0819. I apologize.

Q. 819. Ours are not numbered in that way. Ours are --

MR. SIMON: Hold on. I think he's looking at 0019.

A. Okay. 0019.

Q. 0019. And that is a page that in the right-hand corner it says "Monday," and the date appears -- is very small print, but I believe that is the 19th. Can you read that?

A. Yes.

Q. So if we're all on the same page, literally, what on this page relates to presence or absence of backfill or padding under the pipeline in the wetland or swamp area, or the wetland buffer area, of New Haven, Vermont, nearby to the Monkton town line?

A. I see nothing.

Q. Can you tell me, referring to the same exhibit, whose handwriting is on the exhibit?

A. The handwriting should be Jolene's.

Q. Do you recognize your wife's handwriting?

A. Yes.

Q. Is that true all the way down to where it's signed Jolene Bubolz, foreman?

A. Yes.

Q. Do you see a signature beneath that, it says M. Reagan, R-e-a-g-e-n?

A. Yes.

Q. 9/21/16. Do you know who Mr. Reagan is?

A. Yes.

Q. Was he on the site in New Haven?

A. I don't recall. I could not tell you.

Q. Isn't it true he stayed in Williston?

A. I do not know where he stayed.

Q. Did you ever see him on the work site?

A. Yes.

Q. Did you ever see him in New Haven?

A. I do not recall.

Q. So going back to the subpoena, paragraph 1(d) and paragraph 2, the subpoena addressed "Whether the materials under the pipeline in the wetland or swamp area, or the wetland buffer area, of New Haven, Vermont, nearby to the Monkton town line were inspected for rocks or clods greater than 3 inches in greatest dimension."

Did -- in September of 2016, did the Michels Corporation generate or possess any records that would provide evidence about this subject matter?

A. None that I'm aware of.

Q. In fact, were the materials under the pipeline in the wetland or swamp area, or the wetland buffer area, of New Haven, Vermont, nearby to the Monkton town line inspected for rocks or clods greater than three inches in greatest dimension?

A. Yes.

Q. How do you know that?

A. I know that because if there -- I know that they -- the on-site inspector was watching and the crew was watching as we were digging and backfilling.

Q. So when you say "watching," what do you mean by that?

A. There was an inspector watching the backfill activities for rocks.

Q. Was that Michels Corporation's obligation under its contract with Vermont Gas to inspect this, or was it somebody else's obligation?

A. It was our obligation to ensure there was no rocks. It was the inspector's obligation to inspect it.

Q. What did the Michels Corporation do in September of 2016 when working to install the pipeline in the wetland or swamp area, or the wetland buffer area, of New Haven nearby to the Monkton town line to ensure that no rocks or clods greater than three inches in greatest dimension were under the pipeline?

A. We did a visual inspection.

Q. Tell me how you did the visual inspection.

A. We could see that there were no rocks in the soil.

Q. How do you see what's underneath a pipeline?

A. We could see the bottom of the ditch.

Q. Before the pipeline was placed on it; is that what you're saying?

A. Yes.

Q. In fact, how was this pipeline installed in the wetland or swamp area, or the wetland buffer area,

of New Haven, Vermont, in September of 2016? Was a trench dug and then the pipeline was laid down in the trench? Is that what you're testifying?

A. Yes.

Q. You were present, and that's your sworn testimony?

A. Yes. I know the process.

Q. I'm not asking for your general knowledge. I'm asking whether in fact you know that's the process that was used in the wetland or swamp area, or the wetland buffer area, of New Haven, Vermont, nearby to the Monkton town line.

A. The trench was dug and the pipeline was put in it. Correct.

Q. And it's your testimony that the standard procedure for Michels would be to inspect the trench before the pipeline is placed in it?

A. Yes.

Q. Was any other method of construction used at this location other than the one you've just described?

A. Yes.

Q. Tell us what the other method was.

A. We dug a shallow trench and then dug the pipeline down as we went.

Q. Please explain what you mean by "dug the

pipeline down as we went."

A. We dug next to the pipe that was there to get the pipeline where it ultimately had enough cover.

Q. So in fact what you did was not to lay the pipeline in an open trench; you dug on either side of it and the weight of the pipeline between the two trenches sank it down into the wetland, correct?

A. First we dug the trench and put the pipeline in it.

Q. How deep was that trench?

A. Roughly two to three feet.

Q. How do you know that?

A. Because that's what we did.

Q. Were you there at all times?

A. No, I was not there at all times.

Q. On what did you base your testimony that the trench that was dug was two to three feet?

A. Because that's how we decided we were going to install the pipe.

Q. Okay. How do you know that that's what was done since you weren't there?

A. I -- I visited the site frequently.

Q. Okay. How did you determine the depth of the trench? Did you measure it with a yardstick or did you use the surveyor's data? How did you know?

A. I seen it. When the pipeline was lowered beneath the ground level, we dug a two- to three-foot trench and placed the pipe in it first. I guess two to three feet would be an estimate. I do not have an exact depth of the first time we dug it.

Q. Does Michels have any data showing the exact depth of the trench that was dug?

A. No.

Q. Does anyone else, to your knowledge? Does the surveyor? Does Vermont Gas? Does the Department of Public Service? Does anybody know the exact depth of the trench that was dug?

A. No. The initial trench that we dug was not important at the time. It was not our final product.

Q. Okay. So when I asked you just a few minutes ago how you knew that there were no materials -- no rocks or clods greater than three inches in greatest dimension, you testified that you inspected the trench before the pipe was placed in it, correct?

A. That's correct.

Q. Well, now you've just told me that that's not how this pipe was actually installed, correct?

A. We dug another trench next to the pipe. We could see that trench as well.

Q. And what did you do -- what did you do to

inspect the soils, the ground between the two trenches; in other words, the soil underneath the pipeline?

A. We could see it. It was visual.

Q. Did someone get down into the trench that was alongside it and look along the -- look sideways inside that trench?

A. No. Nobody could go in the trench, but it was very easy to see.

Q. Wasn't the trench filled with water?

A. No.

Q. Wasn't the trench occupied by water to some depth?

A. There was presence of water, but it was not full of water at all the time.

Q. How deep was the water?

A. I do not recall.

Q. Did you measure how deep the water was?

A. No.

Q. Am I correct the water was present at all times inside both of the two trenches on either side of the pipeline?

A. No.

Q. Were you ever personally present when both trenches were not filled with water?

A. Yes.

Q. Were you personally present when neither trench had any water in it?

A. Yes.

Q. How many times would you think you were present at this site in September?

A. I couldn't even guess. I was there frequently.

Q. Were you there on the 19th of September?

A. I -- I did not keep records of every place I visited and when. I assume I was, but I could not tell you that for a fact.

Q. Well, if we look at page 19 of the exhibit, does it not list every person present at the work site?

A. 19? That list is a time sheet for the workers present. It does not list everybody present.

Q. So tell me -- we're talking about a pipeline in this area that's 2,500 feet -- approximately 2,500 feet long, correct?

A. Correct.

Q. Is it your testimony that Michels Corporation inspected all 2500 feet visually to make sure there were no rocks or clods greater than three inches in dimension underneath the pipeline?

A. Yes.

Q. And they did so without creating any record of

doing so, correct?

A. Correct.

Q. Is that standard practice in -- for Michels at all sites in the country? Not to make any record is what I'm asking. Is it standard practice not to make any record of inspections of the materials on which a pipeline is being placed?

A. Oftentimes, yeah, we do not keep record of that, no.

Q. Paragraph 1(e) and 2 pertain to "The depth of burial of the pipeline in the wetland or swamp area, or the wetland buffer area, of New Haven, Vermont, nearby to the Monkton town line."

So we're not talking about the depth of the trench. We're talking about the depth of the pipeline. Did the Michels Corporation possess or create any records in September 2016 pertaining to the depth of burial of the pipeline in the wetland or swamp area, or the wetland buffer area, of New Haven, Vermont, nearby to the Monkton town line?

A. The only thing that Michels would have records of is on the time sheets provided to you.

Q. So if we turn to -- back to page 19, that's the record you're referring to?

A. That's -- that's correct.

Q. That's the only document that exists that Michel had -- that Michels possessed in September of 2016, correct, that relates to this subject?

MS. BOUFFARD: Objection.

MR. DUMONT: If I'm asking a poor question, I'd be happy to amend it. What would you like me to clarify?

MS. BOUFFARD: You -- you said this is the only document, and his -- his response to you was that there were time sheets.

MR. DUMONT: I think this is a time sheet, but let's clarify that.

Q. Is this the time sheet that you're referring to?

A. What are you looking at again?

Q. Page 19 of -- of this exhibit that says "Daily Time Report" on the top.

A. Yes.

Q. This -- when you said "time sheet," you mean this page, correct?

A. Correct.

Q. So I'm going to ask you to read all of the narrative on the page. I assume your copy is better than my copy. And also I assume you can read your wife's handwriting better than I can. So why don't we

start with -- it says "2 lab" on the left. What does that mean?

A. Two laborers.

Q. Okay. "2 laborers went to," and then in parentheses "Jeff Nighburg," N-i-g-h-b-u-r-g, end parentheses. What does that mean?

A. That's another foreman.

Q. What does that mean, "2 laborers went to (Jeff Nighburg)"?

A. It means two of her crew members went to a different crew that day.

Q. Not working on this site, in other words, on this particular site?

A. For that particular day.

Q. For that day. Okay. So it says "2 laborers went to (Jeff Nighburg) for the day and tomorrow but will be back with me." Did I read that correctly?

A. Yes.

Q. Okay. What does that mean, "but will be back with me"?

A. I think it's pretty clear. They'll be back.

Q. On this -- "with me" means on this site in the New Haven wetlands? Is that what it means?

A. I would assume so.

Q. And we're talking about September 19th,

correct?

A. Yes.

Q. And the next day is September 20th, correct?

A. Yes.

Q. So she's saying two laborers went to Jeff Nighburg for the day, the 19th, and tomorrow, the 20th, but will be back with me after the 20th. That's what it means, correct?

A. Yes.

Q. Okay. Next -- maybe if you could just read it, because it's a little hard for me to read. I see "worked through lunch." Why don't you read all of it.

A. It says, "Worked through lunch because we are in the clay planes swamp."

Q. Then what does it say?

A. "Very hard to get ditch and cover."

Q. Then what does it say?

A. "Worked in clay planes swamp from 1645+87 to 1649+75."

Q. And then?

A. It says, "We" -- I think that says located 9 welds starting with only three foot of cover. By the end of the day had 3.9. And this says "Getting Deeper."

Q. I think you may have missed some words. It

says, "Started with only 3 feet cover. By end of day number 9 weld had 3.9." Correct?

A. Okay.

Q. There were nine welds. One of them had 3.9 feet of cover. Correct?

A. Correct.

Q. The other eight did not, correct?

MS. BOUFFARD: Object to the form of the question.

Q. Am I correct?

A. It does not say that the other eight does not.

Q. Okay. So it says, "Started with only 3 feet of cover. By end of day number 9 weld had 3.9" feet. Correct?

A. That's what it says, yes.

Q. Is there any record other than this time sheet of the depth of cover for the other eight welds?

MR. SIMON: Can you clarify? Which time period are you talking about?

Q. September -- September 19th, 2016.

A. Not that I am in possession of.

Q. Did any such record exist on September 19th, 2016?

A. There was a survey crew on-site that would have the records for the depths of the welds.

Q. Did you have access -- did you actually see those records on the 19th?

A. No.

Q. Do you know if Jolene saw that record on the 19th when she wrote this time sheet?

A. No.

Q. After the words 3.9 -- or the number 3.9, it says "Getting Deeper," capital G, "Getting Deeper," capital D, "Deeper," and then period. Did I read that correctly?

A. Yes.

Q. Do you know what that means?

A. It means they were continuing to work on that area.

Q. Based on your years of experience in the field and your knowledge of the site, how were they getting the pipeline deeper?

A. They were digging another trench along the side of it.

Q. Mr. Bubolz, as the superintendent of this project, did you ever look at the specifications provided by Clough Harbour & Associates, CHA, for how to construct each portion of the project, including this portion?

A. I would be certain I did, but I don't really

recall.

Q. Well, if Michels Corporation had those specifications in 2016, would they have them now?

A. The specifications?

Q. Yes.

A. I would believe so.

Q. Okay. So those specifications relate to the depth of burial of the pipeline, correct? They set forth the depth of burial of the pipeline, correct?

A. Correct.

Q. And those specifications from Clough Harbour set forth how the pipeline was to be constructed, how the trenches were to be dug, correct?

A. Correct.

Q. And you were familiar with those? You had seen them, correct?

A. As I said, I would be certain I did, but I do not recall the details.

MR. DUMONT: So for Mr. Simon, the specifications for this portion of the pipeline clearly fall within the subpoena and have not been produced, so that's something we can work on after the deposition.

MR. SIMON: I would encourage you to look at the documents entitled -- numbered Michels 8 through 11.

MR. DUMONT: Well, I tried to, but they weren't legible. Too small. Couldn't read them.

MR. SIMON: I can clearly see them on my computer, but I sent you a native version as well shortly before this deposition, so feel free to take a look at those, and if you'd like, we can --

(Interruption by the reporter.)

MR. SIMON: The documents that were produced, Michels document number 8 through 11, in their original format -- granted they were Bates stamped. I sent the non-Bates stamped version of the same document. If that's any clearer, great. I don't have any problems with -- with the clarity of the document that was produced on my end, but of course I'm not seeing what you're seeing, right? So take a look at those, and if you'd like to pause for a minute and look at them in greater detail or you have specific questions, we're glad to answer them. I would suspect these documents should already be in your records, right? I assume they've been produced, but of course I don't know what you received.

MR. DUMONT: Mr. Simon, we went through this last week. I needed the documents by the close of business Friday so I could prepare for the deposition. They weren't produced Friday. They weren't produced

Saturday. They weren't produced yesterday. Apparently they were produced while I was driving to Montpelier today.

MR. SIMON: They were produced last night. You saw them. Apparently you can't see -- for some reason the version you have is blurry. The version I have is not. Again, like I said, I'm not sitting on your end, so I can't see what you see. If they're blurry, I believe you. Now, I did send the original native version un-Bates stamped, the exact same document. They look the same on my computer. If it's for some reason clearer on yours, great. I have no idea why it would be blurry on your end, right? But the document was originally produced in PDF. It has been produced to you. I produced all the documents in my possession last Friday. I didn't have these documents. Meeting with Carl yesterday, we discovered a few additional documents, not many. There were I believe 30 in total, and those were sent to you. These are four of those documents.

MR. DUMONT: The ones that you sent us which we're now discussing that are legible were received 6:30 PM Eastern time after I'd left work. I went back to my office last night to look at them, and they were not legible on the computer. I printed them. They're

not legible printed. I enlarged them on the computer, and because of the nature of the PDF, you could not read anything when they were enlarged because they were blurry. Now you said you sent me a legible copy sometime this morning.

If we have time permitting, I will ask the Department of Public Service to let me have access to their Internet so I can read them. I am not an employee of the Department of Public Service. I don't have Internet access right now, and I can't interrupt the deposition to find the documents and peruse them to prepare for the deposition.

MR. SIMON: I think I've made my position clear. Have you not received these documents before previously in this proceeding?

MR. DUMONT: So I will need to return to the subject after I read a legible copy of those documents, but let me return to Mr. Bubolz.

BY MR. DUMONT:

Q. Mr. Bubolz, do you agree with me that the method you've been describing for sinking the pipeline down deeper than the trench that was dug is not set forth in any of the Clough Harbour specifications that the Michels Corporation was given? Am I correct?

A. I would believe so.

Q. Thank you. Do you recall any discussions on September 19th with anyone from Clough Harbour, from Vermont Gas, from the Department of Public Service, from Mott MacDonald, with any employee or officer of any other company, as to whether it was permissible to use a pipeline construction method that wasn't set forth in the Clough Harbour specifications?

A. Not on September 19th, no.

Q. How about same question at any other date?

A. Yes.

Q. Tell me about that conversation.

A. The conversation? We talked about how we were going to install the pipe in this area, and we all determined that this was the best method.

Q. Who was part of that -- who was present for that conversation?

A. Myself, Danny Vincent, Mike Reagan, and Darrel Crandall.

Q. Who is Mr. Vincent?

A. Danny Vincent was the -- our eastern division manager. Danny was my boss.

Q. Okay. You mentioned a second person, Mike Reagan. Tell us --

A. That's correct.

Q. -- who Mike Reagan was.

A. Mike Reagan was the construction manager for Hatch Mott MacDonald.

Q. Who is Danny Crandall?

A. Darrel Crandall --

Q. Darrel Crandall. Thank you.

A. -- was the chief inspector.

Q. Who did he work for?

A. I do not know. I believe it was Hatch Mott, but I could not tell you for certain.

Q. When did this conversation occur?

A. This conversation occurred in the planning stages for when -- before we started to work in this swamp. I do not know the date.

Q. That was on September 12th, correct?

A. No. We talked about this before September 12th.

Q. Okay. How long before September 12th did you talk about it?

A. I do not know the dates.

Q. If you return to Michels 0003, that's a document that has a title "Job #61103 Vermont Gas." And what was sent to us was a three-page -- four-page document -- five-page document. I'm sorry. Five-page document. What is this document, five pages long, with the caption "Job #61103 Vermont Gas"?

A. Those are the notes I made for the project.
Q. And how did you make these notes? On a hand-held device, a laptop? Are they handwritten?
A. This was on a laptop.
Q. Can you read the entry for September 12th?
A. Yes. Talked with Joey, Darrel, and Mike Reagan about clay plains. Made it clear our two options were to let the dirt fall off the right-of-way or to sheet the entire thing. The answer was to get it done and make good later [sic].
Q. What does it mean to sheet the entire thing?
A. Sheet piling would be a method of driving steel plates in along both sides of our excavation before we dig as a way of shoring and holding our banks.
Q. Okay. What does it mean to let the dirt fall off the right-of-way?
A. The concern was the width of the right-of-way.
Q. What does it mean --
A. And --
Q. Go ahead.
A. The -- there would not be enough room for all the spoils.
Q. So when you state, Talked with Joey, Darrel, and Mike Reagan about clay plains, what is it you

talked to them about? Was there a problem you were addressing?

A. We suggested the use of sheet piling.

Q. Why?

A. Because of the conditions and of the room we had.

Q. What were the condition -- what were the conditions?

A. Well, it was a swamp.

Q. There were numerous other swamps along the pipeline's 41-mile length, correct?

A. Yes.

Q. Had you had similar discussions about the other locations?

A. We used sheet piling in one or two other locations, yes.

Q. Which locations?

A. I -- I do not recall.

Q. So reading still the entry for Monday, September 12, you just read what's captioned "Daily Activities," and then it says Issues/Comments [sic]. As I read it -- it's tiny, but as I read it, it says -- it says, Danny suggested leaving swamp pipe on ditch line and digging it down as we went, space space, Great idea, space space, Inspection thought so too.

Did I read that correctly?

A. Yes.

Q. Can you explain that?

MS. BOUFFARD: I think it actually says, Danny suggested laying the swamp pipe. It's tiny, but I think it's the word "laying," not "leaving."

MR. DUMONT: Oh, I think you're right. I think it says "laying."

Q. "Danny suggested laying swamp pipe on ditch line and digging it down as we went." What does that mean?

A. That means exactly what I told you before about the method of installation we used.

Q. Okay. And then it says -- there's another caption that says "don holly ROW." What does "don holly ROW" mean?

A. Don Holly was a foreman of our right-of-way crew. That was one crew.

Q. And he reported to you?

A. That's correct.

Q. Okay. And what's the entry under Don Holly right-of-way for September 12?

A. It says, Met with Wayne from the Town of Monkton.

Q. Did you meet with Wayne from the Town of

Monkton?

A. Yes.

Q. Is that -- did that meeting have anything to do with the clay plains problem?

A. No. I believe it was roads that I met with him with.

Q. So did someone discuss on September 12th whether or not Michels or Hatch Mott MacDonald or someone else needed to get permission from Vermont Gas to depart from Clough Harbour's plans?

A. That I do not know.

Q. Who would know that if you don't?

A. It would be either Mike Reagan or Darrel Crandall.

Q. As I recall, you said you actually discussed this method of construction prior to September 12th. Is that right?

A. I don't know that. The way I wrote it down there, it looks like September 12th is the first time it was discussed.

Q. Under "Issues/Concerns" are the words "Great idea" that -- I read those words earlier. Who said great idea or whose thought was it, great idea?

A. Those are my notes that I thought it was a great idea.

Q. Are there any other notes in your -- your own log that are marked Michels 3, 4, 5, 6, 7 that relate to the clay plains swamp or the buffer area in New Haven?

A. I'm certain there is.

Q. Okay.

A. I would have to read through them all.

Q. A question for you just about formatting. Michels 003, looking at that and Michels 004, is Michels 004 an extension to the right of Michels 003, or is it a whole new page?

A. Extension to the right.

Q. Okay. So to continue understanding the entry for Monday, September 12th, we have to go on to the next page?

A. That is correct.

Q. So on the next page it says "jolene Tie In." What does "jolene Tie In" mean?

A. Jolene's crew was a tie-in crew.

Q. What is a tie-in crew?

A. A crew that would come back and do the small pieces and put the ends together after the line crews went through.

Q. So is the entry for Monday, September 12th, "jolene Tie In," or is the entry "tied in off of the

little otter creek bore"?

A. That September 12th is "tied in off of the little otter creek bore."

Q. Okay. What does that mean?

A. It means she made the tie-in off of the Little Otter Creek bore.

Q. And what is the Little Otter Creek bore?

A. It was a bore under the Little Otter Creek.

Q. So in English, when someone ties in off of the Little Otter Creek bore, what does that mean?

A. It means she put the pipe together after the bore crew had left.

Q. Was this aboveground, in the ditch, in the -- in the wetland? Where -- where does this happen?

A. This was in the ditch.

Q. Before the ditches were dug on either side to get it deeper? We're still on September 12th.

A. Well, no. This instance she was making a tie-in off of a bore, so the method of construction was not used. And this -- and when they were making the tie-in, they were not digging pipe down on either side.

Q. So what does -- what does it mean to tie in?

A. I would have to describe the process of building a pipeline pretty much, but in essence you would have a mainline ditch crew that would dig the

mainline ditch through larger stretches and put the pipe in the ground, and then you would have a bore crew that would bore places like the Little Otter Creek, and then you have another tie-in crew that would put the two ends together and make the pipeline whole.

Q. Thank you. So if we could continue across the September 12th entry going from right -- left to right, what's the next entry for that date?

A. We're going left to right? That would be "brandon duffy."

Q. What does that -- can you read what it says under "brandon duffy" or as part of that entry, the whole entry for the 9 -- for 9/12.

A. Hit rock by power pole coming around hill. Went back and set up six-inch pumps for dewatering and New Haven River drill.

Q. Now, is this -- does this pertain to work in the clay plains swamp or other work?

A. This is other locations. Another foreman working in a different area.

Q. Next entry to the right, still for September 12th, I read finished stringing in the New Haven swamp. Did I read that correctly?

A. Yes.

Q. What does it say above that? What's the

caption? I can't read that.

A. It says Roy stringing.

Q. Roy stringing. Okay. So Roy is a person's name?

A. Roy is a person's name, and stringing is misspelled.

Q. Okay. What does "stringing" mean?

A. Stringing is a crew that lays down the pipe from the pipe yard to the right-of-way.

Q. Is welding done as part of stringing?

A. No.

Q. It's done afterwards?

A. That is correct.

Q. All right. So when it says finished stringing in the New Haven swamp, what does that mean?

A. It means he finished placing the pipe in the New Haven swamp.

Q. Was it placed in the trench that we discussed earlier?

A. No. This was placed aboveground.

Q. Was it placed on any kind of bedding?

A. No. This was placed on skids in preparation for welding.

Q. What is a skid?

A. A piece of wood approximately four foot long

used as cribbing to elevate the pipe off the ground.

Q. Thank you. On the 12th, next entry to the right, it says, Finished at Monkton Road. Moved to Plank Road. Dug up bore end south of Plank. Took down fence. Moved last two hoes and dozer at the end of the day to Plank.

Did I read that correctly?

A. Yes.

Q. And the caption on the top of that column is "Dave Hemphill/tie in." So what does that -- the entry that I read, what does it mean?

A. It describes what Dave Hemphill tie-in crew did for the day.

Q. So when it says he finished at Monkton Road, what does that mean? What did he finish?

A. He finished his tie-ins.

Q. Okay. And when it says moved to Plank Road, that just means he moved his -- his equipment to Plank Road?

A. That's correct.

Q. And then it says, Dug up bore end south of Plank.

What does that mean?

A. There's no other way to describe it besides he dug up the bore end south of Plank.

Q. Okay. But I thought the pipeline was on skids. Right?

A. What you're -- you're -- no. The pipeline is not on skids on this tie-in. He dug up the end of a bore and that bore is in the ground.

Q. So different section. Further south is already in the ground?

A. Correct.

Q. So south of the clay plains swamp and north of the clay plains swamp, the pipeline is in the ground as of September 19th?

A. There's pieces, yes.

Q. Okay. Continuing to Michels Bates stamp 0005, is this still a continuation of the entry from September 12th?

A. Yes.

Q. Okay. Does any of the rest of the entry for September 12th pertain to the clay plains swamp area just south of the Monkton town line?

A. No.

Q. Same question about Michels 0006, the entry for September 12th. Does any of that pertain to the area we've been discussing?

A. Actually, yes, it does.

Q. Okay. Tell me about that.

A. I see there's a coating crew that was working at the clay plains swamp.

Q. It says "Matt Wagner coating": Worked on jeeping and rock-shielding clay plains. Then it's either a period or a comma; it's hard to read. Sent half of crew to finish pre jeeping, j-e-e-p-i-n-g, Hunt Road, 53 jeeps on last section.

What does that mean?

A. A jeep would be a small void in the coating.

Q. So when you're jeeping, you're checking for voids?

A. That's correct.

Q. What is rock -- when it says "rock shielding clay plains," what does that mean?

A. Rock shield is something you would put over pipe to protect it.

Q. What distance of pipeline in the clay plain was rock-shielded?

A. I honestly do not remember.

Q. Is there any document that would answer that?

A. No.

Q. How was the pipeline in the clay plains swamp rock-shielded?

A. I would assume it would only be the welds that we would have put rock shield on because the rest of

the pipe in the clay plains had a concrete coating on it already.

Q. How did you rock-shield -- what's your understanding of how the welds were rock-shielded?

A. It would be the voids in between the concrete.

Q. What -- how does one rock-shield the void between the concrete?

A. We would wrap the material in the void between the concrete.

Q. Wrap it with what?

A. The rock shield.

Q. And what does -- what does the rock shield consist of?

A. It would be like a plastic mesh.

Q. Now, you've stated that the pipeline aside from the welds -- welding areas already had a concrete coating. How do you know that?

A. Because all of the pipe through that swamp had a concrete coating on it.

Q. You recall that from being on-site and seeing it, correct?

A. From memory, correct.

Q. Was the concrete coating 1-1/2 inches thick?

A. We did not do the concrete coating. I believe so.

Q. Who did the concrete coating?
A. The crew the previous year before we arrived.
Q. So this is a 12.75 outer diameter steel pipeline, correct?
A. That is correct.
Q. And you're adding three inches of concrete to it, 1-1/2 inch -- it's a 1-1/2-inch coating, so the overall diameter is now 15.75 inches, correct?
A. That sounds logical.
Q. If you could look further on the same page 006 under "Matt Wagner coating," there's a later entry. It looks like it might be the 17th?
MS. BARRETT: 21st.
Q. Or the 16th.
MS. BARRETT: 21st, I think.
Q. It's hard for me -- you have to go all the way to the first page to get the date, but it says under "Matt Wagner coating," Began coating in Maine Drilling and Blasting -- began coating -- maybe you can read that. It has to do with coating.
A. Began coating in Maine Drilling and Blasting and stayed late to prejeep the last section for Jeff.
Q. Then above that it says -- actually, starting right below where we first read, Working on jeeping and rock-shielding, the next entry says, Coated pipe on

Drinkwater today.

That's a different site. That's not the clay plains, correct?

A. That is correct.

Q. And then underneath that it says, Coated concrete pipe at Rotax Road. Finished jeeping Rotax. Helped with removal of concrete barriers.

That's a different site, correct?

A. Correct.

Q. And then what we just read, Began coating in Maine Drilling and Blasting, is that this site in the clay plains swamp, or is that a different site?

A. That's a different site.

Q. Okay. And then it says -- next entry below that, "coating concrete," do you know where that pertains to?

A. I would believe it would pertain to the New Haven swamp.

Q. And what, if you --

A. A different site.

Q. Different site of the New Haven swamp but still the New Haven swamp?

A. The New Haven swamp would be a different site than the clay plains.

Q. Okay. What's -- in your mind what's the

difference?

A. Excuse me?

Q. What's the difference between the clay plains swamp and the New Haven swamp?

A. It's a different site.

Q. Physically what -- or geographically what's the difference?

A. New Haven swamp was south of the clay plains swamp.

Q. Do you know the station numbers or the distance south from the clay plains swamp?

A. I -- I do not right offhand.

Q. Has all your testimony up until now been just about the clay plains swamp?

A. Yes.

Q. Okay. So further on the same page, 0006, below what we read, it now says "coating across swamp." It doesn't say which swamp. What -- do you have any way of knowing which swamp that is?

A. It would be the New Haven swamp. I can tell by the -- the first entry of Maine Drilling and Blasting, that was the beginning of the New Haven swamp there and our access to it.

Q. Okay. While we're on your entries from 0- -- Mitchell's -- Michels 03 to 07, are there any other

entries that relate to the clay plains swamp area or the New Haven swamp area -- well, let me -- let me withdraw that.

So we're clear, was the method of construction you discussed earlier where you dig a trench on either side of the pipeline and then it sinks down between the trenches, is it your understanding that was used only in the clay plains swamp, or was it also used in the New Haven swamp?

A. I don't recall.

Q. Are there any records that would answer that question that Michels maintained in September of 2016?

A. No.

Q. Are there any records that you could turn to now, whether they're created by Michels, by Clough Harbour, by Hatch Mott MacDonald, anything you know of as someone who's been working in this field for a long time, that would answer that question?

A. I could not tell you that. I do not have access to their records.

Q. Okay. Thank you. So while we're on 03 through 007, so we don't have to come back to it, could you just look at that and see if there are any other entries that relate to how the pipeline was constructed in the clay plains swamp or in what you call the New

Haven swamp?

A. Can you repeat the question?

Q. Yes. And feel free to take a break to do this, but we've been going through Michels 03 through Michels 008 -- sorry, 007, and it's very difficult for me to read because the print is so small, so while we're on this, I'm asking Mr. Bubolz if there are any other entries that relate to how the pipeline was installed/constructed in the clay plains swamp or what he calls the New Haven swamp. It's obvious to me there are many entries here that have nothing to do with either area, which I'm not really interested in.

A. Most of the clay plains swamp activity was done by Jolene's tie-in crew, and they would be listed under that column.

Q. Okay. So that's on Michels 0004.

A. That's correct. The first column.

Q. Okay. You want to read through that for us and tell us what each entry means? We start off with, Tied in off of the Little Otter Creek bore.

What's the next entry below that, and what's the date of the entry?

A. On the 13th it says, Dug in and tied in last mainline piece before swamp.

Q. Okay. Next?

A. On the 14th it says, Prepping swamp. Dug two-foot ditch and set mats for dirt. Lowered in pipe to trench and began digging at 3. 700 foot by the end of the day.

MR. SIMON: Hold on one second.

MR. DUMONT: Sure.

MR. SIMON: All right. Sorry about that. There was someone at the door. Continue.

MR. DUMONT: Okay. Thank you.

Q. So next entry, give us the date and what it says and what it means.

A. The date would be the 15th. It says, Hit terrible spot in swamp. Cleanup hoe slid off of mats at the end of the day.

Q. What does that mean? In terrible spot in swamp, and then what does it mean, cleanup -- cleanup hoe slid off of mats at end of the day?

A. On that particular day the material got poor, and at the end of the day a machine slid off of the matting underneath it and got stuck in the mud.

Q. And this is the 15th?

A. Yes.

Q. Okay. What does it mean to you when you wrote -- well, let me back up.

You wrote these entries, correct?

A. That's correct.

Q. And it said "hit terrible spot in swamp." What did you mean by that?

A. It means the conditions were terrible.

Q. You probably know what that means because you've been in this business a long time, but how would you explain that to a layperson?

A. I would tell them that the -- the ground was not stable, they were having a hard time holding their excavation, and the mud was really bad.

Q. Okay. What's the next entry about the clay plains swamp or the New Haven swamp?

A. It says "digging" -- on the 16th it says, Digging through bad spot in swamp. Taking time.

Q. Now, do you recall what the digging was that was occurring on that day?

A. Say that again.

Q. Yes. Do you recall what the digging was that was occurring on that day? Was this digging the initial trench or digging the two trenches on either side of the pipeline?

A. This would be digging the trench on the side of the pipeline.

Q. So when did the process of digging the trench on the side of the pipeline start?

A. 3 o'clock on the 14th.
Q. And -- and that's what Jolene was referring to as they got 700 feet done by the end of that day?
A. That is correct.
Q. Okay. Thank you. What's the next entry relating to the clay plains swamp or the New Haven swamp?
A. It would be on the 19th. It says, 400 more foot through the swamp. It got worse, then better.
Q. Is this one trench to the side of the pipeline, or is this trenches on both sides of the pipeline?
A. It's one trench on the side of the pipeline.
Q. Okay. What's the next entry?
A. The 20th says, Out of bad area. Got our five foot of cover on Hurlburt property. Made tie-in weld on north side of the swamp.
Q. And again, that is which day?
A. I believe it's the 20th.
Q. I am sorry if this is repetitive, but what is a tie-in weld?
A. A tie-in weld would be putting the swamp piece that they dug in and connecting it to the mainline piece that was on the other side of the swamp.
Q. North of the swamp?

A. North of the swamp.

Q. Who did the welding?

A. I would have to refer back to the time sheet and see who the welder was.

Q. All right. Why don't you do that. Are you looking at page Michels 0021?

A. Yes. The welder was Brian Foster.

Q. Okay. Thank you. Was other welding -- when was the other welding performed on the -- in the clay plains swamp, welding other than the tie-in to the section to the north?

A. Other than the tie-in?

Q. Yes.

A. I do not know. I don't have it in front of me.

Q. Is there a record that would tell us when the welds were done and who did them?

A. Only in my notes.

Q. So you told us that there's a -- a coating -- rock coating that's done where the welds are because where the welds are, there's no concrete coating around the pipeline. So can you -- from looking at your notes, can you reconstruct when the welds were performed that were later covered with rock shielding within the clay plains swamp or the New Haven swamp?

MR. SIMON: Give us a minute. Carl's looking through his notes right now.

MR. DUMONT: Sure.

MR. SIMON: He can't see.

A. It would be August 29th and 30th.

Q. And how did you figure that out?

A. I looked at the rest of my notes.

MR. SIMON: And we will certainly produce -- there's one additional day. We had originally produced one day -- or one week on either side when we were in the clay plains. That's what we're looking through right now in the record. Looking at the notes in their entirety, apparently this one particular crew had moved in in August, and of course I'll produce those days.

MR. DUMONT: Okay. Thank you.

MR. SIMON: Let me make a note quick so I don't forget.

Q. So, Mr. Bubolz, the notes you looked back on were the ones from your laptop from earlier in the year?

A. That is correct.

Q. Okay. Is there a separate set of records that just pertain to who did a weld or when it was done or whether the weld was tested?

A. Of who did the welds?

Q. Who the welder was, when the weld was performed, and whether the weld was tested. Are there records other than your laptop notes that we have in front of us that would --

A. I do not possess them records at all.

Q. Did Michels create or possess such records back in August and September of 2016?

A. I do not believe so. I believe that was tracked by the x-ray company.

Q. The -- you said the x-ray company?

A. That is correct.

Q. What -- tell us what you mean by that.

A. There's a crew that x-rays the welds for defects after they're welded.

Q. So that crew wouldn't know who the welder was, would it?

A. I could not tell you that.

Q. Do you know who -- what company had performed those x-ray checks?

A. I do not remember that, either, offhand.

Q. Were those x-ray checks provided to you as the superintendent of the Michels -- for the Michels Corporation?

A. No.

Q. Were the welders Michels employees?

A. Yes.

Q. Returning to Michels 004, you were reading under "jolene Tie In." I think when we stopped, it said, Out of bad area. Got our five feet of cover on Hurlburt property. Made tie-in weld on north side of swamp.

The next entry below that says, Moved equipment around swamp and began installing pipe out of the other side of swamp section.

Did I read that correctly?

A. Yes.

Q. And what does that mean? And also, sorry, what date was that?

A. It was the 21st.

Q. Okay. And what does that mean?

A. And they moved their equipment around to the south side of the swamp to tie the end in from the swamp section to the mainline section.

Q. So that's tying into the mainline section that had already been constructed south of the swamp?

A. Correct.

Q. And when you're referring to south of the swamp here, do you recall whether you're referring to south of the clay plains swamp or today what you've called the New Haven swamp?

A. This crew is working in the clay plains swamp.
Q. Okay. So it would be -- even further south than where they tied in would be what you refer to as the New Haven swamp?
A. The New Haven swamp is a whole nother location.
Q. Okay. Next entry below that one, could you read that to us.
A. Next three-joint section in off of PI swamp section. Had to dump truck mud back. Ugly ditch.
Q. What is the PI swamp section?
A. PI would be point of intersection. That's where we would have a bend in the pipe, either a fitting or a field bend.
Q. What does it mean -- what's the reference to the dump truck?
A. They had to dump truck their mud away to -- to another -- further down the right-of-way.
Q. What does it mean to dump truck the mud away?
A. They had to haul it.
Q. These are your notes. Can you recall why they had to haul it?
A. No. I don't recall.
Q. Do you know where they hauled it to?
A. More than likely they just hauled it down to a

right-of-way -- down the right-of-way to where there was either an area already constructed or where there was more room.

Q. Why would you have to haul mud away?

A. Because they ran out of room.

Q. So it's after it's excavated; they just ran out of room to store it?

A. Yes.

Q. Okay. Next entry under that is for the 24th, I -- if I'm reading this correctly?

MS. BARRETT: 23rd.

Q. 23rd? Yes, 23rd. It says "2 welds left thru wetland." Then I can't read the next word.

A. Says "rain out."

Q. "Rain out." Okay. What does "2 welds left thru wetland" mean?

A. They -- it seems like they had two welds left to go before they moved out of that area.

Q. And is this what you're referring to as the clay plains area or another area?

A. The clay plains area. I believe this work would be out of the swamp itself, but I still referred to it as the wetland in general.

Q. What does "rain out" mean?

A. It means that it rained that day and the crew

went home.

Q. Can you explain why two welds were left in the wetland? I thought that all the welds had been done in August.

A. They didn't leave them. There was two left to go. They needed to be completed before they were done in that area.

Q. Okay. So can you explain why two welds needed to be done? I thought the welds had been done in August.

A. These are tie-in welds. Putting the sections together after the crews went through.

Q. Okay. The next entry on this page, I believe this one is Saturday, September 24th. Can you read that one?

A. It says, Dug out four-joint wetland/arc site section. Need to x-ray and coat welds.

Q. What does that mean?

A. It means they dug out a four-joint section. It seems to me that they got the weld done but ran out of time in the day to both x-ray and coat them.

Q. And is this the clay plains swamp area?

A. This would all be in that area, correct.

Q. So the pipe is in the ground. How is the welding done -- go ahead. If I understand, the pipe

has already been laid down. This is the 24th. How was the welding done?

A. We would dig a bell hole, which is an excavation sloped so somebody can get in it, and the weld is done underground in the ditch.

Q. You used a word I'm not sure we caught. What kind of hole? A barrel hole?

A. A bell hole.

Q. Bell hole. Like b-e-l-l?

A. That is correct.

Q. Okay. So it's bell shaped?

A. Yes.

Q. How did it come to pass that four welds had to be dug out and rewelded? How did that come to pass?

A. That's not what it says.

Q. Okay. What is --

A. They're not -- there was a four-joint -- a four-joint section. That means there was four pieces of pipe up on the ground welded together at a section, and they dug the ditch for that and installed that pipe.

Q. Okay. So the welding was done aboveground?

A. A portion of it.

Q. Okay. So I am quite confused. I thought the entire pipeline in the clay plains area was already in

the ground.

A. This is outside of the swamp area.

Q. Okay.

A. Working on the south side of the swamp. Everything in the swamp was already in the ground.

Q. So I don't know whether you answer this by looking at 003 through 007 or back to the time sheets, but I haven't -- so far I haven't seen a record that describes the process of covering up the pipeline. When did that happen; how was that done? Are there any records that discuss that?

A. No.

Q. Were there any records in September of 2016 that documented the process of covering up the pipeline, who did it, how it was done, that kind of thing?

A. No.

Q. My very poor comprehension of all these plans and specifications is that part of the process of burying the pipeline had to wait until there was a zinc ribbon that was attached along the pipeline. Are you familiar with the zinc ribbon?

A. Yes.

Q. Is there any record of the zinc ribbon being placed down before the pipeline was covered up?

A. No.
Q. Whose responsibility was it, Michels or Clough Harbour or somebody else, to install the zinc ribbon?
A. We actually had another crew that went in afterwards to install the zinc ribbon.
Q. After the pipeline was covered up?
A. That is correct.
Q. What was -- do you know what the name of that crew was or who the crew leader was?
A. Dave Prokosch was his name.
Q. What was his first name?
A. I did not keep a record of him. He does not have a column in my notes.
Q. What was Mr. Prokosch's first name?
A. Dave.
Q. Dave, like David?
A. Yes.
Q. Okay. David Prokosch. P-r-o-k-o-s-h, maybe?
A. That sounds pretty close.
Q. And he was a Michels employee?
A. That is correct.
Q. Do you know whether Mr. Prokosch kept his own records that would show that the zinc ribbon was put down and who put it down and when it was put down?
A. He would have had a time sheet, and I -- I

don't believe we've ever seen it. That is something I'll have to look into.

Q. Okay. Thank you. So going back to Jolene's notes from Monday, the 19th, which are Bates stamp page 0018, having gone back through your notes from your laptop, looking back at Jolene's notes from the 19th, are there any other records we haven't talked about that would tell the Department of Public Service, the Public Utilities Commission, or my clients the details of how the pipe was installed, how it was inspected, the depth of burial, the backfill, any records we haven't talked about yet --

MS. BOUFFARD: Objection.

Q. -- pertaining -- pertaining to the 19th?

A. Not that I can think of that Michels would have.

Q. Okay.

A. There would be inspection records from the inspection company, and there would be what survey had, but we don't have access to any of that.

Q. Okay. Turning to 0020 and 0021, can you tell me what those are?

A. These are the time sheets for the overhead of the project. This would include the safety guys and assistant superintendent, project manager, people like

that.

Q. So your wife's signature isn't on this page 20, correct?

A. Correct. My signature.

Q. That's yours on the bottom right? Looks like CLZ?

A. That is my signature, correct.

Q. Okay. The thing that starts with a C is you?

A. Yes.

Q. Yeah. All right. And so this is -- the purpose of 0020 is not -- actually it says time record, but it's not to keep track of time; it's for some other purpose?

A. Well, it's to keep track of time as well for the people that did not necessarily fall into a crew.

Q. I see. Okay. So the corresponding sheet for the 19th is sheet 18?

A. That's correct.

Q. All right. If we can move to sheet 21, daily time report, is this again in Jolene's handwriting?

A. Yes.

Q. It says "worked till 7 PM," and it says "finished clay planes 885 feet."

"885 feet" is circled and it's highlighted in yellow. Do you know who circled it and who highlighted

it?

A. I would assume Jolene did, but I couldn't tell you that.

Q. I want to see if you can help me with the math a little bit. It looks like on the 21st 885 feet was completed, and if we go back to the day before, which is page 18, how many feet were completed?

A. You mean page 19?

Q. Sorry. Yes. I'm sorry. I misled you. 19, not 18.

A. I would have to do the math here.

Q. Yeah. Take your time. So you're looking at 1645+87 running up to 1649+75.

A. 388.

Q. All right. So the 388 from the 19th, and we've got 885 from the 20th. That's less than 1200 feet. It's about 1200 feet.

A. I apologize. My math was wrong. I must have hit the wrong button.

Q. Okay.

A. Okay. I see what -- we have 1273 is the total.

Q. 1273. Okay. So the --

MS. BARRETT: No, it's not. Yes, it is. Okay.

Q. Why don't you tell us -- tell us just so the record's clear how you figured that out so we are all on the same figurative page.

A. Took 885 --

Q. Um-hum.

A. -- plus the last total I gave you, the 388, equals 1273.

Q. Okay. And 388 is the distance from 1645+87 to 1649+75?

A. Correct.

Q. Okay. So the information provided to us by the company is that we're looking at a much longer distance, roughly 2500 feet, that is an area of concern. So the other 1300 feet that had areas that involved construction in wetland, do you think that would be in the area you're calling the New Haven swamp?

A. No. There were two separate swamps.

Q. Okay. All right. Well, let's continue on Exhibit -- page 0021. It says, Finished clay plains 885 feet.

Why don't you read the rest, because I'm not sure I can read it.

A. It says, "made 1 weld and 1 cut. Coming in side is tied-in."

Q. All right. What does that mean?
A. It means they tied the -- I believe the north end in.
Q. What does "1 cut" mean?
A. Well, when you make a tie-in, you have -- you have a lap and you would have to cut the excess off to make it fit.
Q. So you're saying that the two sections of pipe overlap so you have to cut off part of one?
A. You have to cut them off and put them together, correct.
Q. What does it mean to say "coming in side is" -- well, I'm not sure what -- read that last line. "Coming in" --
A. "Side is tied-in."
Q. Oh, "coming in side is tied-in." What does that mean?
A. It would be the direction we're working on the project. So if this was -- if we were working north to south, which I believe we were, this would be the north side tied in.
Q. So let me ask you a big-picture question about the 20th the same as I asked you about the 19th. Are there any documents other than the one in front of us, page 21, and your laptop notes that are pages 3 through

7 that were created in September of 2016, that would document the depth of the trench, the depth of the pipeline, presence or absence of backfill, whether there was inspection underneath the pipe, the presence or absence of stones underneath the pipe, checking for welds, who did the welds, whether the welds were inspected? Are there any other documents other than the ones in front of us that would answer those questions?

MS. BOUFFARD: Object to the form of the question.

A. Not that we possess.

Q. Okay. And do you think such documents existed back in September of 2016 regardless of whether you possess them now?

A. No. It would be by -- it would -- the only other place I could think would be the inspector's notes, and we do not have access to them.

Q. Okay. Thank you. Paragraph 1(f) of the subpoena and paragraph 2 related to whether -- "Whether compacted backfill was placed around the pipeline in the wetland or swamp area, or the wetland buffer area, of New Haven, Vermont, nearby to the Monkton town line."

I haven't asked you compaction questions. Do

you know whether or not compacted backfill was placed around the pipeline in the wetland or swamp area or the wetland buffer area?

A. We did not compact the backfill.

Q. And is there a reason that you recall?

A. Yes. It was not compactible backfill. It was muck. I do believe there was an agreement with VELCO before we started about compaction.

Q. Did you ever see the agreement?

A. No. I don't believe so.

Q. Paragraph 1(g) and 2 relate to the following: "The earliest date on which Michels Corporation, or any officer, employee, agent or contractee of Michels Corporation, first communicated with Vermont Gas Systems about the need or potential need to bury the gas pipeline less than four feet below the surface of the ground within the VELCO right of way in New Haven, Vermont; and also the nature and manner of the communication."

So let me ask you, are there any documents that would tell us the earliest date of that communication?

A. I do not have any documents.

Q. When you say "I," you mean the Michels Corporation?

A. Correct.
Q. Did the Michels Corporation have any such documents in September of 2016 or at any time in 2016?
A. No.
Q. Was there any verbal communication between the Michels Corporation and Vermont Gas about the need or potential need to bury the gas pipeline less than four feet below the surface of the ground within the VELCO right-of-way in New Haven?
A. Yes.
Q. And tell me what you know about that.
A. I had conversations with Mike Reagan and Darrel Crandall about -- about that.
Q. When do you -- go ahead. Sorry.
And --
A. I was done.
Q. What was the -- what was the earliest date on which you had such a conversation?
A. I do not know.
Q. Now, you've told us your notes, which are page 003, refer to a conversation on September 12. Is that --
A. I believe that conversation --
Q. Go ahead.
A. -- referred to the sheeting issue.

Q. Okay. So that's different than the depth issue?

A. Essentially.

Q. Okay. When is the first -- the earliest date on which the Michels Corporation became aware that the pipeline might be buried or potentially would have to be buried less than four feet below the surface within the VELCO right-of-way in New Haven?

A. It would have been as we were constructing when we realized how bad the conditions really were.

Q. And looking through your notes that we've been just looking through, what date was that?

A. My -- let me take a look at my notes.

MR. SIMON: We're looking for them.

MR. DUMONT: Yup.

A. My guess would be the 15th.

Q. Okay. What is it about your notes that suggest it was the 15th?

MR. SIMON: Could you -- could you repeat the question?

Q. Yes. What is it in your notes that suggests it was the 15th of September?

A. It said the machine -- or it said hit the terrible spot in the swamp and the machine slid off the mats at the end of the day.

Q. Okay. Do you recall speaking to Darrel, Michael, or anyone at Vermont Gas on the 15th?

A. Yes.

Q. Tell me what you recall.

A. I remember we talked about the -- the troubles we were having there and the conditions.

Q. Had Michels --

A. What our op- --

Q. Go ahead. Sorry.

A. And what our options would be.

Q. At other locations along the pipeline, had you personally been aware of a similar problem, meaning a need to burial less than -- need to bury less than four feet within the VELCO right-of-way?

A. I honestly don't remember.

Q. If you had used sheeting in the clay plains swamp, could you have achieved four feet depth of burial?

A. I believe so.

Q. Do you remember any communications you had with any employee of Vermont Gas, not Hatch Mott MacDonald or Clough Harbour but Vermont Gas, about the depth of burial that we've been discussing?

A. I do not remember. The construction manager and the chief inspector were my points of contact.

Q. Mr. Reagan and Mr. Crandall?
A. Correct.
Q. Did you ever learn that Vermont Gas had approved of burial less than four feet deep within the VELCO right-of-way in New Haven?
A. In the clay plains --
Q. Yes.
A. -- you mean?
Q. Yes, I do.
A. Yes.
Q. How did that come to your attention?
A. It was verbal from Mr. Crandall.
Q. Tell me what you remember him saying.
A. I remember him saying it got approved.
Q. Approved by whom?
A. I believe it was VELCO.
Q. Do you remember when that conversation happened?
A. I -- I honestly cannot pinpoint the exact date. I do not know. It would have been somewhere between the 12th and the -- and the 22nd.
Q. We've been given a document showing that Mott MacDonald did engineering studies to analyze whether it would be safe to bury the pipeline less than four feet deep within the VELCO right-of-way much earlier in

2016. The study was done in May of 2016, not September. Do you recall any issues pertaining to depth of burial less than four feet earlier in 2016 than the discussions we've had, whether it's at the New Haven site or any other site?

MS. BOUFFARD: Objection.

Q. Go ahead.

A. I do not recall. I know the swamp was talked about and we talked about it a lot in planning to get in there, but I do not recall the dates, who, when, and where.

Q. Tell me about that discussion. Who was part of the discussion?

A. It would have been Mike Reagan, Darrel Crandall, and I believe Joey Wilson was involved in several of them.

Q. Do you remember where you were when you had the discussion?

A. It would have been in Mike and Darrel's office.

Q. Where was that?

A. At our construction yard in Williston.

Q. Do you think that could have been in the spring of 2016?

A. It very well could have been. I -- I don't

know.

Q. How did the subject come up?

A. When we were talking about the -- the width of the right-of-way in this location and the concerns we had.

Q. "At this location" meaning the clay plains swamp?

A. That is correct.

Q. Who first raised concerns about construction in the clay plains swamp? Was it you on behalf of Michels or Mr. Crandall or Mr. Reagan?

A. I believe it was me.

Q. Why did you have concerns?

A. Because of the width of our right-of-way. It was extremely narrow.

Q. How wide was it?

A. I don't remember exactly. I believe it was 30 or 40 feet.

Q. Why was that -- why did that seem narrow to you?

A. Because that is not typical at all. Thirty feet is extremely narrow.

Q. What's typical in your business?

A. Seventy-five to a hundred.

Q. Tell me the connection between your concern

about the narrowness of the right -- of the construction corridor and depth of burial.

A. In 30 feet, especially in the conditions we had, you don't have enough room to get your dirt away from you.

Q. In other work -- at other work sites have you worked in a wetland with only a 30-foot-wide corridor to work in before this one?

A. I do not -- I do not recall any time where we only had a 30-foot corridor.

Q. And this is in your entire career at Michels?

A. From what I can remember.

Q. And do you mean -- I want to be clear. You mean a 30-foot corridor in a wetland or a 30-foot corridor in any area?

A. I believe we've worked in a 30-foot corridor in -- a narrow one, anyways, in other areas, but not in a wetland.

Q. This will be obvious to you, but can you explain to me why it's a particular problem in a wetland?

A. Because the dirt is not solid and it don't stack. It's just muck, and you can't -- you can't do anything with it.

Q. Is this a problem just because there's not

room to store it or because you just can't dig deep enough in -- in a mucky area if you only have 30 feet to work in?

A. Both.

Q. Both. Okay. So tell me anything -- anything more you remember about this discussion you had back at the office in Williston which started with your concern about the narrowness of the right-of-way.

A. I really don't remember details of -- of exactly what we talked about.

Q. Did Mr. Reagan or Mr. Crandall say don't worry about it, it's a problem, or did they say we'll get back to you, or did -- was there some other resolution?

A. There were many options and solutions proposed, if I remember right, and it's something we talked about for some time.

Q. What were the other possible solutions?

A. Well, acquiring more right-of-way would be the first solution, and I don't think that was possible there. The second would be to sheet it.

Q. Any other options?

A. There would have been an option to directional drill it.

Q. Was that directional drilling discussed between you and Mr. Reagan and Mr. Crandall?

A. I believe only briefly.
Q. What did they say about directional drilling?
A. I do not recall, but we did not do that.
Q. Did you discuss that directional drilling is much more expensive?
A. I do not recall.
Q. At any time did Reagan or Crandall say directional drilling is off the table because it's too expensive?
A. Again, I'm sorry, I do not recall the exact conversation. I would not be able to answer it correctly.
Q. Okay. Do you recall any discussion at all about the cost of the alternative ways of dealing with the concern you had raised?
A. I know there was a large cost in sheeting as well as drilling, but like I said, I don't -- I don't remember exactly what was said.
Q. Okay. Now, I'm going to compliment you and say I know you're not a lawyer. That's intended as a compliment. Having said that, do you know whether or not the contract between Michels and Vermont Gas would have imposed the cost of directional drilling on Michels or on Vermont Gas?
A. It would have been all on how we would have

made the agreement.

Q. So do you recall -- did you know at the time in 2016 whose cost that would have been?

A. Again, if the decision would have been to drill, there would have had to have been agreement made between Michels and Vermont Gas and hash out whose cost it would be.

Q. Okay. Do you know if that discussion ever happened?

A. I do not believe it happened. I do not believe it ever happened, no.

Q. Thank you. During the entire time you were working for Michels in Vermont, did any -- let me back up.

This relates to question on the subpoena 1(i) and 2. I'll read 1(i) and then I'll ask you a question about it: "Whether any Michels Corporation employee, officer, agent or contractee expressed concern, or knows of any other person who expressed concern, about failure to properly bury the pipeline in any respect (including but not limited to improper depth of trench, failure to use backfill beneath pipe, failure to inspect material beneath pipe, failure to use compacted backfill around pipe, improper depth of burial of the pipeline, et cetera), at any location."

So the question I have for you is, During the time you worked for Michels, are you aware of any concerns that any Michels employee, officer, agent, or contractee or any other person expressed about failure to properly bury the pipeline in any respect?

A. Nope.

Q. Does Michels have any kind of in-house whistle-blowing or similar policy?

A. Of course.

Q. Briefly, what is the policy?

A. I could not tell you the policy off the top of my head.

Q. Okay. But if, say, one of your workers had said, you know, I have a concern about this, I'm not sure this is safe, that employee would have been protected against any retaliation?

A. Yes.

Q. Okay. You've been very helpful and I know you're trying really hard to listen to my questions and answer them as best you can. A question that I still have is this: You've described to me based on Jolene's time sheets and your own laptop notes that first a trench was dug, then the pipe was put in and a second trench was dug alongside of it to try and get the -- the pipeline deeper. Isn't it true that there were

trenches dug on both sides of the pipeline so that it would sink deeper?

A. You know, it could be. I do not recall.

Q. Have you seen any of the photographs that were taken by Joey Wilson?

A. I don't believe so.

Q. Of this site, to be clear. You don't think so?

Have you seen the photographs that some of my clients took of the site on the 19th of September?

A. I don't know. I don't -- I don't believe so.

Q. Okay. Did Michels take any photographs of the New Haven swamp or the clay plains swamp before, during, or after construction?

A. I took photos after construction, and I sent what I had.

Q. That's in the package we got last night?

A. Yes.

Q. And the date -- do you know how long after construction those were taken?

A. These were taken in November.

Q. Of what year?

A. 2016.

Q. Do you know who took the photographs?

A. I did.

Q. And why did you take them?

A. We had some depth-of-cover issues at the end of the project. Most of it was contouring and sunken ditch, and this area in particular is -- is settlement, and I took them to show the settlement areas.

Q. Was any change made to these -- the sites shown in the photographs after the photographs were taken?

A. No.

Q. So if I were to go there today, the depth of cover would be the same as it was in November of 2016?

A. That is correct.

MR. SIMON: For the sake of clarity, Attorney Dumont, let me clarify those two questions. You're saying by Michels Corporation?

MR. DUMONT: Yes. Thank you. By Michels Corporation. Thank you.

Q. That's what you meant, correct?

A. Yes.

Q. Have you looked at the time sheets for the dates you've been discussing about with relation to Michels 003, 004, 005 -- let me rephrase that.

In what we were sent last night, we have the time sheets for the 19th and the 20th, but not the time sheets for, for example, the 12th or the 15th, which is

when you believe the equipment fell off the matting and into the swamp. Have you looked at the time sheets for dates other than the 19th and the 20th?

A. Not recently. Not since the dates they were written and I signed them.

MR. SIMON: Want to take a look through your records?

A. No, I did not.

Q. Okay. So I have one we obtained from Vermont Gas. It's a daily time report -- I'm sorry. I'm not going to go there.

Let me ask -- go back to the photographs. Why is it that you took photographs in November of 2016 but none during construction or before construction?

A. I don't know.

Q. Did anyone ask you to take photographs in November of 2016?

A. No. No. I did this on my own because it was an issue.

Q. How did this issue come to your attention?

A. There was an e-mail sent that showed the depths of cover after the project was completed.

Q. Sent by who?

A. Vermont Gas. I don't know the exact person.

Q. Do you still have that e-mail?

A. It was the depth of cover chart that -- that was 0012.

Q. Oh. So it's in this package?

A. Yes.

Q. Okay. In the package that was sent, this is Michels 0012, so you're saying this was sent to you by e-mail?

A. Yes.

Q. In the package that's been prepared to us, we don't have any cover -- any cover e-mail. What we have is just this depth-of-cover table. When -- when this -- how do you know this arrived by e-mail?

A. I had this saved in my files. I will have to check and see if I have those e-mails still.

Q. This chart, as far as I can see, doesn't have any date on it. Are you saying this is -- was taken -- what's your -- what's your understanding of the date this was provided to Michels?

A. This was in November, I believe.

Q. Was Michels asked to do anything about the insufficient depth of cover?

A. The issue we have with this is that dirt has more than likely squished out on the sides where you cannot import material into a wetland and bring in other material to fill with, and if it was a simple

regrading, we would -- we would have put a machine in there and regraded it, but there really was no material to regrade with, and that's why I took the pictures.

Q. If I look at Michels 0015, I see numbers on the left, 1905 running through 1940. What are those numbers?

A. I believe those are weld numbers.

Q. And then there's a black rectangle. What -- on my copy it's black. What is that? Is that material that's been redacted, or was that in the original?

A. That's material that's been redacted.

Q. Who redacted it?

MR. SIMON: That was redacted by me in our production. This is Andrew speaking.

MR. DUMONT: So let me stick with the witness.

Q. Mr. Bubolz, in the copy you received from Vermont Gas, nothing was redacted, correct?

A. Correct.

MR. DUMONT: So, Mr. Simon, how could a communication from Vermont Gas, a regulated Vermont utility, to a contractee working on a pipeline be covered by attorney-client privilege? Explain that to me, please.

MR. SIMON: It's not attorney-client privilege. It was redacted for reasons of

confidentiality.

And, Debra, if you would like to explain your reasoning, I'm glad to allow you to do so.

MR. DUMONT: I'm sorry. I didn't catch that. Could you say that a little slowly -- more slowly?

MR. SIMON: It's not attorney-client privilege. It was for reasons of confidentiality and public safety.

And, Debra, if you would like to elaborate further, I'm glad to allow you to do so.

MS. BOUFFARD: The information that was redacted had more specific -- specific location detail in there that -- that hasn't been included in other submissions and wouldn't be information that we would make publicly available in terms of the specific coordinates of where the pipe is.

MR. DUMONT: In other dockets, material -- information covered by the federal statute has been provided to the parties. The parties signed a protective agreement, and it has never been the practice of the Public Utilities Commission to allow one party to unilaterally decide that information is confidential and just withhold it.

MS. BOUFFARD: If you want to talk about a protective agreement and entering into that, we can

certainly do that, and -- and for today this facilitated getting the discovery here to you, but we can absolutely talk about that.

BY MR. DUMONT:

Q. The third column has some numbers starting with 254.9 and ending at 255.5. Do you know what those numbers are?

MR. SIMON: Can we hold on one sec? The witness needs to utilize the lavatory, so can we take five minutes?

MR. DUMONT: Sure.

(A recess was taken.)

BY MR. DUMONT:

Q. So this is Jim again. Mr. Bubolz, I'm wondering if you could give us sort of a big picture. We've been going through lots of details, and I'm afraid I've missed the big picture, which is I'd like you to describe for me in your own words in a narrative fashion the process by which the pipeline was laid down -- the trench was dug, the pipeline was laid down, it was buried, and then the project was finished in the clay plains swamp. So if you could just give us -- spend a couple minutes and describe what the whole -- how the process happened from start to finish.

A. Certainly. First off, the reason for having

to do it this way was in the 30-foot right-of-way, when you dig your ditch -- and it's going to be a very wide ditch, and then next to that ditch is going to be a pile of slop spoil. We could not -- there was going to be no road to carry the pipe in and set it in place. That was our biggest obstacle. There's no room. You can't drive on the muck to carry the pipe into place. It would be a safety hazard. The matting underneath you, you wouldn't be able to see it and it would be a really, really bad deal. So we decided to bury the pipe only a foot or two -- two to three feet deep before the ditch turned bad and install the pipe partway and then our excavator could dig alongside of it and lower it down as we went, and that would eliminate the need to have to carry in sections of pipe in the conditions that would not allow it.

Q. So there's a -- I believe there's a 2500-foot-long section of pipe that was concrete coated. Is that your understanding?

A. That is correct.

Q. How was that brought onto the site?

A. It was brought on by trucks.

Q. And how large were the sections that were brought over -- brought to the site?

A. They were 60 foot long.

Q. And so those are assembled on the site, correct?

A. Yes.

Q. They're connected up. And what equipment is used to connect them up?

A. It would be a pipe layer.

Q. What is a pipe layer?

A. It would be a Caterpillar-type machine with a boom that hangs over the side for -- for laying pipe.

Q. Okay. So the concrete-coated pipe is now lying on the ground, and then the sections are then connected together after they're laid on the ground; is that right?

A. Yes.

Q. And this is before any trench has been dug, correct?

A. That is correct.

Q. Is this what's known as stringing the pipe?

A. That is correct.

Q. So the pipe was strung -- a 2500-foot length of pipe was strung, and after that's completed, the trench -- the initial trench was excavated, correct?

A. Yes.

Q. Now, what use of the wooden matting was made up until this point -- let me -- up to the point that

the stringing is completed, were you using wooden matting?

A. Yes.

Q. So, now, we've got the matting now. Does it stay down before -- while the trench is dug, or do you lift -- was it lifted up to dig the trench?

A. The matting stays down.

Q. And is the trench dug to the side of the matting or in some other way?

A. To the side of the matting. Correct.

Q. How was the 2500 foot of pipe then laid into the ditch?

A. We dug a partial ditch over the top of the ditch line first, and we only excavated the topsoil, which was the first two or three feet, and then we placed that pipe in that partial ditch before we started digging and dirt was an issue.

Q. So I'm thinking 2500 foot of concrete-coated pipe is extremely heavy. What was the process that you picked this up and put it in the ditch?

A. It is heavy, but you do not pick up the whole thing at one time. It's also more flexible than you would think, and four or five machines could pick it up and place it in and move along and place it versus picking up the entire section.

Q. Were you there when that was done?
A. I do not believe so.
Q. Is there any record of how the -- what you've just described; that is, how the concrete-coated pipe was picked up and put into the initial trench?
A. Only what's on Jolene's time sheet. It was put in the trench the same way that all pipe is put in the trench. It's a very standard procedure.
Q. Is there any record of what the concrete-coated pipeline was resting on before it was placed in the trench?
A. It would have been resting on the wooden skids that I mentioned earlier.
Q. And you say that because that's standard practice?
A. Yes.
Q. Is there any record that wooden skids were used in this --
A. No.
Q. -- in the clay plains swamp?
A. No.
Q. If we were to look on the time sheets, would Jolene have indicated that skids were used?
A. No. Skids are used everywhere that you assemble pipe to elevate it off the ground for the

welders to weld it.

Q. The initial two- to three-foot trench was excavated. Where was the materials that was -- materials that were removed from the trench placed after the trench was excavated?

A. I believe that was put on the tree line side as topsoil.

Q. What do you mean by "the tree line side"?

A. It would be the other side of the ditch, not where the mat road was but on the other side. I don't have my directions right to tell you north, south, east, or west.

Q. Okay. So the mats were on one side and the fill -- I'm sorry, the excavated material was placed on the other side?

A. Only for the first couple feet.

Q. And after that, what was the process?

A. Then the excavated material was placed on the matting.

Q. And why was that?

A. It was -- one, it was a requirement; two is it was the only room we would have to place it on the matting. It was too narrow next to the -- the narrower side of the right-of-way to store any more than just topsoil. That was all the room we had.

Q. Did anyone -- and this may be repetitious, but I'm trying to put all the pieces together here. When the two- to three-foot trench was finished and you had put the excavated material on the other side of the trench, was any survey taken of the depth of that temporary trench?

A. No. No survey was required. We knew the process and we knew we planned on digging it deeper after that. It was irrelevant.

Q. Was any record made of the nature of the materials that were excavated when you were digging the two- to three-foot trench?

A. In my notes it says the materials were terrible. I believe in Jolene's time sheets, it says there were bad conditions. And that's all I know of.

Q. And when you say "terrible" or "bad," you mean very wet?

A. It wasn't even that wet. It wasn't like we were digging in water. The material was -- it was just like an ooze.

Q. I think you need to explain that for me. You said it wasn't very wet but it was an ooze. I don't -- I can't comprehend the distinction. What do you mean?

A. It -- it was just muck. There -- there wasn't standing -- a ton of standing water in the ditch. It

was -- it was just -- it would just ooze in on you. Every time you took a bucket out, more would come in. It would -- it wasn't stable whatsoever. It wouldn't stay in a pile after you set it on the matting, and it would not hold ditch. No matter what you did or how you tried, it would just keep coming in.

Q. In your experience working for the Michels Corporation, had you ever encountered conditions such as this or similar to this?

A. I would have to say that's one of the worst ones I've ever seen.

Q. All right. So going forward with the narrative, you've got the trench -- the initial trench dug. You've got the material removed from the trench on the other side of the trench from where the equipment is. The equipment is operating on top of wooden mats, correct?

A. That is correct.

Q. The equipment that -- what equipment is then used to move the pipeline into the trench? Is that what's called -- is that an excavator, or was that the pipe-laying equipment?

A. An excavator. When we dug, there was no road along the side of the trench any longer. You could not put any kind of weight there whatsoever. It was an

ooze.

Q. And I'm sorry. I forgot the name of the pipe-laying equipment that you used initially. What was that called? A pipe layer? Is that what you said?

A. A pipe layer, correct.

Q. And what do those look like?

A. It's a Caterpillar-type machine.

Q. Um-hum.

A. Like a -- like a bulldozer but without a blade, and it would have an A-frame structure hanging off the side of it to be able to -- somewhat of a crane off the side that you could pick and move forward and backwards off the side of the machine.

Q. And were those used to place the pipeline into the trench?

A. No. We used excavators to place the pipeline into the trench.

Q. Okay. And how does an excavator with a blade move a concrete-coated pipeline?

A. The excavator does not have a blade. It has a bucket. A bucket has a lifting ring in which you can hang a hook off of, and you can -- you can not only dig but pick and move things with it.

Q. So what -- did the hook -- was the hook placed underneath the pipeline to place it in the trench?

A. No. We would have used lifting slings for that.

Q. Okay. What's a lifting sling?

A. It would be a nylon rope sling that would be rated for such poundage that you would use to actually lift the pipe without putting any kind of hook or anything on it. You would hook the sling into the hook.

Q. And what was the spacing between the slings?

A. I could not tell you.

Q. Was there any record made of the spacing between the slings?

A. No.

Q. So now we have the pipeline in this trench. What happened next?

A. We went to dig it down. We dug a ditch alongside the pipe, deeper than the pipe itself, and it fell down. It wasn't like the materials underneath it stayed. I mean, it was ooze where the pipe would just kind of settle down as we dug. And that spoil would go on the mat side or the road side of the right-of-way.

Q. Did placement of the spoil on the mats prevent your equipment from traveling on the mats?

A. Yes. Absolutely.

Q. So --

A. We did not have the ability to put any additional weight on that side on the mats or it would ring our -- everything we were working on, it would push that ooze back into our trench.

Q. Were different sections of the 2500-foot concrete pipeline lowered in the manner you've described by digging a trench next to it at one time, or was it one section at a time?

A. It was -- what we ended up having was one machine digging from one end to the other, and the rest of the equipment would -- the machine would take its dirt and put it next to it on the mats. We had another machine that would take the dirt and relay it behind because we didn't have enough room for that spoil, so we would take it and fill it behind us.

Q. So you had -- you did the entire length basically foot by foot --

A. With one machine.

Q. -- with one machine foot by foot from start to -- from one end to the other?

A. That is correct.

Q. How long did that take?

A. I would have to refer to the time sheets again -- or the notes --

Q. Sure.

A. -- and when they started.
Q. Why don't you do that.
A. I believe it was September 14th through the 20th. Six days, five days.
Q. Now, you've told me quite clearly that this was muck, it was ooze. I'm not saying this should or shouldn't have happened, but I have to ask: Did anybody get out of -- off of the heavy equipment and stand -- get into the trench next to the pipeline and look at what was underneath the pipeline?
A. Well, we -- we dug deeper than the pipeline was going to end up going originally, so you could see all the material on the bottom. Nobody -- we -- nobody could get in the trench that we dug. It was not a safe trench to be in.
Q. Right. I mean, that's why I prefaced my question the way I did. I would imagine there would be major OSHA or just common-sense safety concerns about getting into that trench. Do you agree?
A. Yes, sir.
Q. And you've said you knew you were dealing with muck and ooze because you were pulling it out from next to the pipeline, but I'm left with this question: The pipeline ended up at a final resting depth, correct?
A. Yes.

Q. And underneath that pipeline was material that had never been seen by anybody, correct?

A. We overdug that ditch quite a bit where we could clearly see all the material. There were no rocks or anything present. It was nothing but muck.

Q. But again, when you're done, it's down as far as it's going to go; you've dug next to it, but you haven't dug underneath it, correct?

A. We didn't have to dig underneath it. It was ooze. It would just come out from underneath it automatically when we dug next to it.

Q. Do wetlands sometimes sit on rock, in your experience, if you know?

A. I really don't know. I would assume eventually it does.

Q. So you could have a layer of clay that traps water and keeps the water near the surface or you could have rock, and do you know if the rock sometimes fractures and enters the wetland soils?

A. I don't recall ever seeing any of -- any rock whatsoever. Again, it was all ooze.

Q. All right. So we've gotten to the point where the construction crew believes the pipeline is deep enough. Who would have made that decision?

A. It would have been the on-site survey crew.

Q. And how did they -- were you ever there when they were doing their surveying?

A. They were -- that survey crew I believe was there all the time.

Q. Okay. So how did they do the surveying?

A. They would take a shot on undisturbed virgin ground and then take a shot on top of our pipeline.

Q. And a shot being a GPS reading?

A. That is correct.

Q. Did they provide any -- to you any piece of paper saying at this station number or this location of the pipeline you were at X number of feet, or was it just verbal, it's okay?

A. It was all verbal. We would dig until they said it was deep enough.

Q. At that point, when you received the okay it was deep enough, then what happened?

A. The operator would move another set and continue digging.

Q. All right. And then when that process was finished, all 2500 feet, then what happened?

A. The tie-in crew would proceed to put the ends together.

Q. Okay. So by the time the person -- by the time you're done and you've got sign-off from the

surveyor, the pipeline is at -- according to what you've been told, is at the right depth of burial and it's immediately covered with the material that had been removed not long before; is that correct?

A. That is correct.

Q. So that by the time you were at the very last section and the surveyor says deep enough, if you were to look back, it would all be covered behind you, correct?

A. Yes.

Q. Okay. And then you said after that there's a tie-in that's done. I think I know what you mean, but just describe that.

A. The pipeline is put together in sections. Sections are installed in the ditch, and after they're installed, then the ends get put together to make the pipeline whole.

Q. And that's what you were telling me about in connection with Michels 0021 where it said "made 1 weld and 1 cut. Coming in side is tied-in"?

A. Yes.

Q. Then what happened to all those mats?

A. The mats were removed.

Q. Are they removed as you're filling in behind the pipeline, or are they removed all at one time at

the end?

A. They're removed all at one time at the end.

Q. And then you put them on a truck and they go to the next location?

A. Correct.

Q. Thank you. I have a couple questions about the materials that were sent to us last night.

MR. DUMONT: And, Attorney Simon, I just want him to identify some of the documents that I can't read so at least I know what they are, and then when I have a chance, I'll look at the larger version that you sent earlier today and I may need to ask Mr. Bubolz some questions about them, but I just want to identify what they are for now.

MR. SIMON: Understood. And let me clarify. It's not a larger version. It's a native version. It should be the same size.

MR. DUMONT: Okay. Well, shall we say a legible version.

Q. Michels 008, what is that?

A. That is a depth-of-cover table that was included in our drawings.

Q. So when -- when did you get these -- this -- I'm sorry. When did you get this?

A. This was -- I received the drawings in the

beginning of the project.

Q. When would that have been? 2016, 2015?

A. 2016 for me.

Q. Had -- had Michels started work on this gas project before you came to Vermont?

A. Yes.

Q. So whenever Michels started work, it had 00- -- 0008 to work from?

A. I believe this was another phase of the project. I don't know that this information was included in the 2015 work or not.

Q. Okay.

A. I doubt they would have had this.

Q. And I have to ask you questions about this blind because I can't read any of it. Why do you doubt that they would have had this at the beginning?

A. Because it was another phase of the project. The drawings were for a different location.

Q. I see. So just -- it wasn't time for Michels to work on this segment of the project yet, so these drawings might not have been made available yet?

A. Yes.

Q. Okay. And what is 0009?

A. That is a page out of the drawings. The hatched area would be the new -- would be the -- the

clay plains swamp we're referencing.

Q. Okay. With my old eyes, I don't see any hatched area. What do you mean by "hatched area"?

A. You can see a hatched area on the right side of the drawings.

Q. I see a dark area. Okay.

A. Yup.

Q. It says "Town of New Haven, Addison County." And it's a rectangle there. Is the dark area beneath where it says "Town of New Haven, Addison County"?

A. Yes.

Q. Okay. And what did this sheet tell you?

A. This was the drawings. This sheet pretty much showed us the station numbers and where the swamp started and stopped.

Q. Okay. I can't see what they are, but I see there are little circles. If you go directly underneath "Town of New Haven, Addison County," then there's a dark area and then there's some dashed and broken lines that lead down to a chart that says "Profile." Way over on the left, it says "Profile."

A. Okay.

Q. But between the broken lines and the profile, there's something in circles. What's in those little circles? A number or letter?

A. Are you looking above the dashed-dotted line or below it?

Q. Below the dotted-dashed lines but above where the profile starts.

A. Okay.

Q. Some little circles. Looks like maybe one of them says W.

A. Okay. Yeah. I can see W. Looks like a T.

Q. Do you know what those refer to?

A. I believe they refer to a chart in the beginning of the prints. They show construction type.

MR. DUMONT: So I have seen CHA drawings before, though not this exact drawing, and that's what I was guessing, because I've seen construction types indicated in those little circles in other drawings, so, Attorney Simon, I think it would be useful if you were able to send us the whole set of drawings, because this refers to other pages that you didn't provide. I understand you were trying to get this done at the last minute, but just so we know what these things all refer to, we probably need the whole set.

Q. Mr. Bubolz, when you got this, did you look at those other pages that it referred to?

A. Yes, I did.

Q. Okay. So we don't have them in front of us

now, but whatever they told us these abbreviations meant, you went and read that?

A. Yes.

Q. Okay. What's the next page? It's 0010.

A. That refers to a creek crossing that is not involved in -- directly in this wetland.

Q. Okay. Do you know where the creek is?

A. Yes. It is -- on page 0009, it would be left of the hatched area, kind of in the center of the page.

Q. I see. Okay. There's more dark area in the middle of the page.

A. Correct.

Q. Okay. Great. Thank you. And what is 0011?

A. It would be the other half of the drawings for the clay plains swamp that you're referring to.

Q. Okay. Now, turning to 11 -- turning to 12, 13, 14, 15, which are the depth-of-cover data that you were sent by Vermont Gas, is there any way to correlate the depth of cover shown in this chart with what you've just shown us on Michels 9 and 11?

A. I am fairly certain that it is on page 0015, and you would be able to correlate it with the station numbers that are on there.

Q. So in this -- on 9 and 11, I can't -- I'll have to take your word for it. Are there station

numbers shown?

A. Yes, there are station numbers shown. I believe the pink area on page 0015 represents that swamp.

Q. Okay. Starting with -- on 0009, on what part of the page are the station numbers shown?

A. 0009?

Q. Yeah. Is it in the "Profile" section?

A. Yes. On the "Profile" section on the bottom --

Q. Okay.

A. -- you can see the station numbers.

Q. All right. And in the middle of 0015 are shown the station numbers?

A. Yes.

Q. Okay. So that's how we figure it out. Okay. Thank you.

The process you and I have just gone through of identifying particular locations by station number, is that something you do or your crews do when they were on the site doing the construction?

A. They would track footage by station number, yes.

Q. So are station numbers shown on the ground? If you were there, could you say, Oh, look, there's a

stake here showing what station number I am -- I'm at?

A. Yes.

Q. Okay.

A. Station numbers are typically referenced on the right-of-way stake.

Q. Were -- going back to your meeting in Williston with Mr. Reagan, Mr. Crandall, were there any other construction techniques discussed for this site other than use of sheeting, use of HDD, or the method that you ended up using?

A. I do not recall.

Q. You may have told me this, and I'm sorry if you did. Have you used sheeting in other wetland areas in your career?

A. Yes.

Q. How did it work?

A. Very good.

Q. When you're dealing with the muck that you have described as ugly and terrible, did you ever contact Reagan or Crandall or Vermont Gas and say, We need to stop; we need to use the sheeting?

A. Once we committed to digging, we were pretty much committed to the process we had. The sheeting would have had to have been done initially.

Q. Explain that to me. Why -- why did it have to

be done initially?

A. Well, because we -- we dug the ditch already in them areas and it took all the material that was underneath the mat road and pushed it into the ditch, even just with the weight of the spoil on it, and in essence there was no getting back through that area with anything anymore.

Q. So you couldn't have gone back in to put in sheeting because it would have been impossible to do at that point?

A. Sheeting requires some very heavy equipment. I don't think after the fact it would have been a good idea.

Q. And this will seem like a really dumb question, but when you put in sheeting, does it stay in afterwards, or do you pull it out when the construction's done?

A. It gets pulled out afterwards.

Q. A few more questions about Michels 003 through 007. There's a column that says "environmental," and I wanted to ask you about that. What does that mean?

A. We have an environmental crew that is -- their tasks are to do environmental work, such as soil stabilization, silt fence, cleanup as far as seeding and all them things.

Q. Who -- do you know who was on the environmental crew for the clay plains site?

A. So the environmental crew would go through initially and install all the erosion controls, and then they wouldn't be back until they -- unless they needed to stabilize soil or things like that. There was not an environmental crew present when this was being performed. You couldn't walk in this area on the right-of-way. The mud would be to your waist.

Q. According to some documents that we don't have with us today, because they didn't come from Michels, after construction was completed in September of 2016, months later, Mr. St. Hilaire, who's with us today, notified VELCO that there were additional sites that were not -- at which the pipeline had not been buried four feet deep in New Haven. Do you know how those were discovered?

A. No.

Q. Were those ever brought to Michels' attention?

A. Yes.

Q. How were they brought to your attention?

A. In document 0012.

Q. 0012. Okay. I thought you told me you got this document in November of 2016.

A. I did.

Q. The information we have is that -- well, go ahead. Tell me your answer why -- why you think 0012 answers the question.

A. 0012 incorporates all the places that we -- we did not have cover at the end.

Q. Okay. You mean 12 through 17?

A. Yes.

Q. Okay.

A. For this area.

Q. So to your knowledge, as of November, when you received this document, all the known sites had been disclosed, and that's still true today? The known sites where it wasn't four feet deep in the VELCO right-of-way?

MS. BOUFFARD: Objection.

A. Yes.

MS. BOUFFARD: I don't understand the question myself.

Q. All right. Let me ask it over. As of November of 2016, when you received 12 through 17, all of the locations in New Haven in the clay plain wetland and surrounding buffer where the four-foot standard wasn't met were known and were set forth in this document?

A. I believe so.

Q. And you haven't learned anything afterwards saying there were additional locations?
A. No.
Q. Okay. Have you ever been interviewed by anyone on behalf of Vermont Gas Systems about the same issues you and I have been talking about today?
A. Yes.
Q. When did that happen?
A. Sometime this summer we had a conference call.
Q. Who was on the call?
A. It was the attorney for Vermont Gas; John St. Hilaire; Matthew Westphal, who is a Michels vice president; Danny Vincent, who is the East Coast manager; myself; and Nick Pfundheller.
Q. Can you spell --
A. And also Andrew Simon was on the call.
Q. Victor -- what was the last name?
A. Nick.
Q. Oh. Nick. And the last name was?
A. Pfundheller.
Q. Pfundheller.
A. No, sir, I cannot spell it.
Q. All right. And what did they -- were there any documents discussed at that meeting that we haven't discussed today?

A. Not that I can recall.
Q. Was that meeting -- do you recall what month it was, that teleconference, what month it was?
A. I do not.
Q. Was it before or after the gas company filed a motion with the Public Service Board for a non-substantial change ruling?
A. I do not know when they filed.
Q. Did you disclose to them that -- the details of the meeting that happened in Williston with Mr. Crandall and Mr. Reagan which ADD -- HDD, directional drilling, was proposed and rejected?
A. There was nothing official on that. It was just verbal.
Q. Right. But in the conference you just said you had with lawyers from Vermont Gas, Mr. St. Hilaire, and others, did you disclose to them what you disclosed to me earlier today, that you had a meeting with Mr. Reagan and Mr. Crandall early on where you raised your concern that the right-of-way was too narrow, you discussed using sheeting or HDD instead of the method that you did use? Did you share any information about that meeting with the gas company or its lawyers?
A. I would be certain I did. I just don't recall any details.

Q. Okay. That's fair. You're saying you can't remember exactly what you told them but you know it came up?

A. Yes.

Q. Okay.

A. We also spoke with Vermont Gas representation and Mr. St. Hilaire yesterday.

Q. Thank you. Did you learn anything yesterday that you hadn't known -- had not known before?

A. It was generally the same conversation as today.

Q. At the -- during the conference that happened over the summer, did you learn anything from anyone else, or were you the source of all the information?

A. I don't understand your question.

Q. Sure. Were you being questioned and were you the source of information that was shared with that group on the phone?

A. I believe so. Again, I don't have exact details. I know I had concerns and we were looking for a solution.

Q. You're talking about the meeting you had in Williston; you had concerns and you were looking for solutions?

A. Yes.

Q. And as far -- what about the meeting on the telephone with Vermont Gas's lawyers? Were you the only person providing factual information, or were others providing factual information?

MS. BARRETT: Which conversation?

A. I believe I was the only person providing information.

Q. Again, this is during the telephone conference sometime over the summer, correct? Summer of this year, correct?

A. I thought you were talking about yesterday.

Q. Oh, okay. Well, thanks for clarifying that. So what about the conference -- the teleconference that happened over the summer of 2017? Were you the only one providing information, or was someone else providing factual information?

A. I believe I was the only one.

Q. Do you recall whether or not you told Mr. St. Hilaire at any time that a trench was dug on both sides of where the pipeline was resting?

A. No, I don't recall.

Q. Is it possible you did?

A. It's -- I -- I thought we had dug on only one side, but there's a chance that we probably did dig on both sides. I really could not tell you.

Q. In preparation for that teleconference this past summer, did you do any factual research, such as contacting your wife or others who were present at the scene to ask them what had happened?

A. I was on another project at the time working. I did not do any preparation.

Q. Since then have you spoken to your wife about the same issues -- same facts I've talked with you about today?

A. Not really in detail, no. She knows that I'm here and why I'm here.

Q. Have you --

A. But we really didn't discuss anything in detail about the situation.

Q. Have you talked to anyone else who was present from September 15th through September 20th at the clay plains wetlands site in New Haven about the facts you and I have talked about today?

A. No.

MR. DUMONT: Okay. I think we're -- we're done, but let me take a break for one second and see what my clients tell me I forgot.

(There was a discussion off the record.)

BY MR. DUMONT:

Q. So my clients have some really basic questions

that I promised them I would ask and I forgot to ask.

So when you use the term "padding," what do you mean by "padding"?

A. Padding would be material free of rock.

Q. And is that the same as bedding, or is bedding different?

A. Bedding is the same. We use the same virgin material for bedding, but we would screen it for rocks at the time.

Q. So is bedding padding that has been screened?

A. Yes.

Q. Okay. What is -- in your industry what is shading?

A. Shading would mean to place the dirt over the pipe with an excavator very slowly so you can visually inspect for rocks.

Q. Do you know if shading was done for the Addison Natural Gas Pipeline, in construction of the ANGP?

A. I believe where there was rocks present we used a padding machine, I think, that actually took the rocks out of the dirt.

Q. What's the name of the machine?

A. It was called a padding machine.

Q. And how does it work?

A. It screens the soil and takes the rocks out if there's rocks present.

Q. And that was not used in the area we've been discussing today in the wetland in New Haven, correct?

A. No, sir.

Q. In the industry what does the term "trench breakers" mean?

A. Trench breakers would be a sand bag wall built inside of your trench.

Q. What's their function?

A. It would be used on hills a lot where you would have issues where water would follow the pipeline and erode, and they're also used on the edges of wetlands to keep the material separate.

Q. And what is a weld coating?

A. A weld coating would be coating that's applied after the two sections of pipe are welded together.

Q. Is that the rock shield that you and I talked about?

A. No.

Q. What's the difference?

A. The coating would be a protective barrier that would keep all -- any foreign material, debris, out.

Q. Did --

A. Water --

Q. Go ahead. Sorry.
A. Water, them kind of things. It actually seals to the pipe.
Q. Did the Michels employees not only do the welding but also apply the weld coatings?
A. Yes.
Q. Were there any specifications that were followed for weld coatings at the clay plains wetland?
A. I would be certain of it.
Q. Where would the records be of what was actually done, what the specifications were and whether they were followed? Is there a record of both of those?
A. That would come from the coating inspector that would have been on that crew.
Q. Okay. And who was the coating inspector in the clay plains wetlands?
A. I do not remember.
Q. Can we look at the exhibits and figure that out?
A. Not the ones I have in front of me. It doesn't list who the inspectors are. They're not my employees.
Q. When would that have been done during that process you've now described for us?

A. The coating would have been done after the welding was done.

Q. Before the pipe is put in the first trench?

A. That is correct.

Q. And what about the welds that were done using the bell holes?

A. That would have -- them welds would have been coated by the tie-in crew that -- that made the tie-ins, and there would have been a utility inspector on that crew that would have kept the records.

Q. Who employed the utility inspector who had those records?

A. Vermont Gas.

Q. Have you seen any as-built drawings for the clay plains swamp?

A. No.

Q. In the industry what's the practice that you're aware of for completing as-built drawings of a gas pipeline?

A. Typically the survey crew completes the as-built drawings.

Q. How long are those -- how long does it take to complete those?

A. Well, it takes the entire course of the project for certain to -- just to collect the

information, and then after that I do not know.

Q. So the survey crew that you've mentioned that was signing off on depth of burial of the pipeline, it would be the same folks that would create the as-built drawings?

A. Yes.

Q. The method of pipeline construction that you've described that was used in the clay plains swamp, have you used that anywhere else in your career?

A. No, I have not.

Q. Do you know of any -- sorry. Go ahead.

A. We've used the same technique before in -- in lowering existing lines where we dig next to them and lower them down.

Q. What's the difference between that and what happened at the clay plains swamp?

A. Really none.

Q. So where have you used that technique before?

A. I can't remember.

Q. Is it common in the industry to use the practice that you described happened in the clay plains swamp in New Haven?

A. Yes.

Q. Have you ever seen any specifications setting out how to do that and where to do that?

A. No.

Q. And you agree it was not in the specifications that you reviewed that were prepared by Clough Harbour in this case, correct?

A. Correct. I don't believe that they knew what the conditions were like when the specifications were written.

Q. Just one clarification. This technique that you've described that you've used elsewhere, have you seen it used for installing new pipe or just in situations where you're going back and adjusting the depth of burial of a preexisting pipe?

A. I personally have never seen it used for installing new pipe, but I know that it has been done that way.

Q. And the instances you know of that you mentioned earlier, was that new pipe or burying -- reburying older pipe?

A. Both.

Q. So what you're -- I think the sum and substance of what you're telling me is you've never been involved in doing it before but you're aware that other people have done it; is that right?

A. Yes.

MR. DUMONT: Okay. You've been incredibly

patient with me. Thank you so much.

Mr. Simon, thanks for your help. We will follow up by looking at the more legible versions of some of the exhibits, and you're going to get me a few other pages anyway, and then we'll talk and see if we need to continue this. Thank you for your cooperation.

MS. BOUFFARD: Let me confirm that I don't -- I don't have -- we're all set. Yeah. I don't -- I don't have any follow-up, and just to the extent that you're asking to keep open the deposition, we're not going to object if we're keeping it limited to these new documents that you indicated were difficult to read, and they are, because of the size.

MR. DUMONT: Mr. Clark?

MR. CLARK: Nothing from the Department of Public Service at this point.

MR. DUMONT: Thank you. So I think the process going forward is that our stenographer will get us a written transcript, and the state of practice here is she can give me an electronic version, but she's going to prepare a paper copy that will be the original, and, Attorney Simon, I will mail the paper copy to you so that the deponent can -- has a paper copy in front of him and can read it and make any necessary corrections.

MR. SIMON: Sounds good. Feel free to e-mail it to the address in my signature block on the e-mail.

MR. DUMONT: I'll send you an e-mail copy as well, but in addition to the e-mail copy, we have to work with the paper original.

MR. SIMON: Understood.

MR. DUMONT: Great. Thank you very much.

(The deposition concluded at 1:51 PM.)

S I G N A T U R E O F D E P O N E N T

I, the undersigned, do hereby certify that I have read the foregoing deposition and find it to be a true and accurate transcription of my testimony, with any corrections so noted on the errata sheet.

Date: _____ _____

MICHELS CORPORATION, by and through its corporate designee, Carl Bubolz

STATE OF _____ COUNTY OF _____

Subscribed and sworn to before me this _____ day of _____, 20 _____.

_____

NOTARY PUBLIC

My commission expires:

C E R T I F I C A T E

I, Johanna Massé, Court Reporter, do hereby certify that the foregoing pages, numbered 4 through 136, inclusive, are a true and accurate transcription of my stenographic notes of the Deposition of Michels Corporation, by and through its corporate designee, Carl Bubolz, who was first duly sworn, taken before me on Tuesday, December 19, 2017, commencing at 10:04 AM, in the matter of Investigation Pursuant to 30 V.S.A. §§ 30 and 209 regarding the alleged failure of Vermont Gas Systems, Inc., to comply with the certificate of public good in docket 7970 by burying the pipeline at less than required depth in New Haven, Vermont, Docket No. 17-3550-INV, as to which a transcript was duly ordered.

I further certify that I am neither attorney nor counsel for, nor related to or employed by any of the parties to the action in which this transcript was produced, and further that I am not a relative or employee of any attorney or counsel employed in this case, nor am I financially interested in this action.

_____

JOHANNA MASSÉ, RMR, CRR

Michels 0023

Michels 0024

Michels 0025

Michels 0026


Michels 0027

Michels 0028

Michels 0029


Michels 0030


Michels 0031

Michels 0032

Excerpts from the Engineering Weekly Reports

1/6/2015

2014 Vermont Gas Systems Addison Transmission Pipeline Project

VGS has suspended the majority of construction activities (transmission mainline construction) related to Phase I of the Addison Natural Gas Pipeline project. Pipeline installation related to horizontal directional drilling (HDD) may continue during the current so-called winter closure period. These installation activities are being performed by Engineers Construction of Williston VT and may require other pipeline construction tasks to be performed prior to the selection, by VGS, of a contractor to resume the mainline construction. (Historically the mainline contractor has provided support for HDD installations by performing welding, applying pipeline coatings, pipeline testing, etc.) VGS has informed the Department these processes are currently suspended while project specifications and procedures are being reviewed by the company. The Department has requested VGS to identify the construction processes/procedures which are planned during the winter closure period, the company's status to review those procedures and the entities that will be performing and inspecting each process.

1/14/15

Vermont Gas Systems Addison Transmission Pipeline Project

VGS is planning to perform pipeline construction limited to project areas where horizontal directional drilling (HDD) is utilized for installation during the current winter closure period (while mainline construction, by open trench, is suspended). However, recent extreme cold weather precluded field work during this report period. The company is also planning to resume, in the very near future, actions to protect and preserve pipeline segments installed during 2014. This includes utilizing devices to clean the internal pipe surfaces (cleaning pigs) and subsequently filling the pipe segments with nitrogen. The company has also retained an additional engineering firm to review its welding program and other procedures required to install and inspect pipeline facilities prior to performing further construction.

1/21/15

Vermont Gas Systems Addison Transmission Pipeline Project

Scheduled patrols have begun to monitor the security and condition of pipeline materials currently in storage during suspension of the project's main line construction. VGS will be covering the majority of stored pipe segments with tarps. Weather conditions have continued to delay completion of actions to preserve several project pipeline sections which are installed below ground in Williston, Essex and Colchester. VGS performed cleaning operations on three of these segments during this report period and continued to develop written procedures to address nitrogen injection (into a total of six sections). The company has procured nitrogen and plans to begin these injections next week. VGS is also assessing other pipeline construction processes, which are expected to be performed by VGS and Engineers Construction Inc. prior to resumption of the main line construction. Subject matter experts in quality control and pipeline construction, which were recently retained by the company, continued to develop written procedures related to these activities with particular attention to the company's welding program.

1/28/15

Vermont Gas Systems Addison Transmission Pipeline Project

VGS developed written procedures, during this report period, related to actions to preserve project pipeline sections which are installed below ground in Williston, Essex and Colchester. The procedures are intended to specify company methods to replace oxygen in pipeline segments with nitrogen. Engineering reviewed the documents and informed VGS representatives of several deficiencies related to equipment identification, prerequisite knowledge references and method descriptions required to execute the processes. The company acknowledged the deficiencies and informed Engineering the documents will be revised to address the concerns prior to performance of the procedures.

2/4/15

2015 Vermont Gas Systems Addison Transmission Pipeline Project Activity

The company has not completed actions planned to protect and preserve the pipeline segments constructed and installed during 2014. Extreme weather conditions continued to preclude field work during this report period. (The company has filled several pipe segments with nitrogen and will complete this process on the remaining segments in Colchester and Essex when weather permits.)

Vermont Gas Systems Welding Program

VGS responded to a warning letter, previously issued to the company by the Department, which described probable violations of gas pipeline safety regulations related to pipeline welding of the ANGP project during 2014. The response contains statements of recent actions taken by the company to establish the welding processes utilized on the project were performed in accordance with applicable codes and standards. The actions included specific tests performed and documented to determine the integrity of welds produced by the aforementioned procedures. The response also describes actions the company has scheduled to execute a detailed review of existing ANGP welding records, to perform a comprehensive assessment of the company welding program and to implement welding program improvements prior to resumption of mainline construction activity (which is currently suspended). The Department Gas Engineer will monitor and review these actions to verify completion

2/11/15

Vermont Gas Systems Addison Transmission Pipeline Project

VGS developed written procedures to inject nitrogen into segments of ANGP Pipeline located in Essex, Williston and Colchester. The company has been performing these injections during this report period. The company conducted a preliminary meeting on 2/9/15 to review pipeline construction processes which are expected to be performed in conjunction with horizontal directional drilling later this month. (Current forecasts indicate weather conditions will not be suitable for these activities during the next two weeks.) Subject matter experts in quality control and pipeline construction are continuing to develop the specific written procedures related to

these activities. The company has scheduled a conference call on 2/11/15 with the Department Gas Engineer to review the status and ratification of these procedures.

2/18/15

2015 Vermont Gas Systems Addison Transmission Pipeline Project

VGS and Engineers Construction (ECI) of Williston VT met to review procedures necessary to install a segment of 12" diameter pipeline in Williston. ECI presented specific procedures to install approximately 700 feet of pipeline through a route which was made by directional drilling, under Redmond Road and an adjacent ravine, in 2014. VGS revised and presented procedures for several processes, including welding and coating application, required during the installation. This portion of the project is planned to be installed on the week of 2/23/15, if weather permits.

3/4/15

2015 Vermont Gas Systems Addison Transmission Pipeline Project Activity

The company covered pipe segments being stored in the Williston construction yard to protect the materials from the elements during the current suspension of the project's "mainline" construction. One of the five pipeline segments, constructed and installed during 2014, remain to be injected with nitrogen for preservation of those facilities (located in the most northerly 15 miles of the ANGP project). Electrical construction activities were also performed at newly constructed distribution gate stations in New Haven and Middlebury during this report period.

Vermont Gas Systems welding program

VGS submitted an assessment report which addressed the specific probable violations of gas pipeline safety regulations (related to pipeline welding of the ANGP project during 2014) cited in a warning letter issued by the Department. The report was developed by an engineering firm retained by VGS and included several recommendations for remediation of the VGS welding program to avoid reoccurrence of similar violations. The report was also accompanied with a commitment from VGS for implementation of the recommendations and stated a schedule and detailed plan for implementation will be submitted to the Department later this week. The Department Gas Engineer will monitor and review these actions to verify completion.

3/18/15

2015 Vermont Gas Systems ANGP Project Activity

The Department Gas Engineer monitored installation, via directional drilling, of a transmission pipeline segment under I-89 (north and south lanes, as well as Hurricane Ln), just south of the Williston exit. Company plans to visually inspect this short length of pipeline for damage due to pulling through the drilled tunnel did not include inspection of the first welded joint and its field-applied protective coatings. These concerns were expressed to company representatives and VGS modified the applicable inspection protocol. The "first" weld joint has not yet been inspected, at the time of this report; however coating damage on the leading portion of the installation is not acceptable. The company is making plans to facilitate enhanced visual

inspection via additional excavation and further pulling of the pipeline section (north to south, toward Hurricane Ln.)

3/25/15

2015 Vermont Gas Systems Addison Transmission Pipeline Project construction

Engineers Construction Inc. pulled approximately 800 feet of steel transmission pipeline under I-89, just south of the Williston exit. The VGS inspection process describes a procedure to visually inspect the leading 15' length of the pipeline segment to determine condition of the remaining buried facility. Inspection of the pipe's corrosion-protection coating in this area indicated excessive damage and was determined to be unacceptable. Subsequent to the PSD Gas Engineer expressing concern related to inadequate criteria to inspect and assess pipeline condition following installation by horizontal drilling, the company agreed to also include assessment of the protective coatings associated with a welded joint of a pipeline which has been pulled through a bored hole. The "first" weld joint was inspected, during this report period, and coating damage was also found at that location. The company is currently assessing this damage and developing a plan to access additional sample areas for further inspection and assessment.

3/31/15

2015 Vermont Gas Systems Addison Transmission Pipeline Project Construction

VGS has not yet announced the selection of contractor(s) to continue mainline construction of the Addison Natural Gas Pipeline project, Phase I. The materials for the project remain in storage yards in Swanton and Williston. The company recently informed the Department Gas Engineer that pipeline construction activities may begin in June or July. Construction activity at the site of the pipeline crossing under I-89, in Williston, continued this report period. Engineers Construction Inc. removed approximately 130 feet of pipe which exhibited unacceptable damage to its corrosion protective coating, caused during installation. VGS has not completed revisions to its inspection protocols and criteria for pipe condition following installation by horizontal directional drilling (HDD). The installation plans for Phase I of the ANGP include 15 segments to be installed by HDD. Three HDD sites have been drilled; pipe installation at one of these (under the Winooski River and Rt. 117) has been completed.

4/8/15

2015 Vermont Gas Systems Addison Transmission Pipeline Project construction

Construction activity at the site of the pipeline crossing under I-89 in Williston was suspended this report period to allow VGS and Engineers Construction Inc. to analyze pipe exhibiting damage caused during installation. VGS representatives have committed to regularly inform the Department Gas Engineer of details of a root-cause analysis and action plan(s) to address the topic, as they are developed. These findings and plans will also be applied to remaining 14 segments of ANGP pipeline to be installed by a horizontal directional drilling (HDD) procedure.

4/15/15

2015 Vermont Gas Systems Addison Transmission Pipeline Project Activity suspended

VGS has halted all construction activities related to Phase I of the Addition transmission project, including current pipeline installation by horizontal drilling in Williston. The company has informed the Department Gas Engineer that it is reorganizing its technical personnel and has entered an agreement with an established engineering firm to assume construction management following the suspension. The Gas Engineer will be meeting with VGS representatives later this week to discuss these topics further.

4/29/15

Status meeting, 2015 Vermont Gas Systems Addison Transmission Pipeline Project Activity

The Gas Engineer met with VGS representatives this week to discuss the company's schedule and prerequisites for the ANGP construction project. The company plans to complete the most-northerly 10.4 miles (between the existing transmission line in Colchester and the newly constructed Pressure Regulation Station in Williston) this year. A so-called "main line" contractor has not been selected to perform this construction; however the company is currently negotiating with three possible candidates which have indicated availability during the 2015 season. The company stated the project specifications, drawings, welding program, construction inspection program and quality management systems have all been recently revised and are expected to be completed in mid-May. The company representatives also reiterated plans to resume construction related to these items in July (although the company has agreed to hold off constructing a pipeline segment through the Rock Ridge Golf Course in St. George until November).

5/6/15

Vermont Gas Systems Addison Transmission Pipeline Project

The Gas Engineer met with VGS representatives this week to further discuss prerequisites for the ANGP construction project, which the company plans resume in July. VGS was informed that the Department expects the project specifications, construction procedures and quality management systems to be completed and submitted with adequate time for the Department to review prior to commencement of construction activity. The Gas Engineer also requested the company develop formats for the presentation of periodic reports to the Department during construction, including construction schedules, specific execution plans, construction inspection and testing results, well in advance of the initiation of construction activity.

5/13/15

2015 Vermont Gas Systems Addison Transmission Pipeline Project construction

The pipeline segment (approximately 800 feet long) which was installed by horizontal directional drill (HDD) under I-89 and Hurricane Lane in Williston, was completely removed during this report period. Prior to removal, the "leading" 15' length of the installation was cut out and returned to the mill, which had processed the pipe to apply corrosion-protection coatings, for analysis of those coatings and damage to the coatings which occurred during the installation. The Department has requested a copy of the analysis report for its review. Additional visual examinations had also occurred following excavation of earth surrounding two areas of the pipe

installation near Hurricane Lane. These examinations also exhibited unacceptable damage to the coatings designed for corrosion protection. VGS, the pipe coating mill and the HDD contractor believe the coating damages were caused by insufficient pipeline installation methods. A new "string" of pipe (800') is currently being prepared for installation in the same area, contingent on a revised installation execution-plan to be submitted by the HDD contractor and approved by VGS. VGS anticipates the revised installation execution-plan to include enhancements for conditioning the bored hole, an increase of the bore hole diameter, improvements related to application of drill-fluids and installation-slurry, and utilization of a sacrificial leading pipe section during the process of pulling pipe into the bored hole.

5/27/15

Vermont Gas Systems ANGP project

VGS planned and assessed four Horizontal Directional Drill (HDD) pipeline installations within the most northerly 11 mile segment of the Addison Natural Gas Pipeline project. These include so-called trenchless-technology pipeline construction sites which cross I-89 in Williston, Redmond Rd. in Williston, Rt. 2A in Essex, and a sensitive sandplain site in Colchester. Installation of a test pipe segment into the bored hole at the Redmond Rd. site was unsuccessful due to significant pipe damage caused by underground obstruction(s). It is believed the bore-path passes through a landfill site. Following consideration of the damage and several available methods to protect pipelines installed by HDD, the company has determined to abandon the bored hole and install the segment by conventional open-trench methods. VGS and its contractor continue to prepare for HDD installation at the remaining three sites.

6/1/15

Vermont Gas Systems ANGP project

Contractors, working for VGS, are making preparations to install a new 800' long pipeline segment into a hole previously bored by Horizontal Directional Drill under I-89 in Williston. Activities to enlarge and condition the hole to avoid pipe damage, similar to an earlier installation attempt at this site, are underway.

6/10/15

Vermont Gas Systems ANGP project

Contractors are continuing to prepare to install a 12" diameter pipeline segment under Route 2A in Essex, near the north terminus of Route 289 by Horizontal Directional Drill (HDD). Installation is expected to occur next week. The contractor and VGS are developing a specific execution plan for the operation, including written installation and inspection procedures. These procedures are expected to specify a test pipe segment installation (pull-through) for inspection prior to the final installation. A pipe segment of a larger diameter (larger than 12") is also expected to lead the pipe during final installation (the pipe will be pulled into and through a 24" hole bored by HDD).

VGS informed the Department Gas Engineer it expects to announce the selection of a company to install the remaining segments of the ANGP project, by conventional open-trench methods between Colchester and Williston, later this week. VGS representatives also stated that

the company will provide the Department a revised Welding program and Quality Management program for construction of the project, later this week.

6/17/15

Vermont Gas Systems ANGP project

VGS representatives informed the Department Gas Engineer that final contract negotiations with a company to install the remaining six pipeline portions of the most-northerly 11 miles of the ANGP project (in Colchester, Essex and Williston VT) are under way. VGS is also engaged in contract negotiations with a separate company to perform inspection activities during this construction. VGS plans to provide training for the contractor, related to the project design specifications, in mid-July and expects construction activity to complete the segment (now referred to as Segment One of ANGP Phase I) to occur August through October 2015. VGS has revised its Inspection Manual for the project and provided a draft to the Gas Engineer during this report period.

6/24/15

Vermont Gas Systems Addison Natural Gas Project (ANGP)

VGS continues to be engaged in contract negotiations with a company to complete construction of the most-northerly 11 miles of the ANGP (in Colchester, Essex and Williston VT). VGS has selected and completed contract negotiations with McDaniel Technical Services, Inc. to perform inspection activities during the 2015 construction season. VGS representatives reiterated plans to mobilize these contractors and equipment in mid-July and begin pipeline construction early in August.

7/1/15

Vermont Gas Systems Addison Natural Gas Project "Mainline" Construction

VGS has not yet completed a contract agreement with a company to complete the most-northerly 11 miles of the ANGP project (by open-trench methods) in Colchester, Essex and Williston VT.

Vermont Gas Systems Addison Natural Gas Project "HDD" Construction

Engineer's Construction Inc., the company retained to perform horizontal directional drill installations of the project, installed a 12" diameter pipeline segment under RT2A in Essex, near the north terminus of RT289. The leading pipeline segment, which was pulled through the bored hole, sustained damage to its corrosion protective coatings. An additional length of pipe is currently being welded to the trailing-end. This will allow additional pipe to be pulled through, exposed on the leading-end of the bored hole and inspected.

Vermont Gas Systems Welding Program and Quality Assurance Plan

VGS provided the Gas Engineer a revised welding program to address specific probable violations of gas pipeline safety regulations which were cited in a warning letter issued by the Department. The revised program includes processes to develop, test and qualify welding procedures and to test and qualify individual welders which utilize those procedures. The program is applicable to the Addison Natural Gas Project and any other welding performed

during the construction, maintenance or repair of steel pipeline facilities operated by the company. The company also provided an initial Quality Assurance plan to the Department. The Gas Engineer is currently reviewing these programs.

7/8/15

Vermont Gas Systems Addison Natural Gas Project (ANGP) "Mainline" Construction

VGS has made an agreement with Michels Corporation to complete the most-northerly 11 miles of the ANGP (by open-trench methods) in Colchester, Essex and Williston VT. The final contract for this has not been completed. A comprehensive set of construction specifications, installation procedures and project requirements have not been completed. VGS representatives plan to update the Department Commissioner, PA and Engineering on construction schedules later this week.

Vermont Gas Systems ANGP project, HDD construction

Engineer's Construction Inc., continued to make provisions to pull the 12" diameter pipeline segment installed under Route 2A (in Essex near the north terminus of Route 289) further through the bored hole. The current leading pipeline segment-length, which was pulled completely through the bored hole during installation and exposed, sustained damage to its corrosion protective coatings. Similar results have been observed at two other sites of the ANGP where pipe installations by horizontal directional drilling have been attempted. The Gas Engineer reiterated concern to VGS that the company has not established adequate construction methods and inspection techniques to reliably ensure appropriate condition of all pipe installed by HDD, including segments which will not be visually assessed. This concern is amplified because the design of ANGP Phase I includes approximately 16 additional HDD installations.

Vermont Gas Systems Welding Program and Quality Assurance Plan

The Gas Engineer offered VGS a preliminary assessment of the company's revised written welding program which was recently provided to address probable violations of gas pipeline safety regulations. The Gas Engineer informed VGS of program areas which appear to require further clarification, including scope of the document, document organization, references to other documents related to welding and several specific processes included in the document. VGS also plans to review its revised quality assurance plan with the Gas Engineer in the near future (tentatively next week).

7/14/15

Vermont Gas Systems Welding Program and Quality Assurance Plan

The Gas Engineer continued assessments of the company's revised written welding program and quality assurance plan, and will meet VGS representatives responsible for these programs later this week. The company plans to present its status for implementation of management systems related to quality control, with particular focus on the ANGP project. Discussion regarding further revision of the welding program is also expected during this meeting.

7/22/15

Vermont Gas Systems Inc. ANGP Project

As of 7/21/15, VGS has not signed a contract document with the company it selected to construct the remaining "main line" portions of the Addison Natural Gas Pipeline project, Phase I. It is expected that two weeks may be required to mobilize the personnel and equipment and to initiate construction, following establishment of the contract.

VGS Welding Program, Quality Management System and Operator Qualification Program

The Gas Engineer continued to review Vermont Gas Systems (VGS) programs, plans and procedures which are necessary to ensure the ANGP facilities are constructed as designed and are compliant with the project's CPG and Vermont gas safety regulations. Previously, the Gas Engineer informed VGS representatives that critical elements were missing from each of the programs referenced above. These elements include adequate criteria for inspection of production-welding processes, method(s) to identify root-cause(s) of non-conforming conditions, methods to monitor the efficacy of corrective-actions, specific task training modules for construction personnel, and individual skill assessment verifications. The Gas Engineer reviewed these elements with VGS again during this report period, and VGS indicated these elements are not currently available.

7/29/15

Vermont Gas Systems Inc. ANGP Project

As of 7/21/15, VGS has not signed a contract document with the company it selected to construct the remaining "main line" portions of the Addison Natural Gas Pipeline project, Phase I. It is expected that two weeks may be required to mobilize the personnel and equipment and to initiate construction, following establishment of the contract.

VGS Welding Program, Quality Management System and Operator Qualification Program

The Gas Engineer continued to review Vermont Gas Systems (VGS) programs, plans and procedures which are necessary to ensure the ANGP facilities are constructed as designed and are compliant with the project's CPG and Vermont gas safety regulations. Previously, the Gas Engineer informed VGS representatives that critical elements were missing from each of the programs referenced above. These elements include adequate criteria for inspection of production-welding processes, method(s) to identify root-cause(s) of non-conforming conditions, methods to monitor the efficacy of corrective-actions, specific task training modules for construction personnel, and individual skill assessment verifications. The Gas Engineer reviewed these elements with VGS again during this report period, and VGS indicated these elements are not currently available.

8/12/15

2015 Vermont Gas Systems Addison Transmission Pipeline Construction

The Department utilized a contract Gas Pipeline Inspector to provide site inspections of the Vermont Gas System Inc., Addison Natural Gas Pipeline (ANGP) Project, during this report period. On site observations included the process for certifying individual welders to utilize

specific project welding procedures, horizontal drilling in preparation for pipeline installation in the sandplains of Essex and Colchester, and pipe condition assessments in Williston.

8/19/15

Vermont Gas Systems Addison Transmission Pipeline Construction

The Engineering Division performed design review and site inspections of the Vermont Gas System Inc., Addison Natural Gas Pipeline (ANGP) Project, during this report period. Significant project activity performed by contract personnel (retained by VGS to construct the pipeline facilities) included horizontal drilling for pipeline installation in the sandplains of Essex and Colchester. Preparation activity to install a pipeline segment and mainline valve near the Chittenden Solid Waste District location, Redmond Rd. Essex also occurred. Engineering met with VGS project management personnel to review the company's status to address several items of concern. These items include details related to welding, pipeline coating, overall quality control processes and individual qualification evaluation methods. The company is addressing each area with corrective actions. The Department Pipeline Safety Program staff is monitoring the schedule, implementation and effectiveness of these actions.

8/26/15

Vermont Gas Systems Addison Transmission Pipeline Project Construction

Contract personnel, retained by VGS to construct the pipeline project via conventional open trench method, has installed approximately 750 feet of pipeline near Redmond Road, Williston and approximately 2250 feet adjacent to RT 289 in Essex since beginning these activities on 8/18/15. VGS plans to complete the so-called Segment 1 this construction season. Segment 1 is 10.4 miles long (half of the segment was installed last year by a previous contractor). To complete Segment 1, approximately 20,500 feet is planned to be installed conventionally, 4,673 feet is planned to be installed by horizontal directional drill (HDD) with an additional 229 feet planned for boring under roads which the project crosses. The "new" mainline contractor is presently utilizing two crews for construction; personnel for a third crew are currently preparing to begin construction next week. VGS has retained the company which performed HDD work last year to perform the same type of activity this year. This contractor is currently drilling two areas of a sandplain in Essex/Colchester which will become a total contiguous-length of approximately 4,100 feet. The Department continued to utilize a contract Gas Pipeline Inspector for site inspections of the project, during this report period.

9/2/15

Vermont Gas Systems Addison Transmission Pipeline Project Construction

37,560 feet (approximately 7 miles) of ANGP project facilities have been installed to date. Construction personnel installed 3754 feet (approximately ¾ of a mile) last week. The mainline contractor is utilizing three crews for construction; these crews are all currently working in separate locations adjacent to Route 289. Pipeline project protesters were present at the construction site(s) this report period, however they did not inhibit project progress. The Department continued to utilize a contract Gas Pipeline Inspector for project inspections during this report period.

9/9/15

Vermont Gas Systems Addison Transmission Pipeline Project Construction

3,962 feet of gas transmission pipe were installed by open trench last week. Approximately 7.9 miles of ANGP project facilities have been installed to date. Horizontal drilling operations are continuing to prepare for installation of approximately ¾ mile under sandplains in Colchester. The company expects to complete the pipeline segment between the existing transmission line in Colchester to the newly constructed pressure reduction station in Williston by 10/1/15. The Department continued to utilize a contract Gas Pipeline Inspector for project inspections, during this report period.

9/16/15

Vermont Gas Systems Addison Transmission Pipeline Project Construction

Installation of pipeline by horizontal directional under the Colchester Sandplains began mid-day yesterday (9/15/15). This segment is half of the Sandplains installation (total will be ¾ mile long); contract crews are currently drilling the other half. Mainline construction personnel are continuing to install pipe by open trench to complete the pipeline segment between the existing transmission line in Colchester to the newly constructed pressure reduction station in Williston. VGS refers to this first project portion as "Segment One" which is 10.65 miles long. The Department continued to utilize a contract Gas Pipeline Inspector for inspections of this project, during this report period.

9/23/15

Vermont Gas Systems Addison Transmission Pipeline Project Construction

Approximately 0.43 miles of pipeline were installed under the Colchester Sandplains last week by horizontal directional drill (HDD). Contract crews are currently drilling an additional one-third mile in this area and have encountered solid rock. Other crews installed approximately 0.35 miles of pipe by conventional open-trench method last week. Approximately 9.34 miles of "Segment One" (the 10.65 mile long pipeline segment between the existing VGS transmission line in Colchester and the newly constructed pressure reduction station in Williston) have been installed. The Department continued to utilize a contract Gas Pipeline Inspector for inspections of this project, during this report period.

9/30/15

Vermont Gas Systems Addison Transmission Pipeline Project Construction

Approximately 9.75 miles of "Segment One" (between Colchester and Williston) have been installed. The segment is currently several separate sections of pipeline and will require an additional mile of pipeline construction to become contiguous. When completed, the segment could enable near-future operation of a pressure reduction station which was recently constructed on RT 2 in Williston and provide additional gas capacity to the Greater Burlington Area distribution system. (Two similar stations were also recently constructed in New Haven and in Middlebury) Contract crews continued to drill under the Colchester Sandplains during this report period. Other crews continued to install pipe by conventional open-trench method and by

drilling under RT 15 in Essex. Completion of the segment is expected in October. The Department continued to utilize a contract Gas Pipeline Inspector during this report period.

10/7/15

Construction of Vermont Gas Systems' Addison Natural Gas Pipeline (ANGP) Project

Approximately 440 feet of pipeline was installed last week. Contract crews are continuing to drill an additional one-third mile under the Colchester Sandplains. Approximately 9.83 miles of "Segment One" (the 10.65 mile long pipeline segment between the existing VGS transmission line in Colchester and the newly constructed pressure reduction station in Williston) have been installed. The Department continued to utilize a contract Gas Pipeline Inspector for inspections of this project, during this report period.

10/14/15

Vermont Gas Systems Addison Natural Gas Pipeline Project Construction

No new ANGP pipeline was installed last week. 10.2 miles of "Segment One" has been installed and is contiguous with a few exceptions. Contract crews are continuing to drill one-third mile under the Colchester Sandplains; this will also require approximately 700 feet of addition pipeline (installed by open-trench) to connect with the pipeline already installed. Several short lengths of pipeline installed during 2014 are being addressed to correct deviations from depths required by the project specifications. The Department Gas Engineer has met with VGS representatives to indicate expectations for completion of multiple items prior to Segment One gas operations. The company has committed to submitting an itemized commissioning plan for the Department's review. The Department continued to utilize a contract Gas Pipeline Inspector for inspections of the project, during this report period.

10/28/15

Vermont Gas Systems Addison Transmission Pipeline Project Construction

No new pipe was installed on the ANGP project during this report period. Contract crews are currently preparing to install pipe under the Colchester Sandplains by horizontal drilling. Completion of this, plus short lengths adjacent to it, are required to make the so-called Segment One contiguous between the existing operating transmission pipeline in Colchester and the newly-installed pressure regulation station in Williston. The Department continued to utilize a contract Gas Pipeline Inspector for inspections.

11/4/15

Vermont Gas Systems Addison Natural Gas Pipeline Project Construction

No new pipe was installed on the ANGP project during this report period. A contract crew is continuing to horizontal drill an 1800 long hole under the Colchester Sandplains. The bore is currently 1400 feet long, 10-3/4inches in diameter, and believed to be presently encountering solid quartz. Further construction to complete the so-called Segment One (10.7 miles between Colchester and Williston) cannot proceed until installation at this site is completed, estimated to be approximately in two weeks. VGS laid off the majority of inspection personnel related to this project and the Main-Line contractor has removed its construction work force from Vermont,

retaining a skeleton crew to perform a partial pipeline pressure test later this week. The Department continued to utilize a contract Gas Pipeline Inspector for inspections of this project.

Vermont Gas Systems Addison Transmission Pipeline Project Operation
Vermont Gas Systems intends to operate Segment One and the newly installed pressure regulation station in Williston this heating season. The Gas Engineer has provided VGS representatives with specific expectations, including testing, analysis and appropriate actions required to assure fitness-of-service prior to gas operations of the segment. The company has begun to submit written plans to execute these requirements to the Department; however a minority of complete plans and assurance documents have been received at this time. Consequently, the company is planning to submit each plan in a sequence similar to the activities scheduled to perform the actions. The Gas Engineer has informed the company that the Department requires these plans and documents to be submitted with adequate lead time for review prior to the execution of each. The Gas Engineer is maintaining regular and direct contact with the company to provide the status of the Department's review and acceptance of each parameter

11/11/15
Vermont Gas Systems Addison Transmission Pipeline Project Construction
No new pipe was installed on the ANGP project during this report period. Horizontal drilling is continuing at the Colchester Sandplains. A 9 mile segment, between the Sandplains and the newly constructed gate station in Williston, was successfully pressure tested on Saturday. The Department utilized a contract Gas Pipeline Inspector for inspections of this project.

ANGP Trench Breaker Locations As-Built 2014 (Segment 1)

NOTE: The following approximate stations are the minimum locations for both sand and bentonite trench breakers for Segment 1 (As Built 2014) of the Addison Natural Gas Project. This list was created using information from details #2 and #5 on drawing ANGP-T-G-015 Rev. 1 from the Plan Set titled "Addison Natural Gas Project Transmission Mainline" dated 04-02-15. The Construction Management Team/Inspectors should review actual field conditions and direct the Contractor to install additional trench breakers as necessary to supplement the listed areas.

LEGEND:

	Sand Trench Breaker
	Bentonite Trench Breaker

"Theoretical Station"	Type	As-Built Station	As-Built Type	Comments
NONE	N/A	129+15	SAND	
NONE	N/A	132+62	SAND	
NONE	N/A	144+15	SAND	
NONE	N/A	147+22	SAND	
NONE	N/A	150+10	SAND	
187+75	BENTONITE	NONE	N/A	
188+50	BENTONITE	188+78	BENTONITE	
NONE	N/A	189+14	SAND	
NONE	N/A	190+10	SAND	
190+55	BENTONITE	190+53	BENTONITE	
193+15	BENTONITE	193+56	BENTONITE	
194+55	SAND	NONE	N/A	
195+80	SAND	NONE	N/A	
197+00	SAND	NONE	N/A	
202+17	SAND	NONE	N/A	

ANGP Trench Breaker Locations As-Built 2014 (Segment 1)

NOTE: The following approximate stations are the minimum locations for both sand and bentonite trench breakers for Segment 1 (As Built 2014) of the Addison Natural Gas Project. This list was created using information from details #2 and #5 on drawing ANGP-T-G-015 Rev. 1 from the Plan Set titled "Addison Natural Gas Project Transmission Mainline" dated 04-02-15. The Construction Management Team/Inspectors should review actual field conditions and direct the Contractor to install additional trench breakers as necessary to supplement the listed areas.

LEGEND:

	Sand Trench Breaker
	Bentonite Trench Breaker

"Theoretical Station"	Type	As-Built Station	As-Built Type	Comments
202+95	SAND	NONE	N/A	
211+90	SAND	NONE	N/A	
NONE	N/A	238+79	SAND	
328+10	SAND	327+77	SAND	
328+92	SAND	328+64	SAND	
330+65	SAND	331+22	SAND	
331+40	SAND	331+66	SAND	
343+62	SAND	NONE	N/A	
344+35	SAND	344+50	SAND	
345+08	SAND	345+02	SAND	
347+42	SAND	NONE	N/A	
348+00	SAND	347+80	SAND	
348+60	SAND	NONE	SAND	
348+80	BENTONITE	348+45	BENTONITE	
349+25	BENTONITE	349+52	BENTONITE	

ANGP Trench Breaker Locations As-Built 2014 (Segment 1)

NOTE: The following approximate stations are the minimum locations for both sand and bentonite trench breakers for Segment 1 (As Built 2014) of the Addison Natural Gas Project. This list was created using information from details #2 and #5 on drawing ANGP-T-G-015 Rev. 1 from the Plan Set titled "Addison Natural Gas Project Transmission Mainline" dated 04-02-15. The Construction Management Team/Inspectors should review actual field conditions and direct the Contractor to install additional trench breakers as necessary to supplement the listed areas.

LEGEND:

	Sand Trench Breaker
	Bentonite Trench Breaker

"Theoretical Station"	Type	As-Built Station	As-Built Type	Comments
350+72	BENTONITE	350+72	BENTONITE	
351+06	BENTONITE	351+06	BENTONITE	
367+30	BENTONITE	367+40	BENTONITE	
369+12	BENTONITE	368+72	BENTONITE	
369+47	SAND	NONE	N/A	
370+45	BENTONITE	NONE	N/A	
371+10	BENTONITE	NONE	N/A	
374+22	SAND	NONE	N/A	
375+05	SAND	NONE	N/A	
380+45	SAND	NONE	N/A	
381+40	SAND	NONE	N/A	
380+75	BENTONITE	380+80	BENTONITE	
382+10	BENTONITE	NONE	N/A	
382+60	BENTONITE	NONE	N/A	
384+00	BENTONITE	NONE	N/A	

ANGP Trench Breaker Locations As-Built 2014 (Segment 1)

NOTE: The following approximate stations are the minimum locations for both sand and bentonite trench breakers for Segment 1 (As Built 2014) of the Addison Natural Gas Project. This list was created using information from details #2 and #5 on drawing ANGP-T-G-015 Rev. 1 from the Plan Set titled "Addison Natural Gas Project Transmission Mainline" dated 04-02-15. The Construction Management Team/Inspectors should review actual field conditions and direct the Contractor to install additional trench breakers as necessary to supplement the listed areas.

LEGEND:

	Sand Trench Breaker
	Bentonite Trench Breaker

"Theoretical Station"	Type	As-Built Station	As-Built Type	Comments
384+60	BENTONITE	NONE	N/A	
385+00	BENTONITE	386+12	BENTONITE	
401+49	SAND	NONE	N/A	
403+00	SAND	NONE	N/A	
404+93	SAND	NONE	N/A	
406+42	SAND	NONE	N/A	
407+96	SAND	NONE	N/A	
409+48	SAND	NONE	N/A	
411+00	SAND	NONE	N/A	
429+35	BENTONITE	429+30	BENTONITE	
429+05	BENTONITE	429+43	BENTONITE	
429+50	SAND	NONE	N/A	
430+30	SAND	NONE	N/A	
433+50	SAND	433+53	SAND	
435+00	SAND	NONE	N/A	

ANGP Trench Breaker Locations As-Built 2014 (Segment 1)

NOTE: The following approximate stations are the minimum locations for both sand and bentonite trench breakers for Segment 1 (As Built 2014) of the Addison Natural Gas Project. This list was created using information from details #2 and #5 on drawing ANGP-T-G-015 Rev. 1 from the Plan Set titled "Addison Natural Gas Project Transmission Mainline" dated 04-02-15. The Construction Management Team/Inspectors should review actual field conditions and direct the Contractor to install additional trench breakers as necessary to supplement the listed areas.

LEGEND:

	Sand Trench Breaker
	Bentonite Trench Breaker

"Theoretical Station"	Type	As-Built Station	As-Built Type	Comments
436+90	BENTONITE	436+70	BENTONITE	
NONE	N/A	437+00	BENTONITE	
437+20	BENTONITE	437+19	BENTONITE	
440+50	BENTONITE	440+22	BENTONITE	
440+70	BENTONITE	441+10	BENTONITE	
448+40	BENTONITE	447+75	BENTONITE	
449+30	BENTONITE	449+09	BENTONITE	
459+50	BENTONITE	NONE	N/A	
460+15	BENTONITE	460+09	BENTONITE	
466+05	BENTONITE	466+00	BENTONITE	
466+55	BENTONITE	466+50	BENTONITE	
468+70	BENTONITE	468+62	BENTONITE	
469+30	BENTONITE	469+35	BENTONITE	
506+45	BENTONITE	NONE	N/A	
507+30	BENTONITE	NONE	N/A	

ANGP Trench Breaker Locations As-Built 2014 (Segment 1)

NOTE: The following approximate stations are the minimum locations for both sand and bentonite trench breakers for Segment 1 (As Built 2014) of the Addison Natural Gas Project. This list was created using information from details #2 and #5 on drawing ANGP-T-G-015 Rev. 1 from the Plan Set titled "Addison Natural Gas Project Transmission Mainline" dated 04-02-15. The Construction Management Team/Inspectors should review actual field conditions and direct the Contractor to install additional trench breakers as necessary to supplement the listed areas.

LEGEND:

	Sand Trench Breaker
	Bentonite Trench Breaker

"Theoretical Station"	Type	As-Built Station	As-Built Type	Comments
510+25	BENTONITE	509+90	BENTONITE	
511+80	BENTONITE	NONE	N/A	
514+70	BENTONITE	514+89	BENTONITE	
515+50	BENTONITE	515+45	BENTONITE	
540+35	BENTONITE	540+43	BENTONITE	
540+65	BENTONITE	537+60 (STA EQN.)	BENTONITE	
546+30	BENTONITE	546+09	BENTONITE	
547+35	BENTONITE	547+62	BENTONITE	
548+00	BENTONITE	NONE	N/A	
NONE	N/A	549+68	Unk.*	need to confirm with survey TRBKR type
551+00	BENTONITE	NONE	N/A	
552+60	BENTONITE	553+30	Unk.*	need to confirm with survey TRBKR type