

SHIELDWIRE	
3/8" EHS STEEL 7-STRAND	
STR #	DESIGN TENSION (R.S.)
CENTER SUB TO 3	3000# @ 675' R.S.
3 TO 4	4922# @ 816' R.S.
4 TO 4A	3351# @ 480' R.S.
4A TO 6	3323# @ 480' R.S.
6 TO 9	4064# @ 733' R.S.
9 TO 12	4883# @ 760' R.S.

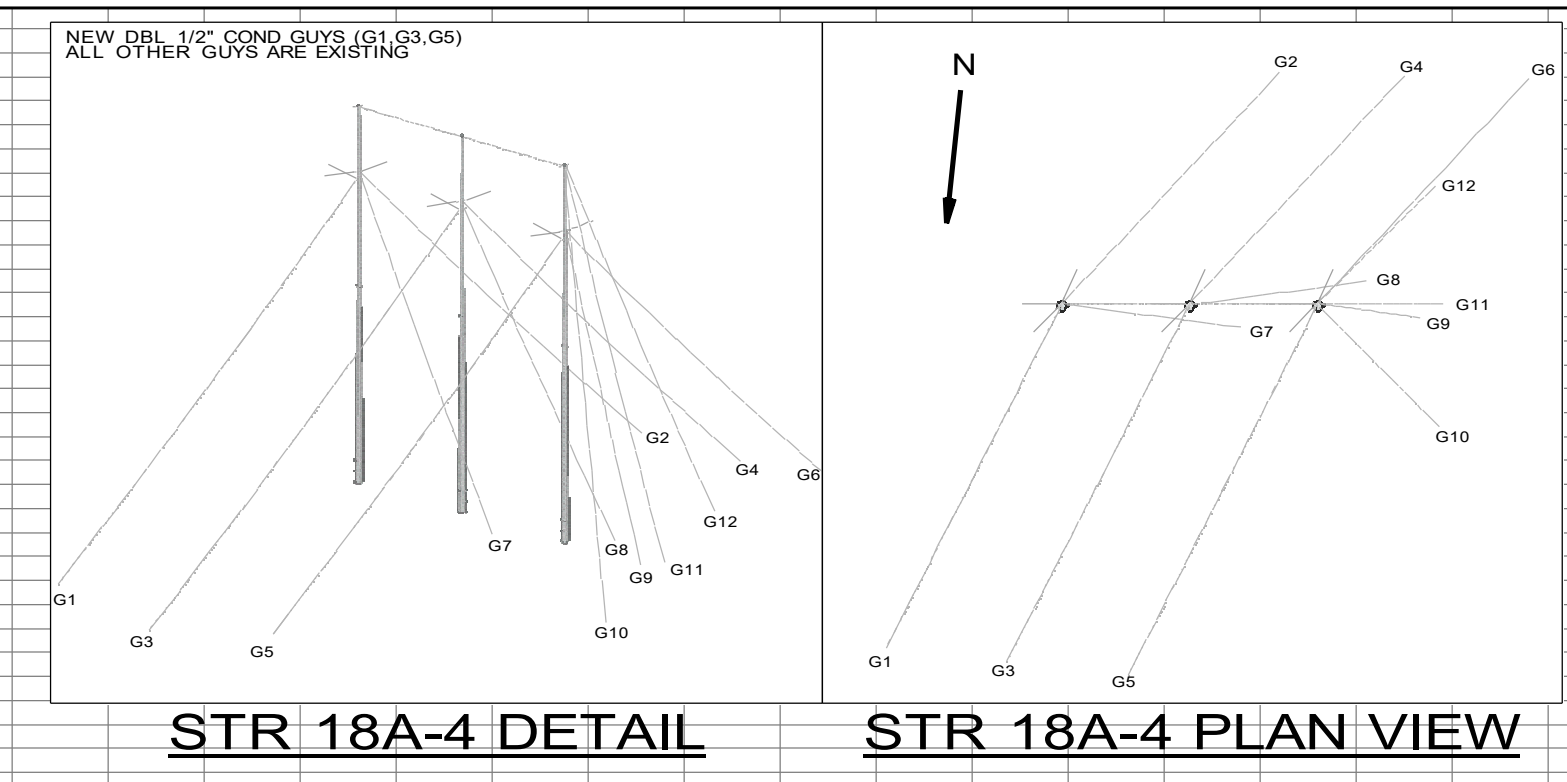
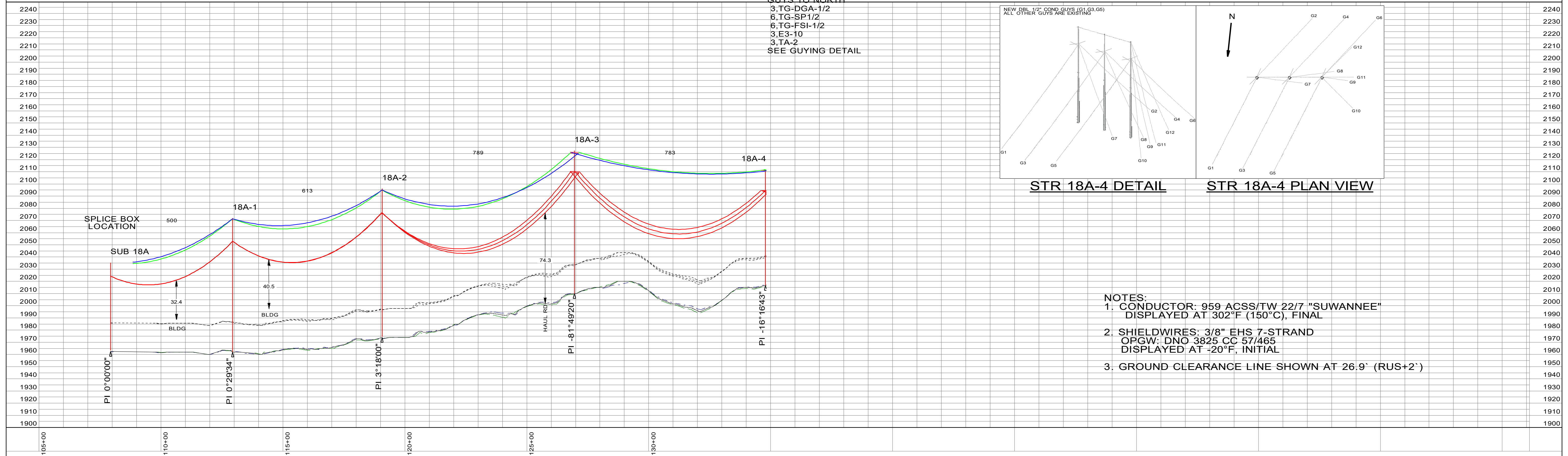
SHIELDWIRE	
OPGW: DNO-3825 CC-57-465	
STR #	DESIGN TENSION (R.S.)
CENTER SUB TO 3	3000# @ 657' R.S.
3 TO 4	5195# @ 747' R.S.
4 TO 4A	3958# @ 480' R.S.
4A TO 6	3924# @ 480' R.S.
6 TO 9	4702# @ 730' R.S.
9 TO 12	5102# @ 900' R.S.
12 TO 15	4535# @ 479' R.S.
15 TO 16	3000# @ 355' R.S.

NOTE:  
ALL TENSIONS @ NESV HVY, 0°F, .5" ICE, 4PSF  
WIND ALL PHASE CONDUCTORS DISPLAYED @ 302°F,  
FINAL SHIELD WIRE DISPLAYED @ -20°F, INITIAL

230KV CONDUCTOR	
CONDUCTOR: 959.6 ACSS/TW 22/7 "SUWANNEE"	
STR #	DESIGN TENSION (R.S.)
CENTER SUB TO 3	6000# @ 666' R.S.
3 TO 4	6000# @ 781' R.S.
4 TO 4A	8183# @ 480' R.S.
4A TO 6	8170# @ 480' R.S.
6 TO 9	9285# @ 732' R.S.
9 TO 11	9745# @ 832' R.S.
11 TO 12	9630# @ 832' R.S.

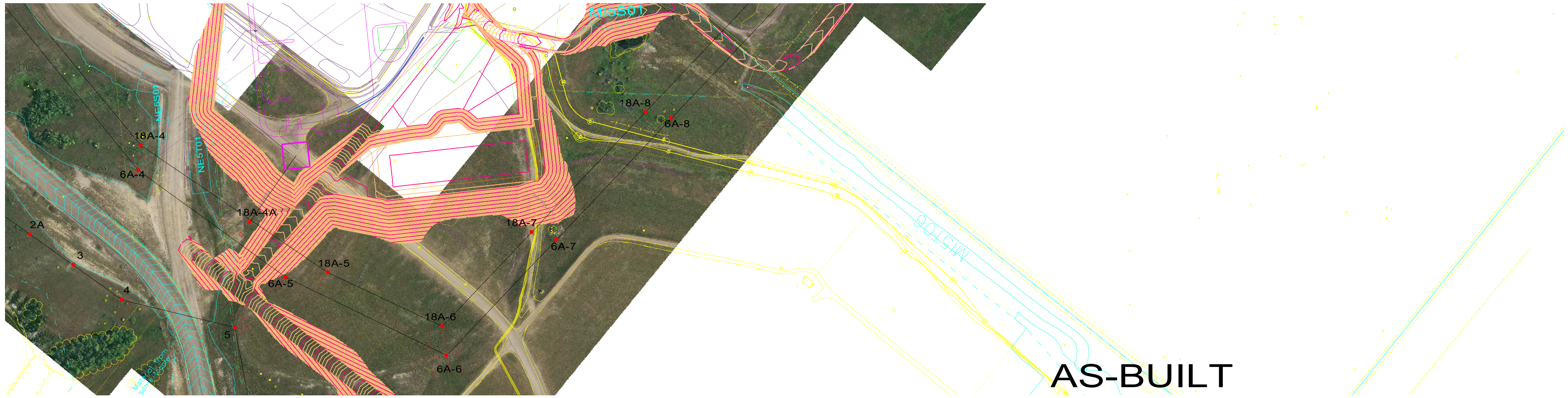
# AS-BUILT

- SUB 18A  
STA=107+93.67  
CENTER SUB  
1, TM-OPGW-230-DE  
1, TM-OPGW-230-SB  
1, GC-141A-02(GND CLAMP)  
SPlice BOX LOC.
- 18A-1  
STA=112+93.97  
B TOWER  
110'  
1, TM-OPGW-S-1L
- 18A-2  
STA=119+06.52  
TST-230-S-H-140.0-21176B  
(2) 140-H2  
(2) 8GR  
1, TM-OPGW-S-1S
- 18A-3  
STA=126+95.40  
TSD-230-S-DE90-135.0-21176B  
(3) 135-H7  
(12) TG-AFP3/4, 2 X TG-PP3/4  
(12) TA-2 @ 5K FT\*LBS  
(12) E3-10  
(3) 8GR  
2, TM-OPGW-230-DE
- 18A-4  
STA=134+78.67  
TSD-230-S-DE90-110.0-21176B  
(3) 110-H5  
(15) TG-AFP3/4, 2 X TG-PP3/4  
(15) TA-2 @ 5K FT\*LBS  
(12) E3-10  
(3) 8GR  
3, TM-959.6-230-DE  
1, TM-OHGW-230-DE  
2, TM-OPGW-230-DE  
GUYS TO NORTH  
3, TG-DGA-1/2  
6, TG-SP1/2  
6, TG-FSI-1/2  
3, E3-10  
3, TA-2  
SEE GUYING DETAIL



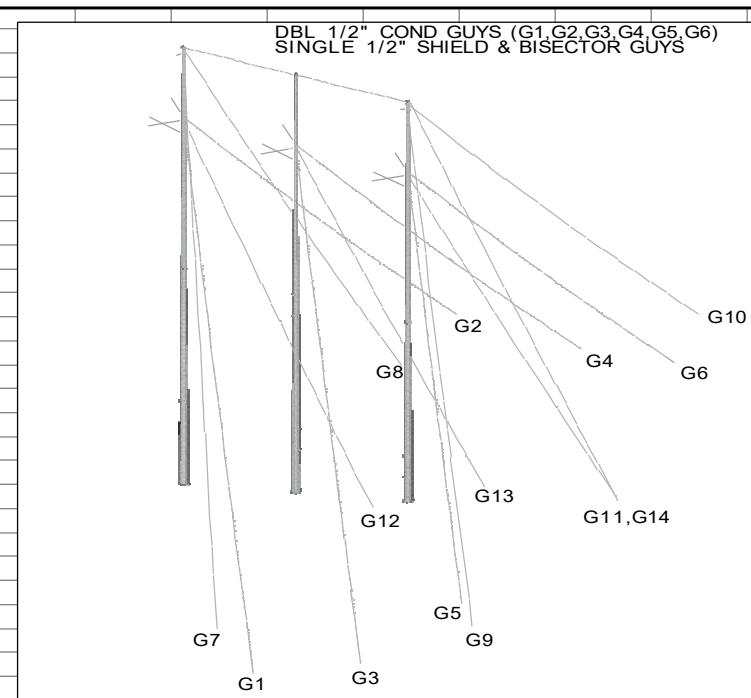
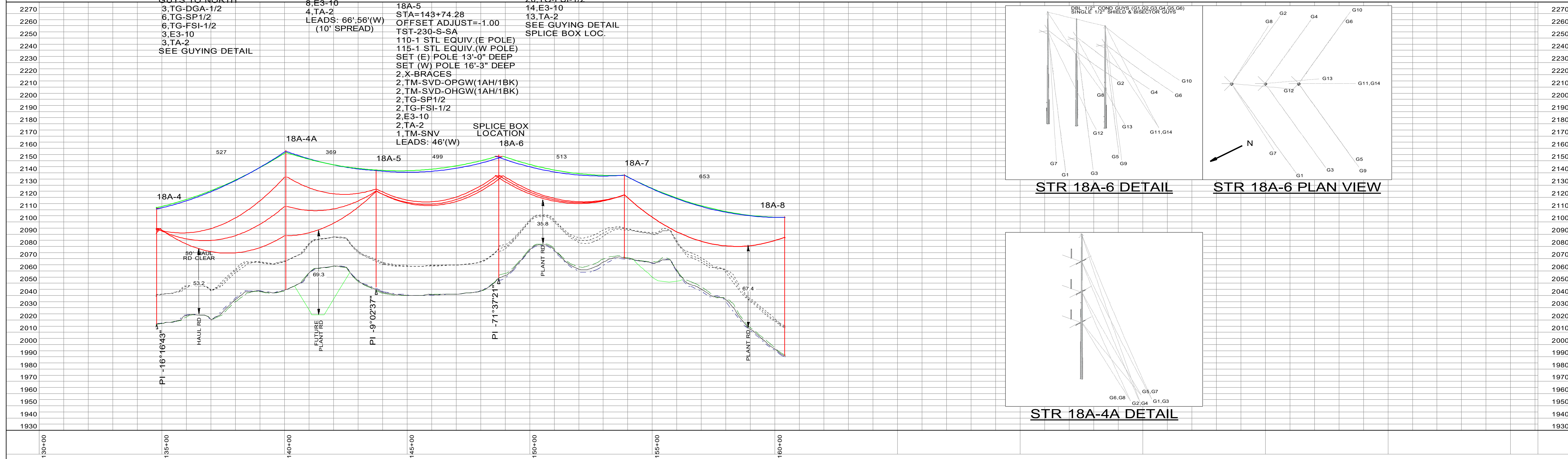
- NOTES:
- CONDUCTOR: 959 ACSS/TW 22/7 "SUWANNEE" DISPLAYED AT 302°F (150°C), FINAL
  - SHIELDWIRES: 3/8" EHS 7-STRAND OPGW: DNO 3825 CC 57/465 DISPLAYED AT -20°F, INITIAL
  - GROUND CLEARANCE LINE SHOWN AT 26.9' (RUS+2')

NO.	DATE	REVISIONS	BY	PROJECT #	R22.12030	DRAWN BY:	CMA	HTRON	200.0 FT. HORIZ. SCALE 40.0 FT. VERT. SCALE DATE: JULY 2023	FROM: CENTER TO: SQ BUTTE STR NO. SUB TO STR NO. 4	230KV TRANS. LINE 018A MPC ASSET:	MINNKOTA POWER COOPERATIVE, INC. GRAND FORKS, N. DAK. SHEET 1 OF 5
0	01/05/2026	AS-BUILT	CMA	WO #	CHECKED BY:	MPE						
					APPROVED:	CMA						

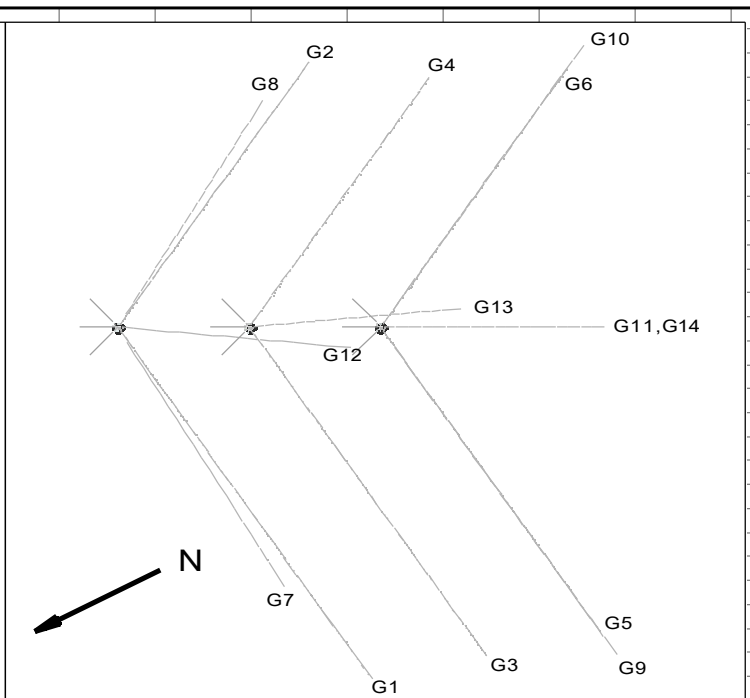


**AS-BUILT**

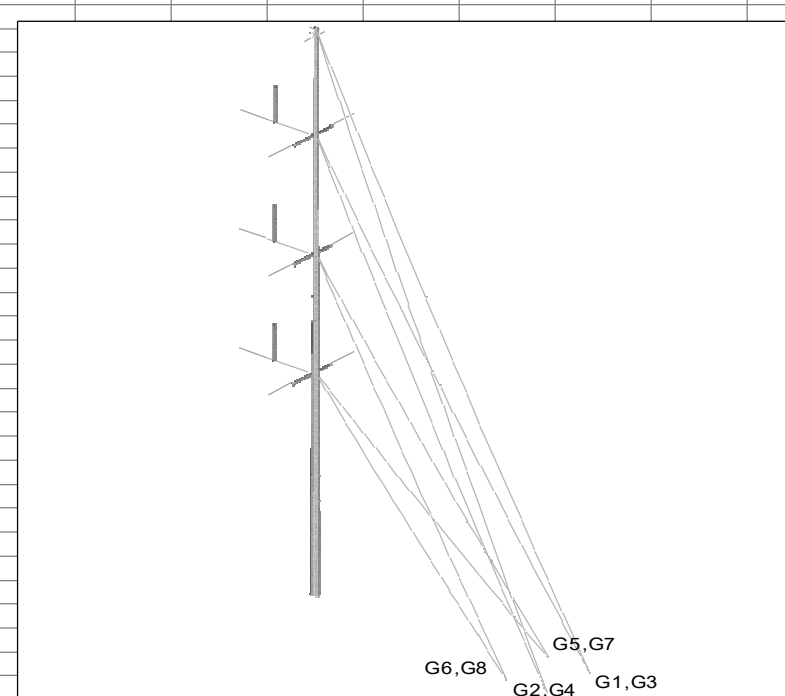
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|---|---|---|---|--|
| <p><b>18A-4</b><br/>                 STA=134+78.67<br/>                 TSD-230-S-DE90-110.0-21176B<br/>                 (3) 110-H5<br/>                 (15) TG-AFP3/4, 2 X TG-PP3/4<br/>                 (15) TA-2 @ 5K FT*LBS<br/>                 (12) E3-10<br/>                 (3) 8GR<br/>                 3, TM-959.6-230-DE<br/>                 1, TM-OHGW-230-DE<br/>                 2, TM-OPGW-230-DE<br/>                 GUYS TO NORTH<br/>                 3, TG-DGA-1/2<br/>                 6, TG-SP1/2<br/>                 6, TG-FSI-1/2<br/>                 3, E3-10<br/>                 3, TA-2<br/>                 SEE GUYING DETAIL</p> | <p><b>18A-4A</b><br/>                 STA=140+05.74<br/>                 OFFSET ADJUST=8.00<br/>                 TST-230-S-SWITCH<br/>                 130-H1 STL EQUIV.<br/>                 SET POLE 16'-0" DEEP<br/>                 1, TM-SVD-OPGW(BK)<br/>                 1, TM-SVD-OHGW(BK)<br/>                 4, TG-DGA-1/2<br/>                 8, TG-SP1/2<br/>                 8, TG-FSI-1/2<br/>                 8, E3-10<br/>                 4, TA-2<br/>                 LEADS: 66'-56"(W)<br/>                 (10' SPREAD)</p> | <p><b>18A-6</b><br/>                 STA=148+73.52<br/>                 TSD-230-S-DE<br/>                 120-H2 STL EQUIV.(NE POLE)<br/>                 115-H2 STL EQUIV.(M POLE)<br/>                 110-H2 STL EQUIV.(SW POLE)<br/>                 SET (NE) POLE 16'-6" DEEP<br/>                 SET (M) POLE 14'-6" DEEP<br/>                 SET (SW) POLE 14'-6" DEEP<br/>                 1, TM-OPGW-230-SB<br/>                 20, TG-SP1/2<br/>                 20, TG-FSI-1/2<br/>                 14, E3-10<br/>                 13, TA-2<br/>                 SEE GUYING DETAIL<br/>                 SPLICE BOX LOC.</p> | <p><b>18A-7</b><br/>                 STA=153+86.51<br/>                 TST-230-S-H<br/>                 (2)80-1 STL EQUIV.<br/>                 SET (N) POLE 11'-0" DEEP<br/>                 SET (S) POLE 11'-9" DEEP<br/>                 2, TM-SVD-OPGW(1AH/1BK)<br/>                 2, TM-SVD-OHGW(1AH/1BK)</p> | <p><b>18A-8</b><br/>                 STA=160+39.28<br/>                 TST-230-S-H<br/>                 (2)130-H1 STL EQUIV.<br/>                 SET (N) POLE 15'-6" DEEP<br/>                 SET (S) POLE 17'-0" DEEP<br/>                 2, X-BRACES</p> |
|---|---|---|---|--|



**STR 18A-6 DETAIL**



**STR 18A-6 PLAN VIEW**

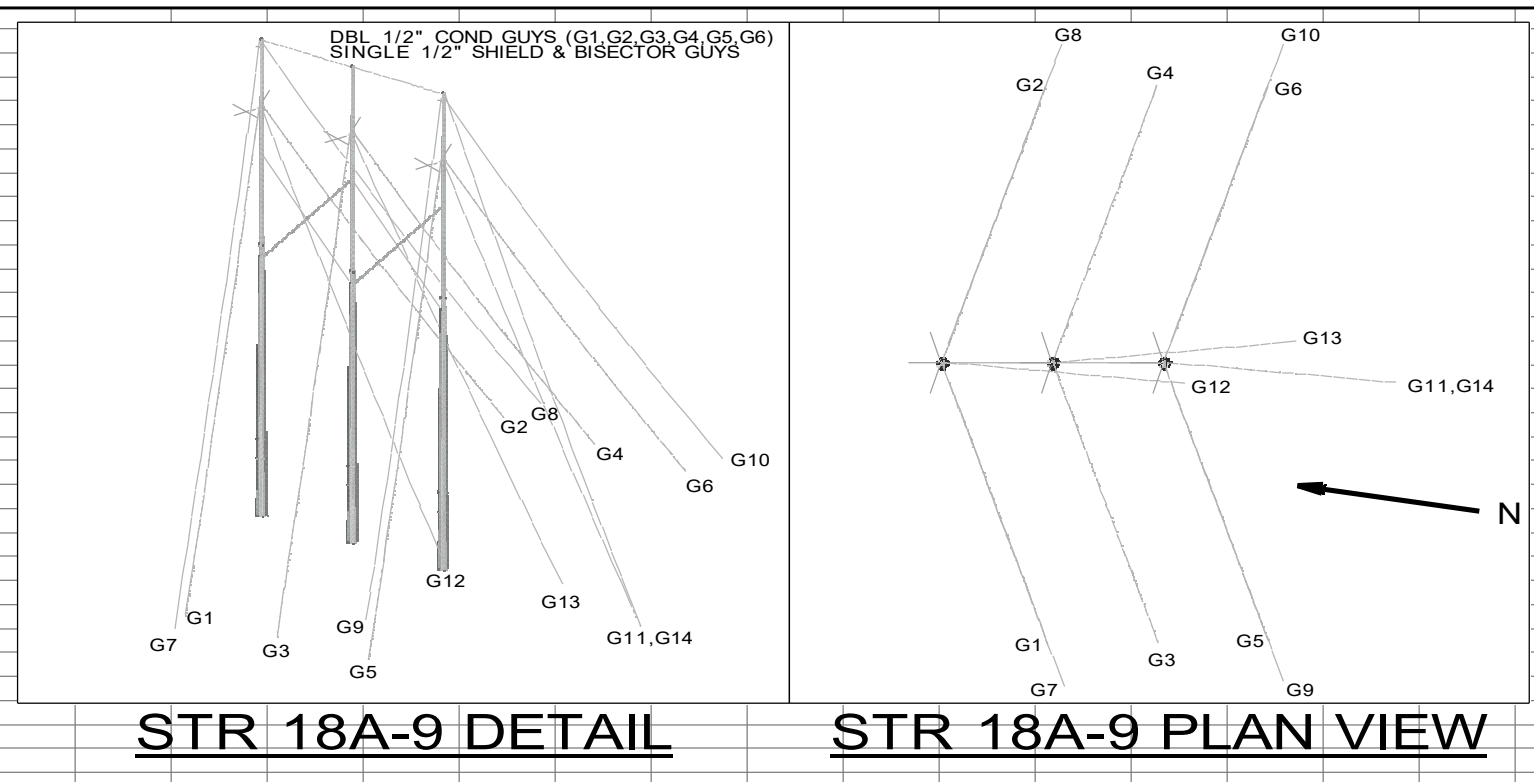
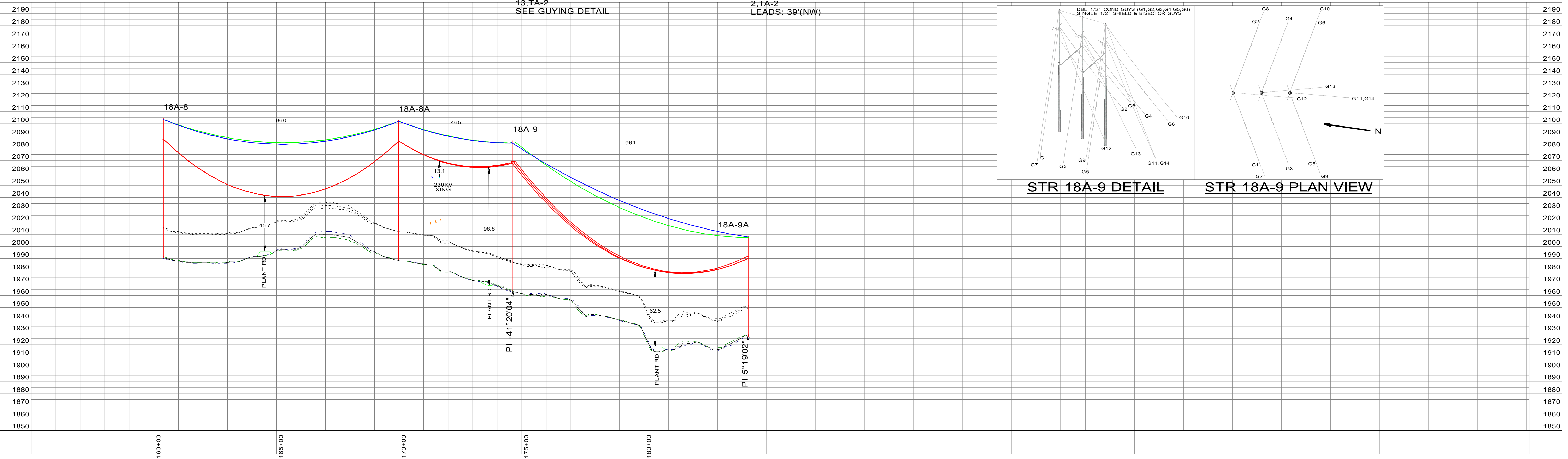


**STR 18A-4A DETAIL**

NO.	DATE	REVISIONS	BY	PROJECT #	R22.12030	DRAWN BY:	CMA		200.0 FT. HORIZ. SCALE 40.0 FT. VERT. SCALE	FROM: CENTER TO: SQ BUTTE	230KV TRANS. LINE 018A	MINNKOTA POWER COOPERATIVE, INC. GRAND FORKS, N. DAK.	
0	01/05/2026	AS-BUILT	CMA	WO #		CHECKED BY:	MPE		DATE:	JULY 2023	STR NO. 4 TO STR NO. 8	MPC ASSET:	SHEET 2 OF 5
						APPROVED:	CMA						



- 18A-8  
STA=160+39.28  
TST-230-S-H  
(2)130-H1 STL EQUIV.  
SET (N) POLE 15'-6" DEEP  
SET (S) POLE 17'-0" DEEP  
2,X-BRACES
- 18A-8A  
STA=169+99.28  
TST-230-S-H  
(2)130-H1 STL EQUIV.  
SET (N) POLE 15'-6" DEEP  
SET (S) POLE 15'-6" DEEP  
2,X-BRACES  
3, TM-SVD-OPGW(1AH/2BK)  
3, TM-SVD-OHGW(1AH/2BK)
- 18A-9  
STA=174+64.40  
TSD-230-S-DE  
(3)140-H3 STL EQUIV.  
SET (N) POLE 16'-6" DEEP  
SET (M) POLE 17'-0" DEEP  
SET (S) POLE 18'-3" DEEP  
X-BRACES  
20,TG-SP 1/2  
20,TG-FSI-1/2  
14,E3-10  
13,TA-2  
SEE GUYING DETAIL
- 18A-9A  
STA=184+25.29  
TST-230-S-SA  
(2)95-H1 STL EQUIV.  
SET (NW) POLE 11'-9" DEEP  
SET (SE) POLE 14'-0" DEEP  
4, TM-SVD-OPGW(2AH/2BK)  
4, TM-SVD-OHGW(2AH/2BK)  
2,TG-SP 1/2  
2,TG-FSI-1/2  
2,E3-10  
2,TA-2  
LEADS: 39'(NW)



NO.	DATE	REVISIONS	BY	PROJECT #	R22.12030	DRAWN BY:	CMA	200.0 FT. HORIZ. SCALE 40.0 FT. VERT. SCALE DATE: JULY 2023	FROM: CENTER	230KV TRANS.	MINNKOTA POWER COOPERATIVE, INC. GRAND FORKS, N. DAK. SHEET 3 OF 5
0	01/05/2026	AS-BUILT	CMA	WO #		CHECKED BY:	MPE		TO: SQ BUTTE	750V LINE	
						APPROVED:	CMA		STR NO. 8 TO STR NO. 9A	MPC ASSET:	



**AS-BUILT**

18A-9A  
 STA=184+25.29  
 TST-230-S-SA  
 (2)95-H1 STL EQUIV.  
 SET (NW) POLE 11'-9" DEEP  
 SET (SE) POLE 14'-0" DEEP  
 4, TM-SVD-OPGW(2AH/2BK)  
 4, TM-SVD-OHGW(2AH/2BK)  
 2, TG-SP1/2  
 2, TG-FSI-1/2  
 2, E3-10  
 2, TA-2  
 LEADS: 39'(NW)

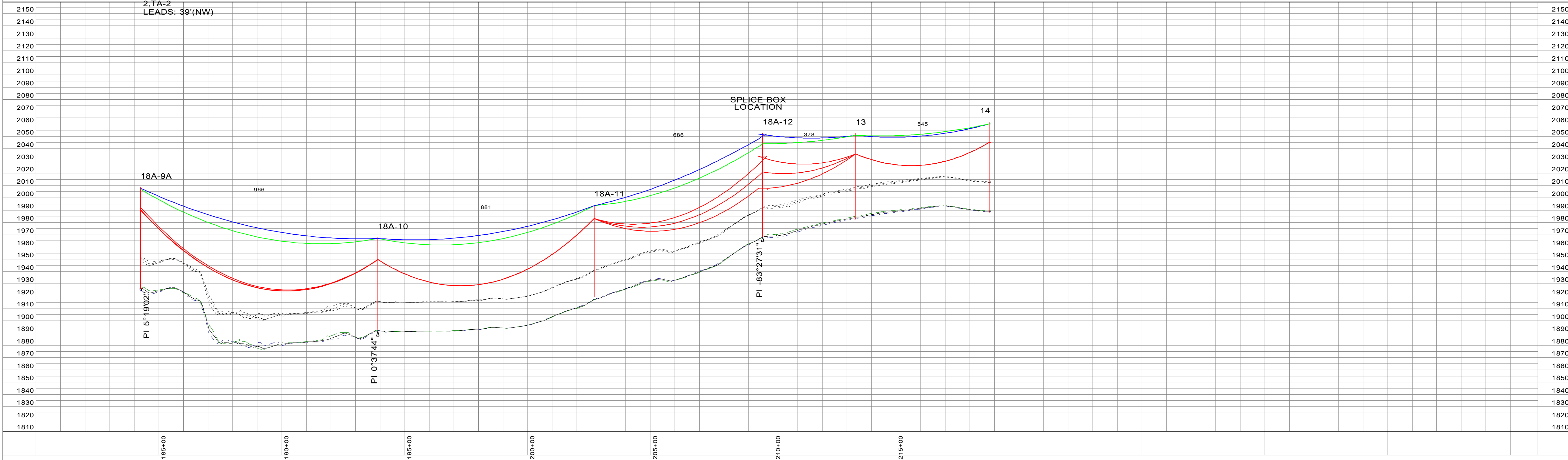
18A-10  
 STA=193+90.85  
 A TOWER  
 75'  
 1, TM-OPGW-S-1L

18A-11  
 STA=202+71.48  
 B TOWER  
 75'  
 1, TM-OPGW-S-1L  
 3, TM-SVD-OPGW(1AH/2BK)

18A-12  
 STA=209+57.19  
 D TOWER  
 85'.75'.50'  
 8 GUY & ANCHORS  
 1, TM-OPGW-DE-2L  
 1, TM-OPGW-SB-1L  
 SPLICE BOX LOC.

13  
 STA=213+35.41  
 TH-230  
 2, 80-3  
 1, TM-OPGW-S-1W  
 2, TM-SVD-OPGW(1AH/1BK)

14  
 STA=218+80.64  
 TH-230  
 2, 85-3  
 1, TM-OPGW-S-1W



NO.	DATE	REVISIONS	BY	PROJECT #	R22.12030	DRAWN BY:	CMA		200.0 FT. HORIZ. SCALE 40.0 FT. VERT. SCALE DATE: JULY 2023	FROM: <b>CENTER</b> TO: <b>SQ BUTTE</b> STR NO. 9A TO STR NO. 14	<b>230KV TRANS.</b> <b>LINE 018A</b> MPC ASSET:	MINNKOTA POWER COOPERATIVE, INC. GRAND FORKS, N. DAK. <b>SHEET 4 OF 5</b>
0	01/05/2026	AS-BUILT	CMA	WO #	CHECKED BY:	MPE						
					APPROVED:	CMA						



**AS-BUILT**

**14**  
 STA=218+80.64  
 TH-230  
 2,85-3  
 1, TM-OPGW-S-1W

**15**  
 STA=223+34.60  
 TH-235  
 3,75-3  
 1, TM-OPGW-DE-1W  
 2, TM-SVD-OPGW(1AH/1BK)

**16**  
 STA=226+74.75  
 TH-230-SWDE  
 2,70-2  
 1, TM-OPGW-DE-3W  
 1, TM-OPGW-SB-1W  
 SPLICE BOX LOC.

**17**  
 STA=230+03.74  
 TH-235  
 3,70-1  
 NO SHIELDWIRE

**SUB**  
 STA=232+35.18



NO.	DATE	REVISIONS	BY	PROJECT #	R22.12030	DRAWN BY:	CMA		200.0 FT. HORIZ. SCALE 40.0 FT. VERT. SCALE	FROM: CENTER TO: SQ BUTTE	230KV TRANS. LINE 018A	MINNKOTA POWER COOPERATIVE, INC. GRAND FORKS, N. DAK.	
0	01/05/2026	AS-BUILT	CMA	WO #		CHECKED BY:	MPE		DATE:	JULY 2023	STR NO. 14 TO STR NO. SUB	MPC ASSET:	SHEET 5 OF 5
						APPROVED:	CMA						