

# BIG STONE SOUTH - ELLENDALE 345 KV TRANSMISSION LINE

## ELLENDALE SUB - STR 189-P

PRELIMINARY SUBJECT TO FINAL REVIEW

20150828  
PRELIMINARY  
SUBJECT TO  
FINAL REVIEW



REVISIONS					
REV	DESCRIPTION	DWN	DGN	CHK	DATE
O	V22: REVISED PER FIELD REVIEW	GMD	GMD		08/28/15
N	V21: REVISED PER FIELD REVIEW	GMD	GMD		08/14/15
M	V19: REVISED PER STR REVIEW MTG	GMD	GMD		07/07/15
L	V18: REVISED PER FIELD REVIEW	GMD	GMD	DJF	05/21/15
K	V13: RCR 11, CTY RD SETBACKS	DJF	DJF	DJF	09/12/14

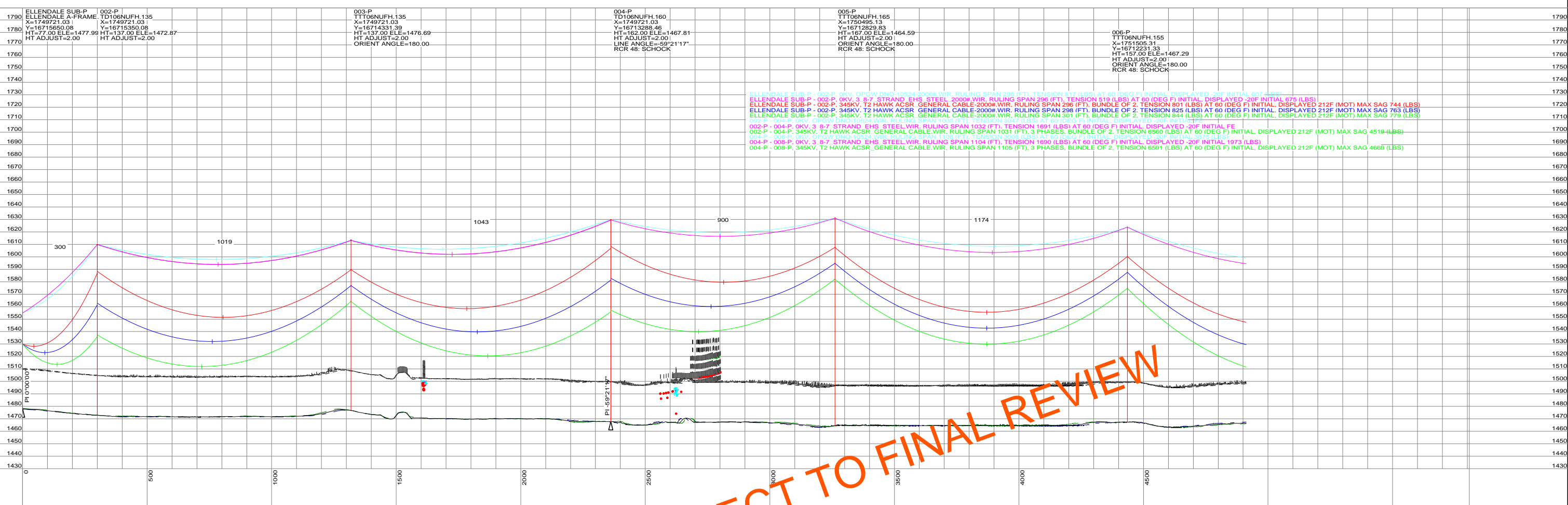
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DESIGN BY: ---	
CHECKED BY: ---	
APPROVED BY: ---	

DESIGN DATA
CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR
DESIGN TENSION: 18% @ 0 F, CREEP
SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
OPGW: 1-DN0-10524
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
MIN. GROUND CLEARANCE: 30 FT
COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE  
345 KV TRANSMISSION LINE

DWG. NO.  
BSSE-PP-101-1  
REVISION: O  
136508



ELLENDALE SUB-P - 002-P OKV, 345KV, T2 HAWK ACSR, GENERAL CABLE, 2000# WIR, RULING SPAN 296 (FT), TENSION 519 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED -20F INITIAL 675 (LBS)  
 ELLENDALE SUB-P - 002-P, 345KV, T2 HAWK ACSR, GENERAL CABLE, 2000# WIR, RULING SPAN 296 (FT), TENSION 801 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED 212F (MOT) MAX SAG 744 (LBS)  
 ELLENDALE SUB-P - 002-P, 345KV, T2 HAWK ACSR, GENERAL CABLE, 2000# WIR, RULING SPAN 298 (FT), BUNDLE OF 2, TENSION 825 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED 212F (MOT) MAX SAG 763 (LBS)  
 ELLENDALE SUB-P - 002-P, 345KV, T2 HAWK ACSR, GENERAL CABLE, 2000# WIR, RULING SPAN 301 (FT), BUNDLE OF 2, TENSION 844 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED 212F (MOT) MAX SAG 779 (LBS)  
 002-P - 004-P OKV, 345KV, T2 HAWK ACSR, GENERAL CABLE WIR, RULING SPAN 1032 (FT), TENSION 1691 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED -20F INITIAL FE  
 002-P - 004-P, 345KV, T2 HAWK ACSR, GENERAL CABLE WIR, RULING SPAN 1031 (FT), 3 PHASES, BUNDLE OF 2, TENSION 6560 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED 212F (MOT) MAX SAG 4519 (LBS)  
 004-P - 008-P OKV, 345KV, T2 HAWK ACSR, GENERAL CABLE WIR, RULING SPAN 1104 (FT), TENSION 1690 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED -20F INITIAL 1973 (LBS)  
 004-P - 008-P, 345KV, T2 HAWK ACSR, GENERAL CABLE WIR, RULING SPAN 1105 (FT), 3 PHASES, BUNDLE OF 2, TENSION 6591 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED 212F (MOT) MAX SAG 4669 (LBS)



STRS: ELLENDALE SUB-P - 006-P

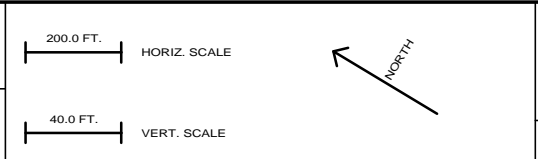
20150828  
 PRELIMINARY  
 SUBJECT TO  
 FINAL REVIEW

REVISIONS				
REV	DESCRIPTION	DWN	DGN	CHK
O	V22: REVISED PER FIELD REVIEW	GMD	GMD	08/28/15
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M	V19: REVISED PER STR REVIEW MTG	GMD	GMD	07/07/15
L	V18: REVISED PER FIELD REVIEW	GMD	GMD	DJF 05/21/15
K	V13: RCR 11, CTY RD SETBACKS	DJF	DJF	DJF 09/12/14

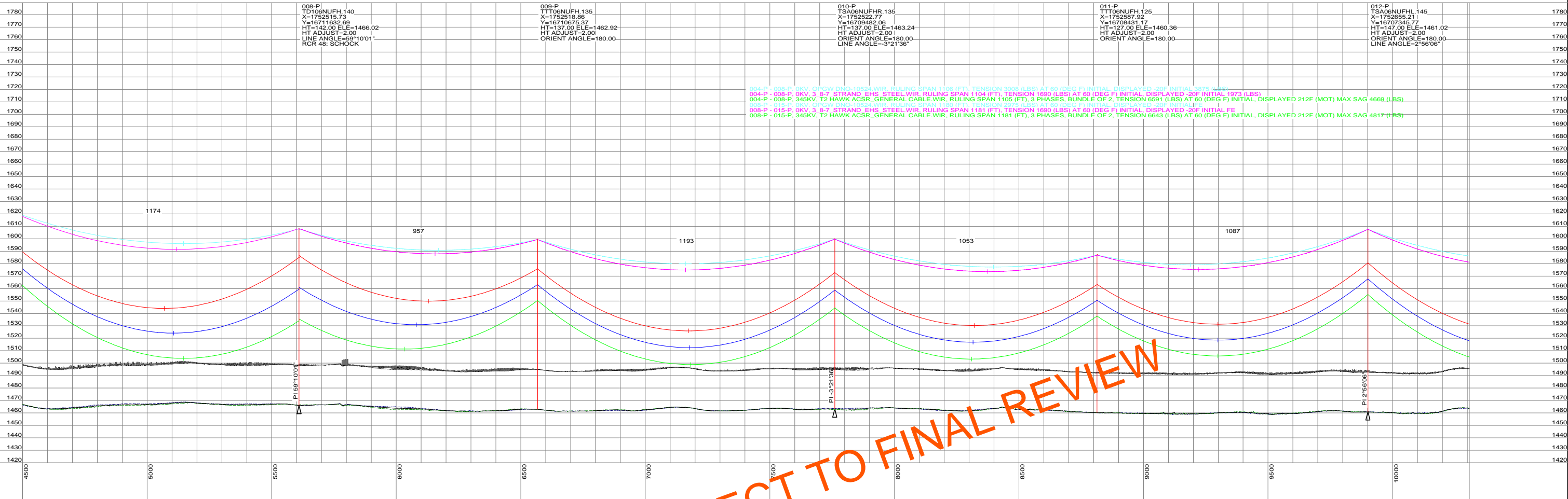
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DESIGN BY: ---		
CHECKED BY: ---		
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DESIGN DATA  
 CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR  
 DESIGN TENSION: 18% @ 0 F CREEP  
 SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 OPGW: 1-DN0-10524  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 MIN. GROUND CLEARANCE: 30 FT  
 COORDINATE SYSTEM: UTM ZONE 14N, US FT

BIG STONE SOUTH - ELLENDALE  
 345 KV TRANSMISSION LINE

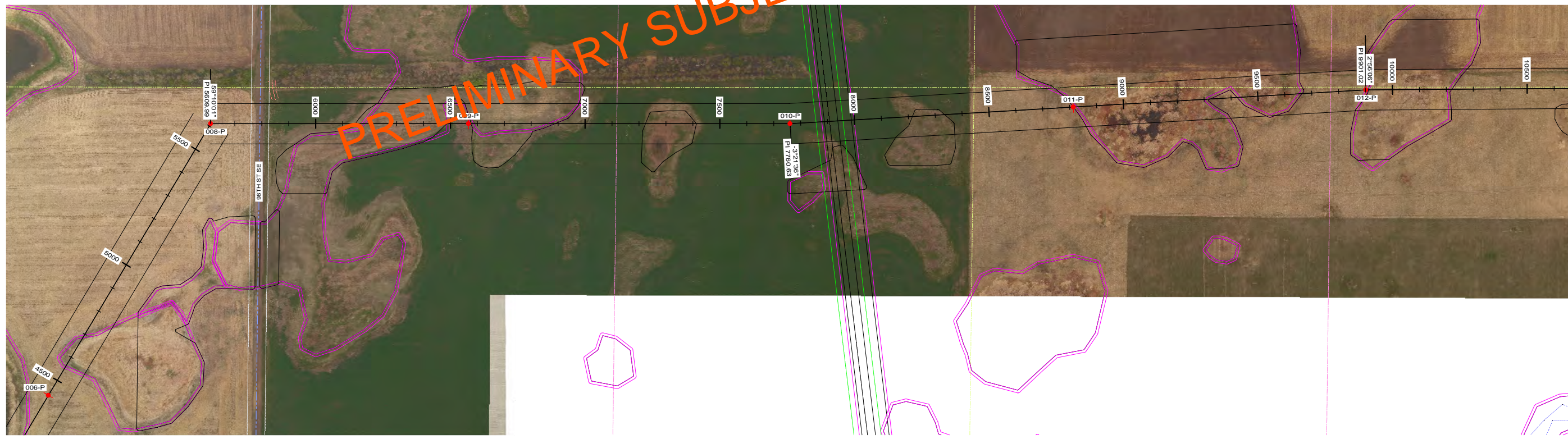


DWG. NO.  
 BSSE-PP-101-7  
 REVISION: O  
 136508



004-P - 008-P OKV, OPGW-DNS-1003, WIR. RULING SPAN 1106 (FT), TENSION 3208 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED -20F INITIAL -375 (LBS)  
 004-P - 008-P, 345KV, T2 HAWK ACSR, GENERAL CABLE WIR, RULING SPAN 1105 (FT), 3 PHASES, BUNDLE OF 2, TENSION 6591 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED 212F (MOT) MAX SAG 4669 (LBS)  
 008-P - 015-P OKV, OPGW-DNS-1003, WIR. RULING SPAN 1181 (FT), TENSION 3208 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED -20F INITIAL -375 (LBS)  
 008-P - 015-P, 345KV, T2 HAWK ACSR, GENERAL CABLE WIR, RULING SPAN 1181 (FT), 3 PHASES, BUNDLE OF 2, TENSION 6643 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED 212F (MOT) MAX SAG 4817 (LBS)

PRELIMINARY SUBJECT TO FINAL REVIEW



STRS: 008-P - 012-P

20150828  
 PRELIMINARY  
 SUBJECT TO  
 FINAL REVIEW

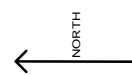
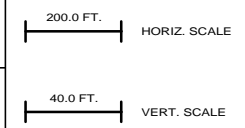


REVISIONS					APPROVALS	DATE	DESIGN DATA
O	V22: REVISED PER FIELD REVIEW	GMD	GMD			08/28/15	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F, CREEP SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP OPGW: 1-DN0-10524 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT COORDINATE SYSTEM: UTM ZONE 14N, US FT
N	V21: REVISED PER FIELD REVIEW	GMD	GMD		---	08/14/15	
M	V19: REVISED PER STR REVIEW MTG	GMD	GMD		---	07/07/15	
L	V18: REVISED PER FIELD REVIEW	GMD	GMD	DJF	---	05/21/15	
K	V13: RCR 11, CTY RD SETBACKS	DJF	DJF	DJF	---	09/12/14	
REV	DESCRIPTION	DWN	DGN	CHK	---	DATE	

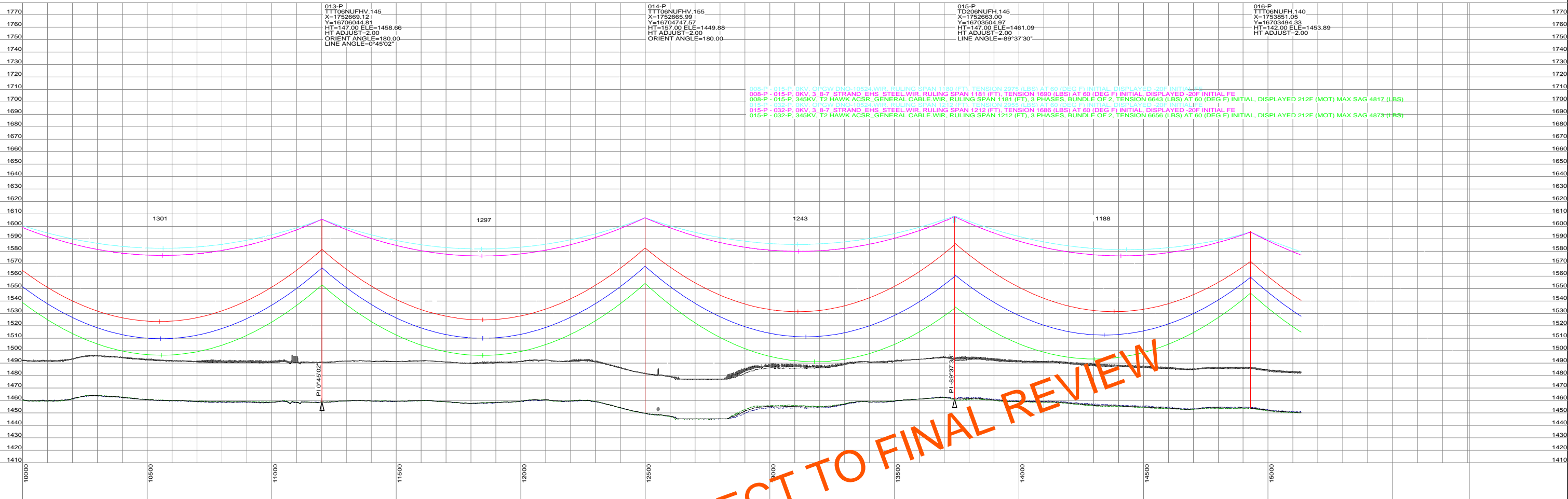
CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR  
 DESIGN TENSION: 18% @ 0 F, CREEP  
 SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 OPGW: 1-DN0-10524  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 MIN. GROUND CLEARANCE: 30 FT  
 COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE  
 345 KV TRANSMISSION LINE



DWG. NO.  
 BSSE-PP-101-8  
 REVISION: O  
 136508



STRS: 013-P - 016-P

**20150828**  
**PRELIMINARY**  
**SUBJECT TO**  
**FINAL REVIEW**

REVISIONS					APPROVALS	DATE	DESIGN DATA
O	V22: REVISED PER FIELD REVIEW	GMD	GMD			08/28/15	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F. CREEP SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP OPGW: 1-DN0-10524 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT COORDINATE SYSTEM: UTM ZONE 14N, US FT
N	V21: REVISED PER FIELD REVIEW	GMD	GMD			08/14/15	
M	V19: REVISED PER STR REVIEW MTG	GMD	GMD			07/07/15	
L	V18: REVISED PER FIELD REVIEW	GMD	GMD	DJF		05/21/15	
K	V13: RCR 11, CTY RD SETBACKS	DJF	DJF	DJF		09/12/14	
REV	DESCRIPTION	DWN	DGN	CHK		DATE	APPROVED BY: ---

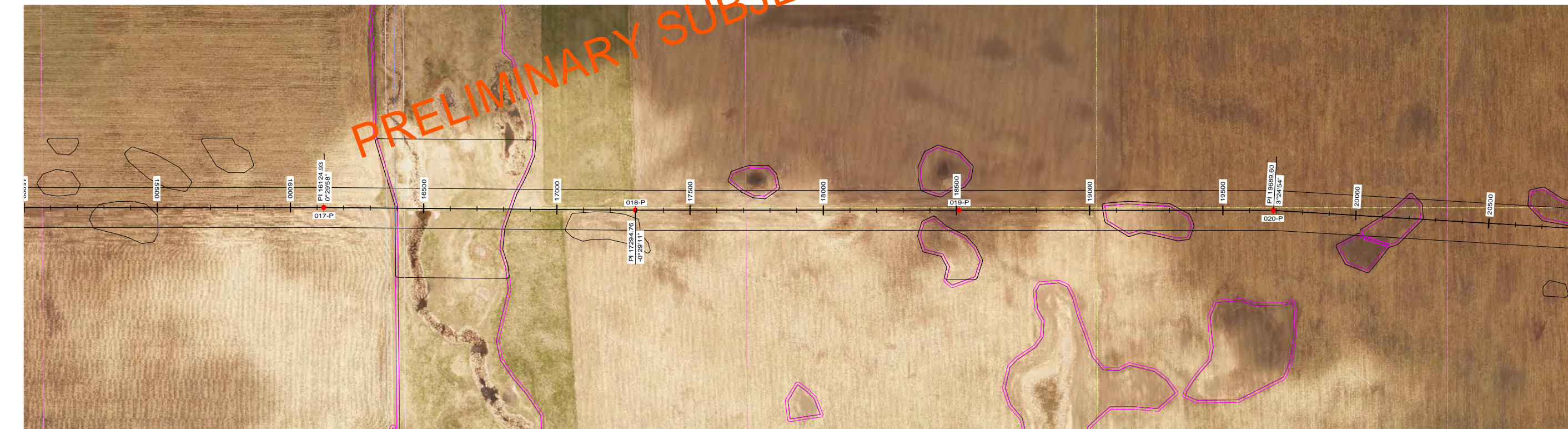
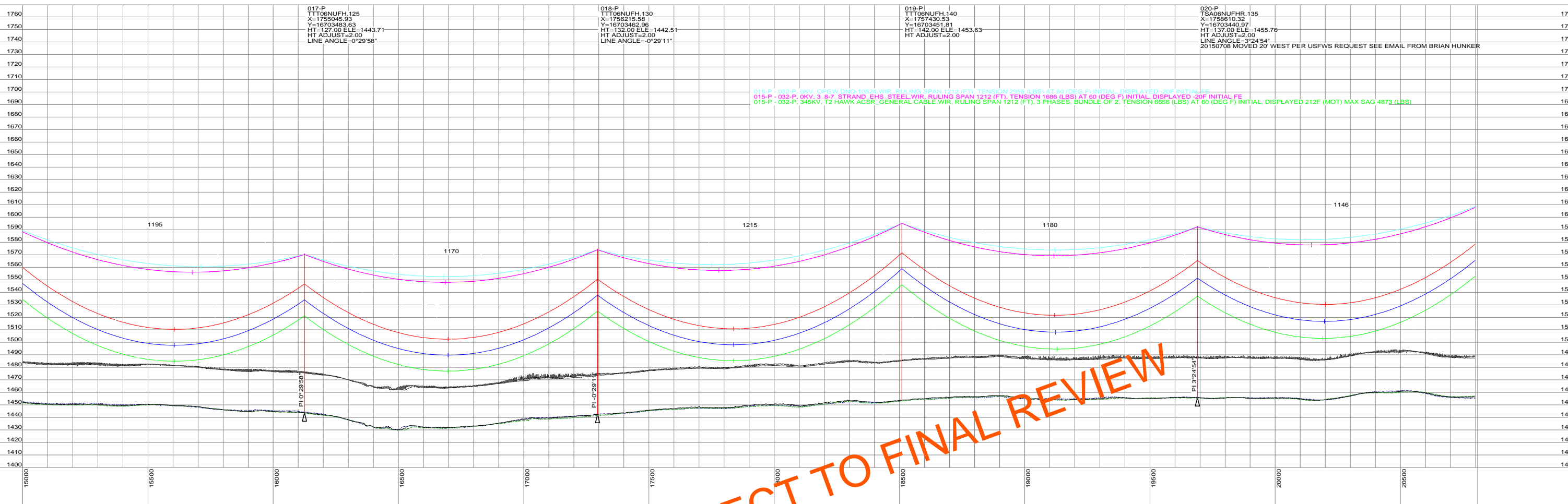
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DESIGN BY: ---	
CHECKED BY: ---	
APPROVED BY: ---	

**BIG STONE SOUTH - ELLENDALE**  
**345 KV TRANSMISSION LINE**

200.0 FT. HORIZ. SCALE

40.0 FT. VERT. SCALE

DWG. NO.  
 BSSE-PP-101-9  
 REVISION: O  
 136508



STRS: 017-P - 020-P

**20150828**  
**PRELIMINARY**  
**SUBJECT TO**  
**FINAL REVIEW**

REVISIONS					APPROVALS	DATE	DESIGN DATA
O	V22: REVISED PER FIELD REVIEW	GMD	GMD			08/28/15	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F. CREEP SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP OPGW: 1-DN0-10524 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT COORDINATE SYSTEM: UTM ZONE 14N, US FT
N	V21: REVISED PER FIELD REVIEW	GMD	GMD			08/14/15	
M	V19: REVISED PER STR REVIEW MTG	GMD	GMD			07/07/15	
L	V18: REVISED PER FIELD REVIEW	GMD	GMD	DJF		05/21/15	
K	V13: RCR 11, CTY RD SETBACKS	DJF	DJF	DJF		09/12/14	
REV	DESCRIPTION	DWN	DGN	CHK		DATE	APPROVED BY: ---

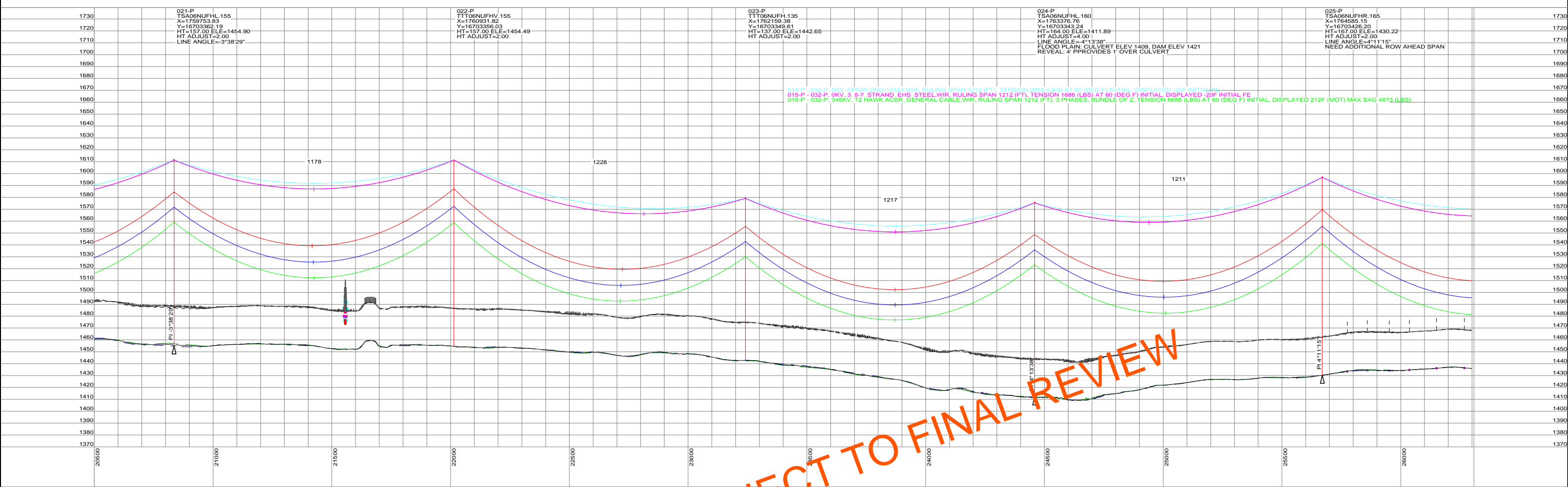
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 DESIGN TENSION: 18% @ 0 F. CREEP  
 SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 OPGW: 1-DN0-10524  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 MIN. GROUND CLEARANCE: 30 FT  
 COORDINATE SYSTEM: UTM ZONE 14N, US FT

**BIG STONE SOUTH - ELLENDALE**  
**345 KV TRANSMISSION LINE**

200.0 FT. HORIZ. SCALE  
 40.0 FT. VERT. SCALE

NORTH ↑

DWG. NO.  
 BSSE-PP-101-10  
 REVISION: O  
 136508



STRS: 021-P - 025-P

**20150828**  
**PRELIMINARY**  
**SUBJECT TO**  
**FINAL REVIEW**

REVISIONS				
REV	DESCRIPTION	DWN	DGN	CHK
O	V22: REVISED PER FIELD REVIEW	GMD	GMD	
N	V21: REVISED PER FIELD REVIEW	GMD	GMD	
M	V19: REVISED PER STR REVIEW MTG	GMD	GMD	
L	V18: REVISED PER FIELD REVIEW	GMD	GMD	DJF
K	V13: RCR 11, CTY RD SETBACKS	DJF	DJF	DJF

APPROVALS		DATE
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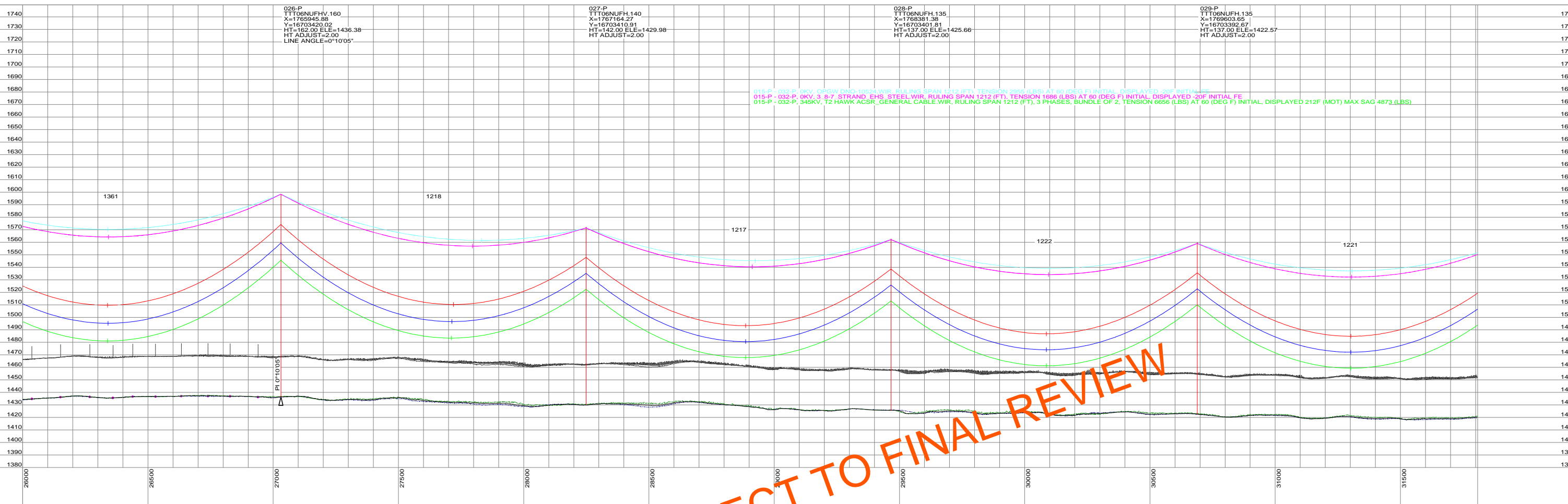
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DESIGN TENSION: 18% @ 0 F, CREEP	
SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL	
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP	
OPGW: 1-DN0-10524	
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP	
MIN. GROUND CLEARANCE: 30 FT	
COORDINATE SYSTEM: UTM ZONE 14N, US FT	

**BIG STONE SOUTH - ELLENDALE**  
**345 KV TRANSMISSION LINE**

200.0 FT. HORIZ. SCALE  
 40.0 FT. VERT. SCALE

NORTH

DWG. NO.  
 BSSE-PP-101-11  
 REVISION: O  
 136508



PRELIMINARY SUBJECT TO FINAL REVIEW



STRS: 026-P - 029-P

**20150828**  
**PRELIMINARY**  
**SUBJECT TO**  
**FINAL REVIEW**

REVISIONS					APPROVALS	DATE	DESIGN DATA
O	V22: REVISED PER FIELD REVIEW	GMD	GMD	08/28/15	---		CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F, CREEP SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP OPGW: 1-DN0-10524 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT COORDINATE SYSTEM: UTM ZONE 14N, US FT
N	V21: REVISED PER FIELD REVIEW	GMD	GMD	08/14/15	---		
M	V19: REVISED PER STR REVIEW MTG	GMD	GMD	07/07/15	---		
L	V18: REVISED PER FIELD REVIEW	GMD	GMD	05/21/15	---		
K	V13: RCR 11, CTY RD SETBACKS	DJF	DJF	09/12/14	---		
REV	DESCRIPTION	DWN	DGN	CHK	DATE	APPROVED BY: ---	

CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR  
 DESIGN TENSION: 18% @ 0 F, CREEP  
 SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 OPGW: 1-DN0-10524  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 MIN. GROUND CLEARANCE: 30 FT  
 COORDINATE SYSTEM: UTM ZONE 14N, US FT

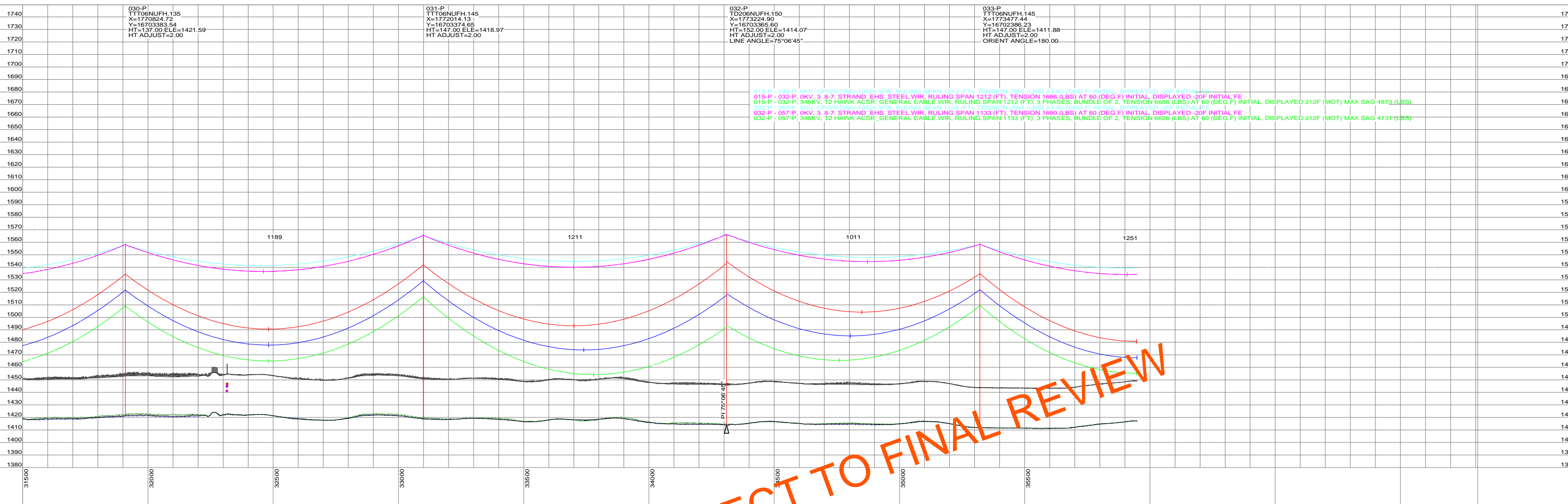
**BIG STONE SOUTH - ELLENDALE**  
**345 KV TRANSMISSION LINE**

200.0 FT. HORIZ. SCALE

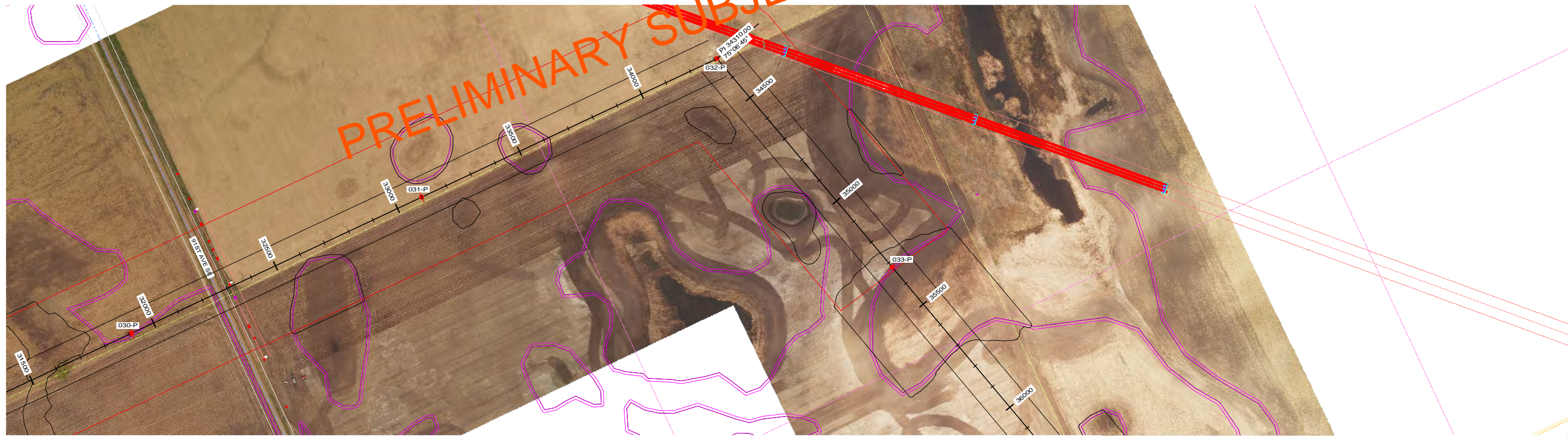
40.0 FT. VERT. SCALE

NORTH

DWG. NO.  
BSSE-PP-101-12  
REVISION: O  
136508



PRELIMINARY SUBJECT TO FINAL REVIEW



STRS: 030-P - 033-P

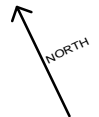
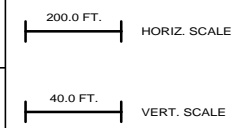
**20150828**  
**PRELIMINARY**  
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**FINAL REVIEW**

REVISIONS					
REV	DESCRIPTION	DWN	DGN	CHK	DATE
O	V22: REVISED PER FIELD REVIEW	GMD	GMD		08/28/15
N	V21: REVISED PER FIELD REVIEW	GMD	GMD		08/14/15
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L	V18: REVISED PER FIELD REVIEW	GMD	GMD	DJF	05/21/15
K	V13: RCR 11, CTY RD SETBACKS	DJF	DJF	DJF	09/12/14

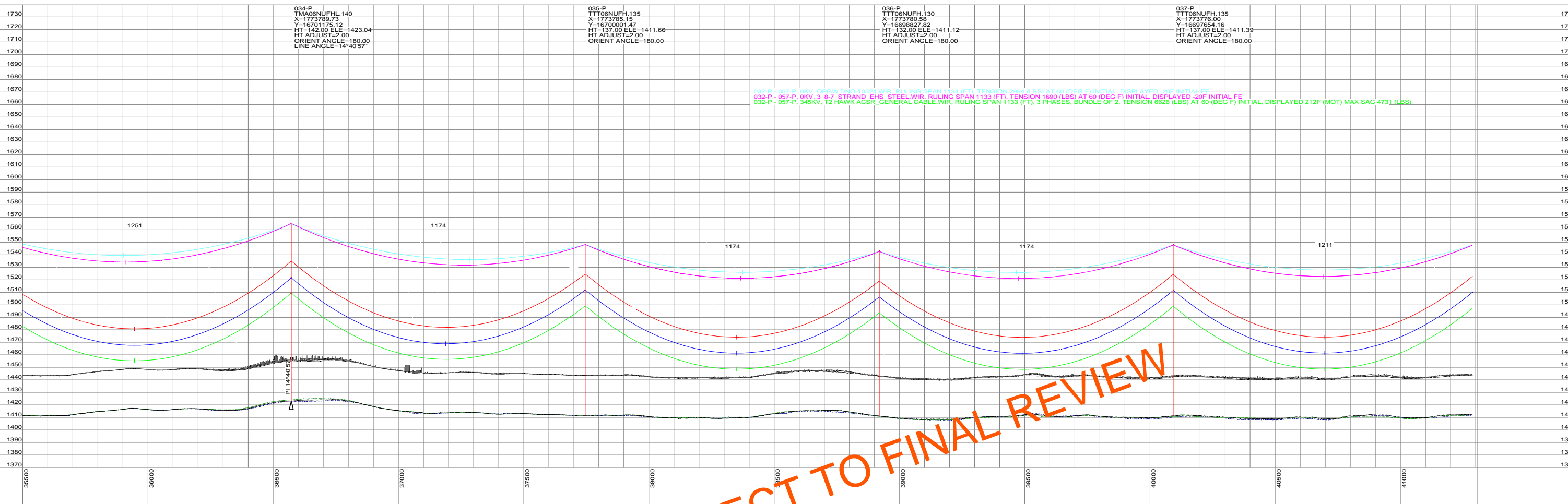
APPROVALS	DATE	DESIGN DATA
DRAWN BY: ---		CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR
DESIGN BY: ---		DESIGN TENSION: 18% @ 0 F, CREEP
CHECKED BY: ---		SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL
APPROVED BY: ---		DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
		OPGW: 1-DN0-10524
		DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
		MIN. GROUND CLEARANCE: 30 FT
		COORDINATE SYSTEM: UTM ZONE 14N, US FT



**BIG STONE SOUTH - ELLENDALE**  
**345 KV TRANSMISSION LINE**



DWG. NO.  
BSSE-PP-101-13  
REVISION: O  
136508



034-P  
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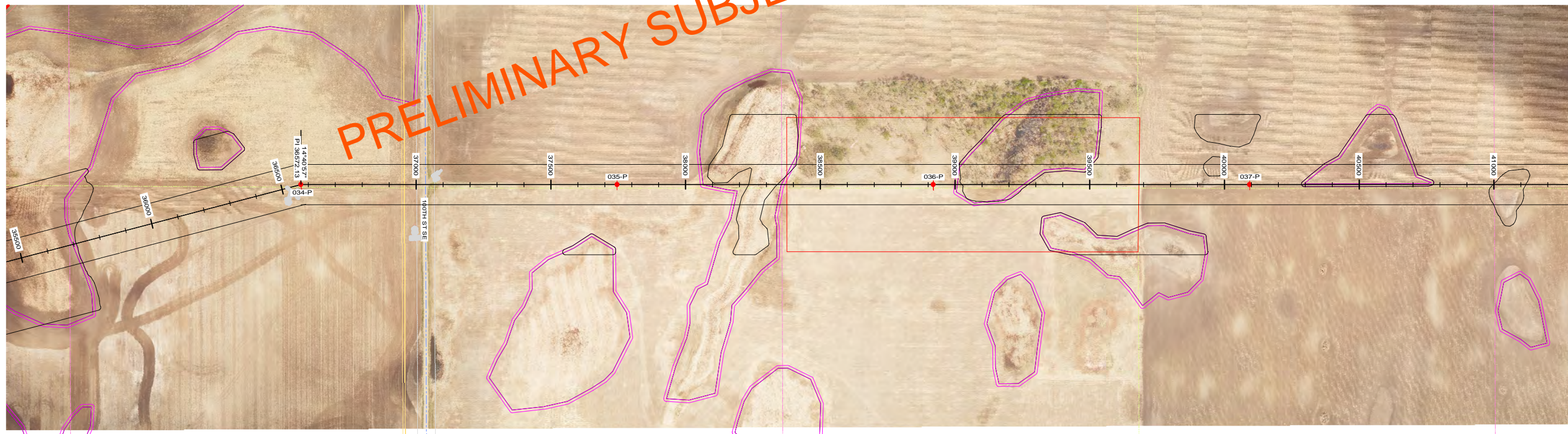
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ORIENT ANGLE=180.00

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Y=16698827.82  
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HT ADJUST=2.00  
ORIENT ANGLE=180.00

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ORIENT ANGLE=180.00

035-P - 037-P, 0KV, 0PGW, DNG, 1800' WIR, RULING SPAN 1134 (FT), TENSION 2994 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED -20F INITIAL  
032-P - 057-P, 0KV, 3-8-7 STRAND EHS STEEL WIR, RULING SPAN 1133 (FT), TENSION 1690 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED -20F INITIAL FE  
032-P - 057-P, 345KV, T2 HAWK ACSR, GENERAL CABLE WIR, RULING SPAN 1133 (FT), 3 PHASES, BUNDLE OF 2, TENSION 6626 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED 212F (MOT) MAX SAG 4731 (LBS)

PRELIMINARY SUBJECT TO FINAL REVIEW



STRS: 034-P - 037-P

20150828  
PRELIMINARY  
SUBJECT TO  
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REV	DESCRIPTION	DWN	DGN	CHK	DATE
O	V22: REVISED PER FIELD REVIEW	GMD	GMD		08/28/15
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K	V13: RCR 11, CTY RD SETBACKS	DJF	DJF	DJF	09/12/14

APPROVALS	DATE
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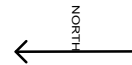
DESIGN DATA  
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 DESIGN TENSION: 18% @ 0 F, CREEP  
 SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 OPGW: 1-DN0-10524  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 MIN. GROUND CLEARANCE: 30 FT  
 COORDINATE SYSTEM: UTM ZONE 14N, US FT



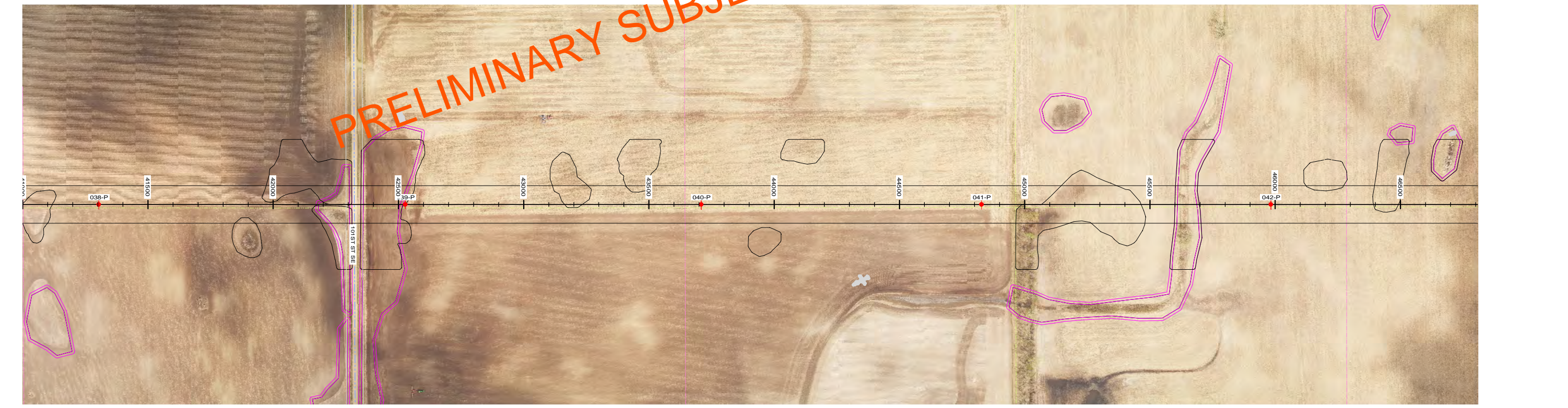
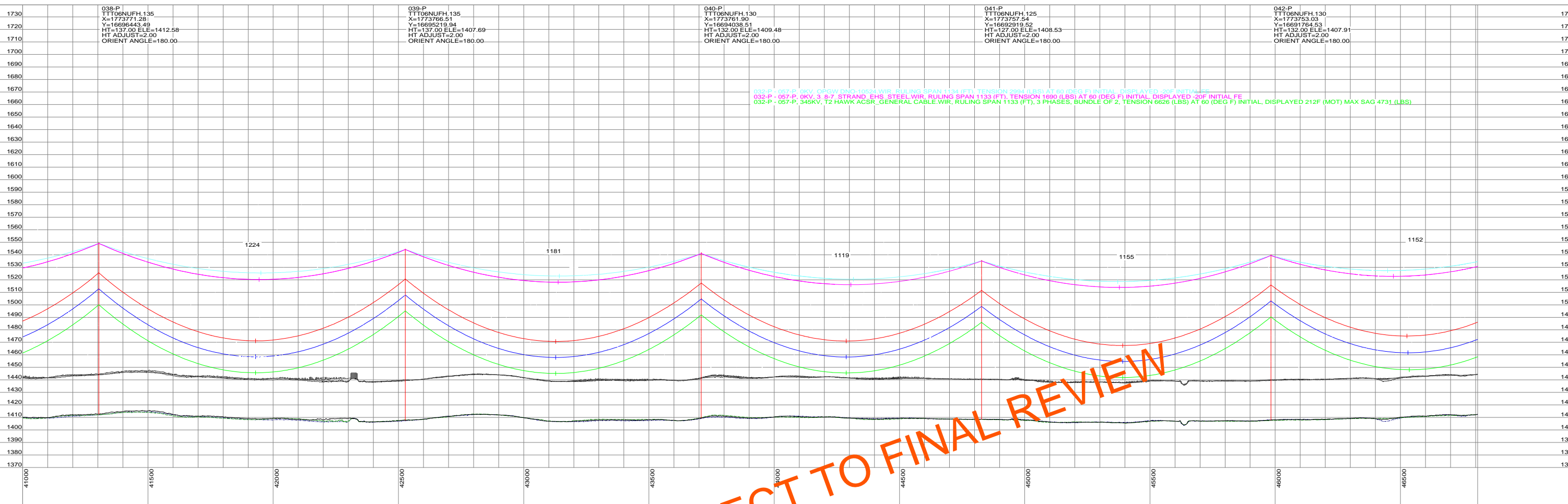
BIG STONE SOUTH - ELLENDALE  
345 KV TRANSMISSION LINE

200.0 FT. HORIZ. SCALE

40.0 FT. VERT. SCALE



DWG. NO.  
BSSE-PP-101-14  
REVISION: O  
136508



STRS: 038-P - 042-P

20150828  
PRELIMINARY  
SUBJECT TO  
FINAL REVIEW

REVISIONS					
REV	DESCRIPTION	DWN	DGN	CHK	DATE
O	V22: REVISED PER FIELD REVIEW	GMD	GMD		08/28/15
N	V21: REVISED PER FIELD REVIEW	GMD	GMD		08/14/15
M	V19: REVISED PER STR REVIEW MTG	GMD	GMD		07/07/15
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K	V13: RCR 11, CTY RD SETBACKS	DJF	DJF	DJF	09/12/14

APPROVALS		DATE
DRAWN BY: ---		
DESIGN BY: ---		
CHECKED BY: ---		
APPROVED BY: ---		

DESIGN DATA

CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR  
 DESIGN TENSION: 18% @ 0 F, CREEP  
 SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 OPGW: 1-DN0-10524  
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP  
 MIN. GROUND CLEARANCE: 30 FT  
 COORDINATE SYSTEM: UTM ZONE 14N, US FT

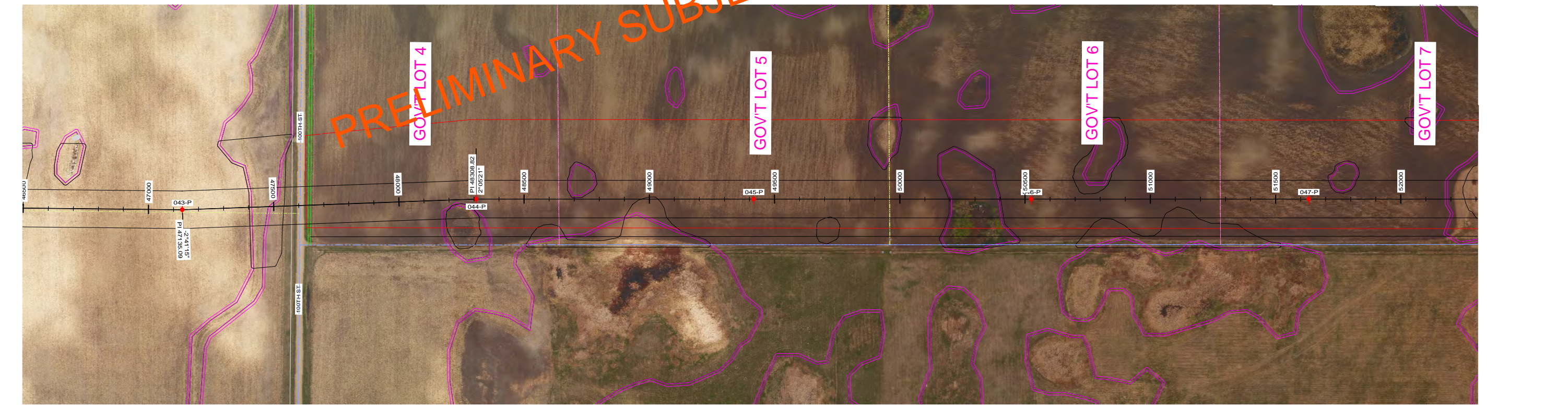
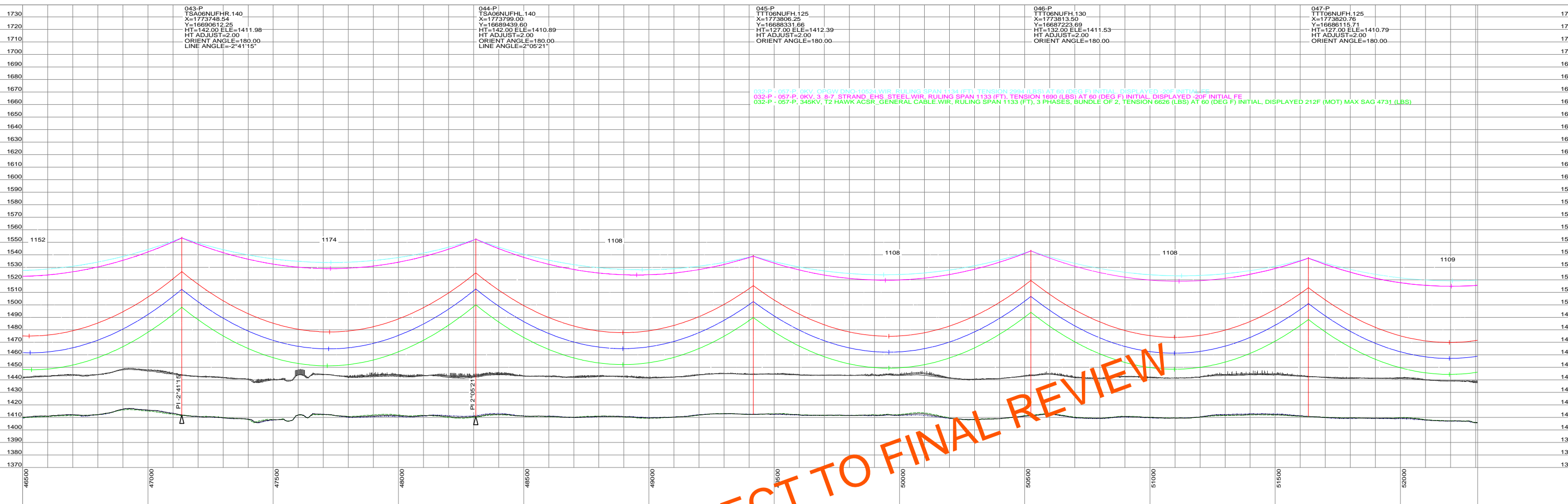
BIG STONE SOUTH - ELLENDALE  
345 KV TRANSMISSION LINE

200.0 FT. HORIZ. SCALE

40.0 FT. VERT. SCALE

NORTH

DWG. NO.  
BSSE-PP-101-15  
REVISION: O  
136508



STRS: 043-P - 047-P

**20150828**  
**PRELIMINARY**  
**SUBJECT TO**  
**FINAL REVIEW**

REVISIONS					APPROVALS		DATE	DESIGN DATA
O	V22: REVISED PER FIELD REVIEW	GMD	GMD				08/28/15	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F CREEP SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP OPGW: 1-DN0-10524 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT COORDINATE SYSTEM: UTM ZONE 14N, US FT
N	V21: REVISED PER FIELD REVIEW	GMD	GMD				08/14/15	
M	V19: REVISED PER STR REVIEW MTG	GMD	GMD				07/07/15	
L	V18: REVISED PER FIELD REVIEW	GMD	GMD	DJF			05/21/15	
K	V13: RCR 11, CTY RD SETBACKS	DJF	DJF	DJF			09/12/14	
REV	DESCRIPTION	DWN	DGN	CHK			DATE	APPROVED BY: ---

APPROVALS	DATE	DESIGN DATA
DRAWN BY: ---		CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F CREEP SHIELD WIRE: 1-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP OPGW: 1-DN0-10524 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT COORDINATE SYSTEM: UTM ZONE 14N, US FT
DESIGN BY: ---		
CHECKED BY: ---		
APPROVED BY: ---		

**BIG STONE SOUTH - ELLENDALE**  
**345 KV TRANSMISSION LINE**

200.0 FT. HORIZ. SCALE

40.0 FT. VERT. SCALE

NORTH

DWG. NO.  
 BSSE-PP-101-16  
 REVISION: O  
 136508