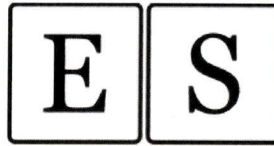


Jerry W. Evenson*
Paul R. Sanderson*
Kelsey A. Krapp

*Certified Civil Trial Specialist,
National Board of Trial Advocacy



EVENSON SANDERSON
PC

103 South 3rd St., Suite 5
Bismarck, ND 58501

Tel: 701.751.1243
Fax: 701.751.2547

Writer's direct email: psanderson@esattorneys.com

May 29, 2014



Mr. Darrell Nitschke
Executive Secretary and Director of Administration
North Dakota Public Service Commission
State Capitol
600 East Boulevard, Dept. 408
Bismarck, ND 58505-0408
Hand-delivered

Re: Case No. PU-13-840

Dear Mr. Nitschke:

Enclosed for filing is Applicants Montana-Dakota Utilities Co. and Otter Tail Power Company's late-filed exhibit, identified as Exhibit 13, along with the Revised Application Figure 2 maps and Revised Plan and Profile. If you have any questions, please let me know. Thank you for your consideration.

Sincerely,

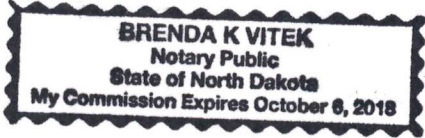
Paul Sanderson

Encl.

Cc: Janet Seaworth
Zachary Pelham
Henry Ford
Dean Pawlowski

Faith Keldrup

Subscribed and sworn to before me this 29th day of May, 2014.



Brenda K. Vitek

Brenda K. Vitek, Notary Public
State of North Dakota

My Commission Expires: 10-6-12

Montana-Dakota Utilities Co. and Otter Tail Power Company (Applicants) requests that the North Dakota Public Service Commission (Commission) approve the revised corridor width and adjusted route alignment described in this late-filed exhibit and as depicted on the attached map (Attachment 1).

Attachments:

1. Revised Application Figure 2:Pages 1 - 4
2. Revised Plan and Profile

Revised Route

Following the April 1, 2014 public hearing, there are three route shifts associated with landowner discussions.

First Route Shift

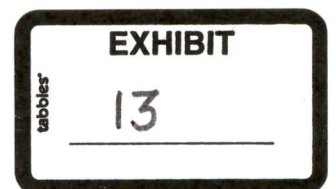
Concurrently with route engineering design the Applicants are designing the Ellendale 345kV Substation located in the northeast quarter of Section 9, Township 129 North, Range 63 West. During further substation engineering design, the bay where the transmission line connects with the substation shifted. This bay shift caused the route to shift about 70 feet west.

This route shift would require three structure moves and one structure to be eliminated as listed below and shown on revised Application Figure 2 (Attachment 1) and on the revised Plan and Profile sheet P1-1 (Attachment 2).

1. Structure 1 would be eliminated
2. Structure 2 moves 208-feet-north and 72-feet-west and this is necessary to facilitate the transmission line into the substation
3. Structure 3 moves 405-feet-north and 76-feet-west and this is necessary to facilitate the transmission line into the substation
4. Structure 4 moves 551-feet-north and 81-feet-west and this is necessary to facilitate the transmission line into the substation

With this proposed route adjustment:

- a) No additional environmental or cultural resource impacts are anticipated. Wetlands will be spanned. The land use is uniform across the area and there is no increase in structure numbers.
- b) The route would be greater than 500 feet from the occupied house in the southeast quarter of Section 9, Township 129 North, Range 63 West.
- c) No new landowners are involved.



Second Route Shift

Outside of the April 1, 2014 public hearing, Mr. Ralph Holte, the owner of southeast quarter of Section 15, Township 129 North, Range 63 West, requested that no transmission line structures be located on the parcel.

As submitted in the Certificate of Corridor Compatibility and Route Permit Application dated October 18, 2013 (Application), the proposed route runs north-south on the quarter-section of Section 15, with Structure 12 located on the aforementioned parcel. With the requested structure adjustment, the proposed route will move 20 feet west, therefore Structure 12 will be located in southwest quarter of Section 15.

This route shift would require two structure moves as listed below and shown on revised Application Figure 2 (Attachment 1) and on the revised Plan and Profile sheet P1-2 (Attachment 2).

1. Structure 11 moves 12-feet-north and 9-feet-west and this is necessary to facilitate the Structure 12 move
2. Structure 12 moves 9-feet-north and 20-feet-west to remove the structure from Mr. Holte's parcel

With this proposed route adjustment:

- a) No additional environmental or cultural resource impacts are anticipated. Wetlands will be spanned. The land use is uniform across the area and there is no increase in structure numbers.
- b) No new landowners are involved. The landowner in the southwest quarter of Section 15 has accepted the structure shift.
- c) The route adjustment moves the structure off of Mr. Holte's parcel, as requested by Mr. Holte.
- d) An overhang easement will still be required from Mr. Holte.

Third Route Shift

Outside of the April 1, 2014 public hearing, the Applicants have been working with South Dakota landowners for optimal route placement. Through these discussions, in Brown County, South Dakota, the route was shifted from the east half of Section 1, Township 128 North, Range 64 West to the west half of Section 6, Township 128 North, Range 63 West. To facilitate this route shift, Structure 43 in Section 32, Township 129 North, Range 62 West, Dickey County, North Dakota will move 18 feet west.

As submitted in the Application, the proposed route diagonals to the southwest from Structure 43 in North Dakota to Structure 44 in South Dakota. With the requested route shift in South Dakota the diagonal segment between North Dakota and South Dakota will be removed and the route will proceed in a north-south line between the states.

This route shift will require one structure move in North Dakota as listed below and shown on revised Application Figure 2 (Attachment 1) and on the revised Plan and Profile sheet P1-10 (Attachment 2).

1. Structure 34 moves 3-feet-north and 18-feet-west and this allows for a route shift in South Dakota

With this proposed route adjustment:

- a) No additional environmental or cultural resource impacts are anticipated. Wetlands will be spanned. The land use is uniform across the area and there is no increase in structure numbers.
- b) No new landowners are involved.
- c) The route adjustment allows the Applicants to work with the South Dakota landowner for optimal route placement.

Revised Corridor Width Description

Per the request of the Commission at the April 1, 2014 public hearing, the Project Corridor was narrowed to be 150-feet-wide from the proposed 1-mile-wide corridor, as filed in the Application with the Commission on October 18, 2013. This revised 150-feet-wide corridor is a buffer of the route as submitted within this late-filed exhibit. In addition, the revised 150-feet-wide corridor coincides with the areas to be surveyed for cultural resources, wetlands, and nesting birds during construction. It is anticipate that the revised corridor will have no additional environmental or cultural resource impacts. In addition, the land use closely correlates to the land use information filed with the Application.

Below is a summary of the surveys to be conducted on the Big Stone South to Ellendale 345kV Transmission Line Project. The summary table lists the survey type, area, and time period. Following the table is a general description of the survey.

Survey Summary Table

Survey Type	General Survey Area	General Method	Survey Time Period	Status
Class I Cultural Resources Literature Search	1-mile-wide either side of the Route	Desktop	Anytime	Completed
Wetland Delineation	150-foot-wide ROW	Desktop with Field Verification	May - late Sept (growing season)	Desktop completed Field verification anticipated in Fall 2014
Class III Cultural Resources Survey	150-foot-wide ROW	Field	May - Nov (No snow or frozen ground)	Anticipated in Fall 2014
Historic Architectural Survey (standing structure)	0.5-mile-wide either side of the Route	Field	Anytime	Anticipated in Fall 2014
Bald Eagle Stick Nest Surveys	1-mile-wide either side of the Route	Field	Mid-February through March 31 st	Survey mobilization 1 – Completed in 2013 Survey mobilization 2 – Pre-construction during time period
Sharp-tailed Grouse Lek Survey	1-mile-wide either side of the Route	Field	Mid-March through Early May	Survey mobilization 1 – Completed in 2013 Survey mobilization 2 – Pre-construction during time period
Tree Inventory	150-foot-wide ROW	Field	May – late Sept (leaves on trees)	Construction - Prior to clearing
Sprague's Pipit and Migratory Nesting Bird Occurrence Survey	150-foot-wide ROW, Ellendale 345kV Substation, and access road in suitable habitat	Field	Mid-May through Mid-June	Construction – Prior to work in grasslands during survey time period

Survey Methodology Summary

WETLAND DELINEATION METHODOLOGY

The wetland delineation strategy was discussed with the U.S. Army Corps of Engineers on January 17, 2013 and March 24, 2014. As stated in the Application (Section 5.13.1), National Wetland Inventory (NWI) data represents general wetland locations, but often underestimates wetland coverage. Therefore, the Project conducted a desktop review of aerial photographs and NWI polygons. During the desktop review the NWI boundaries were adjusted based upon the wetland signature on the aerial photograph and created new polygons for wetlands that did not appear on the NWI data. The desktop review determined the largest wetland signature and boundary for wetland basins within a 0.5-mile-wide buffer of the route.

Next, the Project will field verify the desktop wetland boundaries and delineate U.S. Army Corps of Engineers (USACE) jurisdictional wetlands within the 150-foot-wide right-of-way (ROW) of the route. USACE confirmed the strategy to only conduct delineations with data sheets for each

wetland type that may be impacted by the Project; but that if multiple wetlands of the same type are encountered, that streamlining the data collection is encouraged by the USACE by using representative data sheets for the same wetland type, then field verifying the wetland boundaries for size and assigning a wetland type.

The USACE will provide jurisdictional determinations for the wetlands that engineering shows have the potential for impacts (i.e. a structure within the wetland boundary).

CLASS III CULTURAL RESOURCES SURVEY METHODOLOGY

The Class III cultural resources survey approach is outlined in Section 5.7.2 of the Application. The Class III survey approach includes three components: (1) a component focused on locating traditional cultural properties; (2) a component for locating and evaluating archaeological properties; and (3) a component for locating important historic architectural or engineering properties. Regarding components 1 and 2, the Project worked with the North Dakota State Historic Preservation Office (SHPO) and Tribal Representatives to develop a sample survey approach for archaeological and traditional cultural sites within the 150-foot-wide ROW and/or other areas where direct construction impacts may occur. Therefore, 100 percent of the route will not be surveyed, but survey will occur on areas determined by a map review and the windshield review with archaeologists and Tribal Representatives. Component 3 is described in the next section titled Historic Architectural (standing structure) Survey Methodology.

First step in the Class III cultural resources survey approach entailed using GIS based maps and data overlays from SHPO to find Project segments excluded from survey and those targeted for survey based on the variables and considerations with regard to:

1. Environmental features - proximity to wetlands, streams and other sensitive environments and formations
2. Proximity to environmental features and land use - prominences and unusual landscape features not previously cultivated
3. Past land use - rangeland
4. Previously identified sites and properties - listed, eligible, and unevaluated previously recorded cultural resources
5. Native American sensitive areas

Potential conditions that do not merit survey include the following:

1. Recent industrial development
2. Croplands or previously disturbed areas
3. Submerged lands
4. Steep slopes (>20%)

The second step of the survey approach occurred on November 11-15, 2013 where the Project conducted a windshield survey of the route with archaeologists and Tribal Representatives that identified segments of the route to be field reviewed.

A meeting was held on May 7, 2013 with Tribal Representatives that discussed the survey approach and stated that the 150-foot-wide ROW would be the focus of survey. On May 30, 2013, the Project held a conference call with the SHPO to discuss survey approach and they confirmed with a sampling approach for survey. The survey approach was further discussed with SHPO and Tribal Representatives on June 13, 2013.

The cover letter addressed to the SHPO for the Class I Literature Search Report dated July 22, 2013, states that “Part of the survey principles is to conduct a windshield survey to assess targeted areas along the North Dakota Facility ROW for a Class III field survey for archaeological sites and structures.” It is stated that a windshield review will be completed to find areas along the ROW for cultural field survey. On July 25th, the SHPO responded to the Class I report and concurred with Class III survey approach.

HISTORIC ARCHITECTURAL (STANDING STRUCTURE) SURVEY METHODOLOGY

At a meeting with the State Historic Preservation Officer (SHPO), on 8/29/2012, they requested that the Project consider the potential for adverse impacts to historic buildings and structures. At that time the SHPO requested the survey strategy follow the methodology used on a previous project, specifically Minnkota Power Cooperatives, Inc.’s Center to Grand Forks Project. The goal of this survey will be to provide information regarding the type and distribution of historic buildings and/or structures and/or historic districts within a one mile buffer of the route (0.5 mile to both sides of the route).

The Application (Section 5.7.2) describes that the Project will review a 0.5-mile-wide visual impacts area of potential effects (APE) on either side of the route to evaluate architectural properties. The purpose of the 0.5-mile-wide visual impacts APE is to account for the diminishment of integrity of setting for standing architectural properties for which setting contributes to their significance.

TREE INVENTORY METHODOLOGY

As stated in Application Section 5.14.2, the 150-foot-wide ROW will be cleared of tall trees and shrubs. The Application (Section 5.14.3) states that the Project will follow the Commission’s requirements for mitigating tree and shrub impacts. Therefore, the Project will conduct a tree and shrub inventory by direct stem count of trees greater than 1-inch diameter at breast height (dbh) within the 150-foot-wide ROW and any danger trees as this is there area where tree removal will occur. A danger tree is a tree located just outside of the ROW, but either overhangs the ROW or is determined to be in poor condition and may fall into the ROW. The inventory will record the location, number, and species of trees and shrubs. If tree removal is needed at other locations, outside of the ROW, then the Project will inventory those trees for replacement. The Project filed the executed Tree and Shrub Mitigation Certification at the April 1, 2014 hearing (Exhibit 10) and requested that the Commission approve clearing the 150-foot-wide ROW, of which the cleared areas will be inventoried for replacement.

SPRAGUE'S PIPIT AND MIGRATORY NESTING BIRD OCCURRENCE SURVEY METHODOLOGY

In an effort to avoid and minimize potential impacts to avian species, such as the Sprague's pipit and other grassland nesting species, the Project developed a survey plan to avoid nesting migratory birds during the nesting season. As stated in the Application (Section 5.15.3), grassland bird nest surveys will be conducted on areas that harbor large grassland tracts containing an abundance of native plant species assemblages along the route centerline, and other areas affected by the construction activities. If the construction schedule changes to permit clearing outside of the nesting season, surveys will not be necessary.

The USFWS publishes a Birds of Conservation Concern (BCC) report that identifies those species in greatest need of conservation action beyond those already federally listed under the ESA. The BCC develops lists for 37 different Bird Conservation Regions in North America. The BSSE project lies entirely within the Prairie Potholes Bird Conservation Region. BSSE will focus survey efforts during the nesting season on grassland species listed for this region. A list of grassland species of concern was compiled using guidance from the 2008 BCC list, which is the most recent report available. The primary species of concern were selected based on the species nesting in Bird Conservation Region 11 (USFWS 2008). The following list includes species identified using the BCC criteria:

Swainson's Hawk	Sprague's Pipit
Mountain Plover	Grasshopper Sparrow
Upland Sandpiper	Baird's Sparrow
Long-billed Curlew	Nelson's Sharp-tailed Sparrow
Marbled Godwit	McCown's Longspur
Black-billed Cuckoo	Smith's Longspur (nb)
Short-eared Owl	Chestnut-collared Longspur
Red-headed Woodpecker	Dickcissel

nb = non-breeding or possible only during migration

Survey Methodology

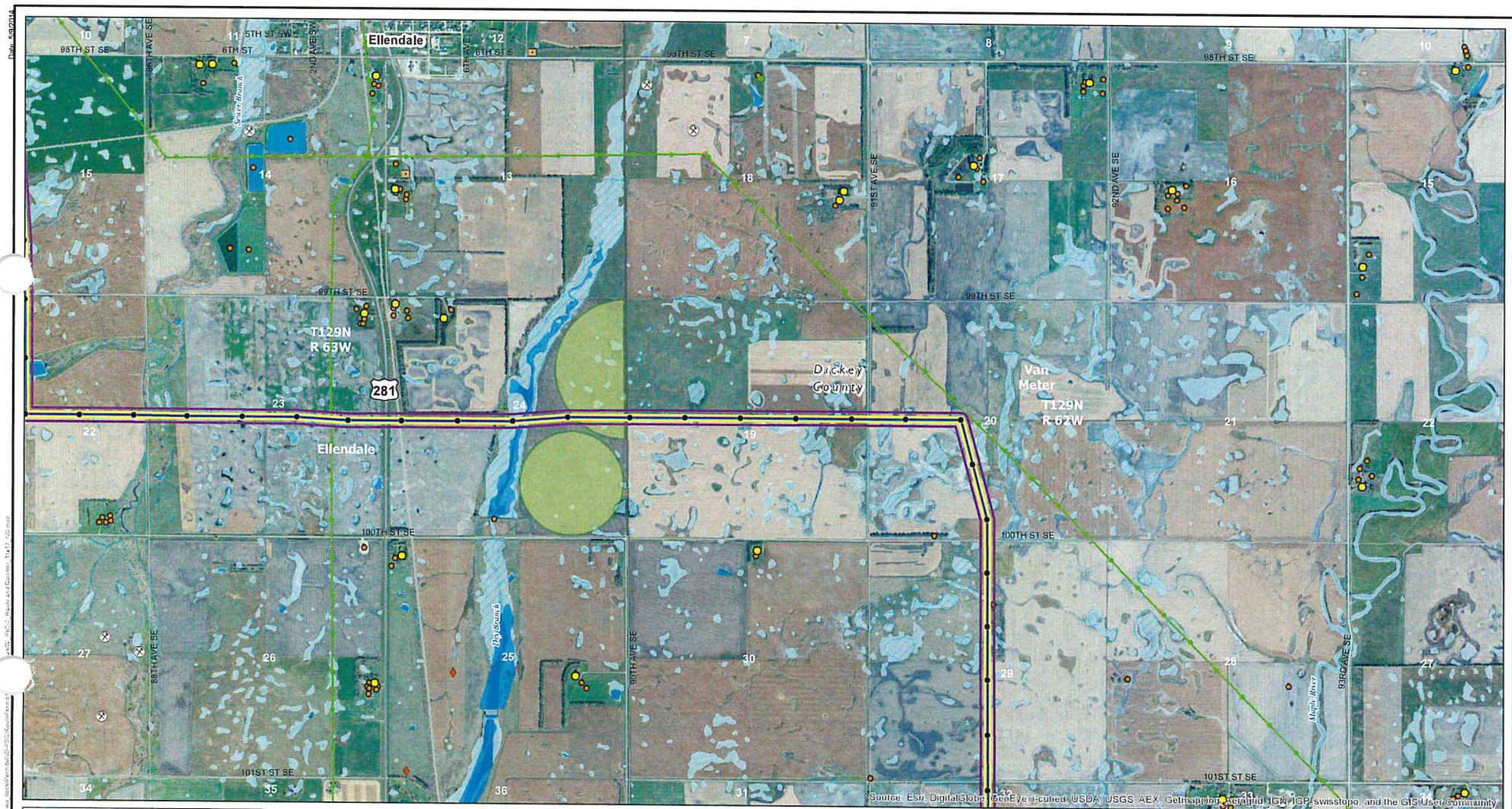
The Project will utilize a strip-transect method (Wakeley 1987) on grassland parcels identified during the habitat classification model. Transects will be oriented along the route centerline, and 25 meters each side of, and parallel to, the route centerline. Transects will be walked at a steady pace and biologists will record bird species as they are encountered. Additionally, the surveyors will stop every 350 meters to listen, observe, and record avian activities. Transects will be placed 25 meters apart where the transmission line crosses grassland habitat, total transect distance will vary according to the size of the site containing potential habitat. Species will be identified using binoculars or other visual and auditory queues. If nesting behavior is observed, efforts to locate the nest will occur by using more focused meander searches at likely nest sites. All nest locations will be recorded using a GPS unit and the area flagged as a nest site.

Optimum weather conditions for observing territorial behaviors are clear, calm days. When weather conditions limit observer effectiveness, sites will be searched again when conditions allow collection of accurate data. Surveys will be conducted within the following parameters:

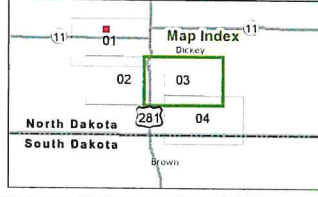
- Weather conditions do not pose a threat to biologists conducting surveys
- Between ½ hour prior to sunrise until 11:00 a.m. (Central Standard Time)
- Surveys will not be conducted when winds exceed 20 mph using the Beaufort wind scale
- Surveys will be suspended if there is continuous precipitation events

All observations will be documented using aerial photographs to mark occupied site locations in the field. Field data will then be digitized on ortho-rectified aerial photographs using GIS technologies. The following information will be recorded on the form.

1. BCC species and numbers observed
2. cloud cover and type
3. temperature
4. wind direction and speed
5. grassland type and condition
6. habitat characteristics
7. recent land use
8. photographs of habitat characteristics



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerofix, IGN, IGP, swisstopo, and the GIS User Community



- | | | | | |
|--------------------------------------|---------------------|----------------------|----------------------------|-----------------------------|
| North Dakota Route | Dwelling - occupied | Recreation | Road | River or Stream |
| North Dakota Facility ROW | Dwelling - vacant | Communication Tower | Highway | Waterbody |
| North Dakota Corridor | Ag/Other Structure | Planned Center Pivot | Railroad | NWI Wetland |
| Facility Structure | Gravel/Mining | Private-use Airport | Abandoned Railroad | Wetland (Desktop Digitized) |
| Ellendale 345 kV Substation Boundary | Cemetery | Public-use Airport | Electric Transmission Line | |
| | Church | | Oil or Gas Pipeline | |
| | School | | | |
| | Utilities | | | |

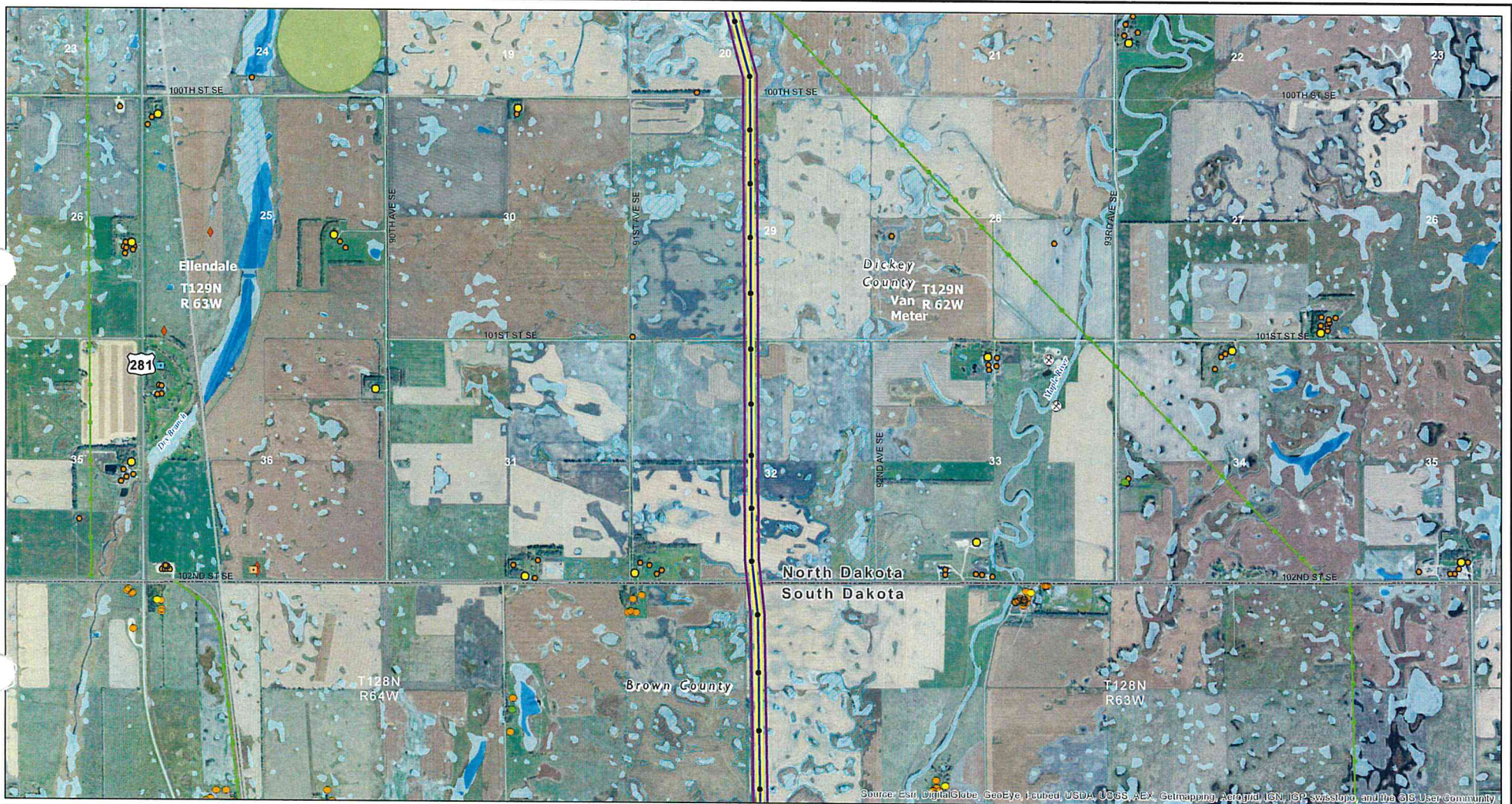
Figure 2: Page 3 of 4
Route and Corridor
Big Stone South to Ellendale
345 kV Transmission Line Project



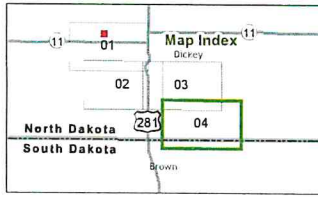
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Source: Esri, DigitalGlobe, GeoEye, USDA, USGS, AEX, Getmapping, Aerofield, IGN, JCP, swisstopo, and the GIS User Community



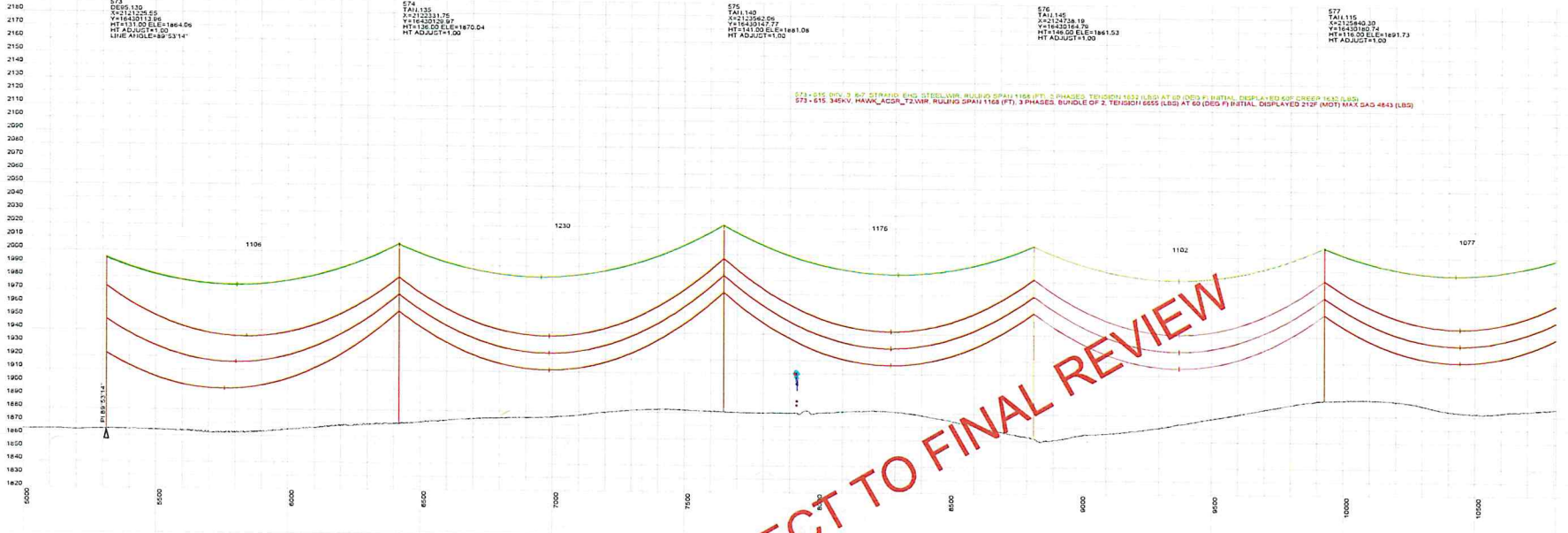
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Figure 2: Page 4 of 4
Route and Corridor
Big Stone South to Ellendale
345 kV Transmission Line Project

0 2,000 4,000 Feet

Scale 1:24,000

BSS+E
Big Stone South to Ellendale



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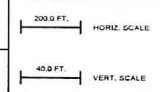


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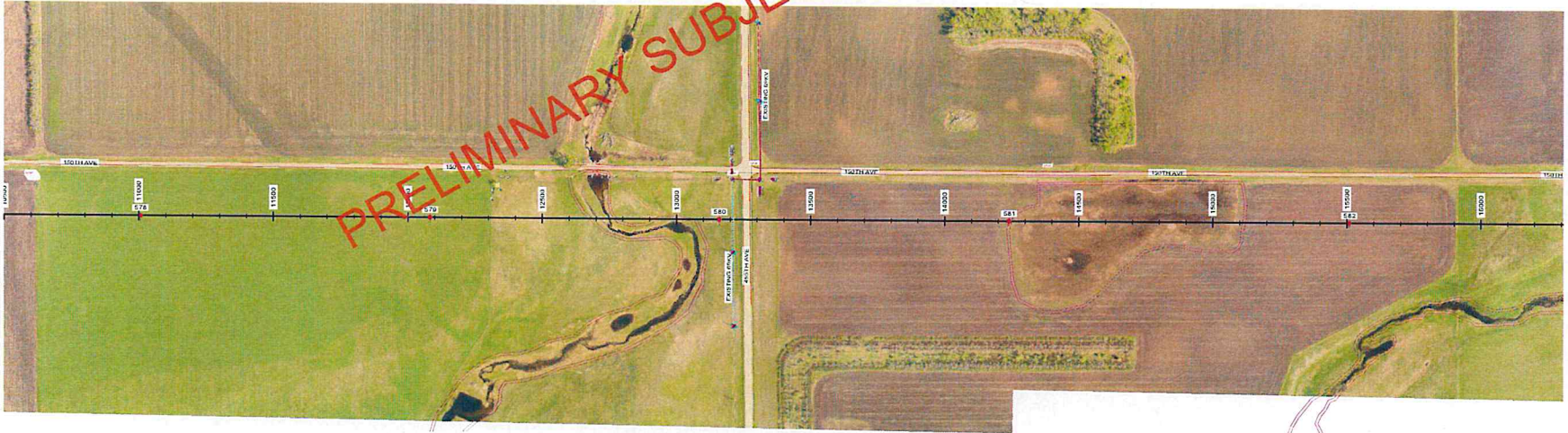
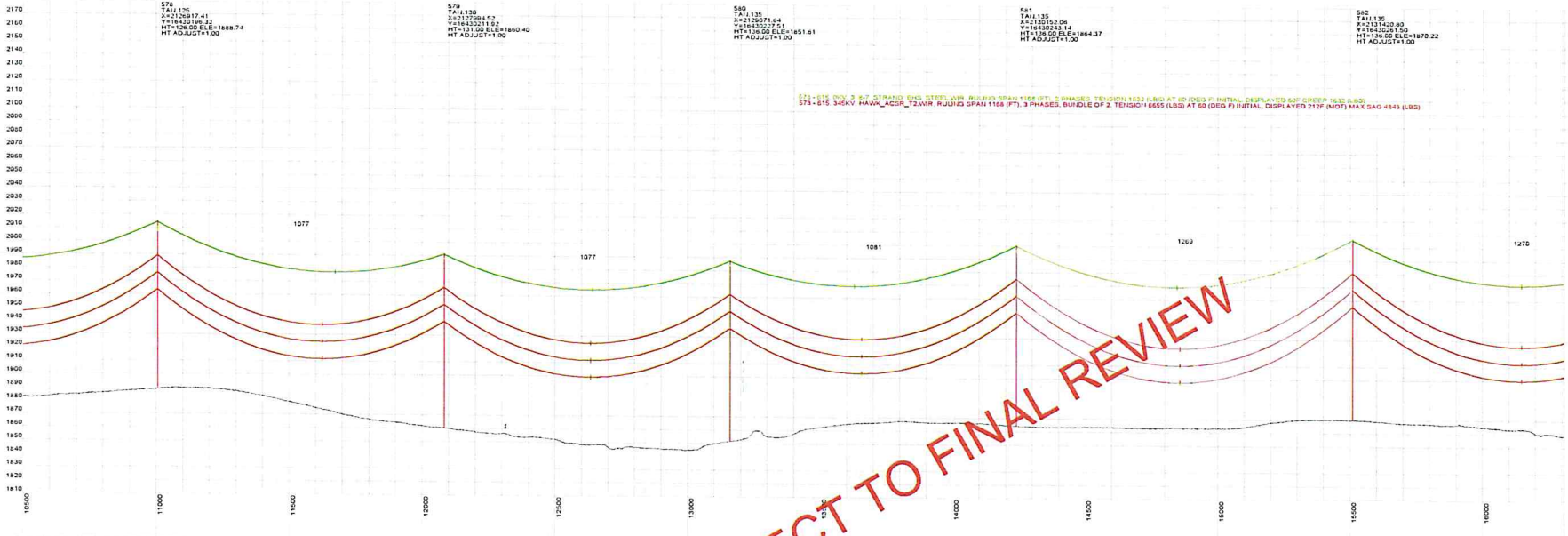
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Big Stone South to Ellendale
 BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



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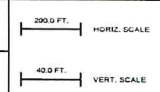


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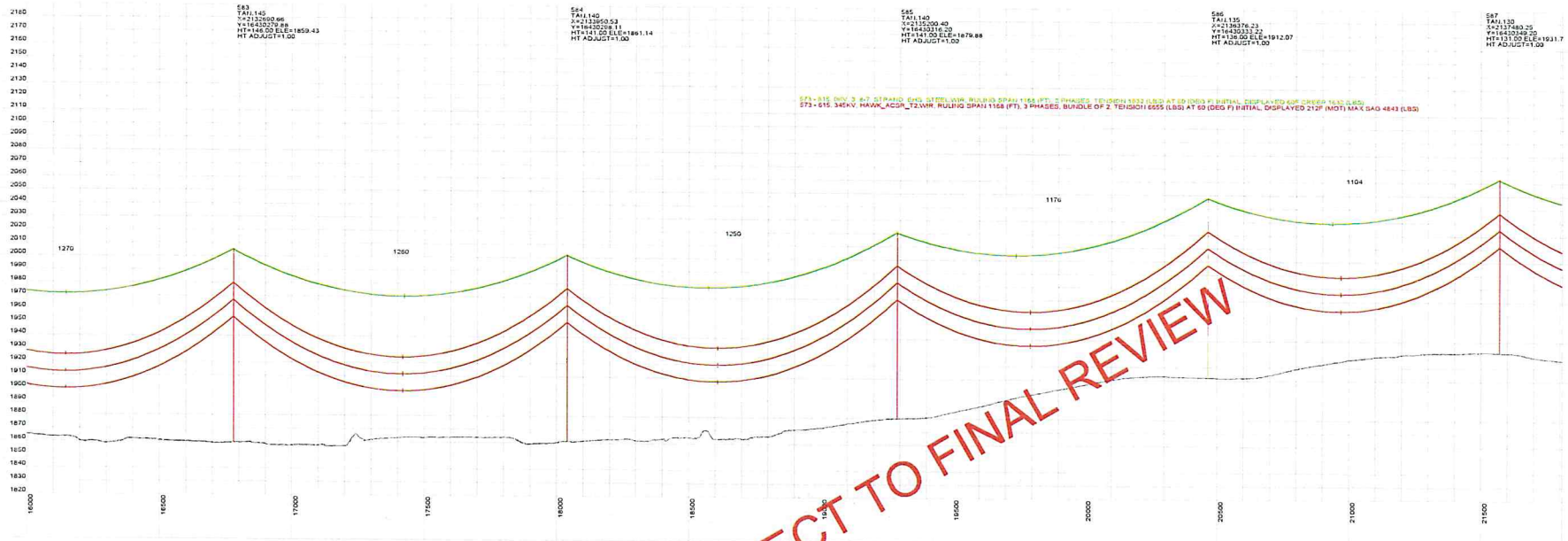
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BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



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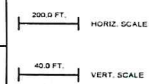
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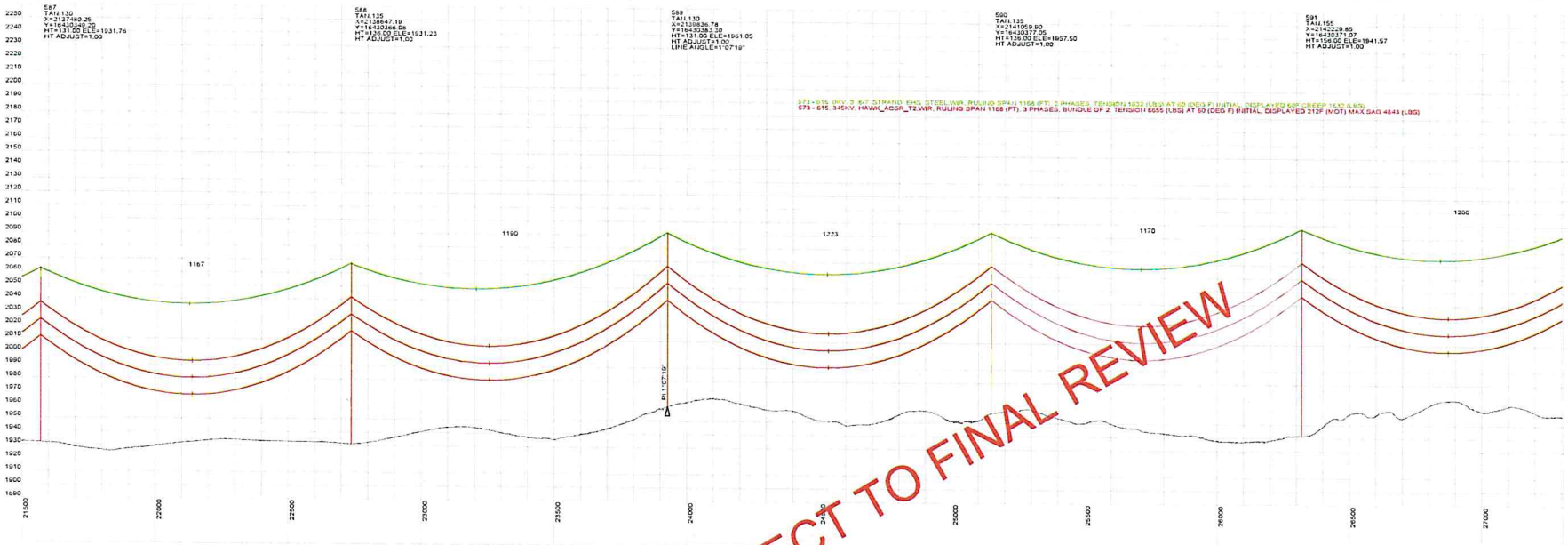
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BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



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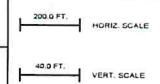
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C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	12/04/13
B	ISSUED FOR SD REVIEW	JRC	JRC	09/27/13
A	PRELIMINARY SPOTTING	PEI	PEI	05/02/13

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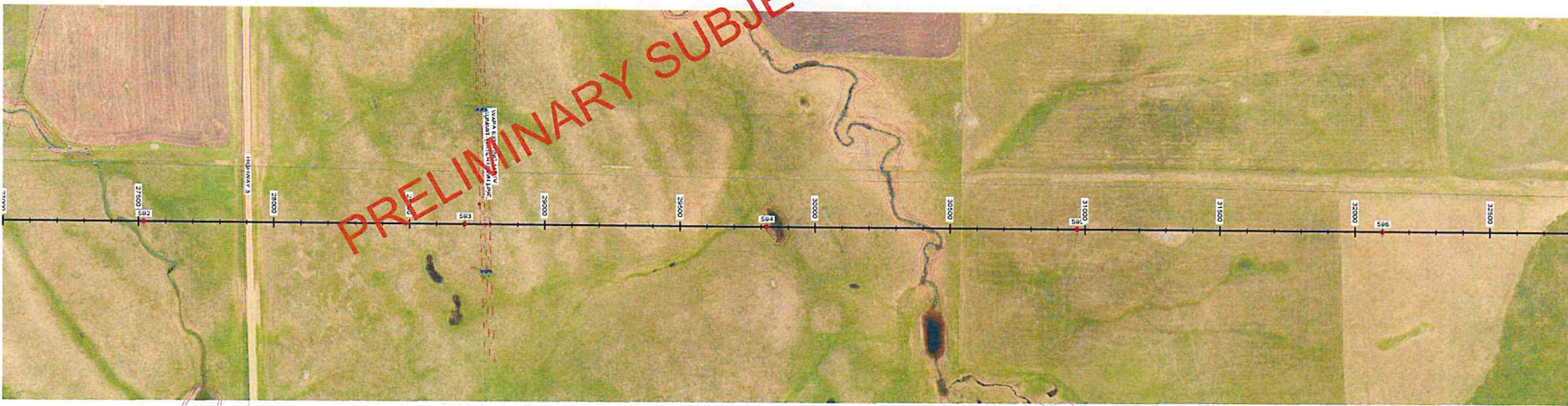
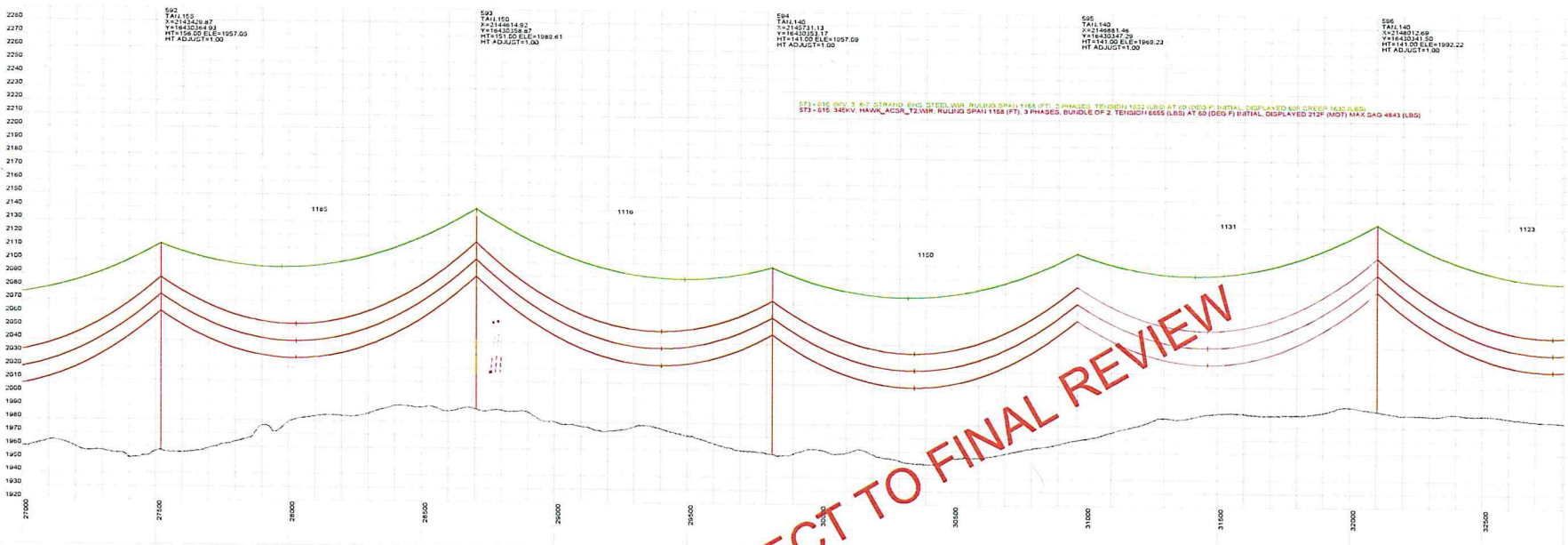
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MIN. GROUND CLEARANCE: 30 FT	
CONDUCTOR SHOW: 212 F. MAX SAG	
COORDINATE SYSTEM: UTM ZONE 14N, US FT	



BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-4
 REVISION: E
 127156



20140515
PRELIMINARY
SUBJECT TO
FINAL REVIEW

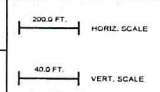


REVISIONS					
REV	DESCRIPTION	DMN	DSH	CHK	DATE
E	GENERAL REVISIONS	DJF	DJF	DJF	05/15/14
D	RCR 17 & 18, STR 635 - 654	JRC	JRC	DJF	12/12/13
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH	12/04/13
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH	09/27/13
A	PRELIMINARY SPOTTING	PEI	PEI		05/03/13

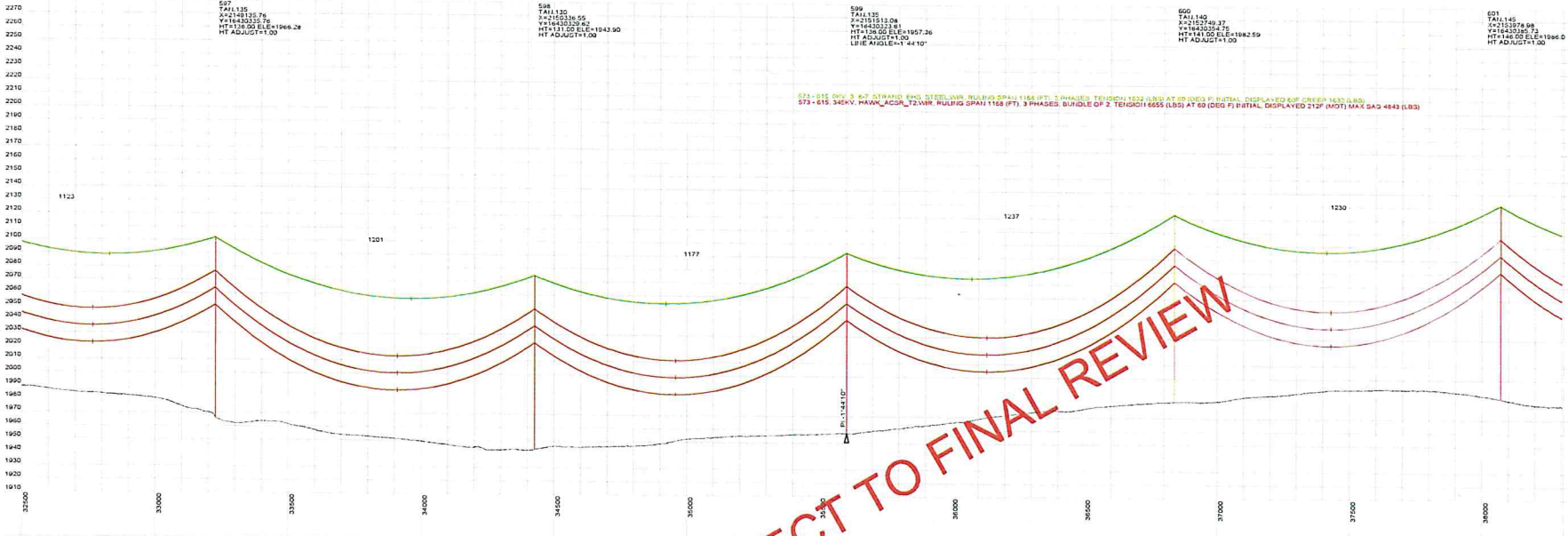
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DESIGN BY: —			DESIGN TENSION: 18% @ 0 F CREEP
CHECKED BY: —			SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL
APPROVED BY: —			DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
			MIN. GROUND CLEARANCE: 30 FT
			CONDUCTOR SHOW: 212 F. MAX SAG
			COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-5
REVISION: E
127156



20140515
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 SUBJECT TO
 FINAL REVIEW



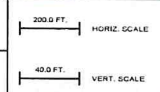
REV	DESCRIPTION	DWN	CHK	DATE
E	GENERAL REVISIONS	DJF	DJF	05/15/14
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	12/12/13
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	12/04/13
B	ISSUED FOR SD REVIEW	JRC	JRC	09/27/13
A	PRELIMINARY SPOTTING	PEI	PEI	05/03/13

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

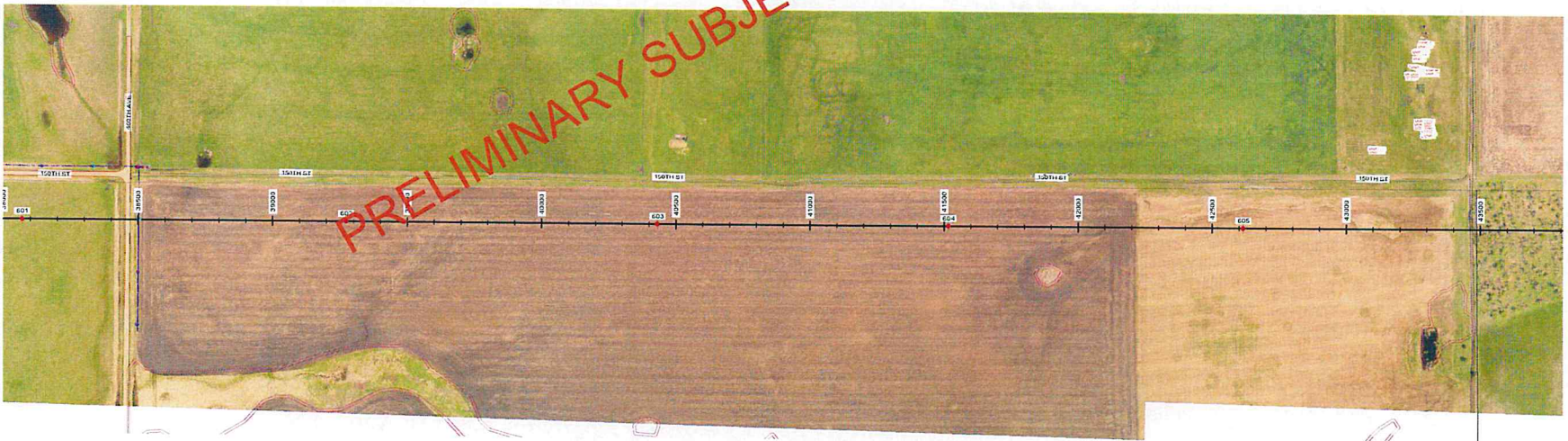
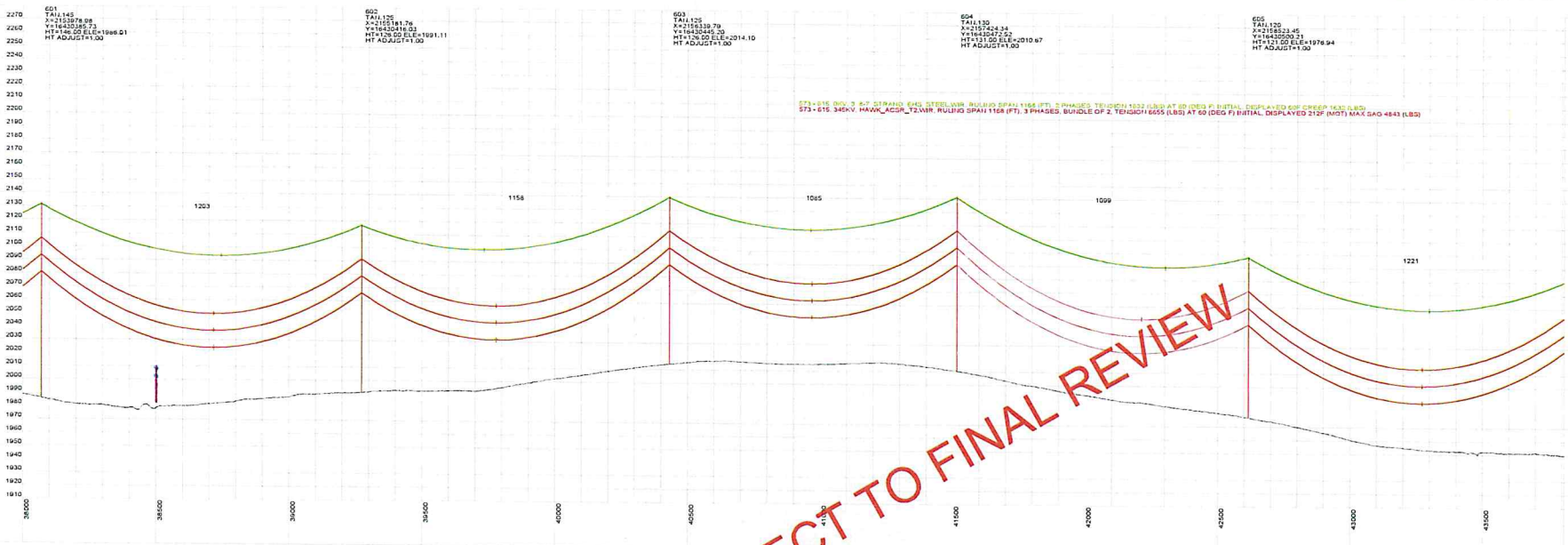
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CONDUCTOR: (3X) 477 KCMIL 26/7 TP HAWK ACSR
DESIGN TENSION: 18% @ 0 F CREEP
SHIELD WRE: 2-3/8" 7 STRAND EHS STEEL
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
MIN. GROUND CLEARANCE: 30 FT
CONDUCTOR SHOW: 212 F, MAX SAG
COORDINATE SYSTEM: UTM ZONE 14N, US FT



Big Stone South to Ellendale
 BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-6
 REVISION: E
 127156



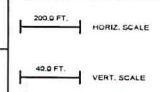
20140515
PRELIMINARY
SUBJECT TO
FINAL REVIEW



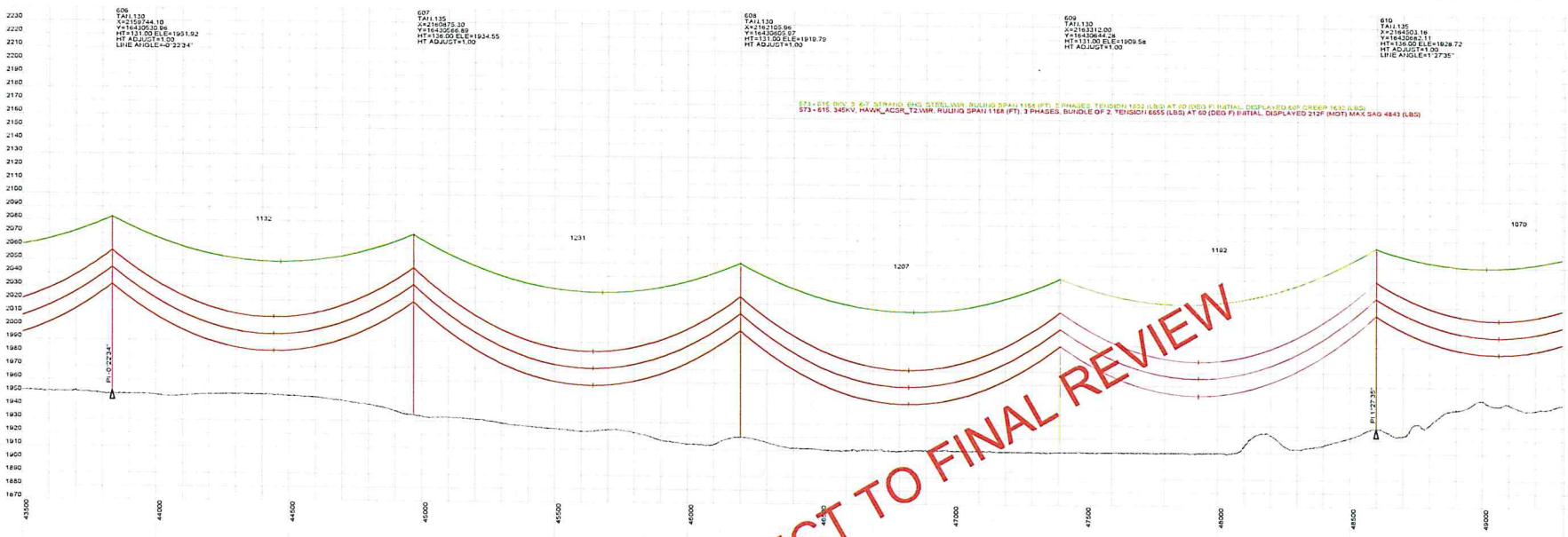
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D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF	12/12/13	DESIGN BY: —		
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH	12/04/13	CHECKED BY: —		
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH	09/27/13	APPROVED BY: —		
A	PRELIMINARY SPOTTING	PEI	PEI		05/03/13			
REV	DESCRIPTION	DWN	DGN	CHK	DATE	APPROVED BY: —		



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-7
REVISION: E
127156



20140515
PRELIMINARY
SUBJECT TO
FINAL REVIEW



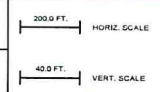
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REV	DESCRIPTION	DWN	DGN	CHK
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D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH
A	PRELIMINARY SPOTTING	PEI	PEI	

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

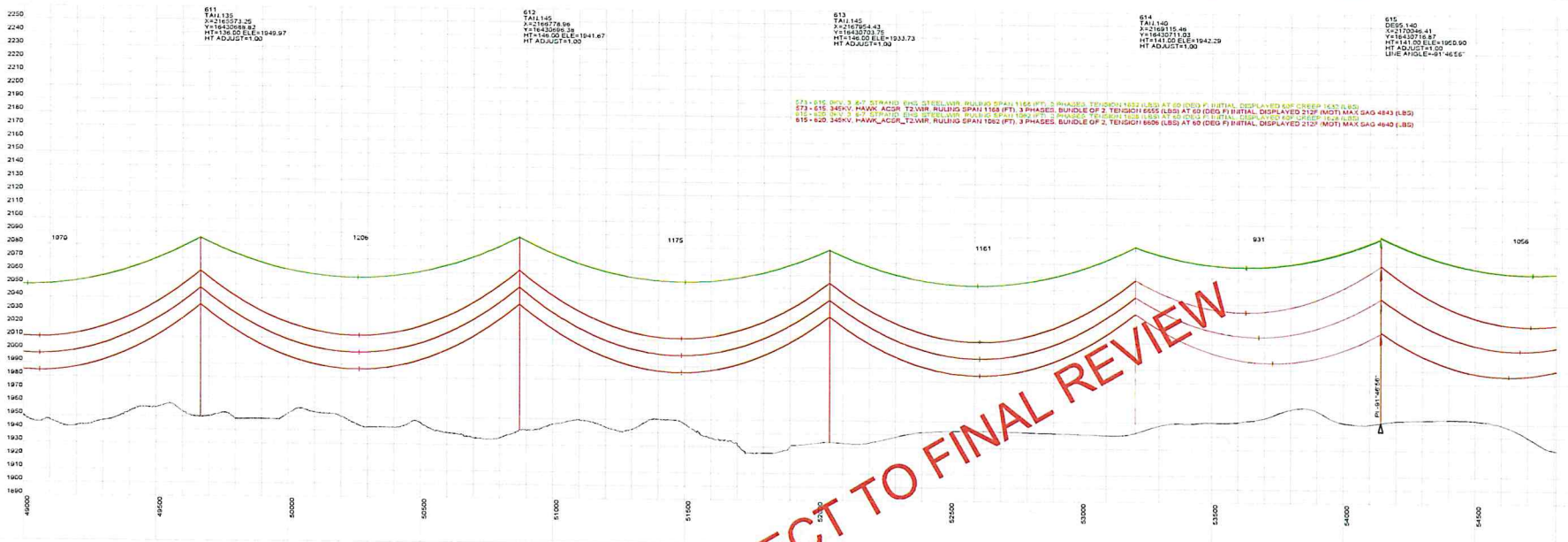
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DESIGN TENSION: 18% @ 9 F. CREEP	
SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL	
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP	
MIN. GROUND CLEARANCE: 30 FT	
CONDUCTOR SHOWN: 212 F. MAX SAG	
COORDINATE SYSTEM: UTM ZONE 14N, US FT	



Big Stone South to Ellendale
BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-8
REVISION: E
127156



611
TAXI 145
Y=1942095.25
X=1043088.82
HT=136.20 ELE=1949.97
HT ADJUST=1.00

612
TAXI 145
Y=1942095.96
X=1043088.82
HT=136.20 ELE=1941.67
HT ADJUST=1.00

613
TAXI 145
Y=1942095.43
X=1043088.82
HT=136.20 ELE=1933.73
HT ADJUST=1.00

614
TAXI 145
Y=1942095.48
X=1043088.82
HT=136.20 ELE=1942.29
HT ADJUST=1.00

615
TAXI 145
Y=1942096.41
X=1043088.82
HT=136.20 ELE=1950.90
HT ADJUST=1.00
LINE ANGLE=97.4655

573-616 345KV HAWK ACSR 72 STR. BUNDLE SPAN 1158 (FT), 3 PHASES, BUNDLE OF 3, TENSICH 1606 (LBS) AT 60 (DEG P) BIRTHAL DISPLAYED 210F (MOT) MAX SAG 4843 (LBS)
573-616 345KV HAWK ACSR 72 STR. BUNDLE SPAN 1158 (FT), 3 PHASES, BUNDLE OF 3, TENSICH 1606 (LBS) AT 60 (DEG P) BIRTHAL DISPLAYED 210F (MOT) MAX SAG 4843 (LBS)
615-820 345KV HAWK ACSP 12 STR. BUNDLE SPAN 1052 (FT), 3 PHASES, BUNDLE OF 3, TENSICH 1606 (LBS) AT 60 (DEG P) BIRTHAL DISPLAYED 210F (MOT) MAX SAG 4843 (LBS)



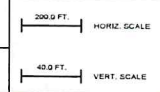
20140515
PRELIMINARY
SUBJECT TO
FINAL REVIEW



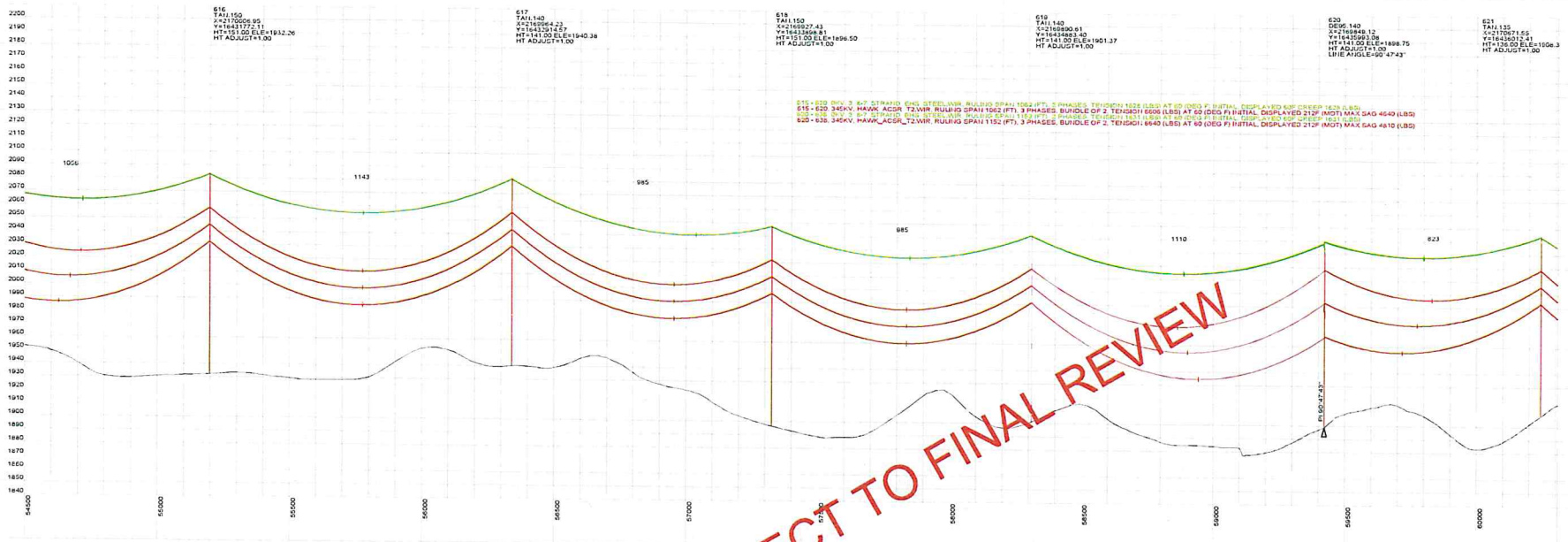
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D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF	12/12/13	DESIGN BY: —		
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH	12/04/13	CHECKED BY: —		
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH	08/27/13	APPROVED BY: —		
A	PRELIMINARY SPOTTING	PEI	PEI		05/03/13			
REV	DESCRIPTION	DWN	DGN	CHK	DATE	APPROVED BY: —		



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-9
REVISION: E
127156



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SUBJECT TO
FINAL REVIEW

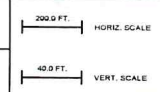


REVISIONS				
REV	DESCRIPTION	DATE	DGN	CHK
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D	RCR 17 & 19, STR 635 - 654	05/15/14	JRC	DJF
C	RCR 13 RESPOTTED STR 721 - 725	12/12/13	JRC	SMH
B	ISSUED FOR SO REVIEW	12/04/13	JRC	SMH
A	PRELIMINARY SPOTTING	09/27/13	PEI	PEI
		05/02/13		

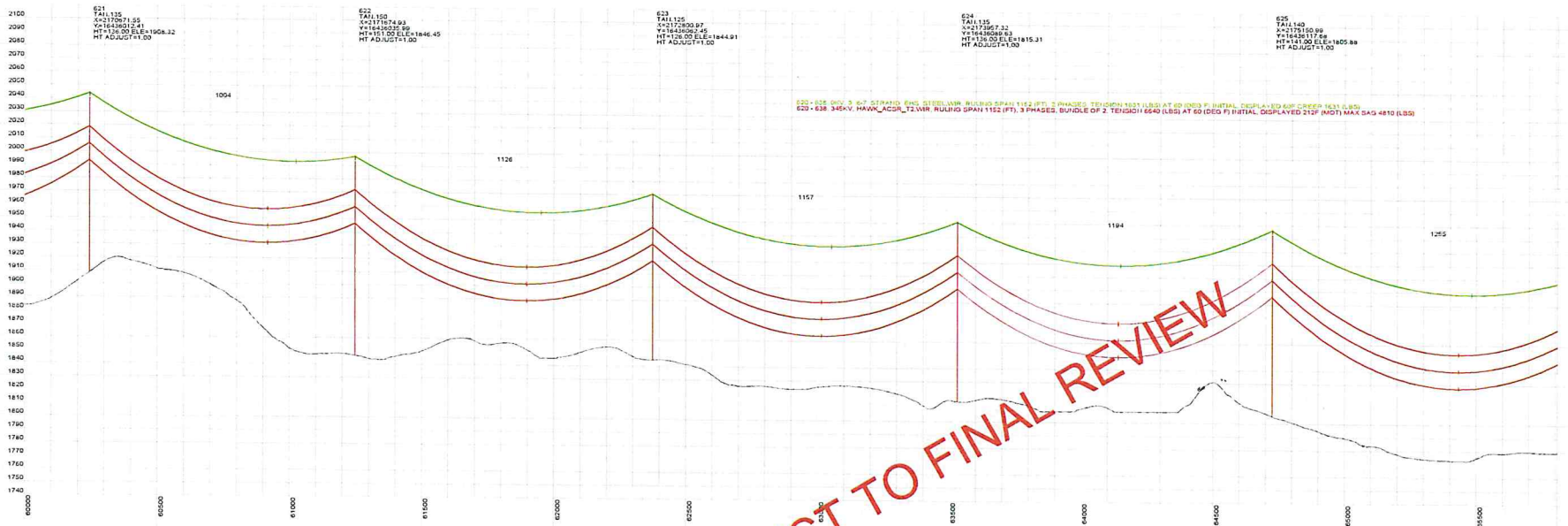
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DESIGN BY: --			DESIGN TENSION: 18% @ 60 F, CREEP
CHECKED BY: --			SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL
APPROVED BY: --			DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
			MIN. GROUND CLEARANCE: 30 FT
			CONDUCTOR SHOWN: 212 F, MAX SAG
			COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-10
REVISION: E
127156



PRELIMINARY SUBJECT TO FINAL REVIEW

20140515
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 FINAL REVIEW

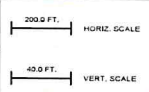


REVISIONS		APPROVALS			DATE	DESIGN DATA
E	GENERAL REVISIONS	DJF	DJF	DJF	05/15/14	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F. CREEP SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT CONDUCTOR SHOWN: 212 F. MAX SAG COORDINATE SYSTEM: UTM ZONE 14N, US FT
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF	12/12/13	
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH	12/04/13	
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH	09/27/13	
A	PRELIMINARY SPOTTING	PEI	PEI		05/03/13	
REV	DESCRIPTION	DWN	DGN	CHK	DATE	APPROVED BY: --

REVISIONS	APPROVALS	DATE	DESIGN DATA
	DRAWN BY: --		CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F. CREEP SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT CONDUCTOR SHOWN: 212 F. MAX SAG COORDINATE SYSTEM: UTM ZONE 14N, US FT
	DESIGN BY: --		
	CHECKED BY: --		
	APPROVED BY: --		



BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-11
 REVISION: E
 127156



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SUBJECT TO
FINAL REVIEW



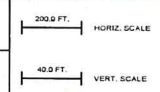
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C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH
A	PRELIMINARY SPOTTING	PEI	PEI	

APPROVALS		DATE
DRAWN BY: --		
DESIGN BY: --		
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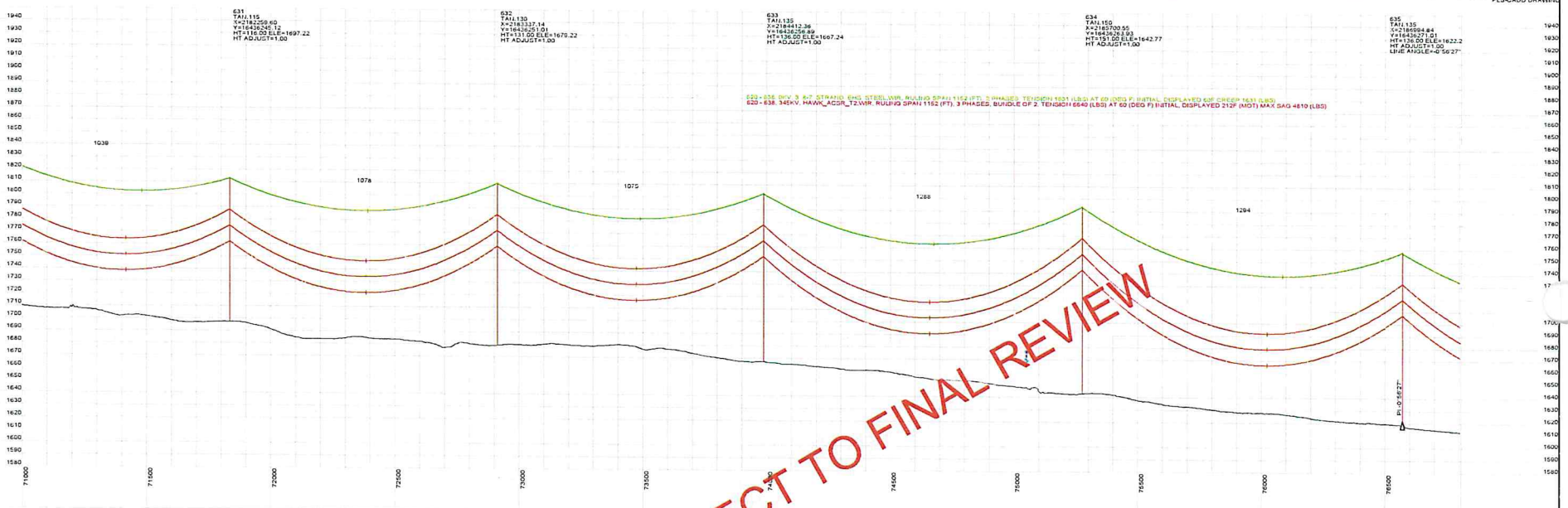
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SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL	
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP	
MIN. GROUND CLEARANCE: 30 FT	
CONDUCTOR SHOWN: 212 F, MAX SAG	
COORDINATE SYSTEM: UTM ZONE 14N, US FT	



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-12
REVISION: E
127156



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FINAL REVIEW



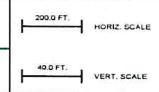
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C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH 12/04/13
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH 09/27/13
A	PRELIMINARY SPOTTING	PEI	PEI	05/03/13

APPROVALS	
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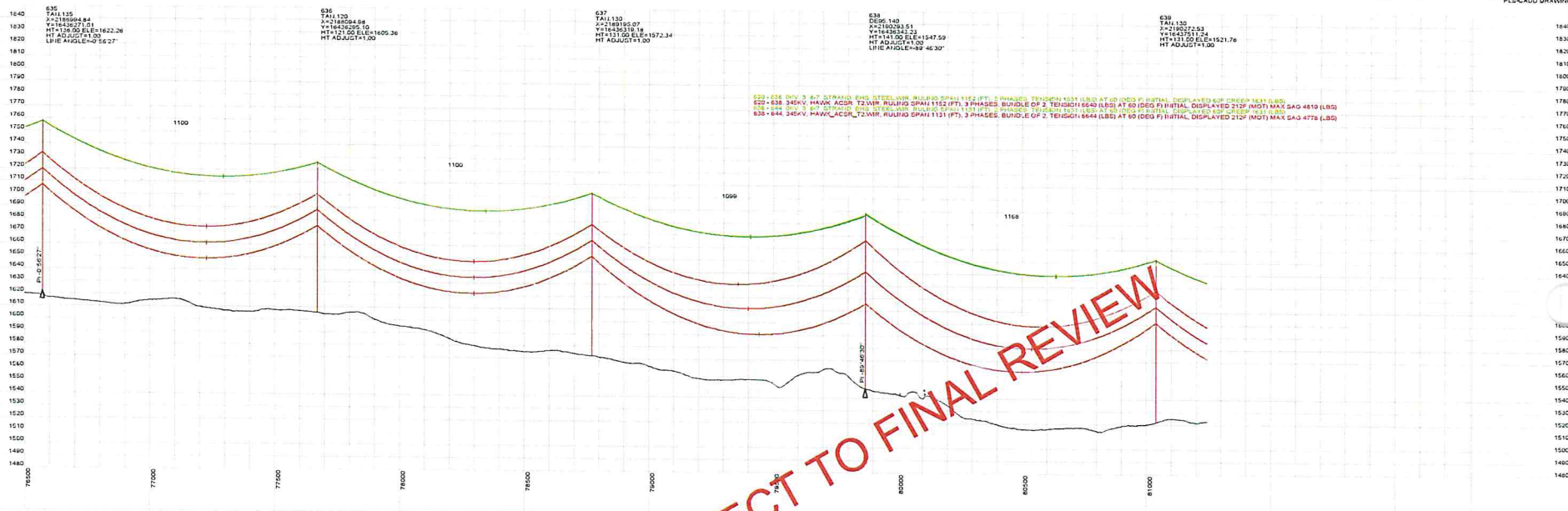
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	DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
	MIN. GROUND CLEARANCE: 30 FT
	CONDUCTOR SHOWN: 212 F, MAX SAG
	COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-13
REVISION: E
127156



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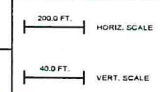
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REV	DESCRIPTION	DWN	DGH	CHK
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C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH
A	PRELIMINARY SPOTTING	PEI	PEI	

APPROVALS		DATE
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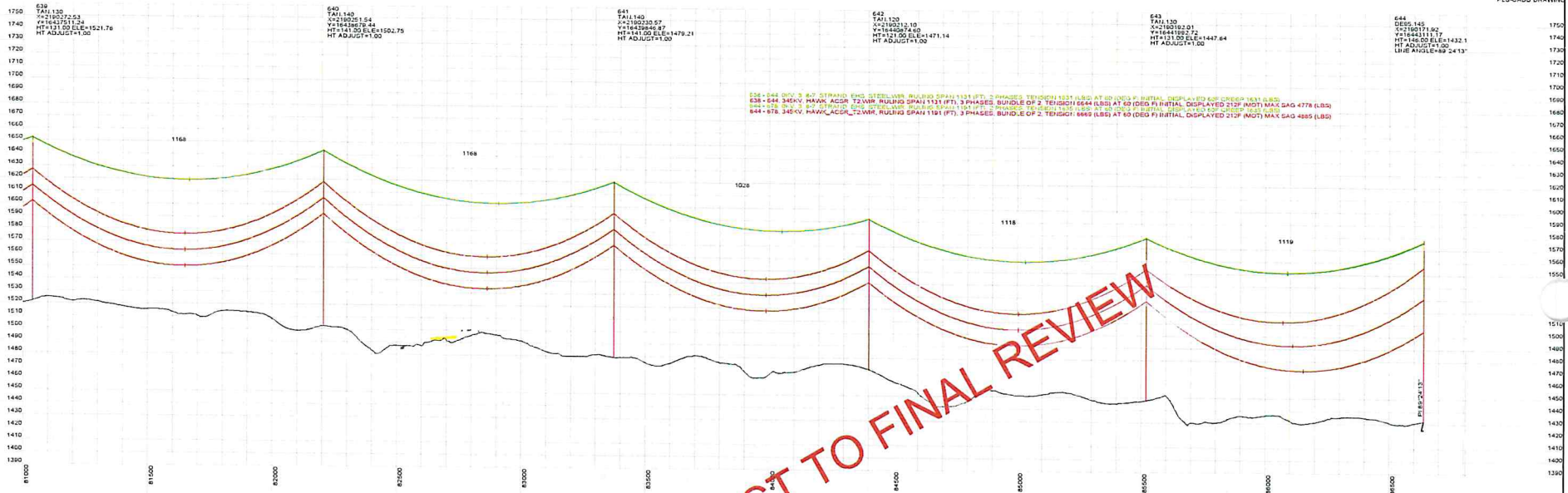
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CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR	
DESIGN TENSION: 18% @ 0 F. CREEP	
SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL	
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP	
MIN. GROUND CLEARANCE: 30 FT	
CONDUCTOR SHOWN: 212 F. MAX SAG	
COORDINATE SYSTEM: UTM ZONE 14N, US FT	



BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-14
 REVISION: E
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REVISIONS				
REV	DESCRIPTION	DWN	DGN	CHK
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D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH
A	PRELIMINARY SPOTTING	PEI	PEI	

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

DESIGN DATA	
CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR	
DESIGN TENSION: 16% @ 0 F CREEP	
SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL	
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP	
MIN. GROUND CLEARANCE: 30 FT	
CONDUCTOR SHOWN: 212 F, MAX SAG	
COORDINATE SYSTEM: UTM ZONE 14N, US FT	

BSS+E
 Dig Stone South to Ellendale

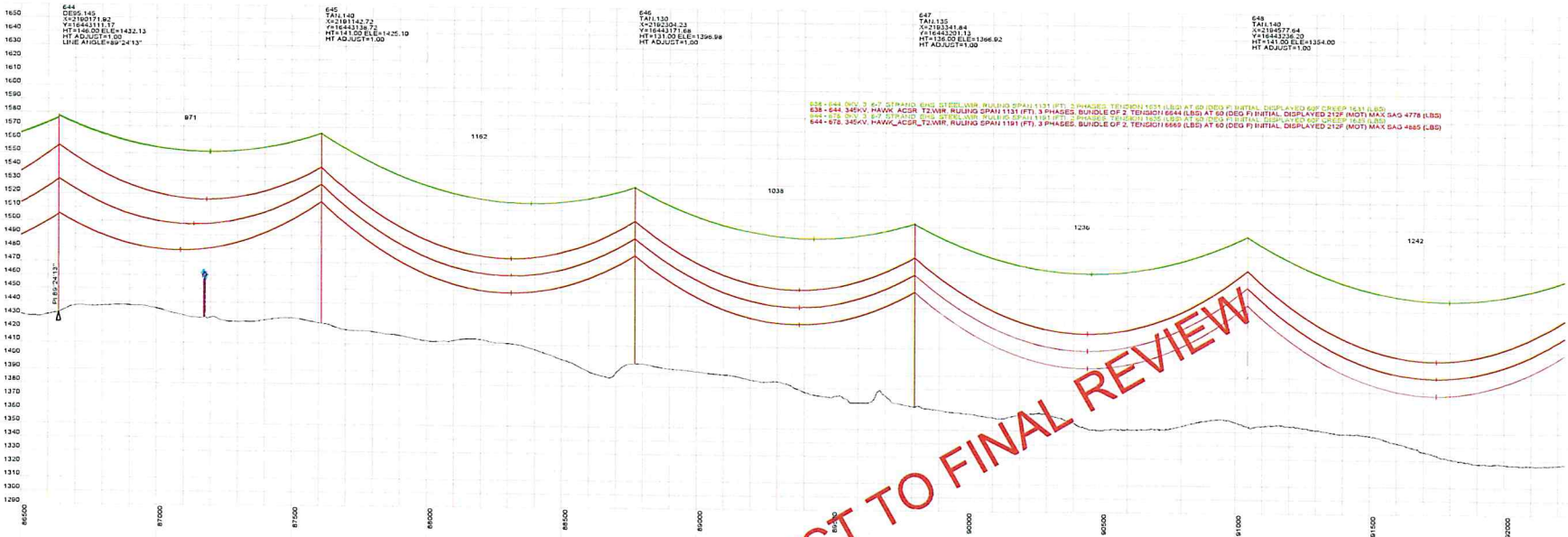
BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE

200.0 FT. HORIZ. SCALE

40.0 FT. VERT. SCALE

NORTH

DWG. NO.
 P4-15
 REVISION: E
 127156



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 FINAL REVIEW

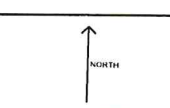
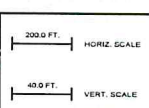


REVISIONS			
REV	DESCRIPTION	DWN	CHK
E	GENERAL REVISIONS	DJF	DJF
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B	ISSUED FOR SD REVIEW	JRC	SMH
A	PRELIMINARY SPOTTING	PEI	PEI

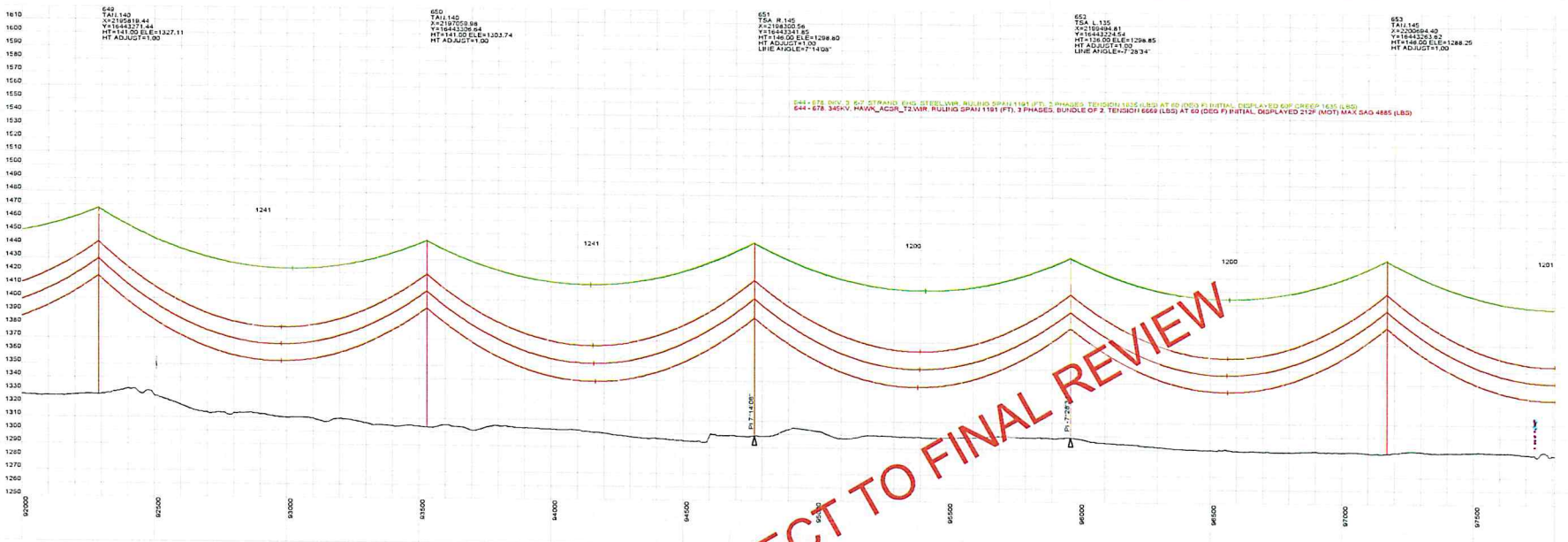
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DESIGN BY: —	DATE
CHECKED BY: —	DATE
APPROVED BY: —	DATE

DESIGN DATA	
CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR	DATE
DESIGN TENSION: 18% @ 0 F, CREEP	DATE
SHIELD WIRE: 2-3/8" 7 S STRAND EHS STEEL	DATE
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP	DATE
MIN. GROUND CLEARANCE: 30 FT	DATE
CONDUCTOR SHOWN: 212 F, MAX SAG	DATE
COORDINATE SYSTEM: UTM ZONE 14N, US FT	DATE

BSS+E
 Big Stone South to Ellendale
 BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-16
 REVISION: E
 127156



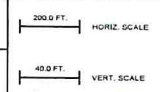
20140515
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 SUBJECT TO
 FINAL REVIEW



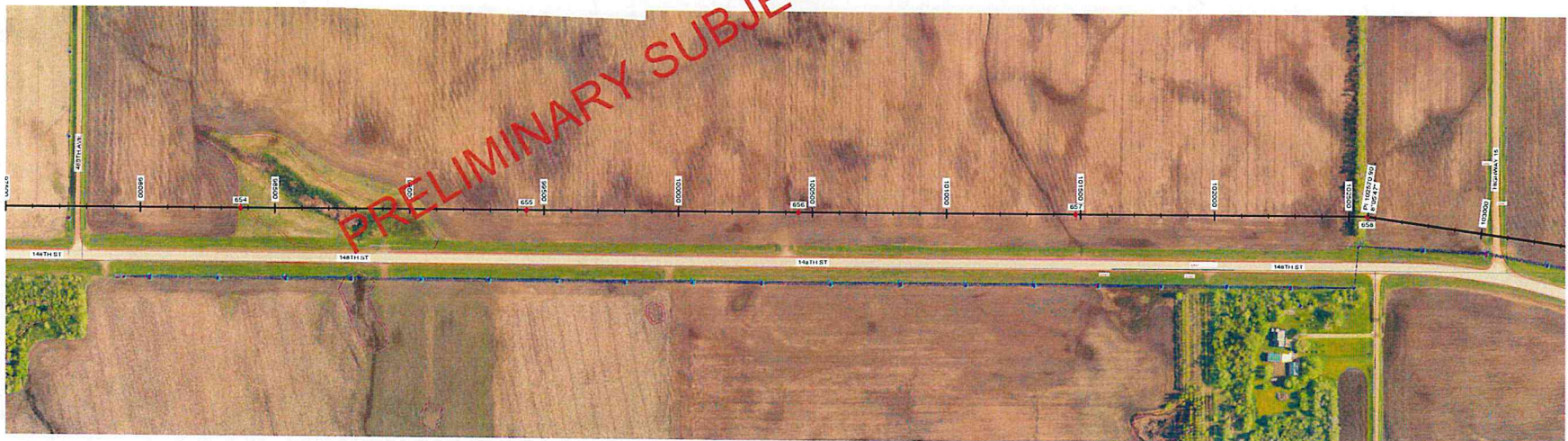
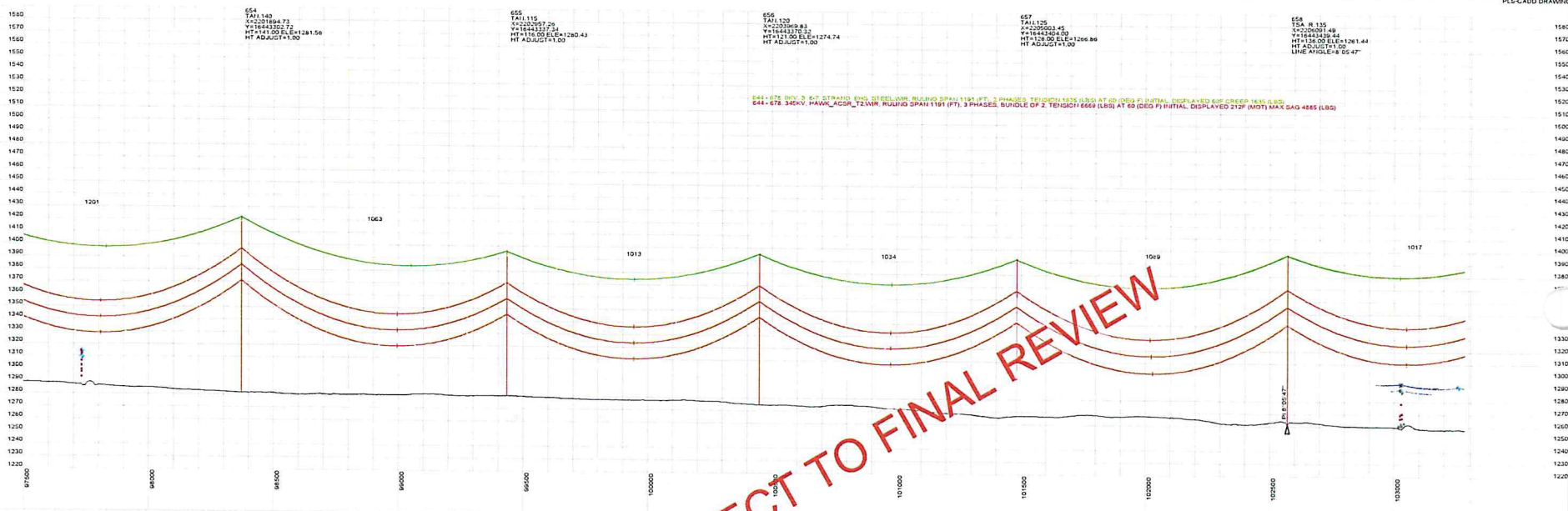
REVISIONS					APPROVALS		DATE	DESIGN DATA
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D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF	12/12/13	DESIGN BY: —		
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH	12/04/13	CHECKED BY: —		
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH	09/27/13	APPROVED BY: —		
A	PRELIMINARY SPOTTING	PEI	PEI		05/03/13			
REV#	DESCRIPTION	DMN	DGH	CHK	DATE	APPROVED BY: —		



BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-17
 REVISION: E
 127156



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SUBJECT TO
FINAL REVIEW

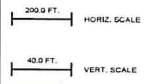


REVISIONS					APPROVALS		DATE	DESIGN DATA
E	GENERAL REVISIONS	DJF	DJF	DJF	05/15/14	DRAWN BY: —	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F CREEP SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT CONDUCTOR SHOWN: 212 F, MAX SAG COORDINATE SYSTEM: UTM ZONE 14N, US FT	
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF	12/12/13	DESIGN BY: —		
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH	12/04/13	CHECKED BY: —		
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH	09/27/13	APPROVED BY: —		
A	PRELIMINARY SPOTTING	PEI	PEI		05/03/13			
REV	DESCRIPTION	DWN	DGN	CHK	DATE			

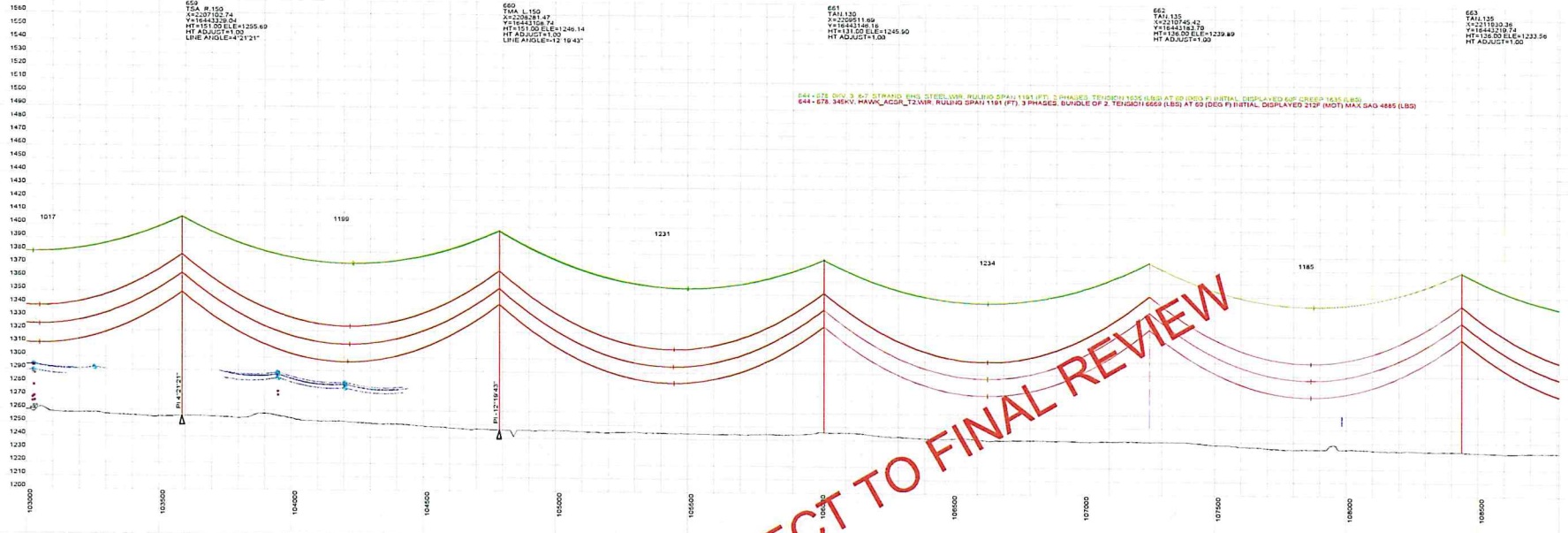
DATE	DESIGN DATA
	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F CREEP SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT CONDUCTOR SHOWN: 212 F, MAX SAG COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-18
REVISION: E
127156



20140515
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FINAL REVIEW



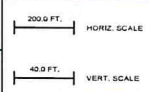
REV	DESCRIPTION	DWN	DGN	CHK	DATE
E	GENERAL REVISIONS	DJF	DJF	DJF	05/15/14
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF	12/12/13
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH	12/04/13
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH	09/27/13
A	PRELIMINARY SPOTTING	PEI	PEI		05/03/13

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

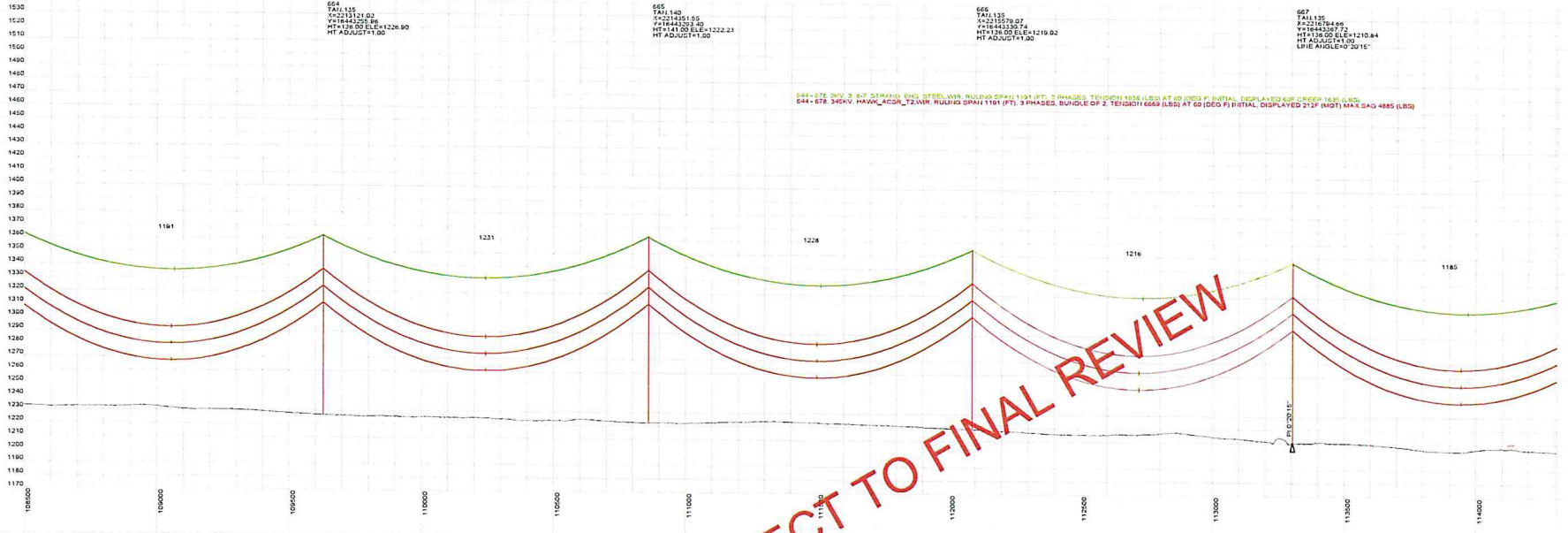
DESIGN DATA
CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR
DESIGN TENSION: 18% @ 6 F. CREEP
SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
MIN. GROUND CLEARANCE: 30 FT
CONDUCTOR SHOWN: 212 F. MAX SAG
COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-19
REVISION: E
127156



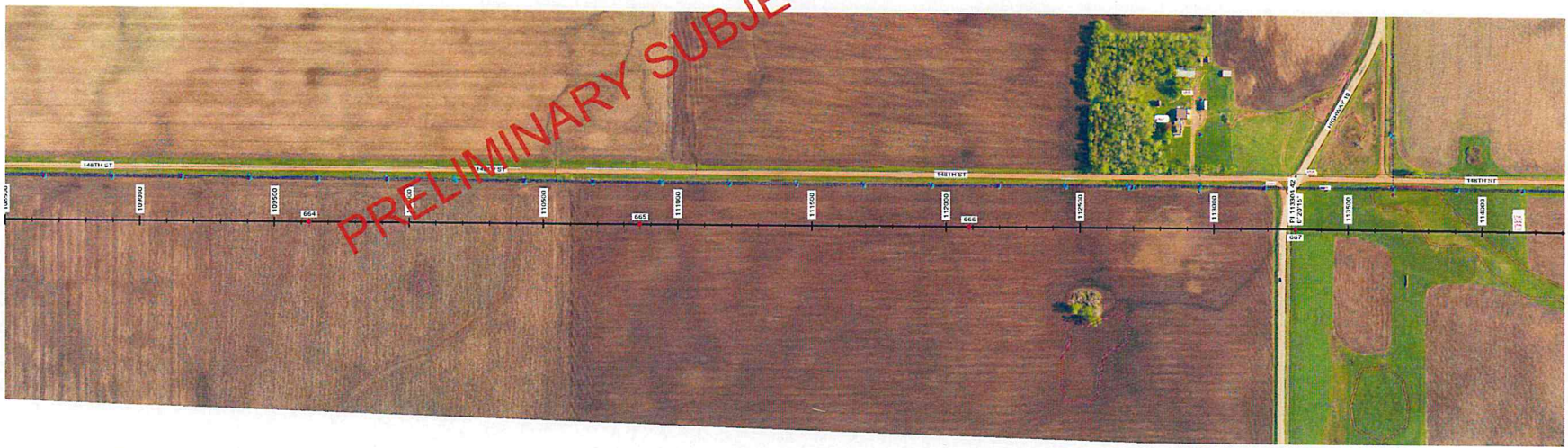
644-072 2HVY. 3 PHASES (2X) STEEL W/WR. BUNDLED SPAH 1191 (FT), 3 PHASES. BUNDLE OF 2, TENSION 6669 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED 60F CREEP 1636 (LBS)
 644-078 2HVY. 3 PHASES (2X) STEEL W/WR. BUNDLED SPAH 1191 (FT), 3 PHASES. BUNDLE OF 2, TENSION 6669 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED 212F (NOT) MAX SAG 4885 (LBS)

654
 TAZI 115
 V=2313121.02
 V=1844325.86
 HT=126.00 ELEV=1226.90
 HT ADJUST=1.00

655
 TAZI 140
 V=2124511.55
 V=1844325.86
 HT=144.00 ELEV=1222.21
 HT ADJUST=1.00

656
 TAZI 135
 V=215579.07
 V=1844325.86
 HT=138.00 ELEV=1219.82
 HT ADJUST=1.00

657
 TAZI 135
 V=215579.07
 V=1844325.86
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 LRIE ANGLE=0.2016°



20140515
 PRELIMINARY
 SUBJECT TO
 FINAL REVIEW



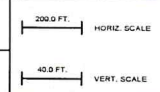
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REV	DESCRIPTION	DWN	DCN	CHK
E	GENERAL REVISIONS	DJF	DJF	DJF
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH
A	PRELIMINARY SPOTTING	PEI	PEI	

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

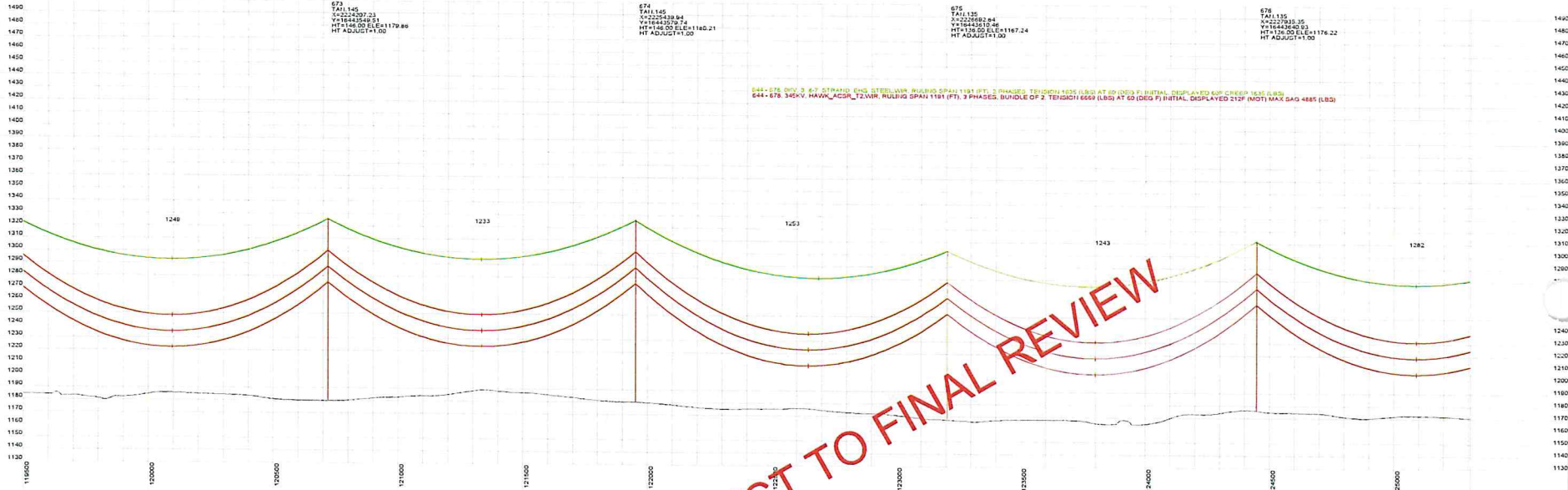
DESIGN DATA
 CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR
 DESIGN TENSION: 18% @ 0 F CREEP
 SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
 MIN. GROUND CLEARANCE: 30 FT
 CONDUCTOR SHOWN: 212 F, MAX SAG
 COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-20
 REVISION: E
 127156



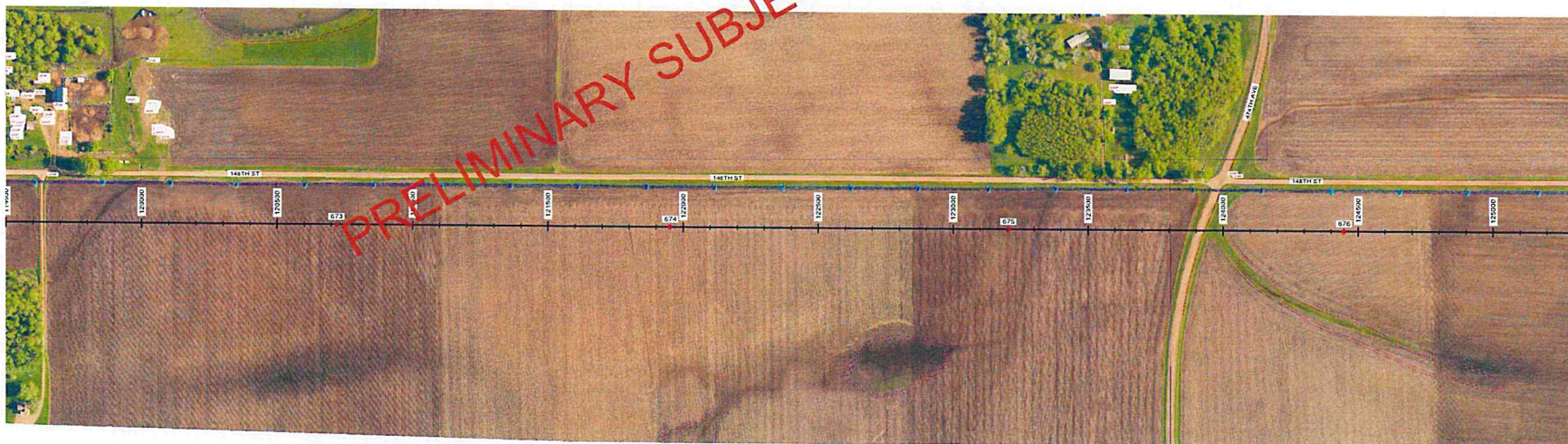
673
TALL 145
V=2224597.31
V=16443249.51
HT=146.00 ELEV=1179.86
HT ADJUST=1.00

674
TALL 145
V=2224597.31
V=16443249.51
HT=146.00 ELEV=1140.21
HT ADJUST=1.00

676
TALL 135
V=2224597.31
V=16443249.51
HT=146.00 ELEV=1167.24
HT ADJUST=1.00

678
TALL 135
V=2224597.31
V=16443249.51
HT=146.00 ELEV=1176.22
HT ADJUST=1.00

644-676 (KV) 3-Ø-37 PHASE EHS STEELWIRE BUNDLES SPAN 131 FT, 2 PHASES, TENSION 1035 (LBS) AT 60 (D) F, INITIAL DISPLAYED 60 F CREEP 1635 (LBS)
644-678 (KV) MAXX_ACR_12.5WR, RULING SPAN 131 FT, 3 PHASES, BUNDLE OF 2, TENSION 669 (LBS) AT 60 (DEG F) INITIAL, DISPLAYED 210 F (NOTI) MAX SAG 485 (LBS)



20140515
PRELIMINARY
SUBJECT TO
FINAL REVIEW



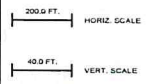
REVISIONS					
REV	DESCRIPTION	DWN	DGN	CHK	DATE
E	GENERAL REVISIONS	DJF	DJF	DJF	05/15/14
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF	12/12/13
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH	12/04/13
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH	09/27/13
A	PRELIMINARY SPOTTING	PEI	PEI		05/03/13

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

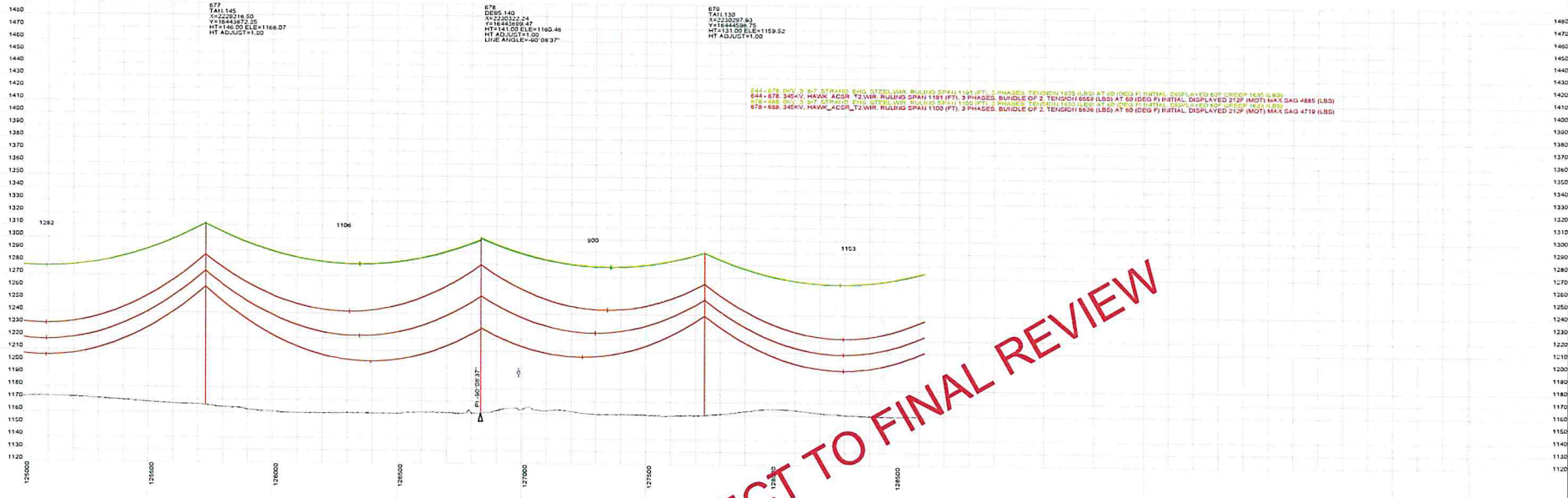
DESIGN DATA	
CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR	
DESIGN TENSION: 18% @ 0 F, CREEP	
SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL	
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP	
MIN. GROUND CLEARANCE: 30 FT	
CONDUCTOR SHOWN: 212 F, MAX SAG	
COORDINATE SYSTEM: UTM ZONE 14N, US FT	



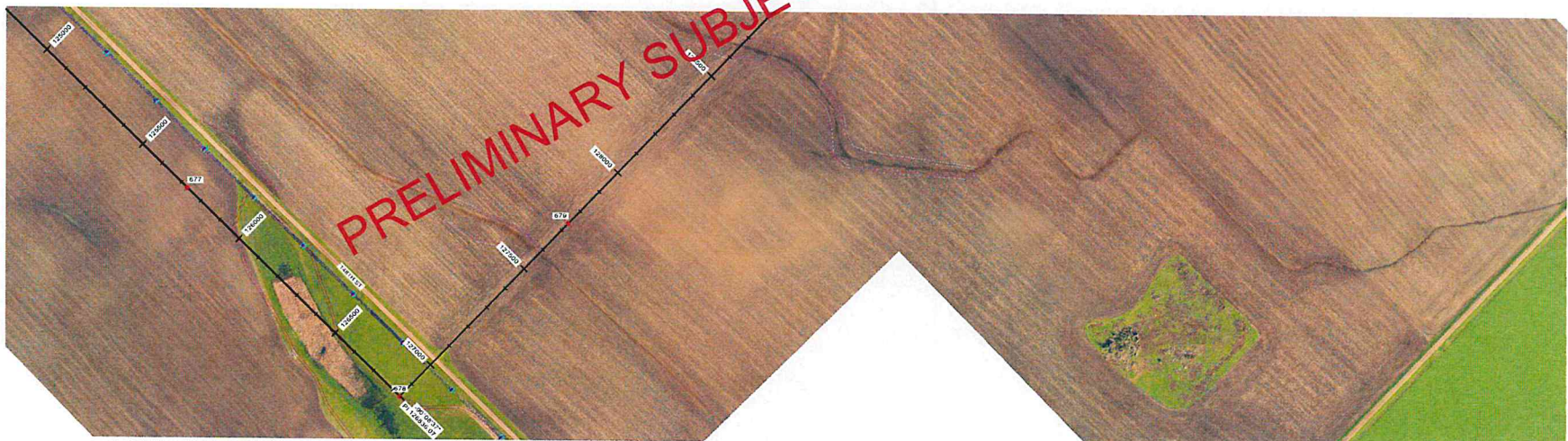
BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-22
REVISION: E
127156



PRELIMINARY SUBJECT TO FINAL REVIEW



20140515
 PRELIMINARY
 SUBJECT TO
 FINAL REVIEW

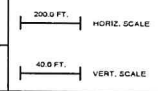


REVISIONS				
REV	DESCRIPTION	DWN	DOH	CHK
E	GENERAL REVISIONS	DJF	DJF	05/15/14
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	12/12/13
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	12/04/13
B	ISSUED FOR SD REVIEW	JRC	JRC	08/27/13
A	PRELIMINARY SPOTTING	PEI	PEI	05/03/13

APPROVALS	DATE	DESIGN DATA
DRAWN BY: —		CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR
DESIGN BY: —		DESIGN TENSION: 18% @ 90 F, CREEP
CHECKED BY: —		SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL
APPROVED BY: —		DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
		MIN. GROUND CLEARANCE: 30 FT
		CONDUCTOR SHOW: 212 F, MAX SAG
		COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-23
 REVISION: E
 127156

640
TAXI 135
X=122236.78
Y=164827.95
HT#136.05 ELEV=1140.37
HT ADJUST=1.00

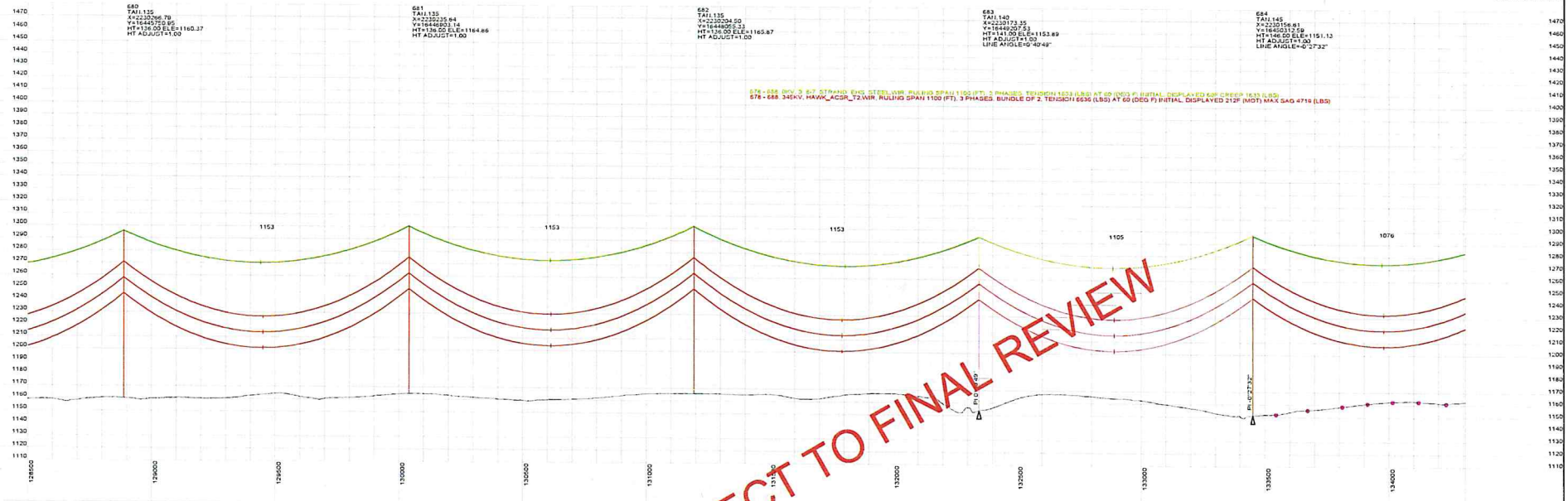
641
TAXI 135
X=123305.84
Y=164827.95
HT#136.05 ELEV=1144.86
HT ADJUST=1.00

642
TAXI 135
X=123305.84
Y=164827.95
HT#136.05 ELEV=1165.87
HT ADJUST=1.00

643
TAXI 140
X=123173.35
Y=164827.95
HT#141.00 ELEV=1153.89
HT ADJUST=1.00
LINE ANGLE=90.48°

644
TAXI 145
X=123173.35
Y=164827.95
HT#146.00 ELEV=1151.13
HT ADJUST=1.00
LINE ANGLE=0.2732°

678 - 688 345KV HAWK_ACSR_72.5WR FULLHD SPAN 1100 FT, 3 PHASES, BUNDLE OF 7, TENSION 1653 LBS, AT 60 FWD 0.5' TYPICAL, MAX SAG 4719 (LBS)



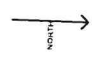
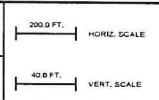
20140615
PRELIMINARY
SUBJECT TO
FINAL REVIEW



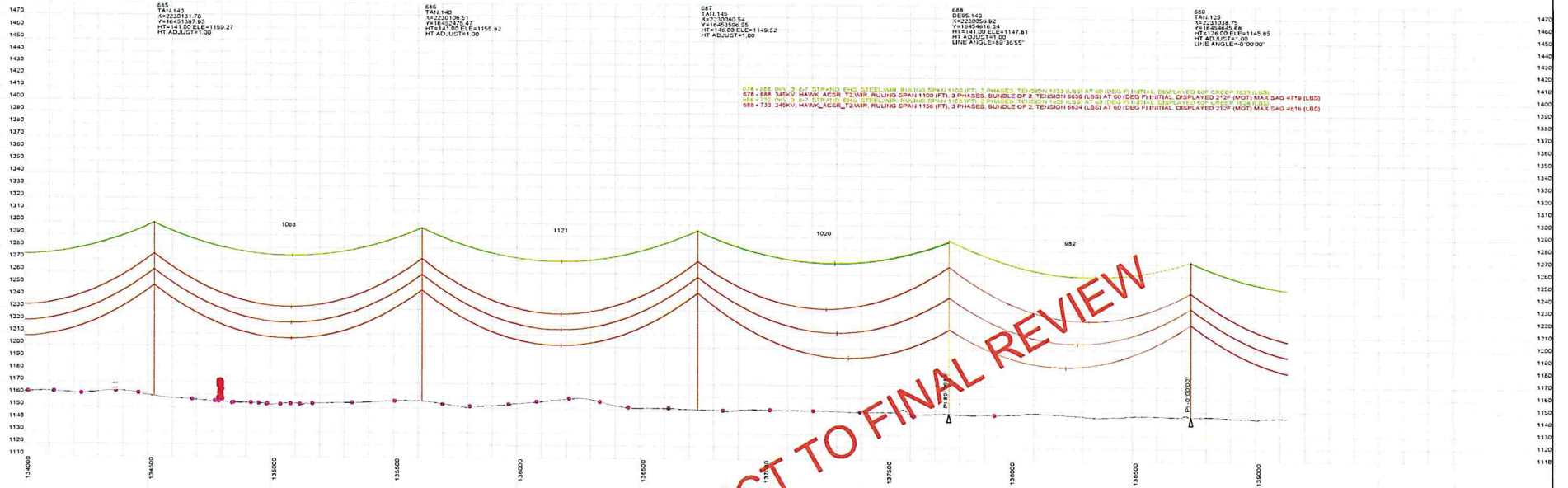
REVISIONS					APPROVALS		DATE	DESIGN DATA
E	GENERAL REVISIONS	DJF	DJF	DJF	05/15/14	DESIGNED BY: ---	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F. CREEP SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT CONDUCTOR SHOWN: 212 F. MAX SAG COORDINATE SYSTEM: UTM ZONE 14N, US FT	
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF	12/12/13	DESIGN BY: ---		
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH	12/04/13	CHECKED BY: ---		
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH	09/27/13	APPROVED BY: ---		
A	PRELIMINARY SPOTTING	PEI	PEI		05/03/13			
REV#	DESCRIPTION	DWN	DGN	CHK	DATE			



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-24
REVISION: E
127156



PRELIMINARY SUBJECT TO FINAL REVIEW



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PRELIMINARY
SUBJECT TO
FINAL REVIEW

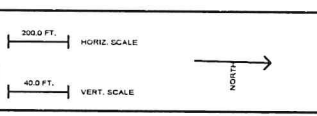


REVISIONS		APPROVALS	DATE	DESIGN DATA		
E	GENERAL REVISIONS	DJF DJF DJF	05/15/14	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR		
D	RCR 17 & 19, STR 635 - 654	JRC JRC DJF	12/12/13	DESIGN TENSION: 18% @ 0 F, CREEP		
C	RCR 13 RESPOTTED STR 721 - 725	JRC JRC SMH	12/04/13	SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL		
B	ISSUED FOR SD REVIEW	JRC JRC SMH	09/27/13	DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP		
A	PRELIMINARY SPOTTING	PEI PEI	05/03/13	MIN. GROUND CLEARANCE: 30 FT		
REV	DESCRIPTION	DWN	DCN	CHK	DATE	APPROVED BY: —

REVISIONS		APPROVALS	DATE	DESIGN DATA		
E	GENERAL REVISIONS	DJF DJF DJF	05/15/14	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR		
D	RCR 17 & 19, STR 635 - 654	JRC JRC DJF	12/12/13	DESIGN TENSION: 18% @ 0 F, CREEP		
C	RCR 13 RESPOTTED STR 721 - 725	JRC JRC SMH	12/04/13	SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL		
B	ISSUED FOR SD REVIEW	JRC JRC SMH	09/27/13	DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP		
A	PRELIMINARY SPOTTING	PEI PEI	05/03/13	MIN. GROUND CLEARANCE: 30 FT		
REV	DESCRIPTION	DWN	DCN	CHK	DATE	APPROVED BY: —

BSS+E
Dig Stone South to Ellendale

BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-25
REVISION: E
127156



650
TAXI 135
X=2232341.65
Y=1645403.53
HT+131.00 ELEV=1148.42
HT ADJUST=1.00

651
TAXI 140
X=2232847.38
Y=16454716.48
HT+141.00 ELEV=1146.67
HT ADJUST=1.00

652
TAXI 130
X=2232672.13
Y=16454784.72
HT+130.00 ELEV=1140.49
HT ADJUST=1.00

653
TAXI 135
X=22325891.24
Y=16454784.72
HT+135.00 ELEV=1150.94
HT ADJUST=1.00

654
TAXI 130
X=22325800.26
Y=16454819.13
HT+131.00 ELEV=1146.4
HT ADJUST=1.00

656 - 721 345V, 3 PHASE, 27.00 FT. 477 KCMIL 26/7 TP HAWK ACSR, 2 PHASES, TENSION 18% @ 60 F CREEP, DISPLAYED 50% CREEP 16.28 (LBS)
664 - 723 345V, HAWK ACSR, 72.00 FT. 477 KCMIL 26/7 TP HAWK ACSR, 3 PHASES, BUNDLE OF 2, TENSION 65% @ 60 F CREEP, DISPLAYED 21% (MGT) MAX SAG 48.16 (LBS)



20140515
PRELIMINARY
SUBJECT TO
FINAL REVIEW



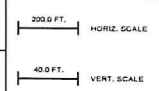
REVISIONS				
E	GENERAL REVISIONS	DJF	DJF	05/15/14
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	12/12/13
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	12/04/13
B	ISSUED FOR SD REVIEW	JRC	JRC	08/27/13
A	PRELIMINARY SPOTTING	PEI	PEI	05/03/13
REV	DESCRIPTION	EXAM	CHK	DATE

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

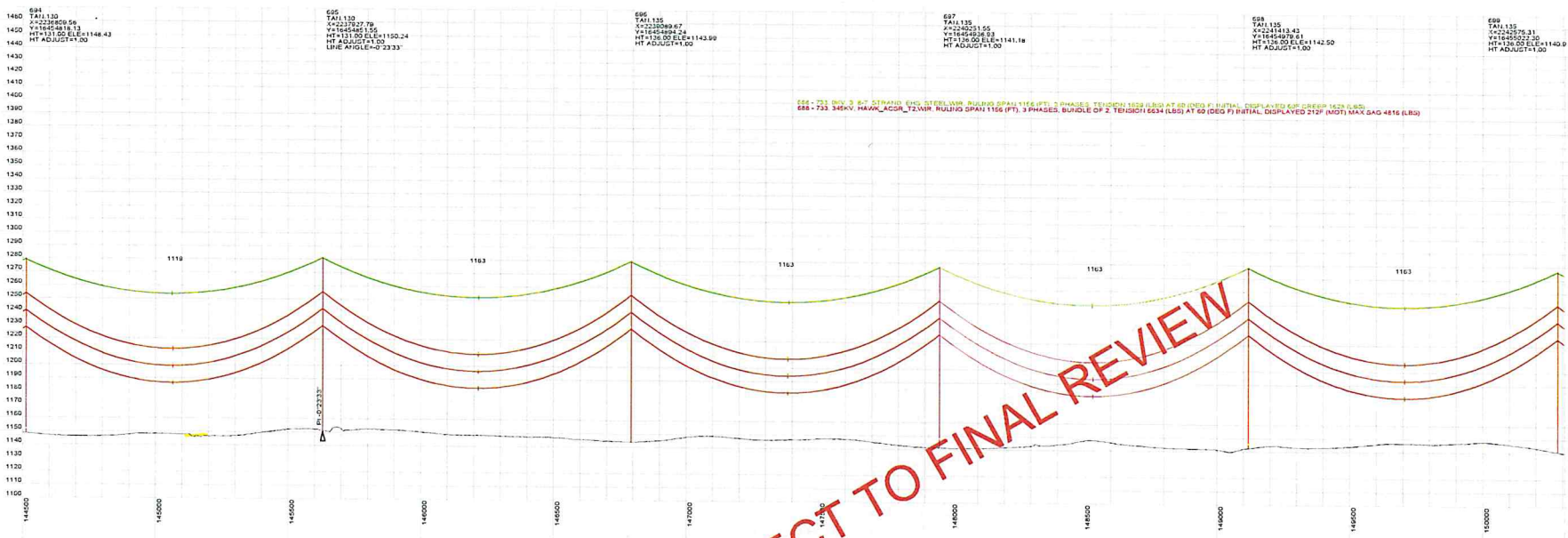
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CONDUCTOR:	(2X) 477 KCMIL 26/7 TP HAWK ACSR
DESIGN TENSION:	18% @ 60 F CREEP
SHIELD WIRE:	2-3/8" 7 STRAND EHS STEEL
DESIGN TENSION:	75% SAG MATCH @ 60 F CREEP
MIN. GROUND CLEARANCE:	30 FT
CONDUCTOR SHOWN:	212 F, MAX SAG
COORDINATE SYSTEM:	UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-26
REVISION: E
127156



688 - 221 SW 3 SW 27 RAVIN (WV STR) 110V BUNDLE SPAN 1156 (FT) 2 PHASES TENSION 1028 (LBS) AT 60 (DEG F) INITIAL DISPLAYED 60 F CREEP 1629 (LBS)
 688 - 221 SW 3 SW 27 RAVIN (WV STR) 110V BUNDLE SPAN 1156 (FT) 3 PHASES BUNDLE OF 2 TENSION 6534 (LBS) AT 60 (DEG F) INITIAL DISPLAYED 212 F (NOT) MAX SAG 4816 (LBS)



20140515
 PRELIMINARY
 SUBJECT TO
 FINAL REVIEW



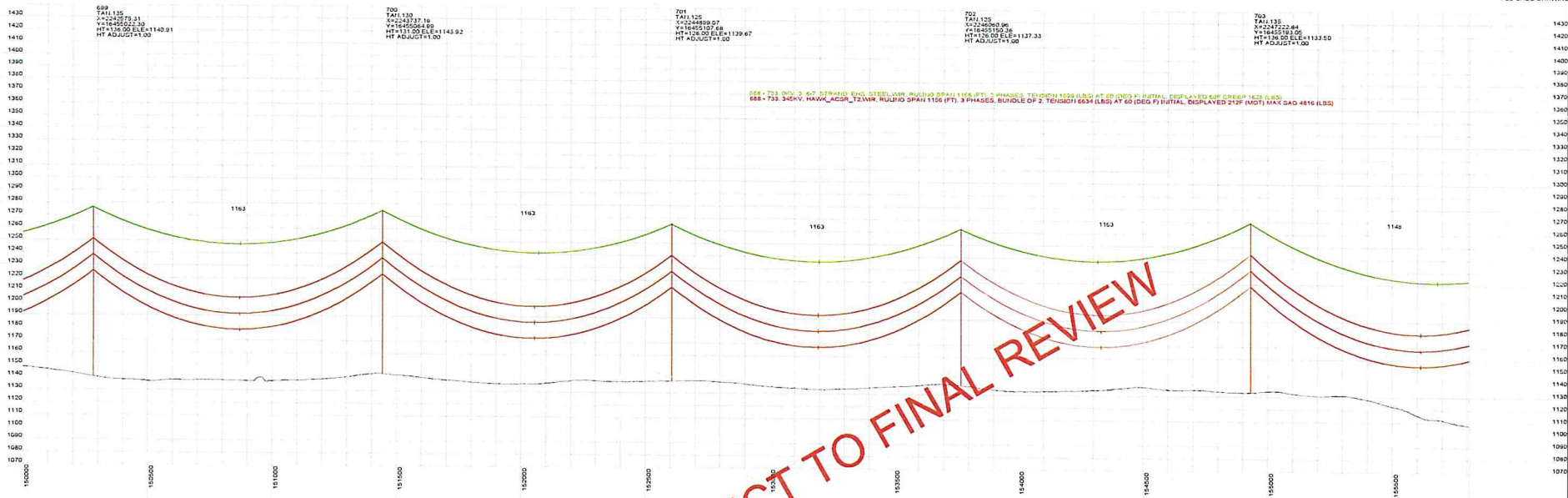
REVISIONS				APPROVALS		DATE	DESIGN DATA
E	GENERAL REVISIONS	DJF	DJF	05/15/14	DESIGNED BY: —		CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F CREEP SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT CONDUCTOR SHOWAN: 212 F, MAX SAG COORDINATE SYSTEM: UTM ZONE 14N, US FT
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	12/12/13	DRAWN BY: —		
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	12/04/13	DESIGN BY: —		
B	ISSUED FOR SD REVIEW	JRC	JRC	09/27/13	CHECKED BY: —		
A	PRELIMINARY SPOTTING	PEI	PEI	05/03/13			
REV	DESCRIPTION	DWN	DGN	CHK	DATE	APPROVED BY: —	

DATE	DESIGN DATA
	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F CREEP SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT CONDUCTOR SHOWAN: 212 F, MAX SAG COORDINATE SYSTEM: UTM ZONE 14N, US FT

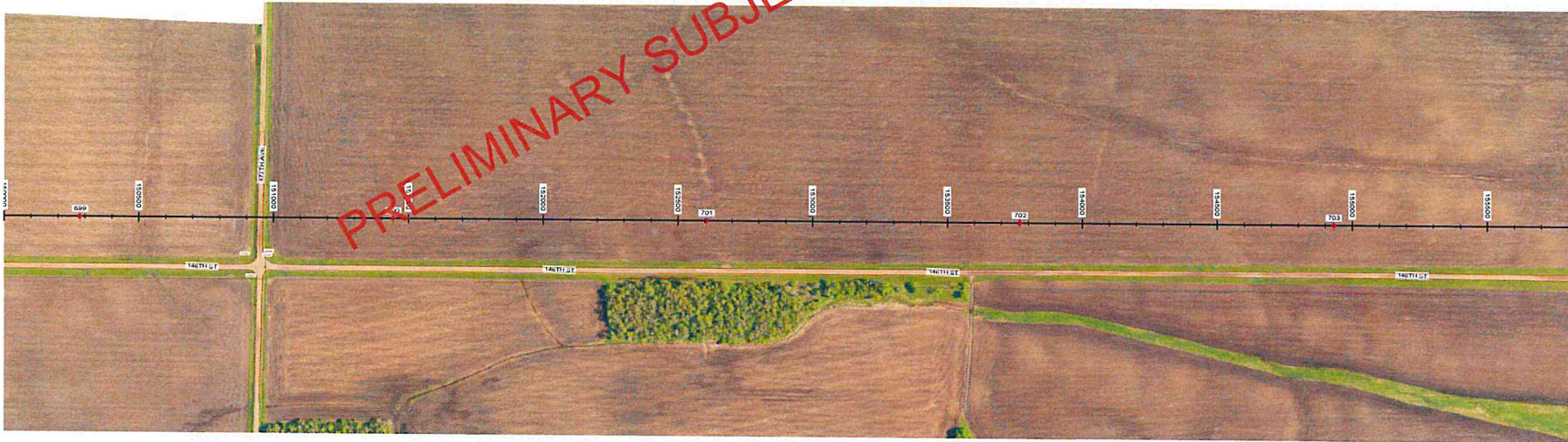

 Big Stone South to Ellendale
BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE

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

DWG. NO.
 P4-27
 REVISION: E
 127156



654 - 731 345KV 3 BKT STRAND EHS STEEL WIRE BUNDLE SPAN 1156 FT. 3 PHASES, BUNDLE OF 7, 1699001 653# LBS @ 60 DEG FT INITIAL, DISPLAYED 210F (NOT) MAX SAG 4816 (LBS)
 658 - 733 345KV HAWK_ACSR_T23MR_RUHPD SPAN 1156 (FT), 3 PHASES, BUNDLE OF 7, 1699001 653# LBS @ 60 DEG FT INITIAL, DISPLAYED 210F (NOT) MAX SAG 4816 (LBS)



20140515
 PRELIMINARY
 SUBJECT TO
 FINAL REVIEW



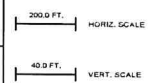
REVISIONS				
REV	DESCRIPTION	DWN	CHK	DATE
E	GENERAL REVISIONS	JRC	JRC	05/15/14
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	12/12/13
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	12/04/13
B	ISSUED FOR SD REVIEW	JRC	JRC	09/27/13
A	PRELIMINARY SPOTTING	PEI	PEI	05/03/13

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

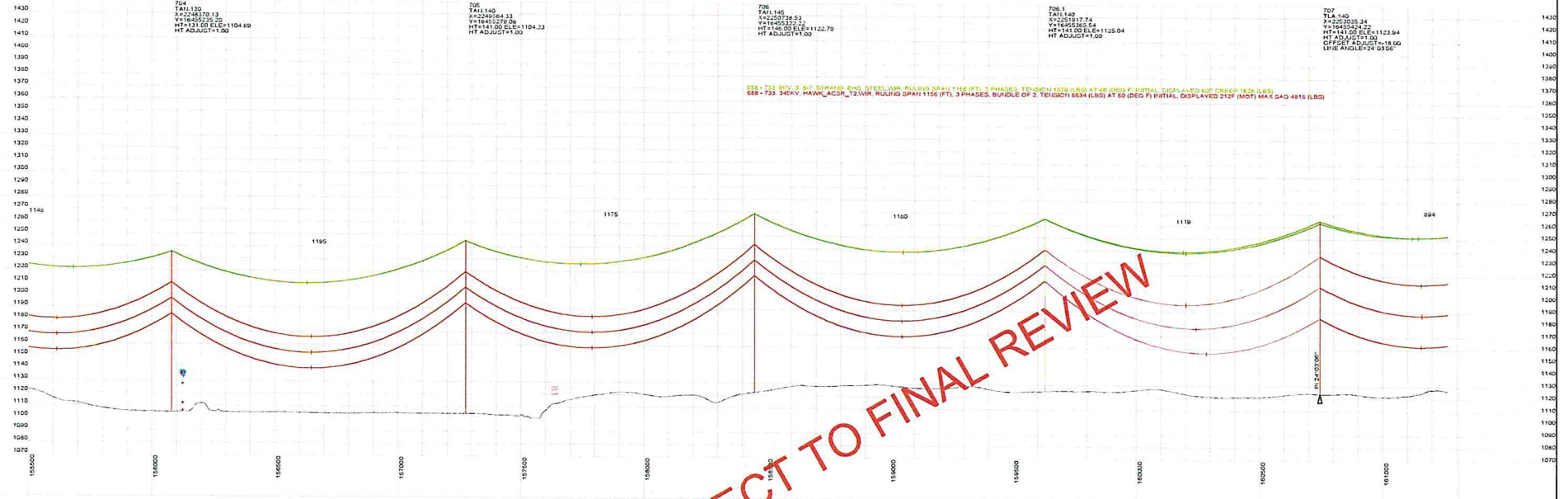
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DESIGN TENSION: 18% B 0 F CREEP	
SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL	
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP	
MIN. GROUND CLEARANCE: 30 FT	
CONDUCTOR SHOWN: 212 F. MAX SAG	
COORDINATE SYSTEM: UTM ZONE 14N, US FT	



BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-28
 REVISION: E
 127156



20140515
PRELIMINARY
SUBJECT TO
FINAL REVIEW



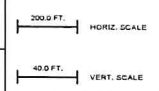
REVISIONS			
REV	DESCRIPTION	DWN	CHK
E	GENERAL REVISIONS	DJF	DJF
D	RCR 17 & 19, STR 635 - 654	JRC	JRC
C	RCR 13 RESPOTTED STR 721 - 725	JRC	SMH
B	ISSUED FOR SD REVIEW	JRC	SMH
A	PRELIMINARY SPOTTING	PEI	PEI

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

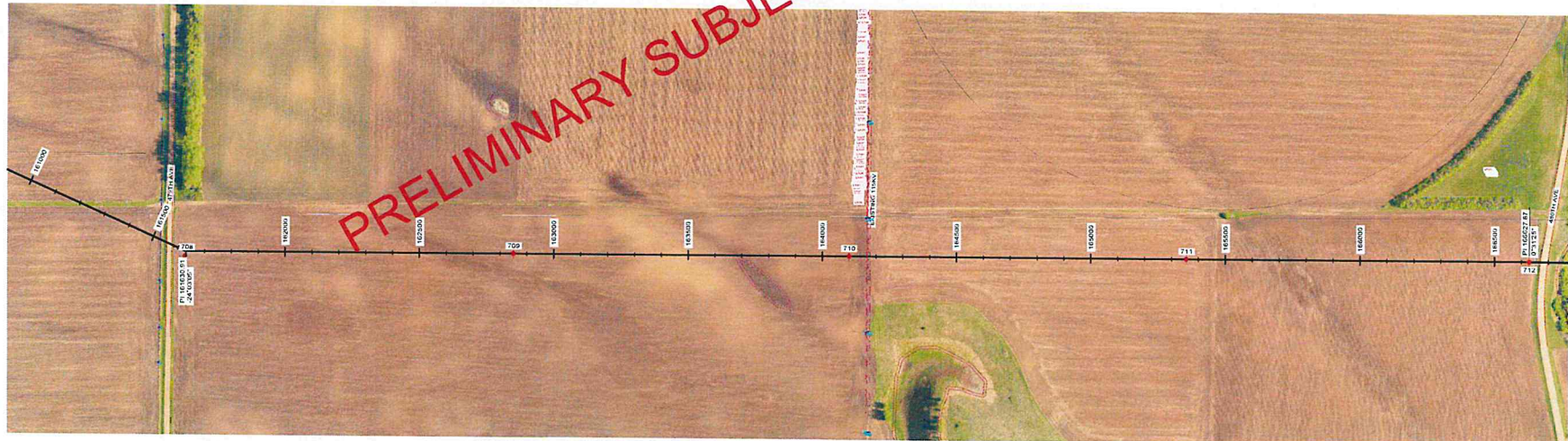
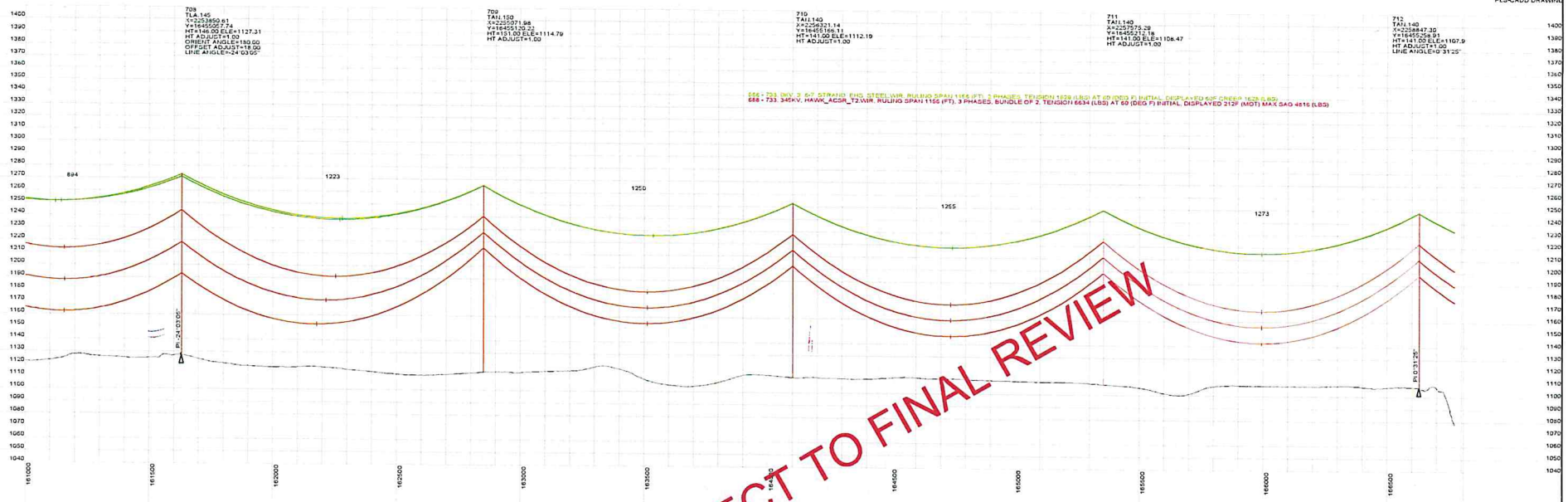
DESIGN DATA	
CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR	
DESIGN TENSION: 18% @ 0 F, CREEP	
SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL	
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP	
MIN. GROUND CLEARANCE: 30 FT	
CONDUCTOR SHOWN: 212 F, MAX SAG	
COORDINATE SYSTEM: UTM ZONE 14N, US FT	



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-29
REVISION: E
127156



20140515
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SUBJECT TO
FINAL REVIEW



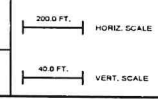
REV	DESCRIPTION	DWN	DGN	CHK	DATE
E	GENERAL REVISIONS	DJF	DJF	DJF	05/15/14
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	DJF	12/12/13
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	SMH	12/04/13
B	ISSUED FOR SD REVIEW	JRC	JRC	SMH	09/27/13
A	PRELIMINARY SPOTTING	PEI	PEI		05/03/13

APPROVALS	DATE
DESIGN BY: —	
DESIGN BY: —	
CHECKED BY: —	
APPROVED BY: —	

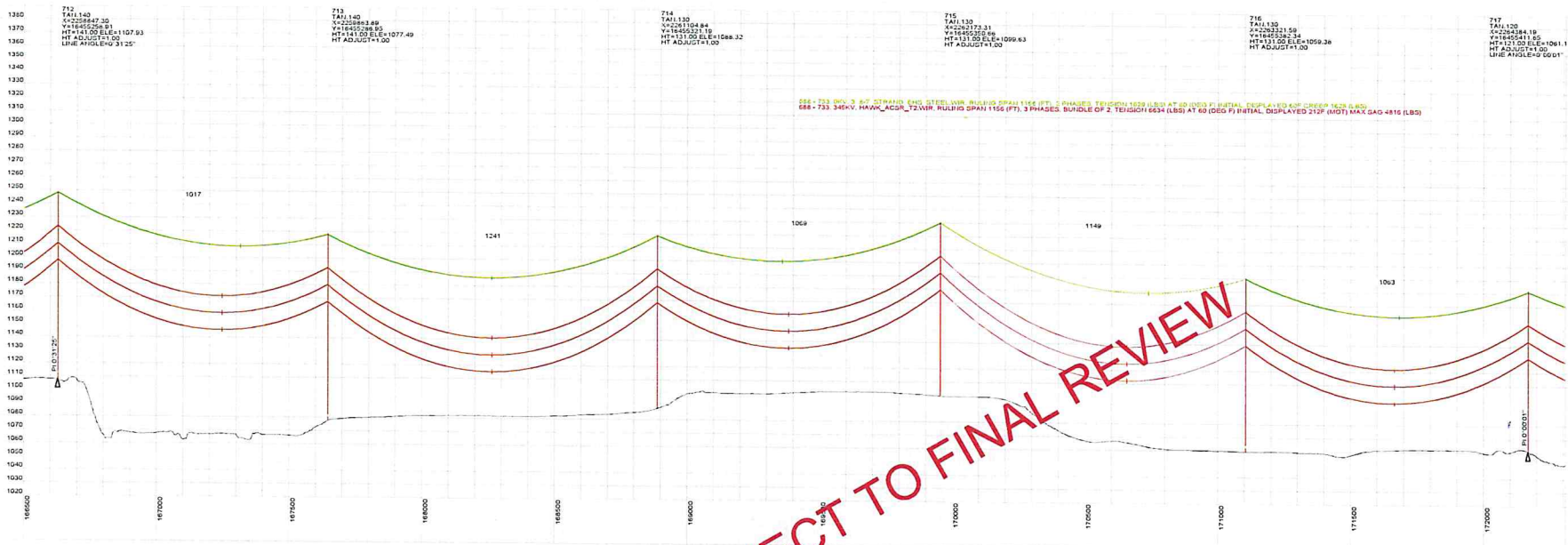
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CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK AC SR
DESIGN TENSION: 18% @ 60 F CREEP
SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL
DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
MIN. GROUND CLEARANCE: 30 FT
CONDUCTOR SHOWN: 212 F, MAX SAG
COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE

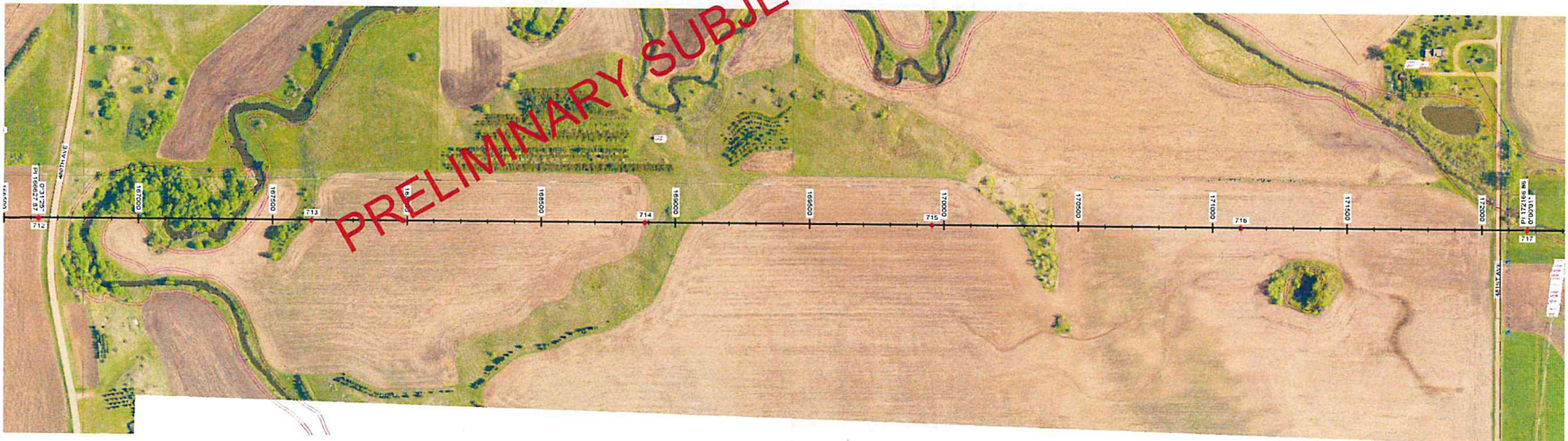


DWG. NO.
P4-30
REVISION: E
127156



226 - 713 345KV 3PH SWAYN 600 FT TOWER BUNDLE SPAN 1156 FT 2 PHASES TENSION 1029 LB/SQ FT BUNDLE DISPLAYED 212F (MGT) MAX SAG 4816 (LBS)
 684 - 713 345KV 3PH SWAYN 600 FT TOWER BUNDLE SPAN 1156 FT 3 PHASES TENSION 1029 LB/SQ AT 80 DEG F INITIAL DISPLAYED 212F (MGT) MAX SAG 4816 (LBS)

PRELIMINARY SUBJECT TO FINAL REVIEW



20140515
 PRELIMINARY
 SUBJECT TO
 FINAL REVIEW

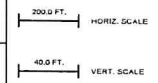


REVISIONS			
E	GENERAL REVISIONS	DJF	DJF 05/15/14
D	RCR 17 & 19, STR 635 - 654	JRC	JRC 12/12/13
C	RCR 13 RESPOTTED STR 721 - 725	JRC	SMH 12/04/13
B	ISSUED FOR SD REVIEW	JRC	SMH 09/27/13
A	PRELIMINARY SPOTTING	PEI	PEI 05/03/13
REV	DESCRIPTION	DWN	DGN CHK DATE

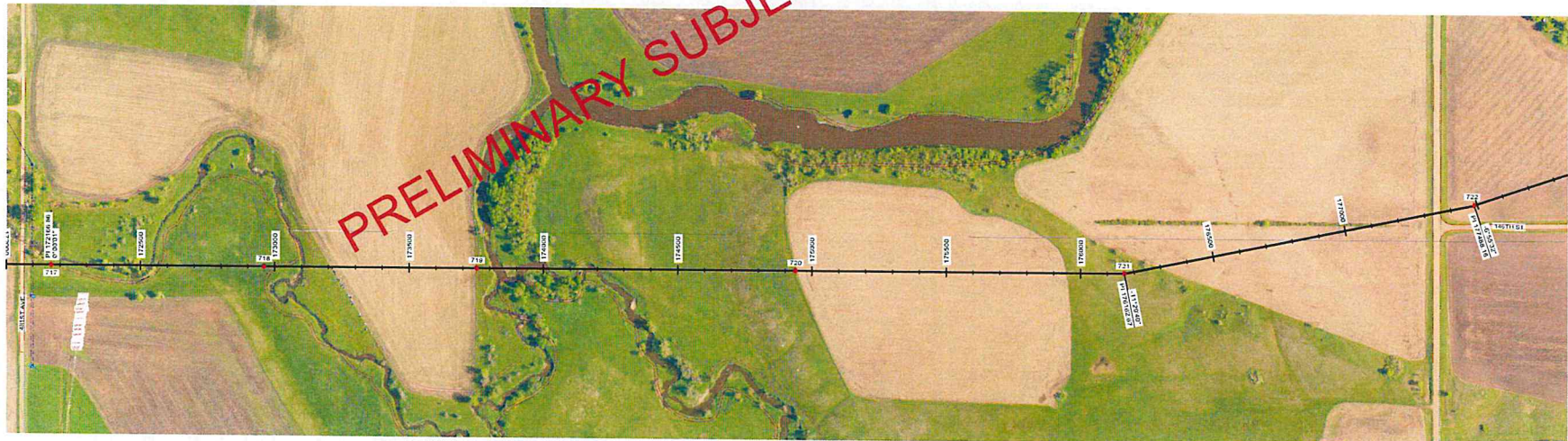
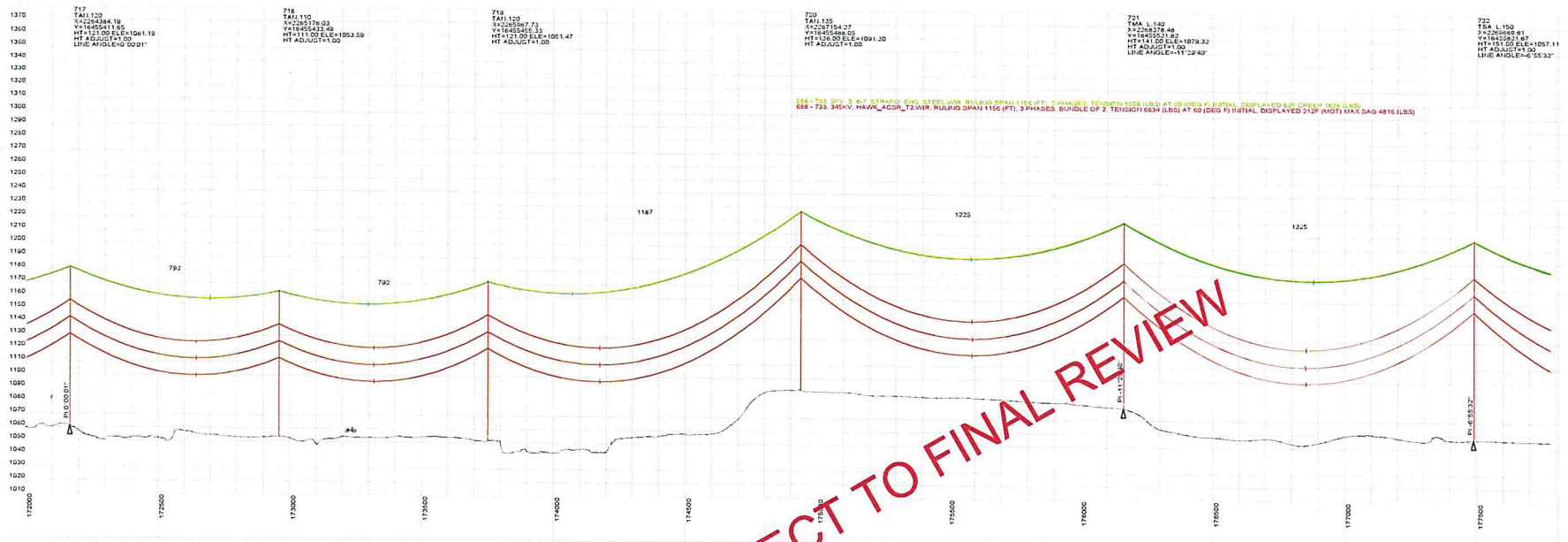
APPROVALS		DATE	DESIGN DATA
DRAWN BY: —			CONDUCTOR: (3X) 477 KCMIL 26/7 TP HAWK ACSR
DESIGN BY: —			DESIGN TENSION: 18% @ 80 F, CREEP
CHECKED BY: —			SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL
APPROVED BY: —			DESIGN TENSION: 75% SAG MATCH @ 80 F CREEP
			MIN. GROUND CLEARANCE: 30 FT
			CONDUCTOR SHOW: 212 F, MAX SAG
			COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-31
 REVISION: E
 127156



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 SUBJECT TO
 FINAL REVIEW

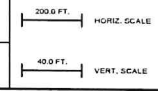


REVISIONS		APPROVALS		DATE	DESIGN DATA	
E	GENERAL REVISIONS	DJF	DJF	05/15/14	CONDUCTOR: (2X) 477 KCMIL 26 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F, CREEP SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT CONDUCTOR SHOWN: 212 F, MAX SAG COORDINATE SYSTEM: UTM ZONE 14N, US FT	
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	12/12/13		
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	12/04/13		
B	ISSUED FOR SD REVIEW	JRC	JRC	09/27/13		
A	PRELIMINARY SPOTTING	PEI	PEI	05/03/13		
REV	DESCRIPTION	DWN	DCN	CHK	DATE	APPROVED BY: —

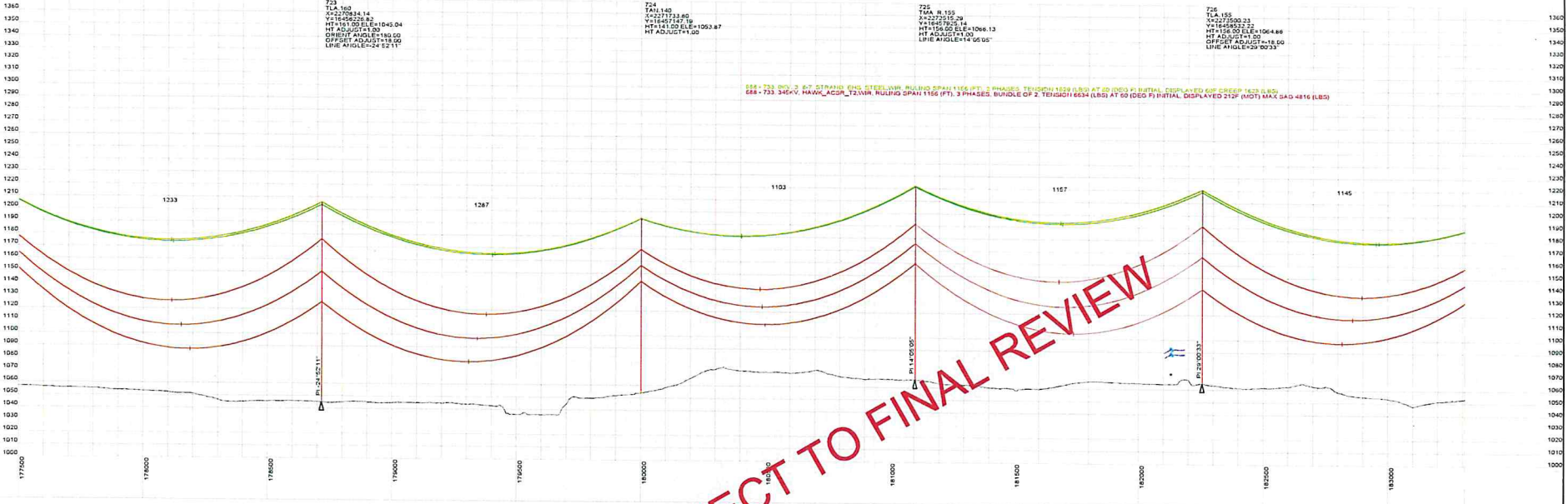
APPROVALS	DATE	DESIGN DATA
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DESIGN BY: —		
CHECKED BY: —		
APPROVED BY: —		



BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-32
 REVISION: E
 127156



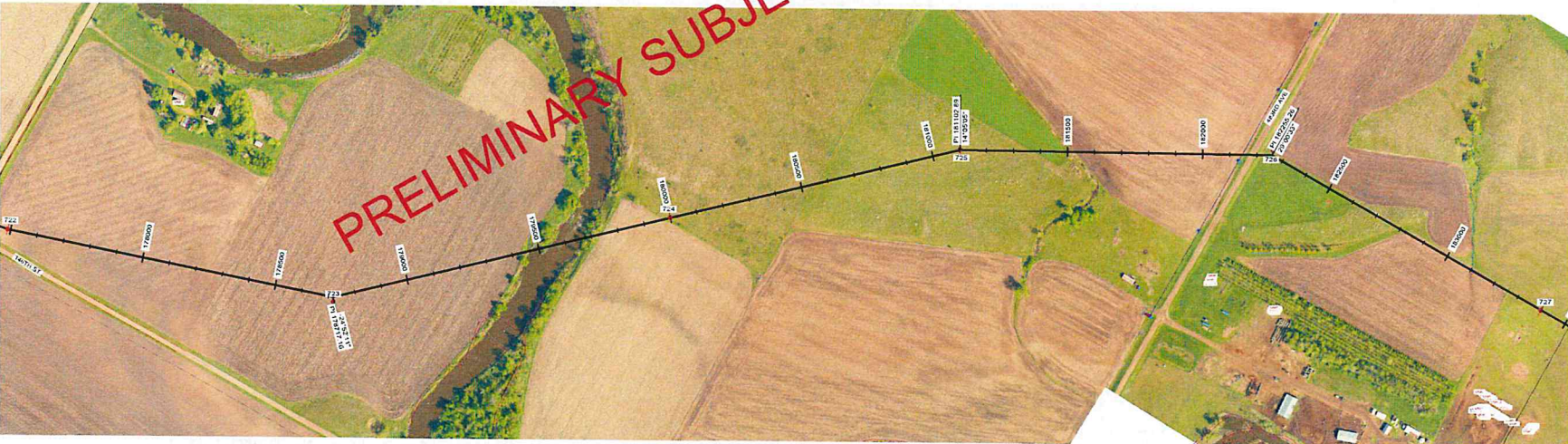
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T/A 160
V=2270934.14
V+1645228.8
HT ADJUST=180.00
OFFICE ADJUST=18.00
LINE ANGLE=24.8211"

T24
T/A 140
V=2271213.90
V+1645782.18
HT ADJUST=180.00
OFFICE ADJUST=18.00
HT ADJUST=1.00

T25
T/A R 155
V=2270715.24
V+1645722.18
HT ADJUST=180.00
OFFICE ADJUST=18.00
HT ADJUST=1.00
LINE ANGLE=14.0655"

T26
T/A 155
V=2272500.23
V+1645532.22
HT ADJUST=180.00
OFFICE ADJUST=18.00
LINE ANGLE=20.0033"

688 - 733 345KV HAWK ACGR 27.5STR 1156 FT. 3 PHASE BUNDLE OF 2. TENSIN 1920 LBS AT 60 DEG P. INITIAL DISPLAYED 2127 (MOT) MAX SAG 4816 (LBS)



20140515
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FINAL REVIEW

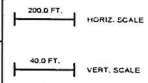


REVISIONS		APPROVALS	DATE	DESIGN DATA
E	GENERAL REVISIONS	DJF DJF DJF	05/15/14	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACGR DESIGN TENSION: 18% @ 60 F. CREEP SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT CONDUCTOR SHOWN: 212 F. MAX SAG COORDINATE SYSTEM: UTM ZONE 14N, US FT
D	RCR 17 & 19, STR 635 - 654	JRC JRC	12/12/13	
C	RCR 13 RESPOTTED STR 721 - 725	JRC JRC SMH	12/04/13	
B	ISSUED FOR SD REVIEW	JRC JRC SMH	09/27/13	
A	PRELIMINARY SPOTTING	PEI PEI	05/03/13	

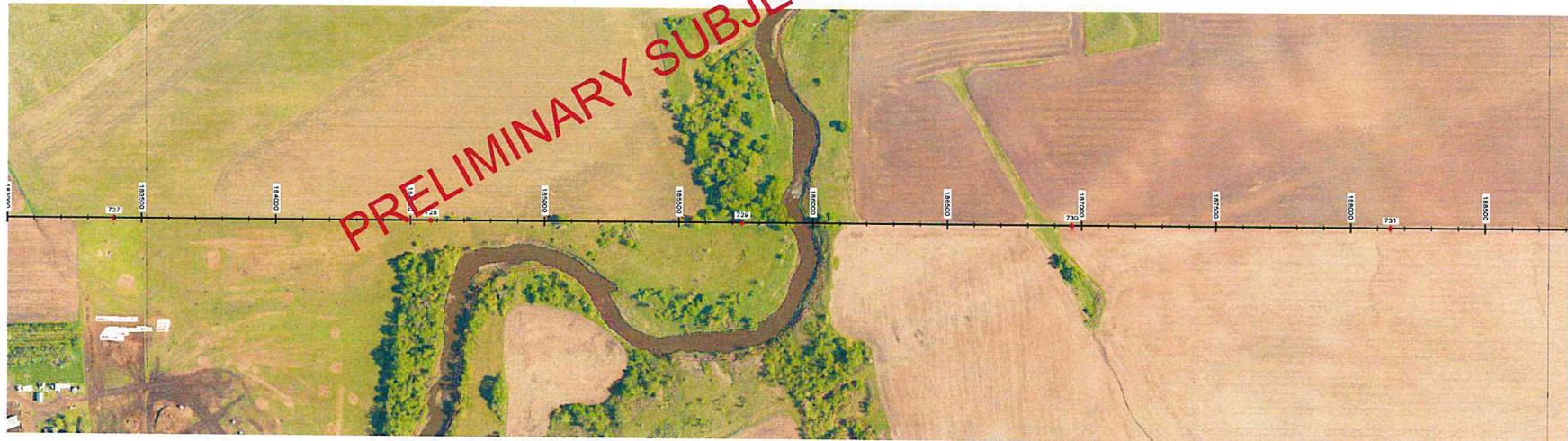
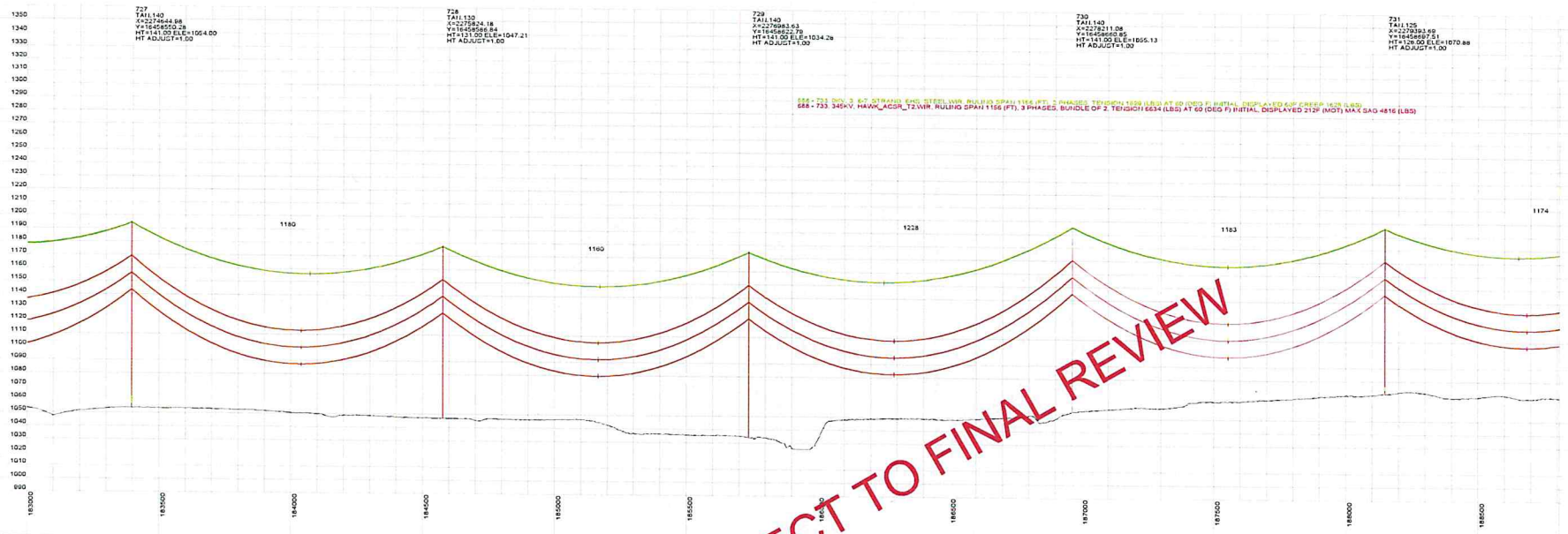
DRAWN BY: ---
DESIGN BY: ---
CHECKED BY: ---
APPROVED BY: ---



BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-33
REVISION: E
127156



PRELIMINARY SUBJECT TO FINAL REVIEW

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PRELIMINARY
SUBJECT TO
FINAL REVIEW

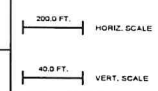


REVISIONS		APPROVALS		DATE	DESIGN DATA	
E	GENERAL REVISIONS	DJF	DJF	05/15/14	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACSR DESIGN TENSION: 18% @ 0 F, CREEP SHIELD WIRE: 2-3/8" 7 STRAND EHS STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT CONDUCTOR SPACING: 212 F, MAX SAG COORDINATE SYSTEM: UTM ZONE 14N, US FT	
D	RCR 17 & 19, STR 635 - 654	JRC	JRC	12/12/13		
C	RCR 13 RESPOTTED STR 721 - 725	JRC	JRC	12/04/13		
B	ISSUED FOR SD REVIEW	JRC	JRC	09/27/13		
A	PRELIMINARY SPOTTING	PEI	PEI	05/03/13		
REV	DESCRIPTION	DWN	DGR	CHK	DATE	APPROVED BY: --

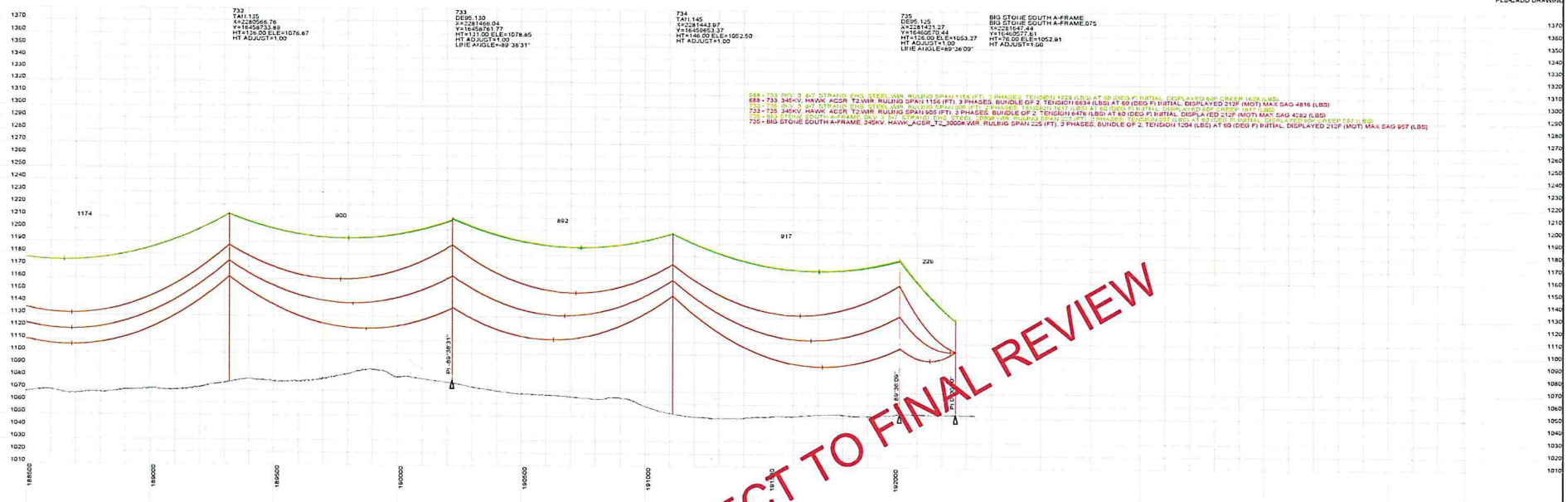
APPROVALS	DATE	DESIGN DATA
DRAWN BY: --		
DESIGN BY: --		
CHECKED BY: --		
APPROVED BY: --		



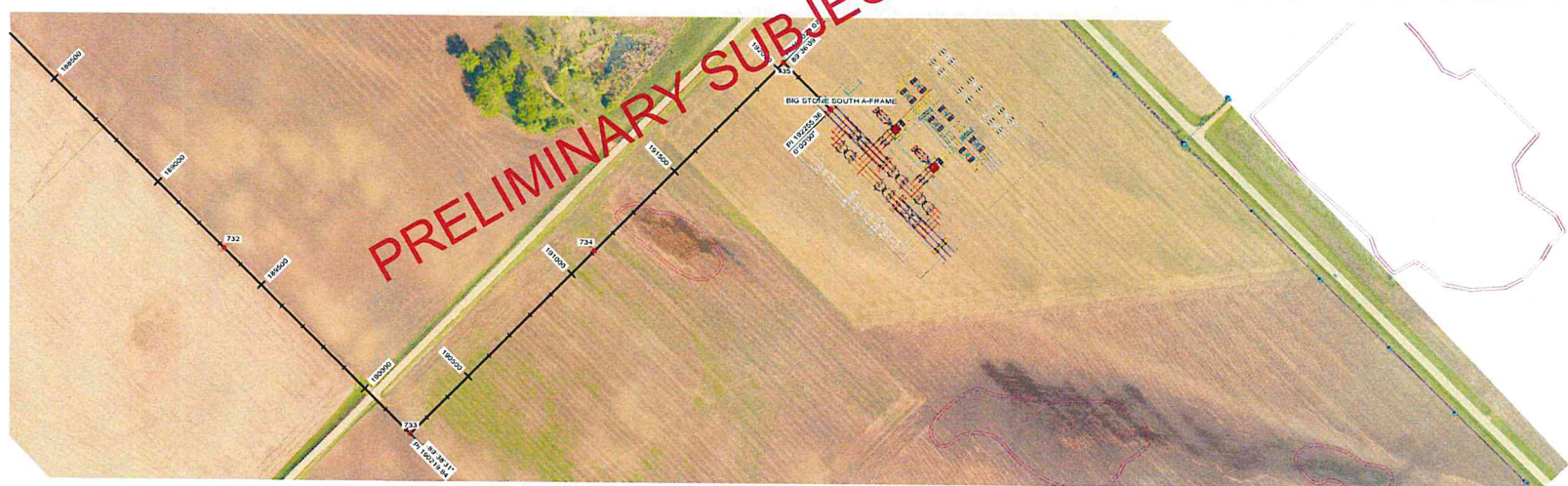
BIG STONE SOUTH - ELLENDALE
345 KV TRANSMISSION LINE



DWG. NO.
P4-34
REVISION: E
127156



PRELIMINARY SUBJECT TO FINAL REVIEW



20140515
 PRELIMINARY
 SUBJECT TO
 FINAL REVIEW



REVISIONS		APPROVALS	DATE	DESIGN DATA		
E	GENERAL REVISIONS	DJF	05/15/14	CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACGR DESIGN TENSION: 18% @ 0 F CREEP SHIELD WIRE: 2-3/8" 7 STRAND EHG STEEL DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP MIN. GROUND CLEARANCE: 30 FT CONDUCTOR SHOW: 212 F. MAX SAG COORDINATE SYSTEM: UTM ZONE 14N, US FT		
D	RCR 17 & 19, STR 635 - 654	JRC	12/12/13			
C	RCR 13 RESPOTTED STR 721 - 725	JRC	12/04/13			
B	ISSUED FOR SD REVIEW	JRC	09/27/13			
A	PRELIMINARY SPOTTING	PEI	05/03/13			
REV	DESCRIPTION	DWN	DN	CHK	DATE	APPROVED BY: —

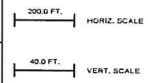
DRAWN BY: —
 DESIGN BY: —
 CHECKED BY: —
 APPROVED BY: —

DESIGN DATA

CONDUCTOR: (2X) 477 KCMIL 26/7 TP HAWK ACGR
 DESIGN TENSION: 18% @ 0 F CREEP
 SHIELD WIRE: 2-3/8" 7 STRAND EHG STEEL
 DESIGN TENSION: 75% SAG MATCH @ 60 F CREEP
 MIN. GROUND CLEARANCE: 30 FT
 CONDUCTOR SHOW: 212 F. MAX SAG
 COORDINATE SYSTEM: UTM ZONE 14N, US FT



BIG STONE SOUTH - ELLENDALE
 345 KV TRANSMISSION LINE



DWG. NO.
 P4-35
 REVISION: E
 127156