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**LETTER OF TRANSMITTAL**

DATE: 05/15/09	PROJ. NO. 108.0495
ATTN: Jerry Lein	
PROJECT: Rugby 230kV	
RE: Plan and Profile Revisions	

TO: North Dakota Public Services Commission  
 Attn: Jerry Lein  
 600 E. Boulevard, Dept. 408  
 Bismarck, ND 58505-0480

WE ARE SENDING YOU  Attached  Delivery via the following items:  
 Shop drawings  Prints  Vellums  Sepias  Specifications  
 Mylar's

COPIES	NO.	REV.	DESCRIPTION
1	RUG-E-515-00	1	ROUTE MAP
1	RUG-E-515-(01-11)	1	PLAN AND PROFILE

THESE ARE TRANSMITTED as checked below:  
 For approval  For review and comment  Approved as noted  
 For your use  Approved as submitted  Returned for corrections  
 As requested

REMARKS Case # PU-05-305  
 Enclosed for filing

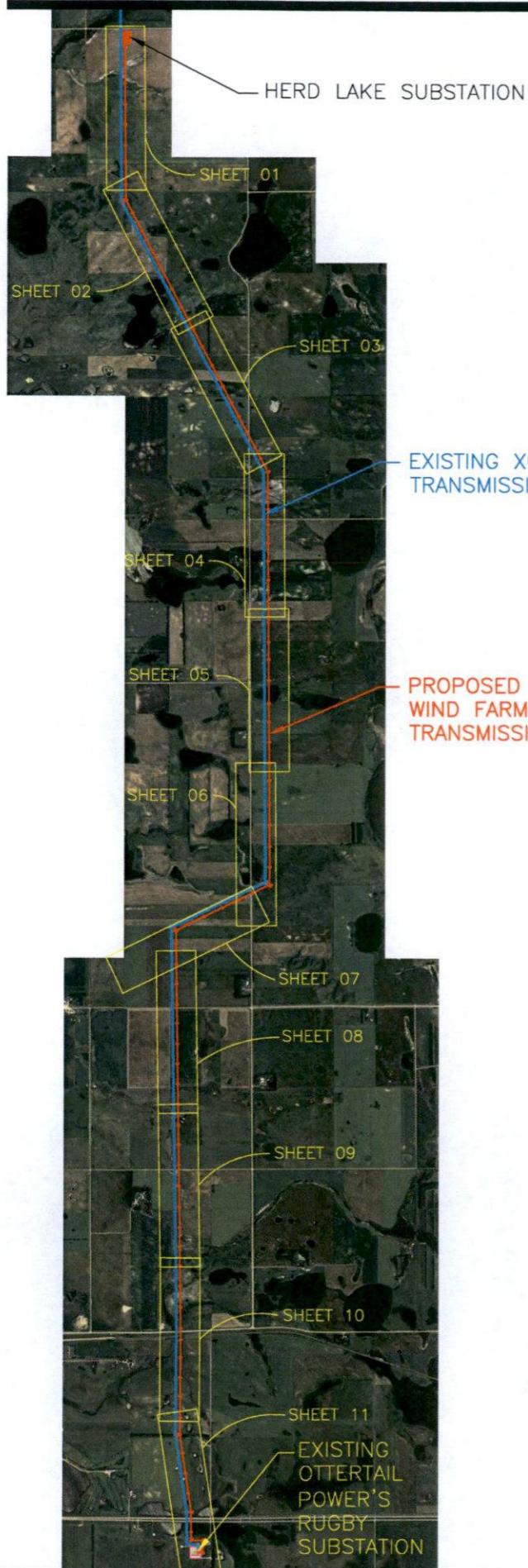
ENGINEER Steve Thompson

COPY TO

SIGNED Lyle Sothern

Please call with any questions  
 If enclosures are not as noted, kindly notify us at once.

87 PU-05-305 Filed: 5/19/2009 Pages: 13  
 Revised Plan & Profile Design Drawings  
 Iberdrola Renewables, Inc.  
 Ulteig Engineers, Steve Thompson



**PLAN AND PROFILE WETLANDS LEGEND:**

	JURISDICTIONAL - US FISH AND WILDLIFE (NO ACCESS ALLOWED)
	JURISDICTIONAL - ARMY CORPS (RESTRICTED ACCESS ALLOWED)
	NON-JURISDICTIONAL - (ACCESS ALLOWED)



DRAWING INDEX			
DRAWING NAME	DESCRIPTION	DATE	REV
RUG-E-515-01	PLAN & PROFILE 230kV TRANSMISSION LINE	5/15/09	1
RUG-E-515-02	PLAN & PROFILE 230kV TRANSMISSION LINE	5/15/09	1
RUG-E-515-03	PLAN & PROFILE 230kV TRANSMISSION LINE	5/15/09	1
RUG-E-515-04	PLAN & PROFILE 230kV TRANSMISSION LINE	5/15/09	1
RUG-E-515-05	PLAN & PROFILE 230kV TRANSMISSION LINE	5/15/09	1
RUG-E-515-06	PLAN & PROFILE 230kV TRANSMISSION LINE	5/15/09	1
RUG-E-515-07	PLAN & PROFILE 230kV TRANSMISSION LINE	5/15/09	1
RUG-E-515-08	PLAN & PROFILE 230kV TRANSMISSION LINE	5/15/09	1
RUG-E-515-09	PLAN & PROFILE 230kV TRANSMISSION LINE	5/15/09	1
RUG-E-515-10	PLAN & PROFILE 230kV TRANSMISSION LINE	5/15/09	1
RUG-E-515-11	PLAN & PROFILE 230kV TRANSMISSION LINE	5/15/09	1
RUG-E-517-00	PHASING DIAGRAM - 230kV TRANSMISSION LINE	3/4/09	0
HF-TAN	STRUCTURE FRAMING - H-FRAME TANGENT	3/4/09	0
HF-TAN-OPGW-S	STRUCTURE FRAMING - H-FRAME TANGENT W/OPGW SPLICE	3/4/09	0
3P-SM-ANG	STRUCTURE FRAMING - 3-POLE SMALL ANGLE - 2'-10"	3/4/09	0
3P-ANG	STRUCTURE FRAMING - 3-POLE RUNNING ANGLE - 10'-30"	3/4/09	0
3P-DE	STRUCTURE FRAMING - 3-POLE DEADEND - 60'-90"	3/4/09	0
5P-DE	STRUCTURE FRAMING - 5-POLE DEADEND	3/4/09	0
RUG-HLK-SUB	HERD LAKE SUBSTATION CONNECTION DETAIL	3/4/09	0
RUG-OTP-SUB	OTTERTAIL POWER'S RUGBY SUBSTATION CONNECTION DETAIL	3/4/09	0
GUYING	GUYING DETAILS	3/4/09	0
TM-16	GUIDE FOR INSTALLING WOOD POLE NUMBERING	3/4/09	0
DAMPER	DAMPER DETAILS	3/4/09	0
EMBED	EMBEDMENT DETAILS - WOOD POLES	3/4/09	0
GND DETAILS	GROUNDING DETAILS - WOOD POLES	3/4/09	0
OPGW-S	OPGW SPLICE DETAILS	3/4/09	0
EROSION	EROSION CONTROL AT US FISH AND WILDLIFE WETLANDS	3/4/09	0
C-6	EROSION CONTROL DETAILS (FOR REFERENCE)	3/4/09	0

**GENERAL NOTES:**

- CONDUCTOR:
  - 954 kcmil 45/7 ACSR "RAIL" (3) PHASE, SINGLE CONDUCTOR - 9.96 MILES
  - CONDUCTOR SAG SHOWN AT 212 DEGREES FAHRENHEIT FINAL
  - DESIGN TENSION SHOWN AT NESC HEAVY, UNLESS NOTED OTHERWISE.
- SHIELD WIRE: TENSION BASED ON 80% OF FINAL CONDUCTOR SAG AT 60 DEGREES FAHRENHEIT
  - SHIELD WIRE #1: 0.496" 24 FIBER OPGW - 9.96 MILES
  - OPGW DEADEND SPLICE BOXES: 4 TOTAL, LOCATED AT TERMINATIONS AT EACH SUBSTATION AND AT 2 STRUCTURES AS SHOWN ON THESE PLAN AND PROFILE DRAWINGS.
  - SHIELD WIRE #2: 3/8" 7-STRAND EHS STEEL - 9.96 MILES
  - SHIELD WIRE SAG SHOWN AT -20 DEGREES FAHRENHEIT INITIAL
- MINIMUM GROUND CLEARANCE IS 24.9' PER RUS.
- STRUCTURE GROUNDING PER "GND DETAILS"
- SECTION LINES, PROPERTY LINES, AND PUBLIC ROW SHOWN PER WESTWOOD PROFESSIONAL SERVICES SURVEY.
- EMBEDMENT IS 10%+2' UNLESS NOTED OTHERWISE ON PLAN AND PROFILE.
- CONTRACTOR NOT TO ENTER THE JURISDICTIONAL US FISH AND WILDLIFE WETLANDS FOR ANY REASON.

1

**CONDUCTOR INFORMATION**

SHIELDWIRE		230kV CONDUCTOR	
0.496" 24 FIBER OPGW		795 kcmil 26/7 ACSR "DRAKE"	
STR #	DESIGN TENSION (R.S.)	STR #	DESIGN TENSION (R.S.)
SUB-1	1000# @ 137' R.S.	SUB-1	1000# @ 138' R.S.
1-22	4145# @ 674' R.S.	1-46	9191# @ 654' R.S.
22-46	4062# @ 636' R.S.	46-52	8927# @ 584' R.S.
46-52	3893# @ 587' R.S.	52-82	9222# @ 672' R.S.
52-56	4037# @ 619' R.S.	82-83	7952# @ 365' R.S.
56-82	4154# @ 678' R.S.	83-84	8258# @ 422' R.S.
82-83	3140# @ 366' R.S.	84-SUB	1000# @ 120' R.S.
83-84	3437# @ 464' R.S.		
84-SUB	1000# @ 141' R.S.		

3/8" EHS	
STR #	DESIGN TENSION (R.S.)
SUB-1	1000# @ 137' R.S.
1-46	3668# @ 654' R.S.
46-52	3448# @ 582' R.S.
52-82	3707# @ 674' R.S.
82-83	2725# @ 366' R.S.
83-84	2827# @ 380' R.S.
84-SUB	1000# @ 98' R.S.

Rev	Date	By
0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



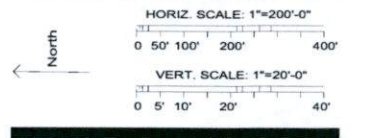
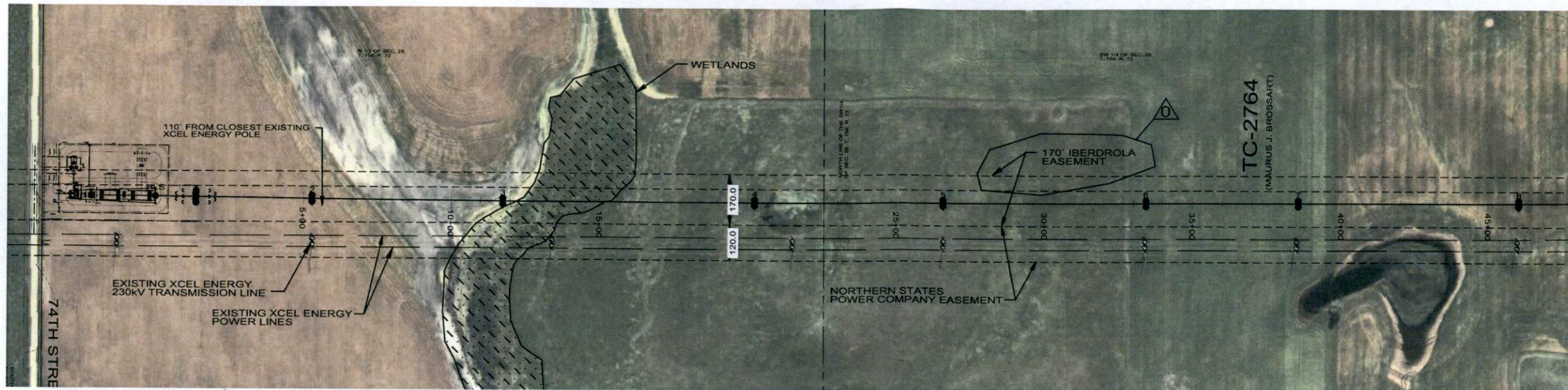
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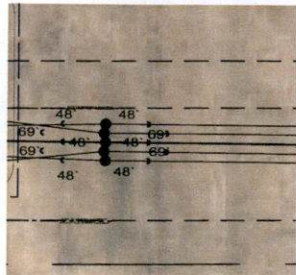
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls  
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 Drawn By: LAS  
 Checked By: MPM  
 Approved By: SPT

230kV  
ROUTE MAP

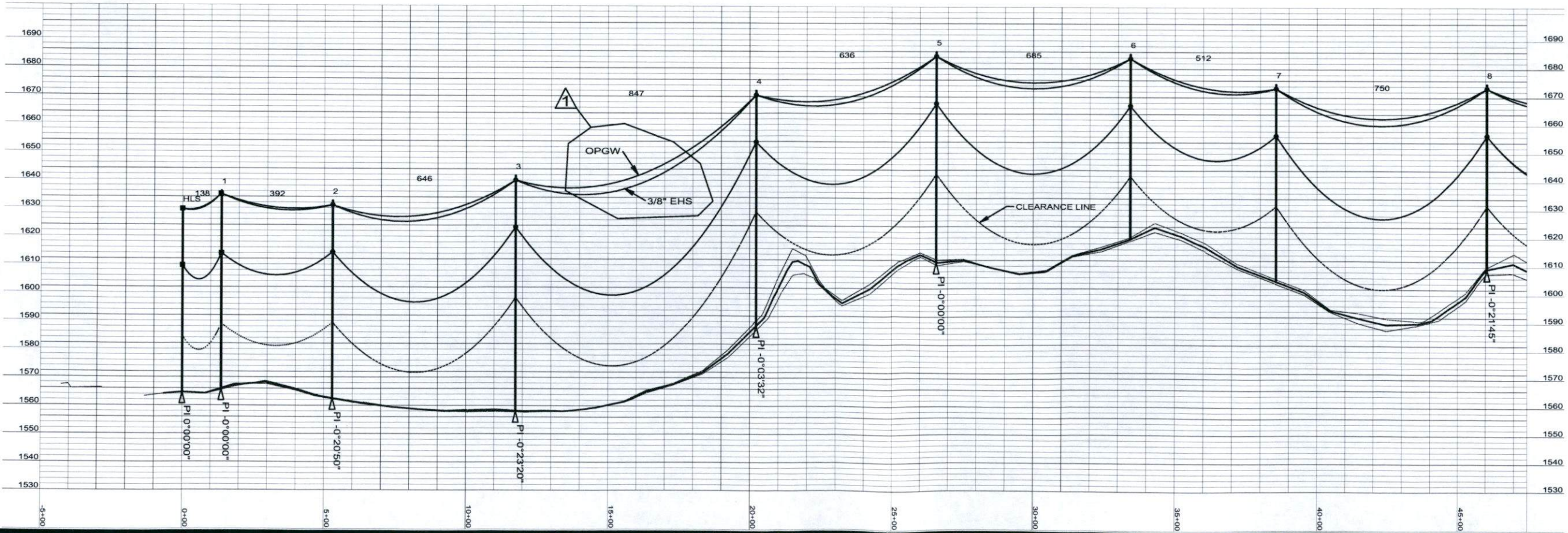
Rev	Date	By
0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



Station	Notes
HLS sta=0+00.00	RUG-HLK-SUB OPGW-S
1 sta=1+38.00	3-80/1 2-80/1 SP-DE GND DETAILS EMBED TM-16 DAMPER (10) GUYING A,B,C NOTE: EMBED 60° POLES 10% + 5'
2 sta=5+29.75	2-80/2 HF-TAN GND DETAILS EMBED TM-16
3 sta=11+75.65	2-95/2 HF-TAN GND DETAILS EMBED TM-16
4 sta=20+23.08	2-95/2 HF-TAN GND DETAILS EMBED TM-16
5 sta=26+58.89	2-85/2 HF-TAN GND DETAILS EMBED TM-16
6 sta=33+43.46	2-75/2 HF-TAN GND DETAILS EMBED TM-16
7 sta=38+55.59	2-80/2 HF-TAN GND DETAILS EMBED TM-16
8 sta=46+05.18	2-75/2 HF-TAN GND DETAILS EMBED TM-16



GUY DETAIL STR 1



FOR CONSTRUCTION

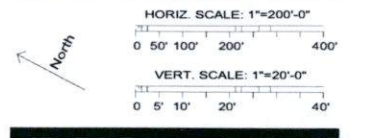
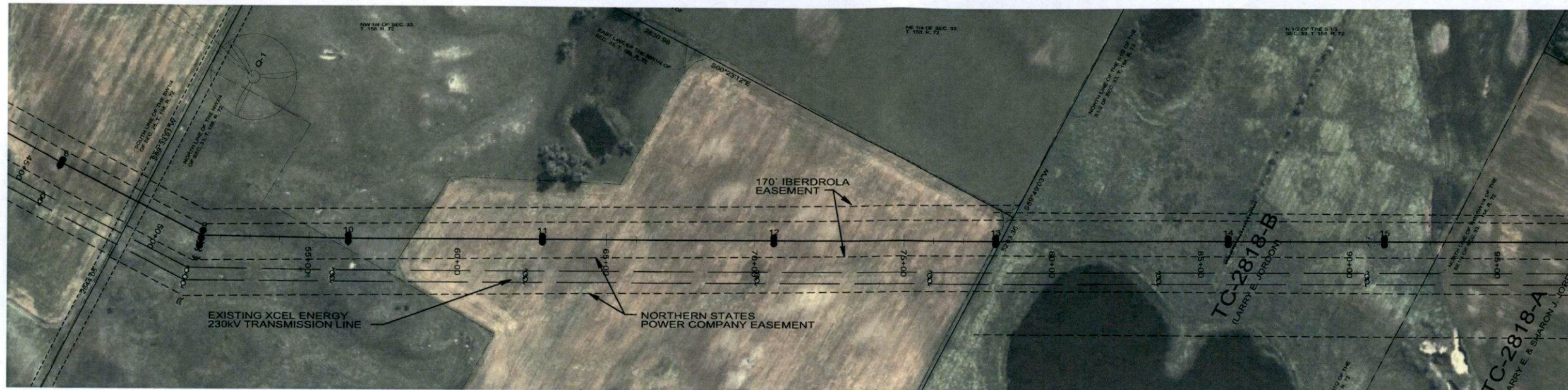


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 Checked By: MPM  
 Approved By: SPT

RUGBY 230kV  
 TRANSMISSION LINE  
 PLAN AND PROFILE

Project Number: 108.0495  
 Date Created: December 3, 2008  
 Dwg No: RUG-E-515-01

Rev	Date	By
0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



8  
sta=46+05.18  
2-75/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

9  
sta=51+36.76  
2-70/2, 1-65/2  
3P-ANG  
GND DETAILS  
EMBED  
TM-16  
DAMPER  
(7)GUYING A,B  
(1)GUYING C  
(3)GUYING D

10  
sta=56+31.92  
2-75/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

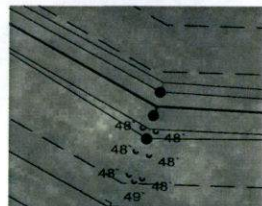
11  
sta=62+85.77  
2-90/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

12  
sta=70+64.27  
2-85/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

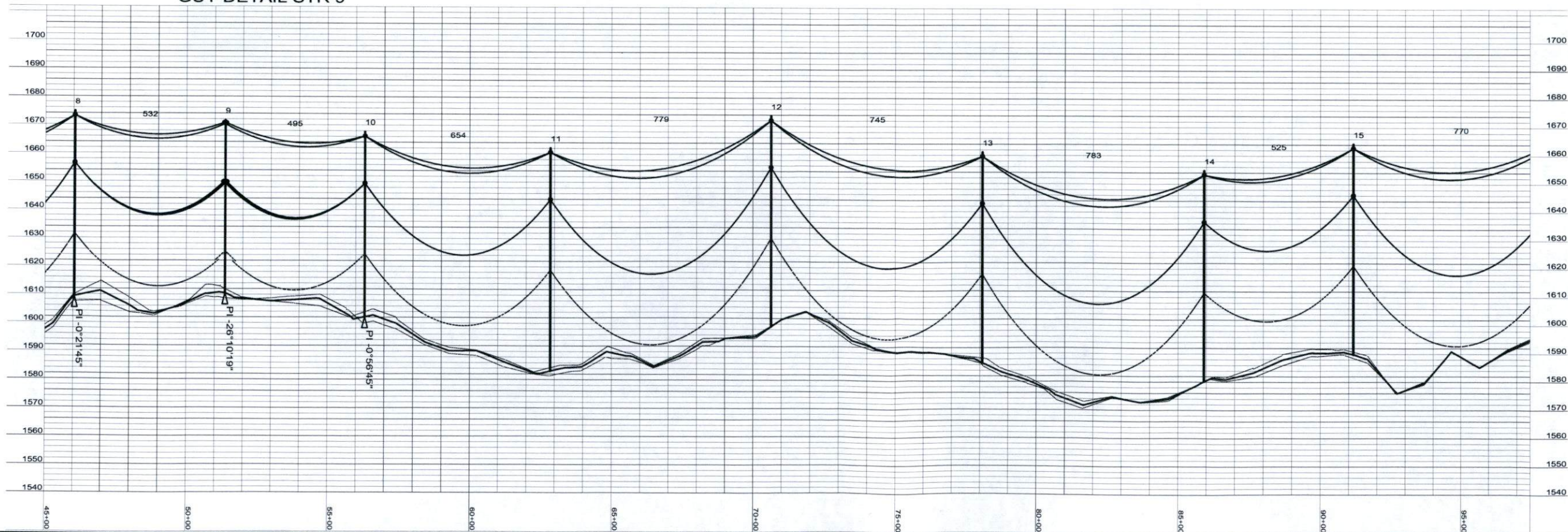
13  
sta=78+09.10  
2-85/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

14  
sta=85+92.05  
2-85/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

15  
sta=91+16.57  
2-85/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16



GUY DETAIL STR 9



FOR  
CONSTRUCTION

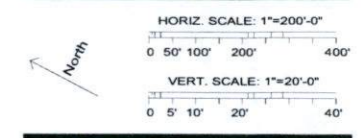
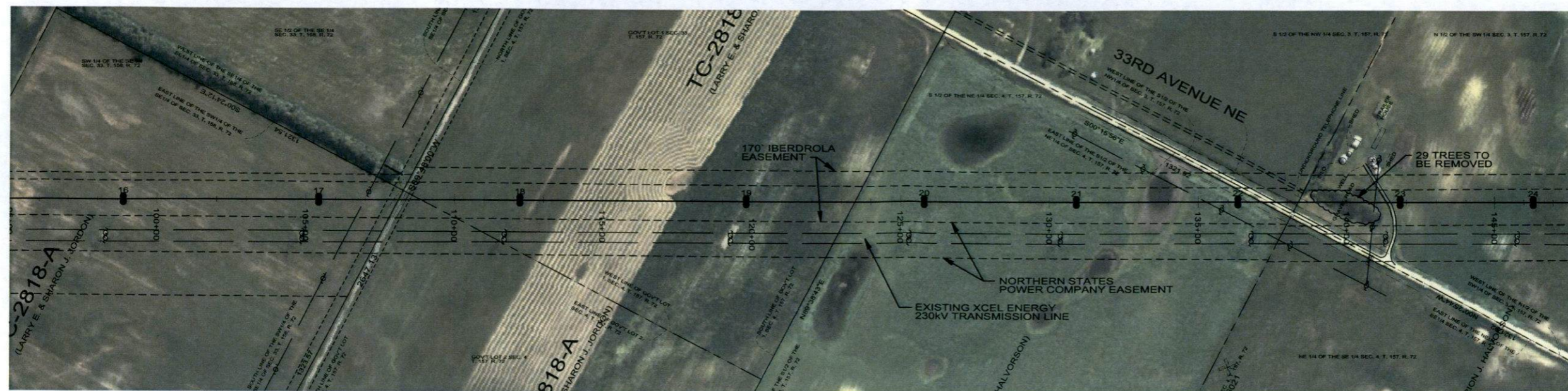


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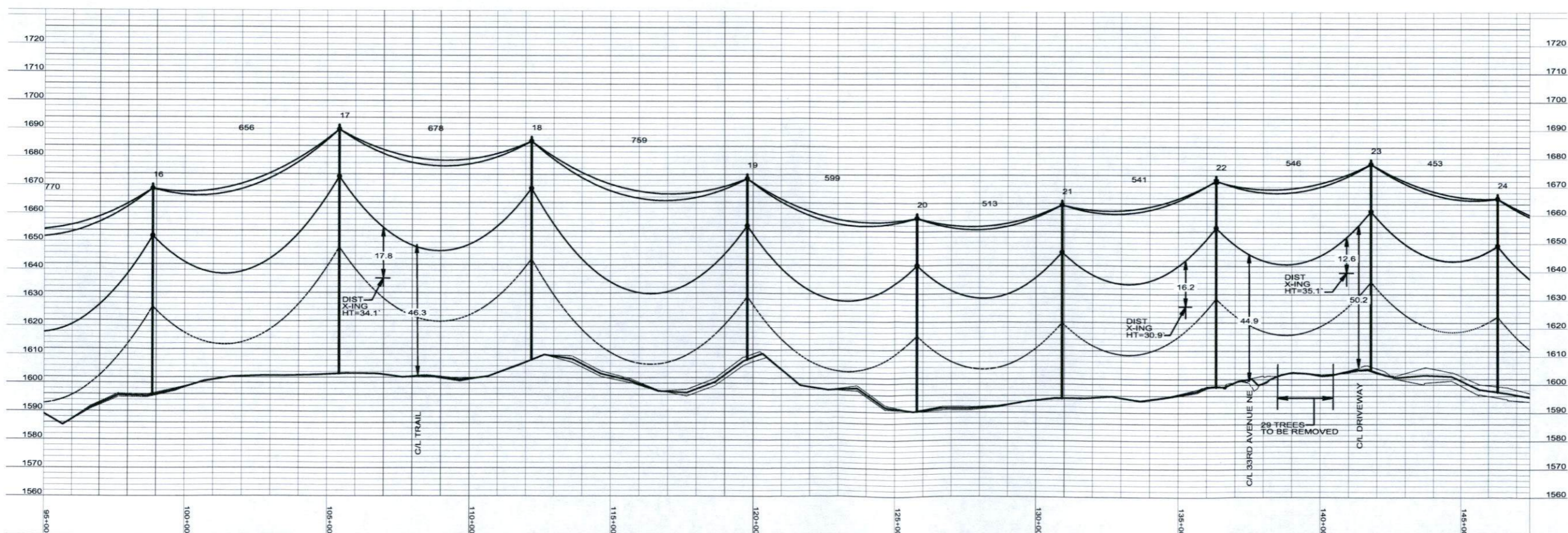
RUGBY 230kV  
TRANSMISSION LINE  
PLAN AND PROFILE

Project Number: 108\_0495  
Date Created: December 3, 2008  
Dwg No: RUG-E-515-02

Rev	Date	By
0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



16 sta=98+87.01 2-85/2 HF-TAN GND DETAILS EMBED TM-16	17 sta=105+43.11 2-100/2 HF-TAN GND DETAILS EMBED TM-16	18 sta=112+20.79 2-90/2 HF-TAN GND DETAILS EMBED TM-16	19 sta=119+79.85 2-75/2 HF-TAN GND DETAILS EMBED TM-16	20 sta=125+79.00 2-80/2 HF-TAN GND DETAILS EMBED TM-16	21 sta=130+92.27 2-80/2 HF-TAN GND DETAILS EMBED TM-16	22 sta=136+33.24 2-85/2 HF-TAN-OPGW-S GND DETAILS EMBED TM-16 OPGW-S	23 sta=141+78.76 2-85/2 HF-TAN GND DETAILS EMBED TM-16	24 sta=146+31.97 2-80/2 HF-TAN GND DETAILS EMBED TM-16
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CONSTRUCTION**

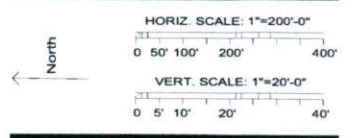
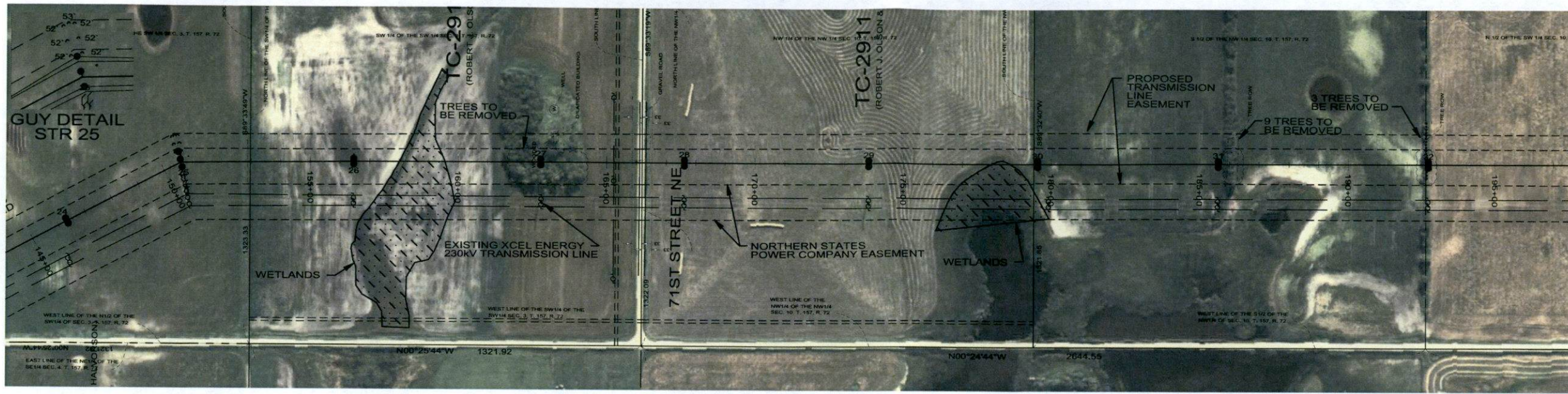


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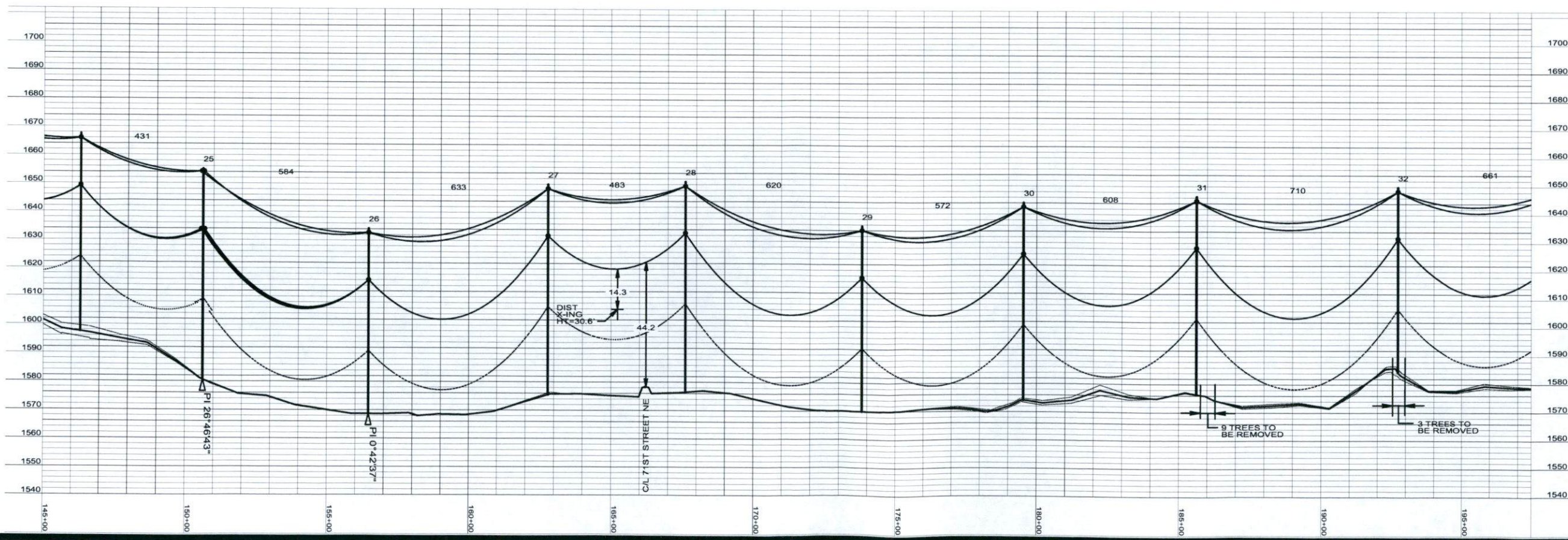
**RUGBY 230kV  
TRANSMISSION LINE  
PLAN AND PROFILE**

Project Number: 108.0495  
 Date Created: December 3, 2008  
 Dwg No: **RUG-E-515-03**

Rev	Date	By
0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



25 sta=150+62.50 3-85/2 3P-ANG GND DETAILS EMBED TM-16 (7) GUYING A,B (1) GUYING C (3) GUYING D	26 sta=156+46.25 2-75/2 HF-TAN GND DETAILS EMBED TM-16	27 sta=162+79.16 2-85/2 HF-TAN GND DETAILS EMBED TM-16	28 sta=167+61.68 2-85/2 HF-TAN GND DETAILS EMBED TM-16	29 sta=173+82.12 2-75/2 HF-TAN GND DETAILS EMBED TM-16	30 sta=179+54.09 2-80/2 HF-TAN GND DETAILS EMBED TM-16	31 sta=185+62.54 2-80/2 HF-TAN GND DETAILS EMBED TM-16	32 sta=192+72.41 2-75/2 HF-TAN GND DETAILS EMBED TM-16
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**FOR CONSTRUCTION**

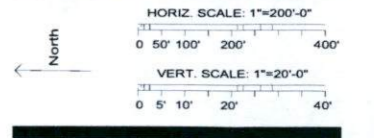
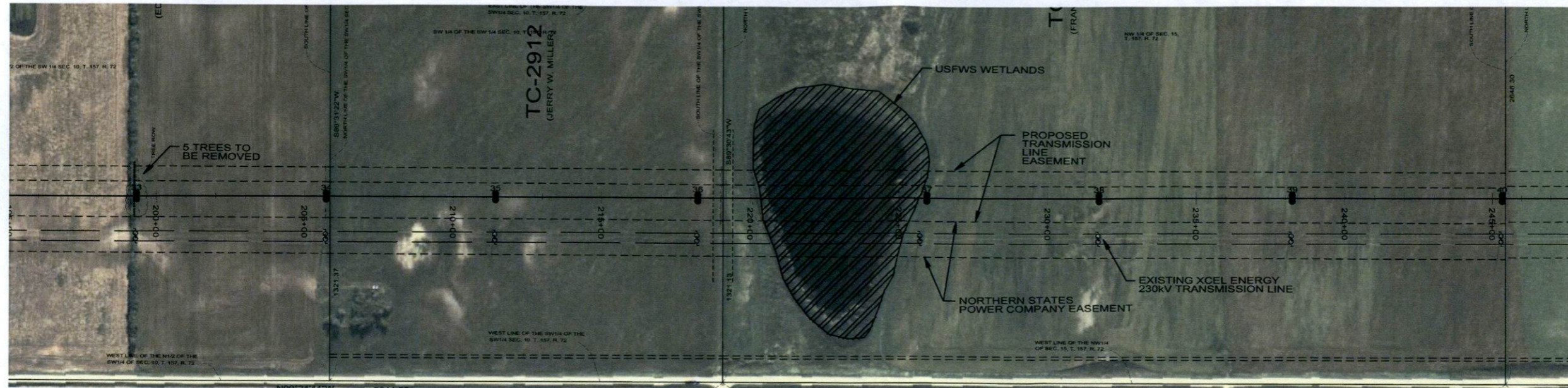


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 Checked By: MPM  
 Approved By: SPT

**RUGBY 230kV TRANSMISSION LINE PLAN AND PROFILE**

Project Number: 108\_0495  
 Date Created: December 3, 2008  
 Dwg No: **RUG-E-515-04**

Rev	Date	By
0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



33  
sta=199+33.12  
2-85/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

34  
sta=205+73.19  
2-80/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

35  
sta=211+42.85  
2-80/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

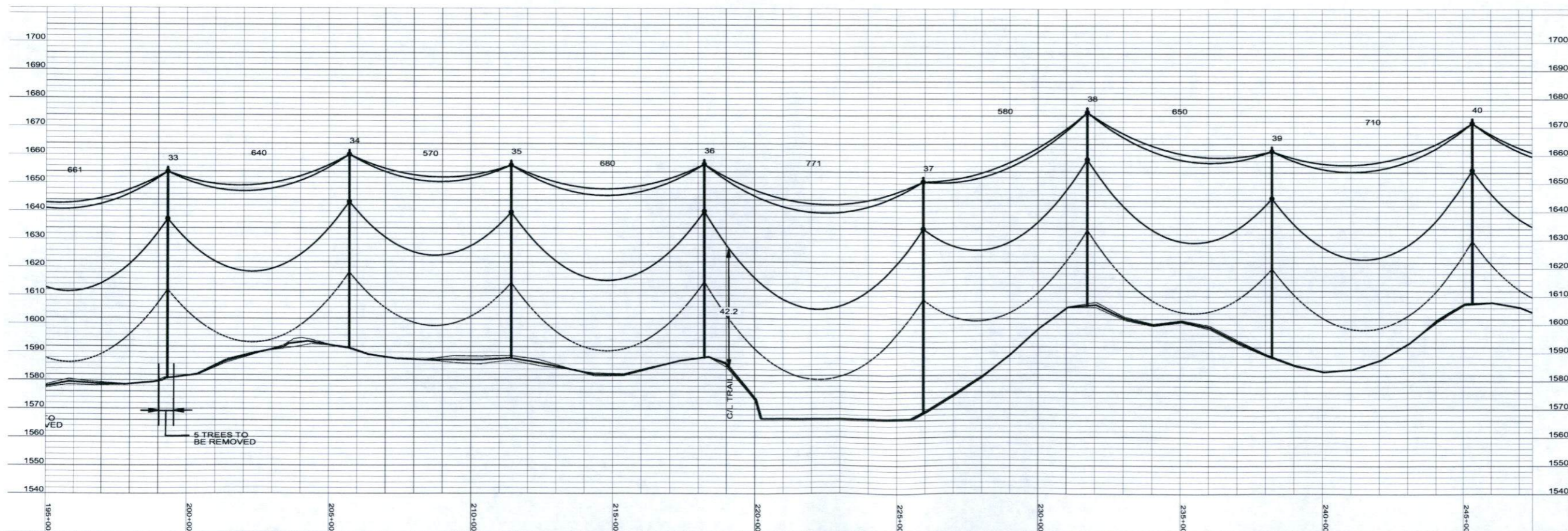
36  
sta=218+22.81  
2-80/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

37  
sta=225+94.16  
2-95/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

38  
sta=231+74.01  
2-80/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

39  
sta=238+23.65  
2-85/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16

40  
sta=245+33.78  
2-75/2  
HF-TAN  
GND DETAILS  
EMBED  
TM-16



FOR  
CONSTRUCTION

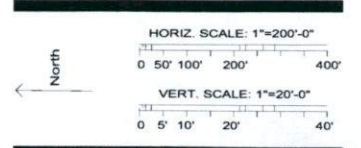


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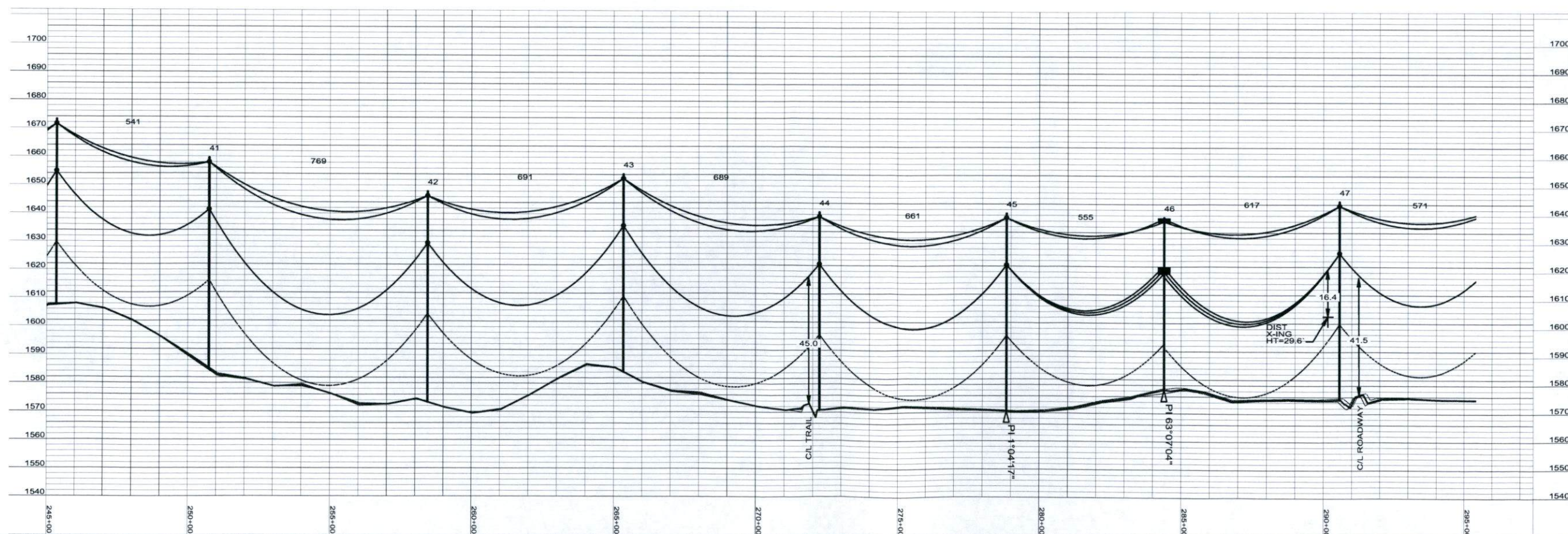
RUGBY 230kV  
TRANSMISSION LINE  
PLAN AND PROFILE

Project Number: 108.0495  
Date Created: December 3, 2008  
Dwg No: RUG-E-515-05

Rev	Date	By
0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



41 sta=250+74.64 2-85/2 HF-TAN GND DETAILS EMBED TM-16	42 sta=258+43.94 2-85/2 HF-TAN GND DETAILS EMBED TM-16	43 sta=265+34.55 2-80/2 HF-TAN GND DETAILS EMBED TM-16	44 sta=272+23.42 2-80/2 HF-TAN GND DETAILS EMBED TM-16	45 sta=278+84.76 2-80/2 HF-TAN GND DETAILS EMBED TM-16	46 sta=284+40.18 3-70/11 3P-DE GND DETAILS EMBED TM-16 DAMPEN (11) GUYING A,B,C	47 sta=290+57.02 2-80/2 HF-TAN GND DETAILS EMBED TM-16
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**FOR CONSTRUCTION**

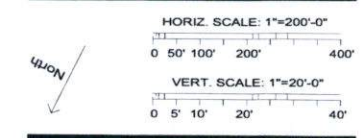


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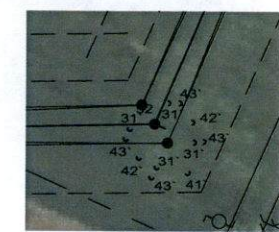
**RUGBY 230kV  
 TRANSMISSION LINE  
 PLAN AND PROFILE**

Project Number: 108\_0495  
 Date Created: December 3, 2008  
 Dwg No: **RUG-E-515-06**

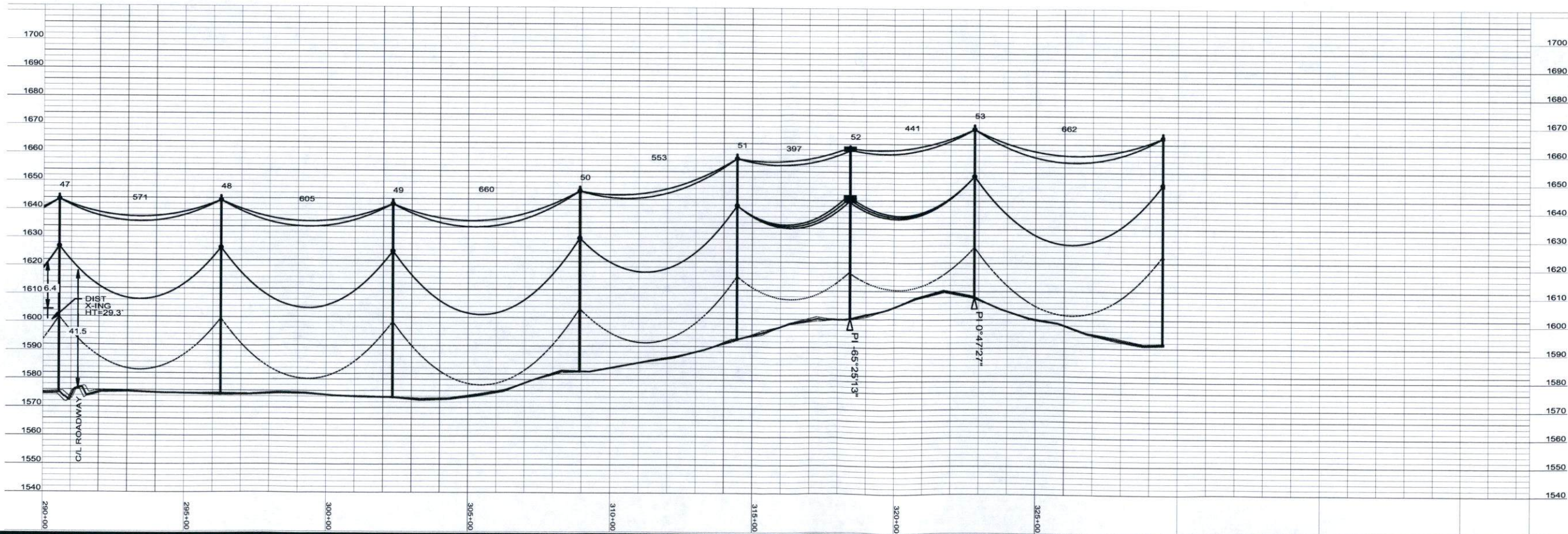
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0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



- |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|
| 47<br>sta=290+57.02<br>2-80/2<br>HF-TAN<br>GND DETAILS<br>EMBED<br>TM-16 | 48<br>sta=296+28.15<br>2-80/2<br>HF-TAN<br>GND DETAILS<br>EMBED<br>TM-16 | 49<br>sta=302+33.50<br>2-80/2<br>HF-TAN<br>GND DETAILS<br>EMBED<br>TM-16 | 50<br>sta=308+93.83<br>2-75/2<br>HF-TAN<br>GND DETAILS<br>EMBED<br>TM-16 | 51<br>sta=314+47.04<br>2-75/2<br>HF-TAN<br>GND DETAILS<br>EMBED<br>TM-16 | 52<br>sta=318+44.13<br>3-70/H1<br>3P-DE<br>GND DETAILS<br>EMBED<br>TM-16<br>DAMPER<br>(11)GUYING A,B,C | 53<br>sta=322+84.87<br>2-70/2<br>HF-TAN<br>GND DETAILS<br>EMBED<br>TM-16 |
|--|--|--|--|--|--|--|



GUY DETAIL STR 52



FOR  
CONSTRUCTION

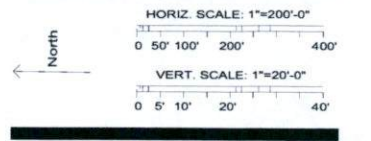
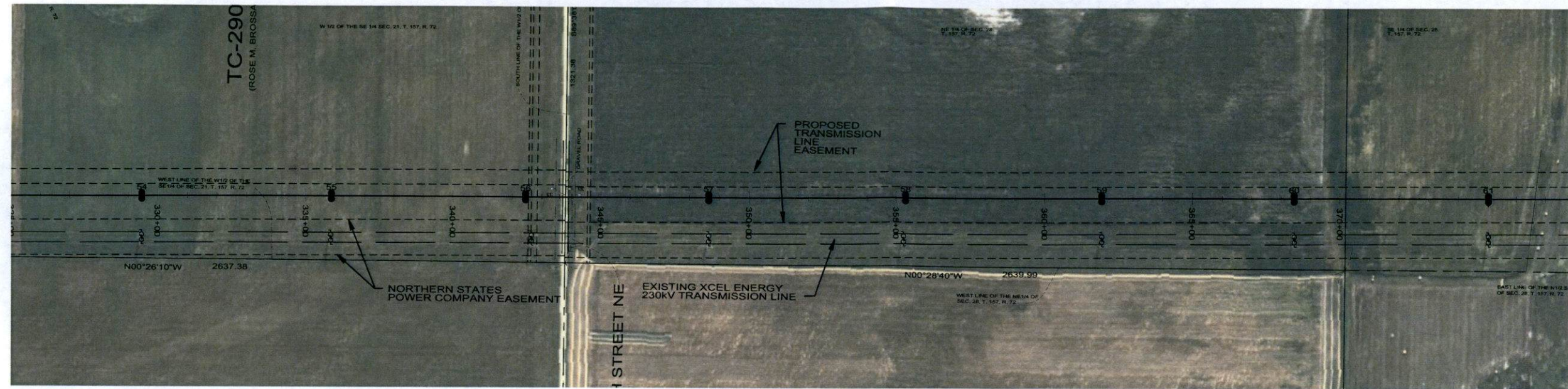


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 Drawn By: NGK  
 Checked By: MPM  
 Approved By: SPT

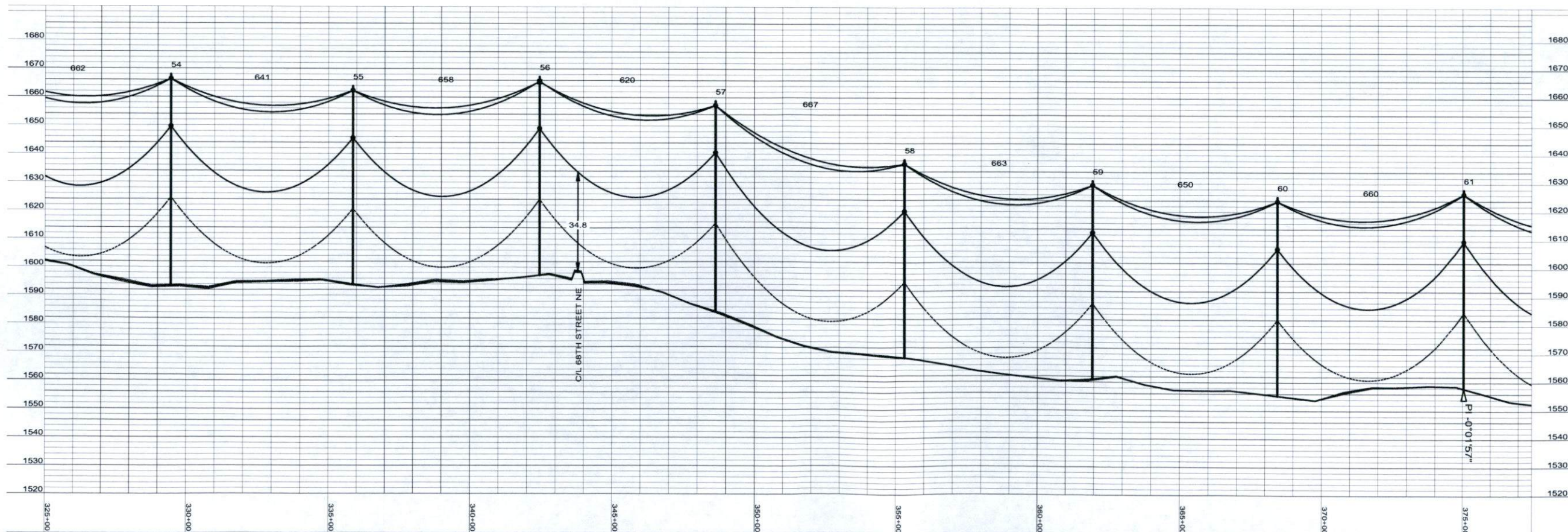
RUGBY 230KV  
 TRANSMISSION LINE  
 PLAN AND PROFILE

Project Number: 108,0495  
 Date Created: December 3, 2008  
 Dwg No: RUG-E-515-07

Rev	Date	By
0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



54 sta=329+46.47 2-85/2 HF-TAN GND DETAILS EMBED TM-16	55 sta=335+87.35 2-80/2 HF-TAN GND DETAILS EMBED TM-16	56 sta=342+45.01 2-80/2 HF-TAN-OPGW-S GND DETAILS EMBED TM-16 OPGW-S	57 sta=348+64.76 2-85/2 HF-TAN GND DETAILS EMBED TM-16	58 sta=355+31.93 2-80/2 HF-TAN GND DETAILS EMBED TM-16	59 sta=361+94.84 2-80/2 HF-TAN GND DETAILS EMBED TM-16	60 sta=368+44.60 2-80/2 HF-TAN GND DETAILS EMBED TM-16	61 sta=375+04.98 2-80/2 HF-TAN GND DETAILS EMBED TM-16
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**FOR  
CONSTRUCTION**

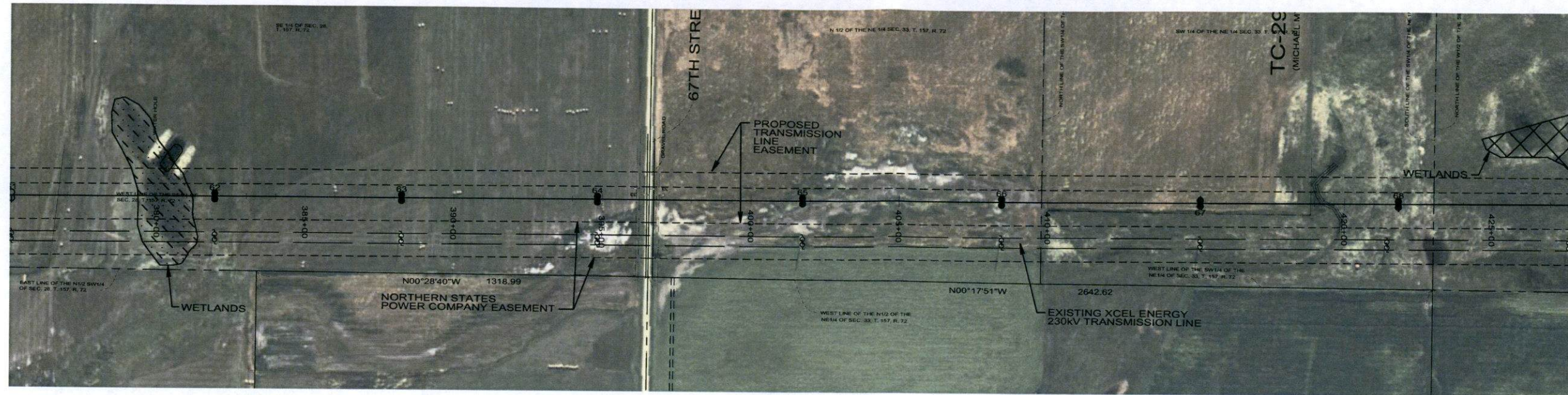
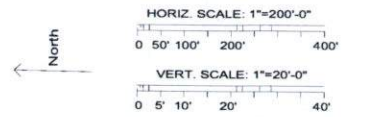


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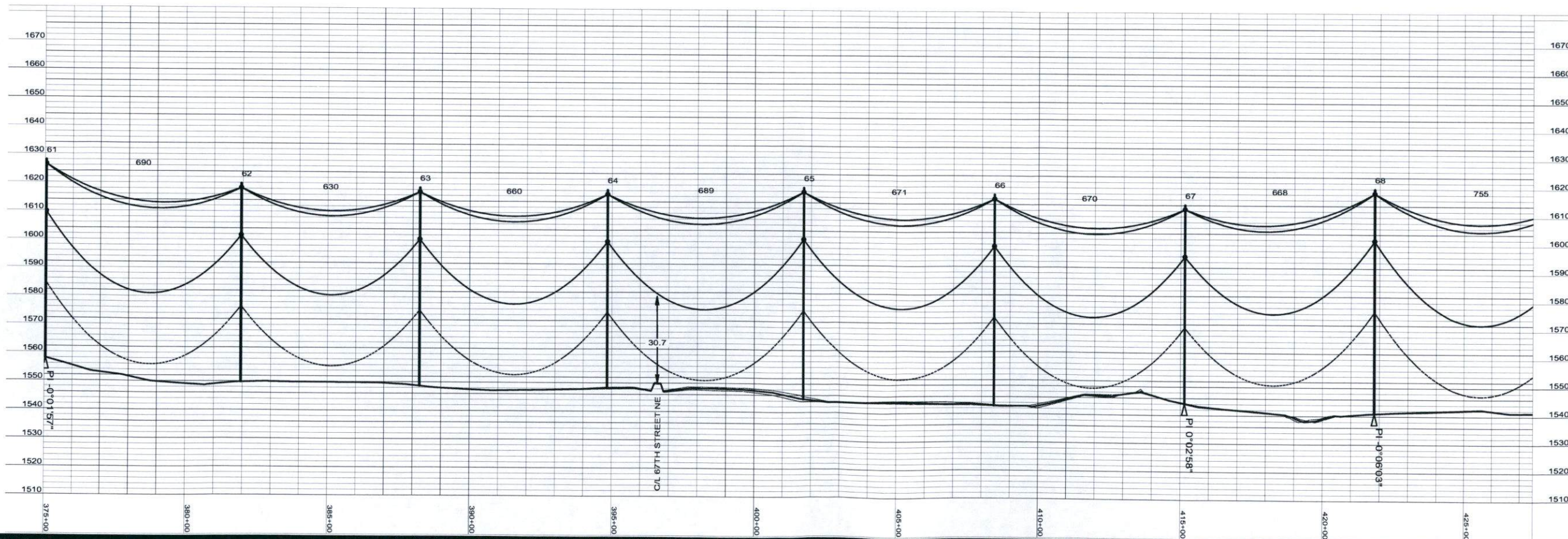
**RUGBY 230kV  
TRANSMISSION LINE  
PLAN AND PROFILE**

Project Number: 108.0495  
 Date Created: December 3, 2008  
 Dwg No: **RUG-E-515-08**

Rev	Date	By
0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



61 sta=375+04.98 2-80/2 HF-TAN GND DETAILS EMBED TM-16	62 sta=381+94.61 2-80/2 HF-TAN GND DETAILS EMBED TM-16	63 sta=388+24.71 2-80/2 HF-TAN GND DETAILS EMBED TM-16	64 sta=394+84.35 2-80/2 HF-TAN GND DETAILS EMBED TM-16	65 sta=401+73.64 2-85/2 HF-TAN GND DETAILS EMBED TM-16	66 sta=408+44.75 2-85/2 HF-TAN GND DETAILS EMBED TM-16	67 sta=415+14.37 2-80/2 HF-TAN GND DETAILS EMBED TM-16	68 sta=421+81.87 2-80/2 HF-TAN GND DETAILS EMBED TM-16
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**FOR CONSTRUCTION**

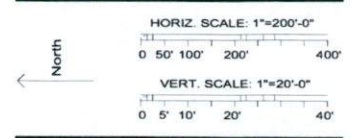
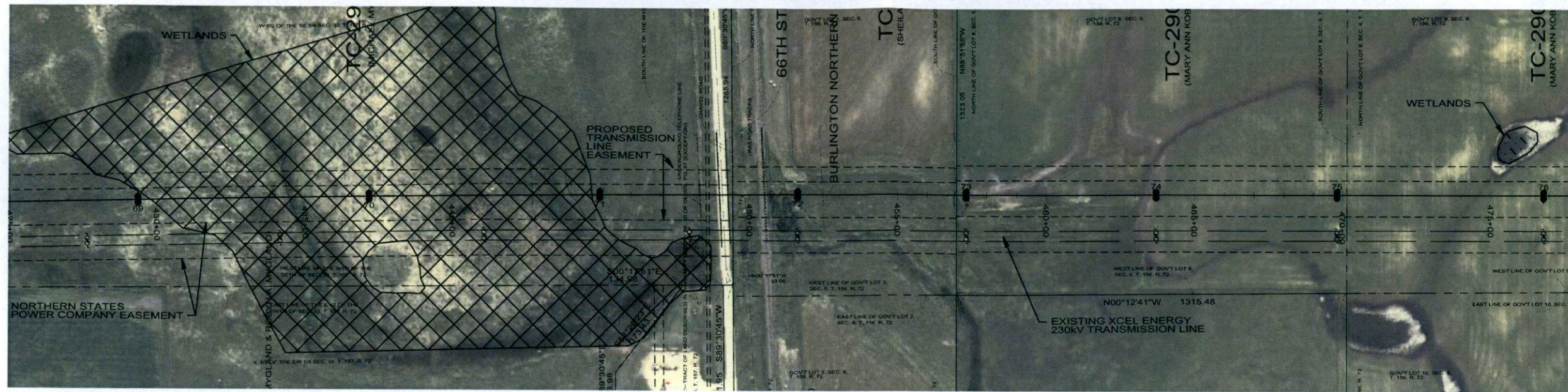


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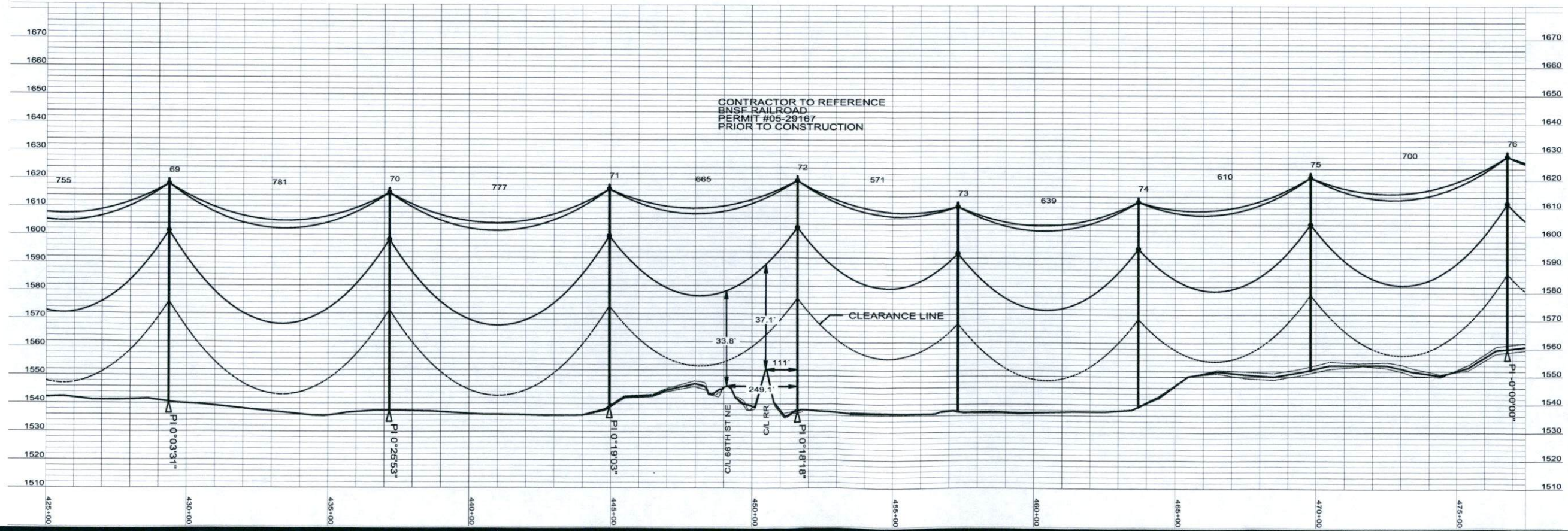
**RUGBY 230kV  
 TRANSMISSION LINE  
 PLAN AND PROFILE**

Project Number: 108.0495  
 Date Created: December 3, 2008  
 Dwg No: **RUG-E-515-09**

Rev	Date	By
0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



- |   |  |   |   |   |   |   |   |
|---|--|---|---|---|---|---|---|
| <p>69<br/>sta=429+37.18<br/>2-90/2<br/>HF-TAN<br/>GND DETAILS<br/>EMBED<br/>TM-16</p> | <p>70<br/>sta=437+18.12<br/>2-90/2<br/>HF-TAN<br/>GND DETAILS<br/>EMBED<br/>TM-16<br/>INSTALL (2) CULVERTS</p> | <p>71<br/>sta=444+95.24<br/>2-90/2<br/>HF-TAN<br/>GND DETAILS<br/>EMBED<br/>TM-16</p> | <p>72<br/>sta=451+60.64<br/>2-95/2<br/>HF-TAN<br/>GND DETAILS<br/>EMBED<br/>TM-16</p> | <p>73<br/>sta=457+31.64<br/>2-85/2<br/>HF-TAN<br/>GND DETAILS<br/>EMBED<br/>TM-16</p> | <p>74<br/>sta=463+71.04<br/>2-85/2<br/>HF-TAN<br/>GND DETAILS<br/>EMBED<br/>TM-16</p> | <p>75<br/>sta=469+81.22<br/>2-80/2<br/>HF-TAN<br/>GND DETAILS<br/>EMBED<br/>TM-16</p> | <p>76<br/>sta=476+81.58<br/>2-80/2<br/>HF-TAN<br/>GND DETAILS<br/>EMBED<br/>TM-16</p> |
|---|--|---|---|---|---|---|---|



**FOR CONSTRUCTION**

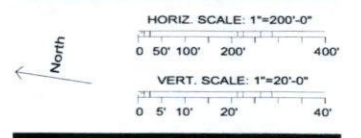
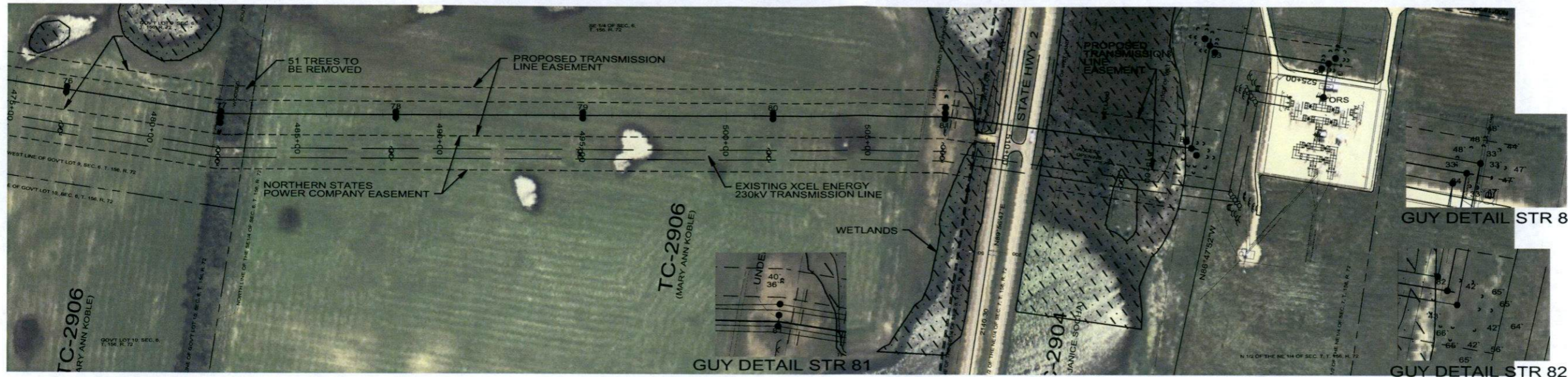


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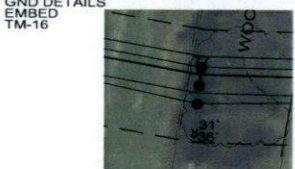
**RUGBY 230kV TRANSMISSION LINE PLAN AND PROFILE**

Project Number: 108.0495  
 Date Created: December 3, 2008  
 Dwg No: **RUG-E-515-010**

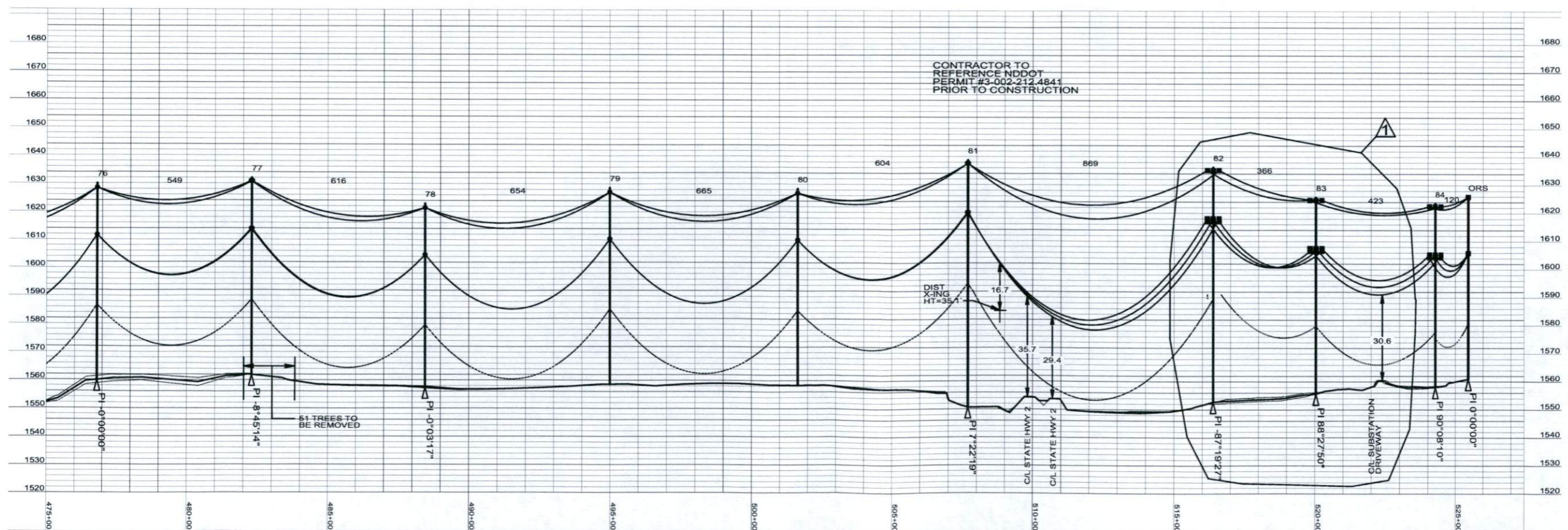
Rev	Date	By
0 - REVISED SINCE BID	03-04-09	SPT
1 - STR #82 & 83 MOVE	05-15-09	SPT



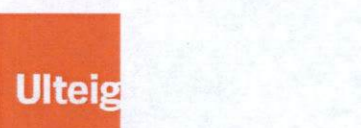
76 sta=476+81.58 2-80/2 HF-TAN GND DETAILS EMBED TM-16	77 sta=482+30.12 3-80/2 3P-SM-ANG GND DETAILS EMBED TM-16 (2)GUYING A,B,C	78 sta=488+45.73 2-75/2 HF-TAN GND DETAILS EMBED TM-16	79 sta=494+99.89 2-80/2 HF-TAN GND DETAILS EMBED TM-16	80 sta=501+65.08 2-80/2 HF-TAN GND DETAILS EMBED TM-16	81 sta=507+69.44 3-100/1 3P-SM-ANG GND DETAILS EMBED TM-16 (2)GUYING A,B,C	82 sta=516+38.31 3-95/H1 3P-DE GND DETAILS EMBED TM-16 DAMPER (1)GUYING A,B,C	83 sta=520+04.47 3-80/H1 3P-DE GND DETAILS EMBED TM-16 DAMPER (1)GUYING A,B,C	84 sta=524+27.04 3-75/H1 3P-DE GND DETAILS EMBED TM-16 DAMPER (1)GUYING A,B,C	ORS sta=525+46.69 RUG-OTP-SUB OPGW-S
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GUY DETAIL STR 77



FOR CONSTRUCTION



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RUGBY 230KV TRANSMISSION LINE PLAN AND PROFILE

Project Number: 108\_0495  
 Date Created: December 3, 2008  
 Dwg No: RUG-E-515-011