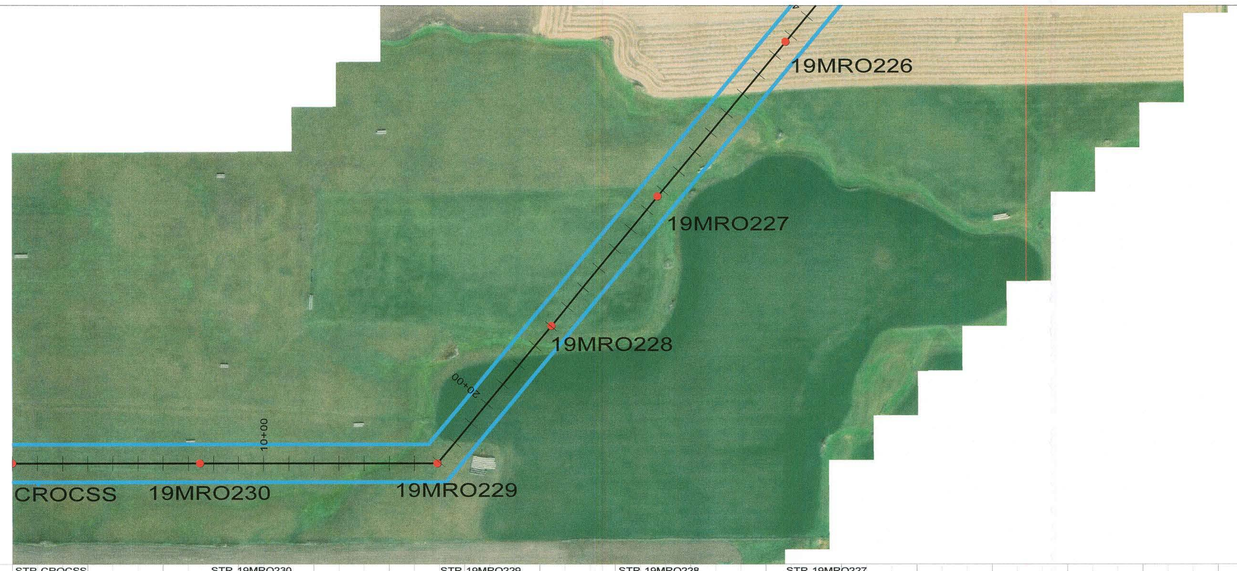
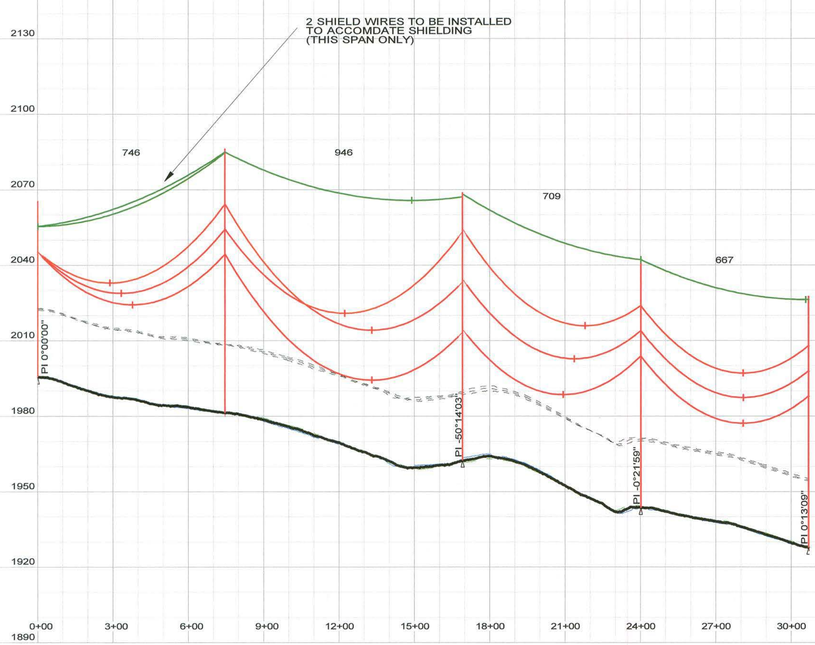


NORTH

STR CROCSS	STR 19MRO230	STR 19MRO229	STR 19MRO228	STR 19MRO227
SUBSTATION DEADEND	HEAVY TANGENT	SELF-SUPPORT DEADEND	LIGHT TANGENT	LIGHT TANGENT
BY OTHERS	CR1-01002	CR1-01005	CR1-01001	CR1-01001
HT=70.00	HT=105.00	HT=106.50	HT=100.00	HT=100.00
ELEV=1995.49	ELEV=1981.29	ELEV=1962.36	ELEV=1943.56	ELEV=1927.68
OPGW SPLICE	EMBED=28.00	POLE LENGTH = 105	EMBED=24.00	EMBED=24.00
SEE DWG CR1-00541, DETAILS 3 & 4	POLE LENGTH = 133	LINE ANGLE=-50°14'03"	POLE LENGTH = 124	POLE LENGTH = 124
	SEE DWG CR1-00541, DETAIL 2		LINE ANGLE=-0°21'59"	LINE ANGLE=0°13'09"



CABLE DATA (UNLESS OTHERWISE NOTED):

300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
4. STRUCTURE NAMES DISPLAYED IN STRUCTURE LABELS CORRESPOND TO THE FOLLOWING STRUCTURE TYPES:
   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/25/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED	DESIGNED	CHECKED
5/24/17	A. HERRMANN	A. HERRMANN	J. CANNON

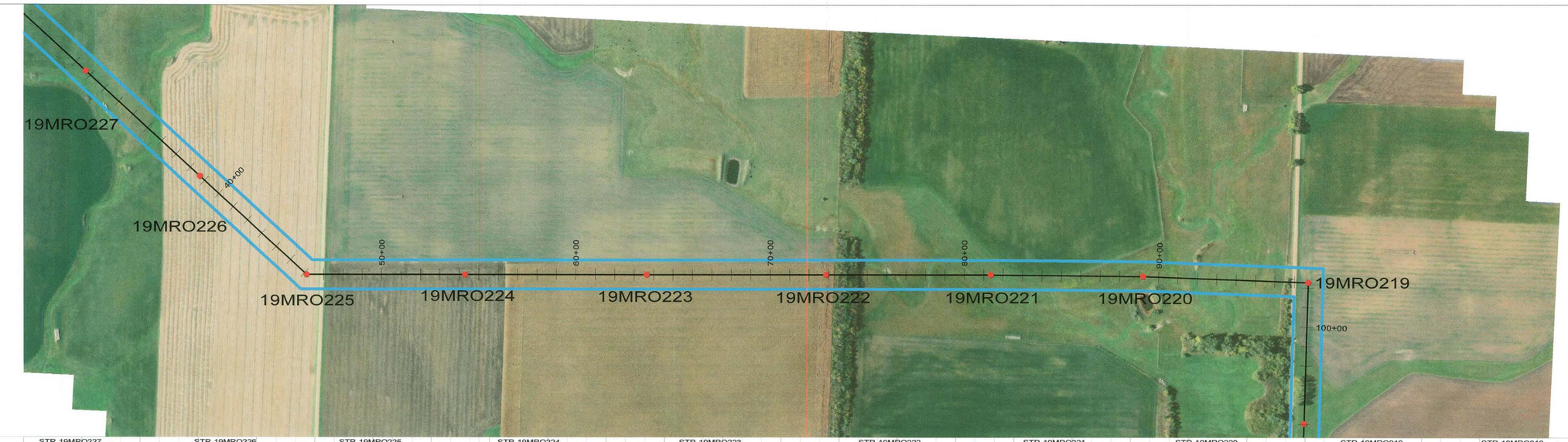
NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

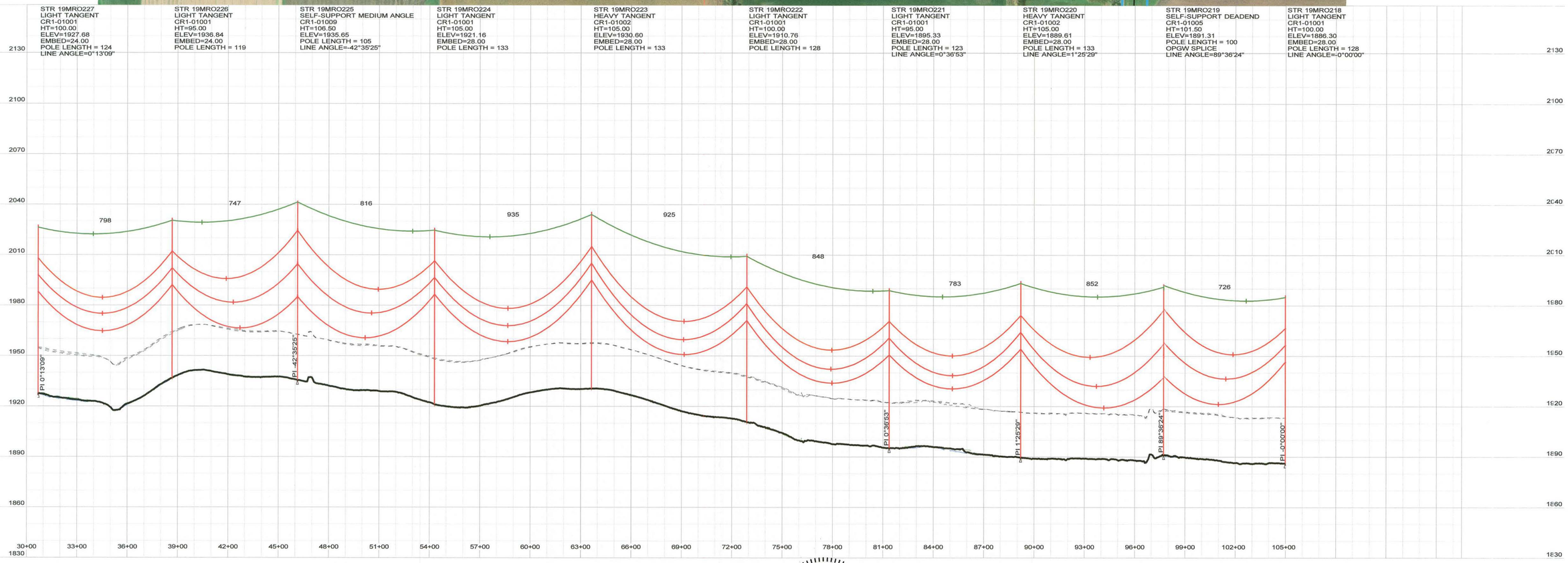
TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. CR1-00932 SHEET 1 OF 28 REV E



STR 19MRO227	STR 19MRO226	STR 19MRO225	STR 19MRO224	STR 19MRO223	STR 19MRO222	STR 19MRO221	STR 19MRO220	STR 19MRO219	STR 19MRO218
LIGHT TANGENT	LIGHT TANGENT	SELF-SUPPORT MEDIUM ANGLE	LIGHT TANGENT	HEAVY TANGENT	LIGHT TANGENT	LIGHT TANGENT	HEAVY TANGENT	SELF-SUPPORT DEADEND	LIGHT TANGENT
CR1-01001	CR1-01001	CR1-01009	CR1-01001	CR1-01002	CR1-01001	CR1-01001	CR1-01002	CR1-01005	CR1-01001
HT=100.00	HT=95.00	HT=106.50	HT=105.00	HT=105.00	HT=100.00	HT=95.00	HT=105.00	HT=101.50	HT=100.00
ELEV=1927.68	ELEV=1936.84	ELEV=1935.65	ELEV=1921.16	ELEV=1930.60	ELEV=1910.76	ELEV=1895.33	ELEV=1889.61	ELEV=1891.31	ELEV=1886.30
EMBED=24.00	EMBED=24.00	POLE LENGTH = 105	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	POLE LENGTH = 100	EMBED=28.00
POLE LENGTH = 124	POLE LENGTH = 119	LINE ANGLE=-42°35'25"	POLE LENGTH = 133	POLE LENGTH = 133	POLE LENGTH = 128	POLE LENGTH = 123	POLE LENGTH = 133	OPGW SPLICE	POLE LENGTH = 128
LINE ANGLE=0°13'09"						LINE ANGLE=0°36'53"	LINE ANGLE=1°25'29"	LINE ANGLE=89°36'24"	LINE ANGLE=-0°00'00"



300.0 FT. HORIZ. SCALE
30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
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   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/25/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE 5/24/17
DETAILED A. HERRMANN
DESIGNED A. HERRMANN
CHECKED J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

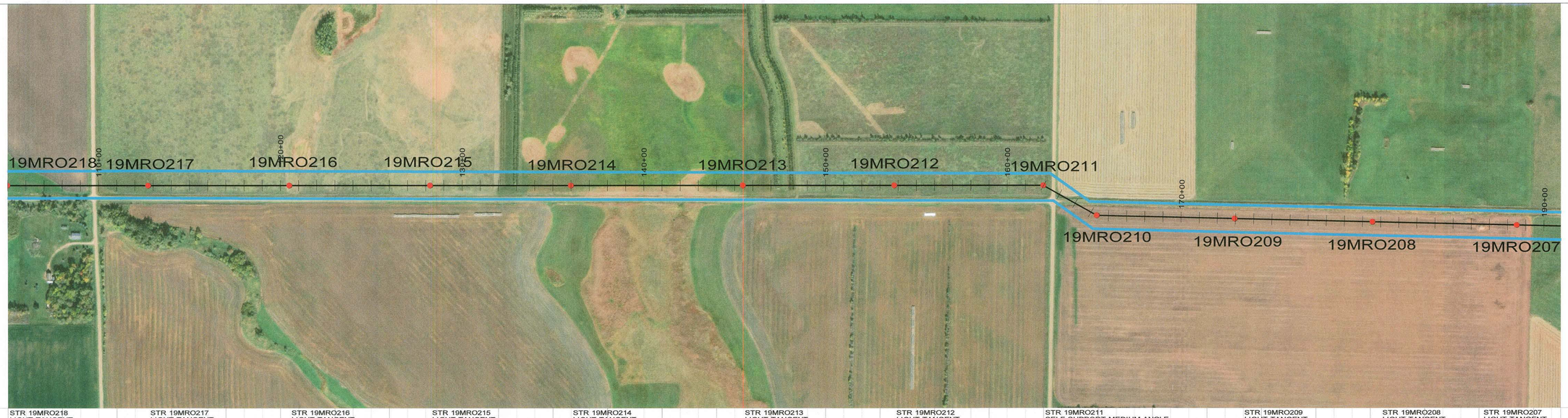
CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

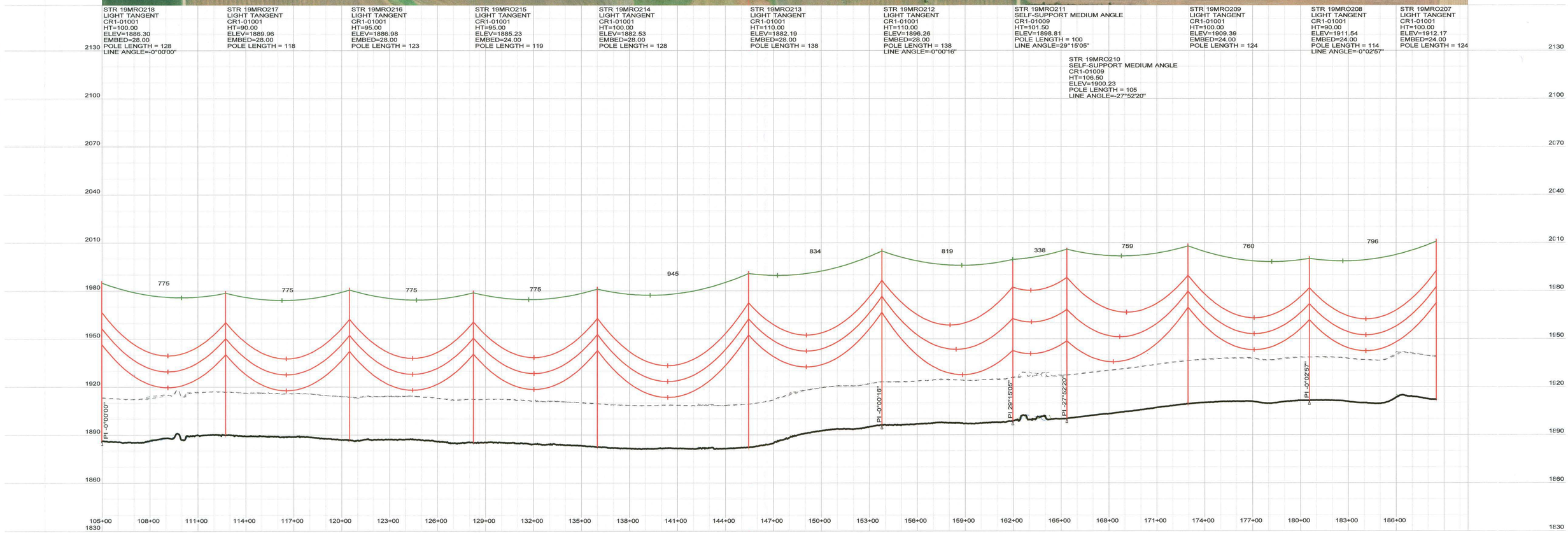
DWG. NO. SHEET 2 OF 28 REV E

PLS-CADD DRAWING



STR 19MRO218	STR 19MRO217	STR 19MRO216	STR 19MRO215	STR 19MRO214	STR 19MRO213	STR 19MRO212	STR 19MRO211	STR 19MRO209	STR 19MRO208	STR 19MRO207
LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	SELF-SUPPORT MEDIUM ANGLE	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT
CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01009	CR1-01001	CR1-01001	CR1-01001
HT=100.00	HT=90.00	HT=95.00	HT=95.00	HT=100.00	HT=110.00	HT=110.00	HT=101.50	HT=100.00	HT=90.00	HT=100.00
ELEV=1886.30	ELEV=1889.96	ELEV=1886.98	ELEV=1885.23	ELEV=1882.53	ELEV=1882.19	ELEV=1896.26	ELEV=1898.81	ELEV=1909.39	ELEV=1911.54	ELEV=1912.17
EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=24.00	EMBED=28.00	EMBED=28.00	EMBED=28.00		EMBED=24.00	EMBED=24.00	EMBED=24.00
POLE LENGTH = 128	POLE LENGTH = 118	POLE LENGTH = 123	POLE LENGTH = 119	POLE LENGTH = 128	POLE LENGTH = 138	POLE LENGTH = 138	POLE LENGTH = 100	POLE LENGTH = 124	POLE LENGTH = 114	POLE LENGTH = 124
LINE ANGLE=-0°00'00"						LINE ANGLE=-0°00'16"	LINE ANGLE=29°15'05"		LINE ANGLE=-0°02'57"	

STR 19MRO210
SELF-SUPPORT MEDIUM ANGLE
CR1-01009
HT=105.50
ELEV=1900.23
POLE LENGTH = 105
LINE ANGLE=-27°52'20"



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
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   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

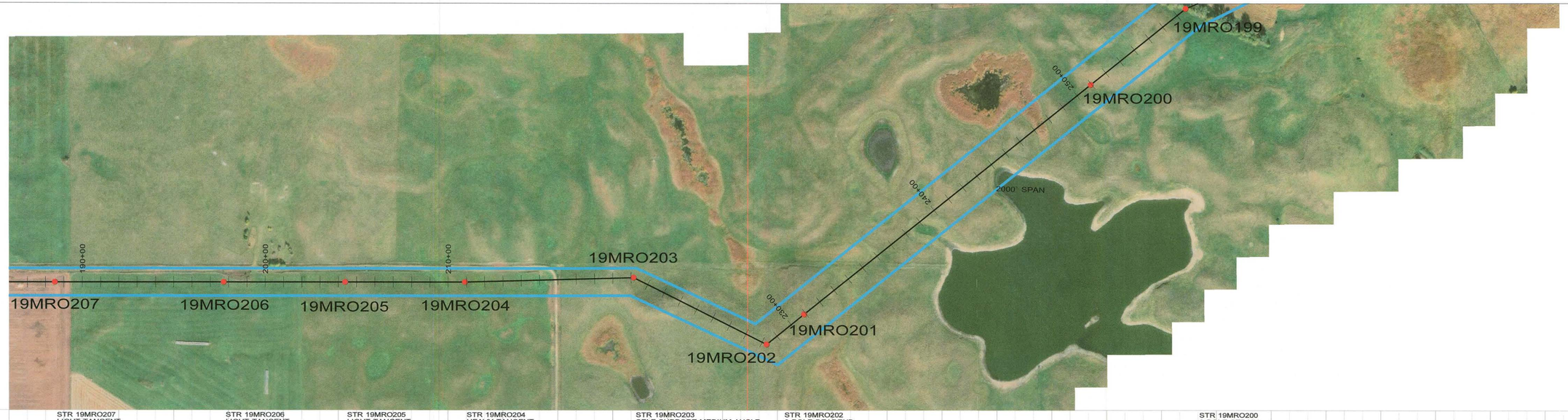
CROWNED RIDGE WIND, LLC

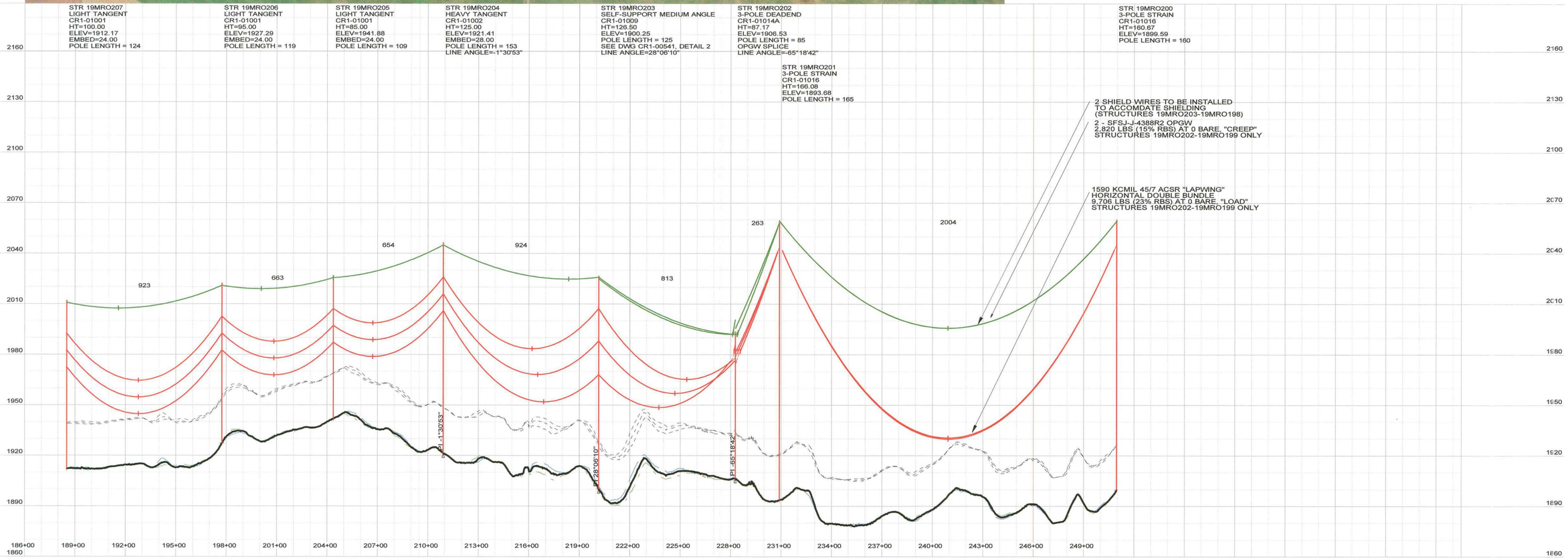
TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. | SHEET 3 OF 28 | REV E

PLS-CADD DRAWING





300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
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   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/24/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE 5/24/17
DETAILED A. HERRMANN
DESIGNED A. HERRMANN
CHECKED J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

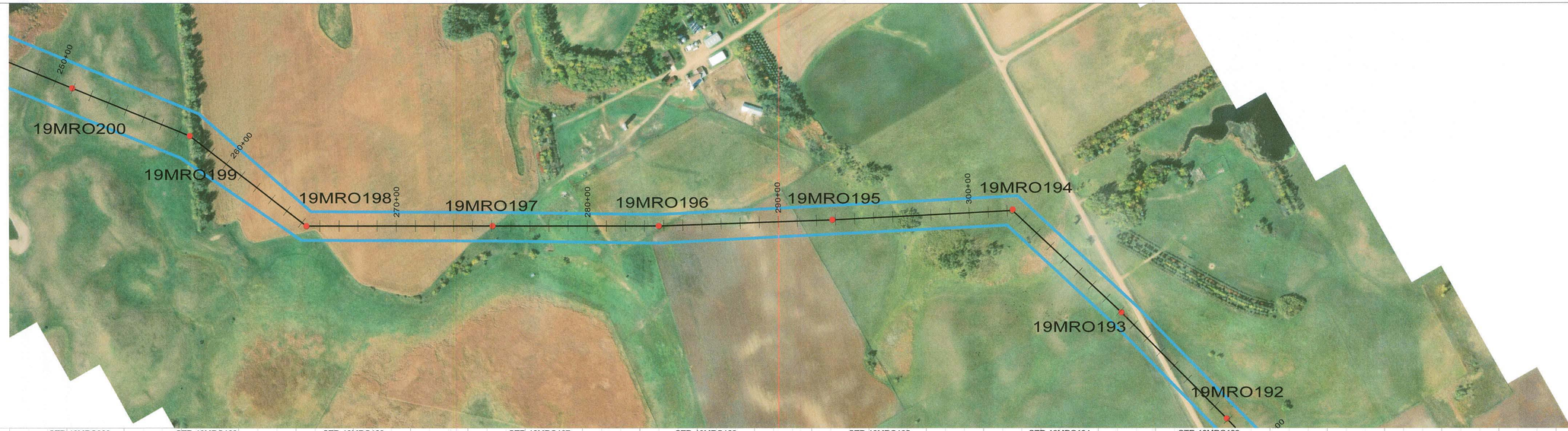
PLAN & PROFILE

DWG. NO.

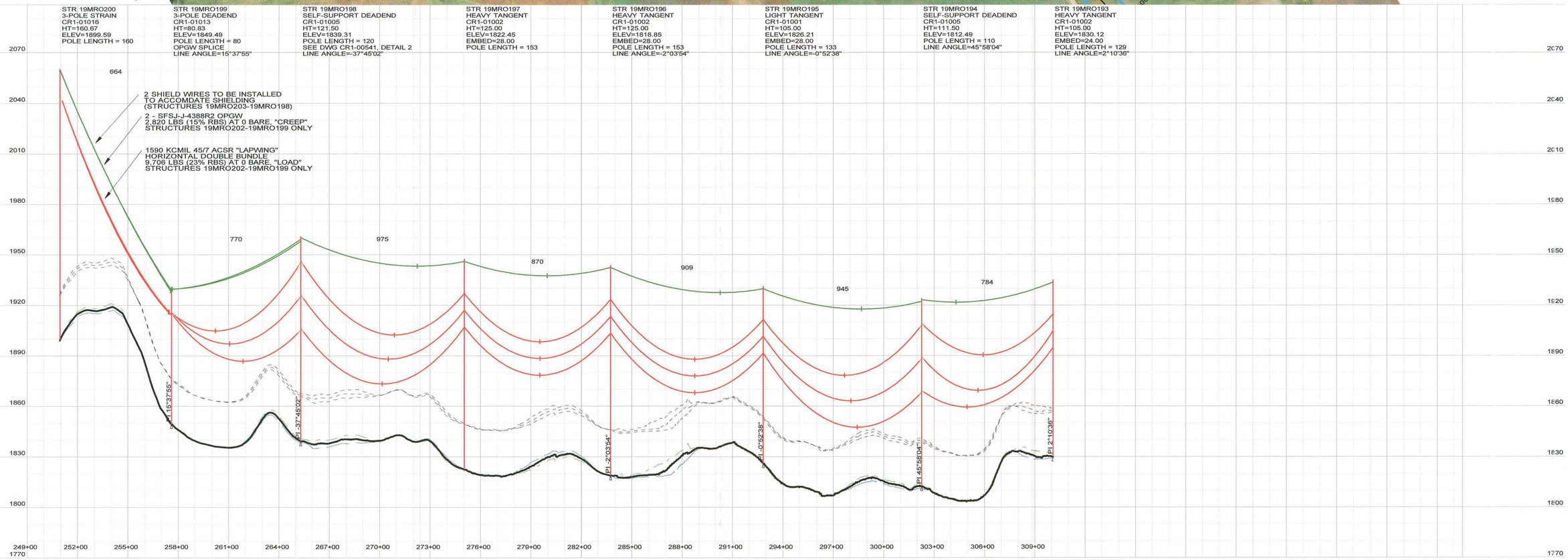
SHEET 4 OF 28

REV E

PLS-CADD DRAWING



STR 19MRO200	STR 19MRO199	STR 19MRO198	STR 19MRO197	STR 19MRO196	STR 19MRO195	STR 19MRO194	STR 19MRO193
3-POLE STRAIN	3-POLE DEADEND	SELF-SUPPORT DEADEND	HEAVY TANGENT	HEAVY TANGENT	LIGHT TANGENT	SELF-SUPPORT DEADEND	HEAVY TANGENT
CR1-01016	CR1-01013	CR1-01005	CR1-01002	CR1-01002	CR1-01001	CR1-01005	CR1-01002
HT=160.67	HT=80.83	HT=121.50	HT=125.00	HT=125.00	HT=105.00	HT=111.50	HT=105.00
ELEV=1899.59	ELEV=1849.49	ELEV=1839.31	ELEV=1822.45	ELEV=1818.85	ELEV=1826.21	ELEV=1812.49	ELEV=1830.12
POLE LENGTH = 160	POLE LENGTH = 80	POLE LENGTH = 120	EMBED=28.00	EMBED=28.00	EMBED=28.00	POLE LENGTH = 110	EMBED=24.00
	OPGW SPLICE	SEE DWG CR1-00541, DETAIL 2	POLE LENGTH = 153	POLE LENGTH = 153	POLE LENGTH = 133	LINE ANGLE=45°58'04"	POLE LENGTH = 129
	LINE ANGLE=15°37'55"	LINE ANGLE=-37°45'02"		LINE ANGLE=-2°03'54"	LINE ANGLE=-0°52'38"		LINE ANGLE=2°10'36"



CABLE DATA (UNLESS OTHERWISE NOTED):

300.0 FT. HORIZ. SCALE
30.0 FT. VERT. SCALE

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
4. STRUCTURE NAMES DISPLAYED IN STRUCTURE LABELS CORRESPOND TO THE FOLLOWING STRUCTURE TYPES:
   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED	CHECKED
5/24/17	A. HERRMANN	J. CANNON
DESIGNED		
A. HERRMANN		

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

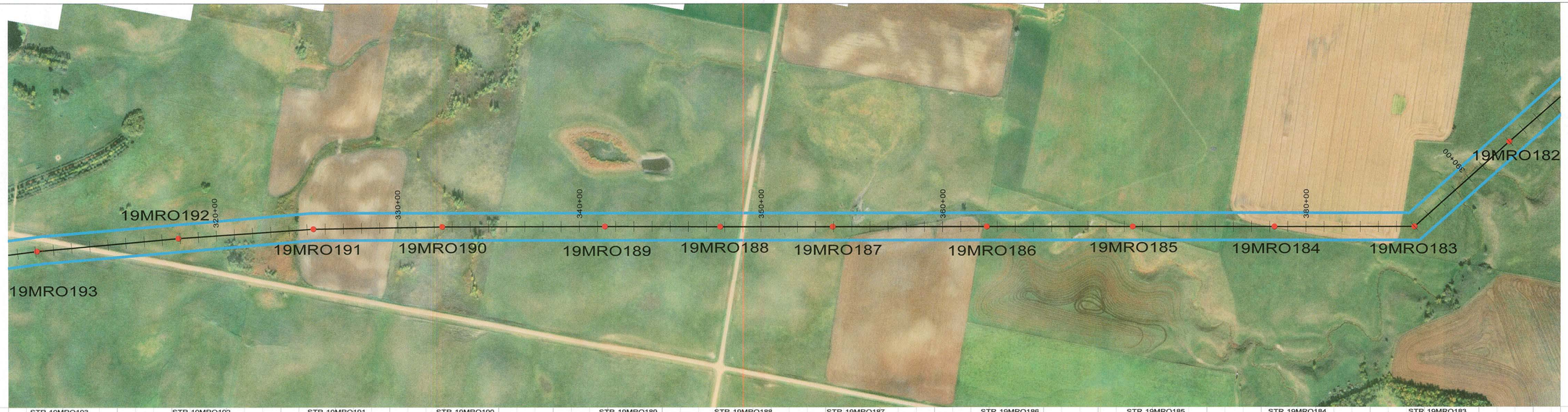
CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

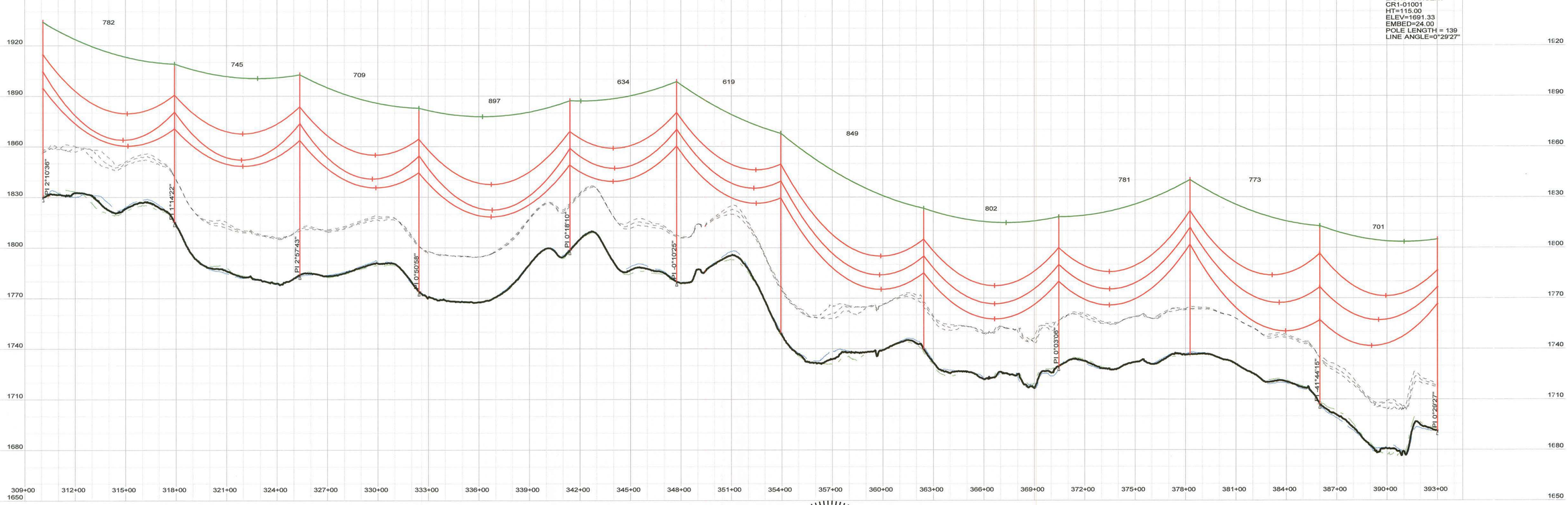
DWG. NO. SHEET 5 OF 28 REV E

PLS-CADD DRAWING



STR 19MRO193	STR 19MRO192	STR 19MRO191	STR 19MRO190	STR 19MRO189	STR 19MRO188	STR 19MRO187	STR 19MRO186	STR 19MRO185	STR 19MRO184	STR 19MRO183
HEAVY TANGENT	LIGHT TANGENT	HEAVY TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	SELF-SUPPORT MEDIUM ANGLE
CR1-01002	CR1-01001	CR1-01002	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01009
HT=105.00	HT=95.00	HT=120.00	HT=110.00	HT=90.00	HT=120.00	HT=120.00	HT=85.00	HT=90.00	HT=105.00	HT=106.50
ELEV=1830.12	ELEV=1815.30	ELEV=1784.00	ELEV=1774.09	ELEV=1798.63	ELEV=1779.93	ELEV=1749.23	ELEV=1739.66	ELEV=1729.61	ELEV=1736.60	ELEV=1707.14
EMBED=24.00	EMBED=20.00	EMBED=24.00	EMBED=24.00	EMBED=20.00	EMBED=24.00	EMBED=24.00	EMBED=20.00	EMBED=20.00	EMBED=24.00	POLE LENGTH = 105
POLE LENGTH = 129	POLE LENGTH = 115	POLE LENGTH = 144	POLE LENGTH = 134	POLE LENGTH = 110	POLE LENGTH = 144	POLE LENGTH = 144	POLE LENGTH = 105	POLE LENGTH = 110	POLE LENGTH = 129	LINE ANGLE=-41°44'15"
LINE ANGLE=2°10'36"	LINE ANGLE=1°14'22"	LINE ANGLE=2°57'43"	LINE ANGLE=0°50'58"	LINE ANGLE=0°18'10"	LINE ANGLE=-0°10'25"			LINE ANGLE=0°03'06"		

STR 19MRO182
LIGHT TANGENT
CR1-01001
HT=115.00
ELEV=1691.33
EMBED=24.00
POLE LENGTH = 139
LINE ANGLE=0°29'27"



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING" HORIZONTAL BUNDLED CONDUCTOR DISPLAYED: 167°F, "FINAL" CONDITION DESIGN TENSION: 10,550 LBS (25% RBS) AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW DISPLAYED: 0°F "INITIAL" CONDITION DESIGN TENSION: 4,700 LBS (25% RBS) AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
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   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

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9400 WARD PARKWAY, KANSAS CITY, MO 64114

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5/24/17	A. HERRMANN	A. HERRMANN	J. CANNON

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D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

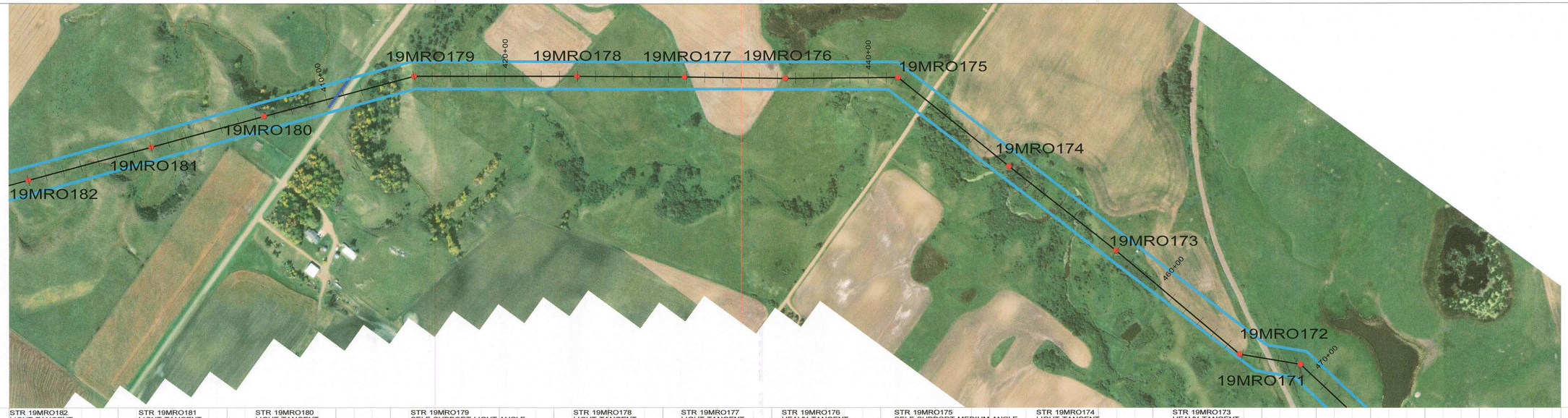
CROWNED RIDGE WIND, LLC

TITLE: CROWNED RIDGE I 230KV TRANSMISSION LINE

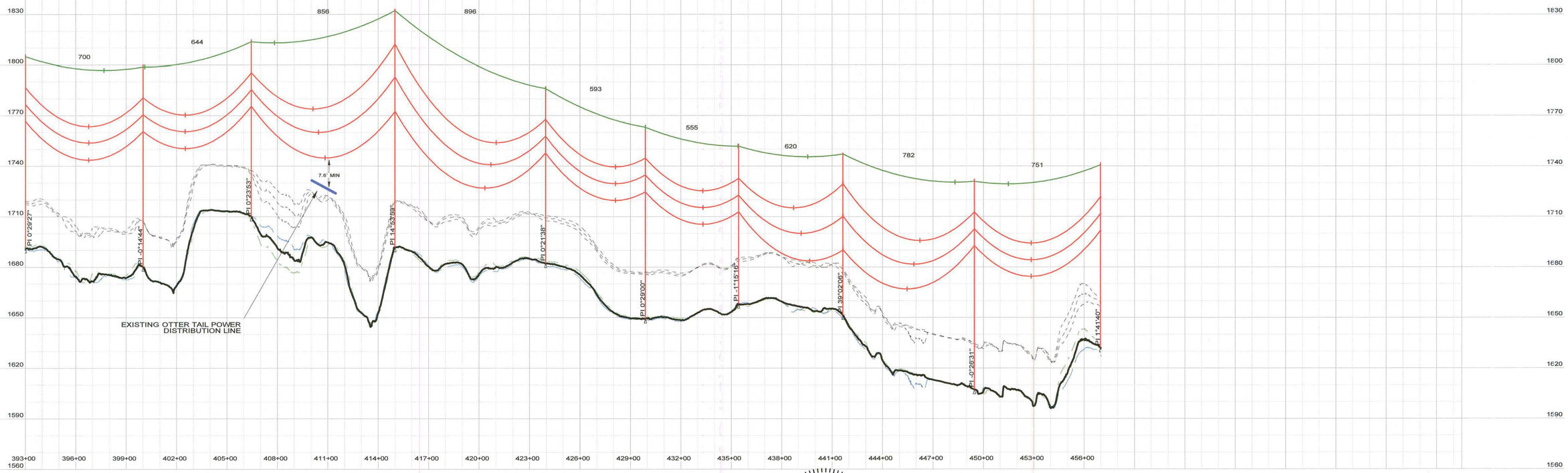
PLAN & PROFILE

DWG. NO. | SHEET 6 OF 28 | REV E

PLS-CADD DRAWING



STR 19MRO182	STR 19MRO181	STR 19MRO180	STR 19MRO179	STR 19MRO178	STR 19MRO177	STR 19MRO176	STR 19MRO175	STR 19MRO174	STR 19MRO173
LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	SELF-SUPPORT LIGHT ANGLE	LIGHT TANGENT	LIGHT TANGENT	HEAVY TANGENT	SELF-SUPPORT MEDIUM ANGLE	LIGHT TANGENT	HEAVY TANGENT
CR1-01001	CR1-01001	CR1-01001	CR1-01010	CR1-01001	CR1-01001	CR1-01002	CR1-01009	CR1-01001	CR1-01002
HT=115.00	HT=120.00	HT=105.00	HT=141.50	HT=105.00	HT=115.00	HT=95.00	HT=96.50	HT=125.00	HT=110.00
ELEV=1691.33	ELEV=1680.28	ELEV=1710.15	ELEV=1691.76	ELEV=1682.35	ELEV=1649.40	ELEV=1658.23	ELEV=1651.45	ELEV=1607.29	ELEV=1632.16
EMBED=24.00	EMBED=24.00	EMBED=24.00	POLE LENGTH = 140	EMBED=24.00	EMBED=28.00	EMBED=24.00	POLE LENGTH = 95	EMBED=24.00	EMBED=28.00
POLE LENGTH = 139	POLE LENGTH = 144	POLE LENGTH = 129	OPGW SPLICE	POLE LENGTH = 129	POLE LENGTH = 143	POLE LENGTH = 119	LINE ANGLE=39°02'06"	POLE LENGTH = 149	POLE LENGTH = 138
LINE ANGLE=0°29'27"	LINE ANGLE=-0°14'44"	LINE ANGLE=0°23'53"	LINE ANGLE=14°53'53"	LINE ANGLE=0°21'38"	LINE ANGLE=0°29'00"	LINE ANGLE=-1°15'16"		LINE ANGLE=-0°26'31"	LINE ANGLE=1°41'40"



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
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   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
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5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

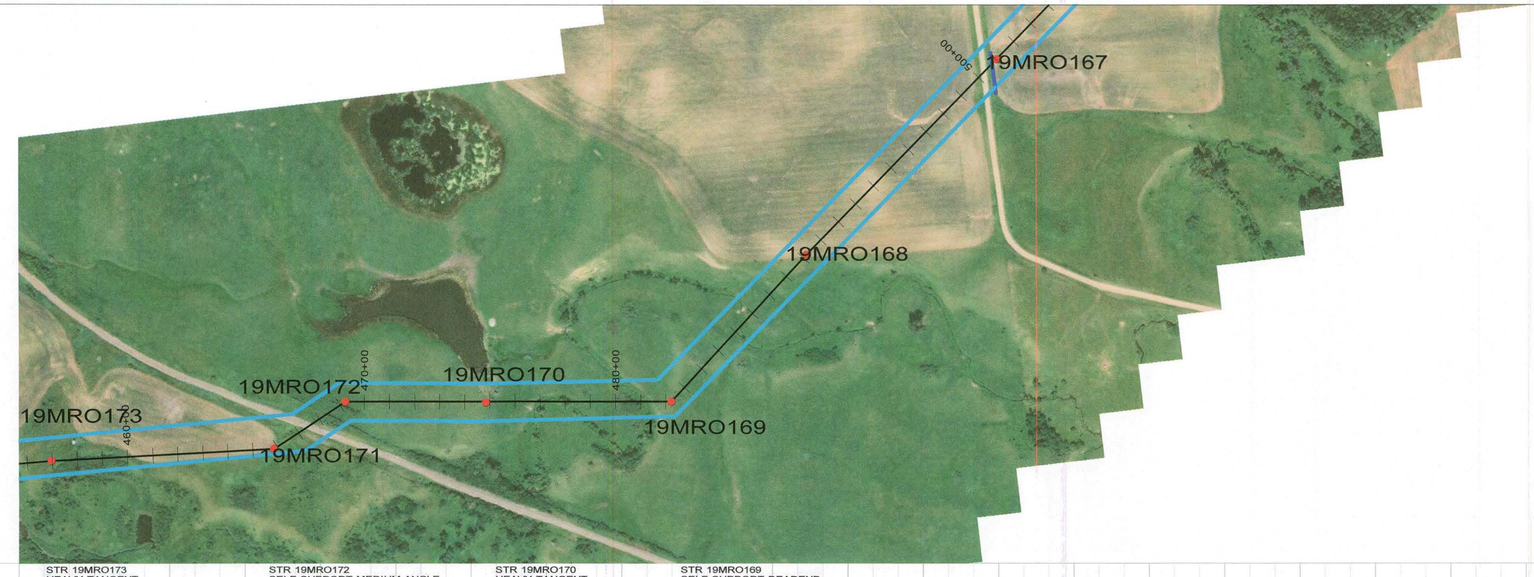
NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. SHEET 7 OF 28 REV E



STR 19MRO173
HEAVY TANGENT
CR1-01002
HT=110.00
ELEV=1632.16
EMBED=28.00
POLE LENGTH = 138
LINE ANGLE=1°41'40"

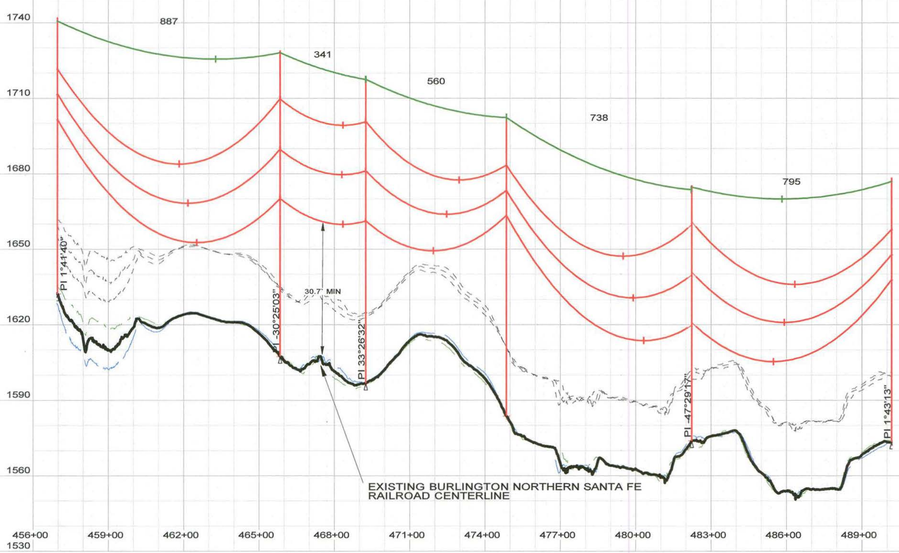
STR 19MRO172
SELF-SUPPORT MEDIUM ANGLE
CR1-01009
HT=121.50
ELEV=1607.41
POLE LENGTH = 120
LINE ANGLE=-30°25'03"

STR 19MRO170
HEAVY TANGENT
CR1-01002
HT=120.00
ELEV=1583.83
EMBED=28.00
POLE LENGTH = 148

STR 19MRO169
SELF-SUPPORT DEADEND
CR1-01005
HT=101.50
ELEV=1573.91
POLE LENGTH = 100
LINE ANGLE=-47°29'17"

STR 19MRO171
SELF-SUPPORT MEDIUM ANGLE
CR1-01009
HT=121.50
ELEV=1596.84
POLE LENGTH = 120
LINE ANGLE=33°26'32"

STR 19MRO168
HEAVY TANGENT
CR1-01002
HT=105.00
ELEV=1573.37
EMBED=28.00
POLE LENGTH = 133
LINE ANGLE=1°43'13"



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
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   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
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7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

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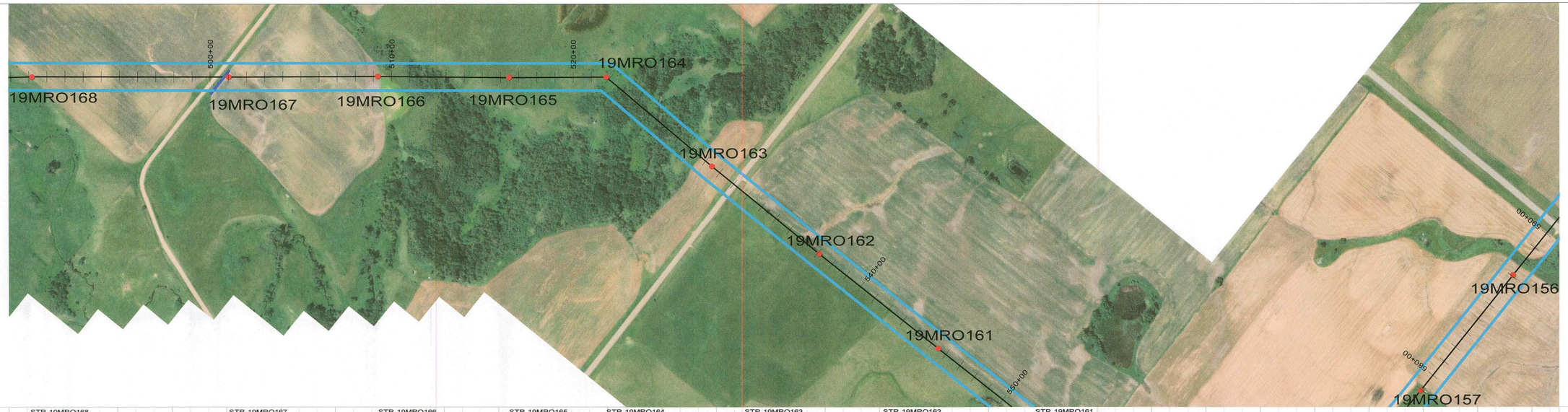
CROWNED RIDGE WIND, LLC

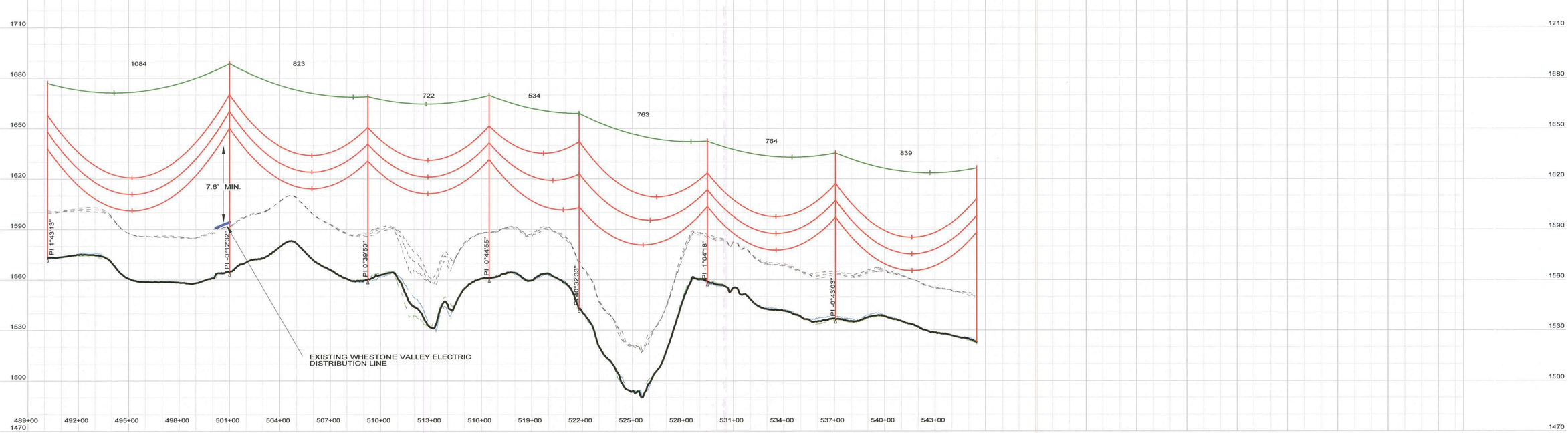
TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. | SHEET 8 OF 28 | REV E



STR 19MRO168	STR 19MRO167	STR 19MRO166	STR 19MRO165	STR 19MRO164	STR 19MRO163	STR 19MRO162	STR 19MRO161
HEAVY TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	SELF-SUPPORT MEDIUM ANGLE	HEAVY TANGENT	LIGHT TANGENT	LIGHT TANGENT
CR1-01002	CR1-01001	CR1-01001	CR1-01001	CR1-01009	CR1-01002	CR1-01001	CR1-01001
HT=105.00	HT=125.00	HT=110.00	HT=110.00	HT=116.50	HT=85.00	HT=100.00	HT=105.00
ELEV=1573.37	ELEV=1564.92	ELEV=1560.34	ELEV=1561.16	ELEV=1543.29	ELEV=1558.96	ELEV=1536.83	ELEV=1522.87
EMBED=28.00	EMBED=28.00	EMBED=24.00	EMBED=24.00	POLE LENGTH = 115	EMBED=28.00	EMBED=28.00	EMBED=28.00
POLE LENGTH = 133	POLE LENGTH = 153	POLE LENGTH = 134	POLE LENGTH = 134	OPGW SPLICE	POLE LENGTH = 113	POLE LENGTH = 128	POLE LENGTH = 133
LINE ANGLE=1°43'13"	LINE ANGLE=-0°12'32"	LINE ANGLE=0°39'50"	LINE ANGLE=-0°44'55"	LINE ANGLE=40°32'33"	LINE ANGLE=-1°04'18"	LINE ANGLE=-0°43'03"	



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

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HORIZONTAL BUNDLED CONDUCTOR
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DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
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DESIGN TENSION: 4,700 LBS (25% RBS)
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NOTES:
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   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
5/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

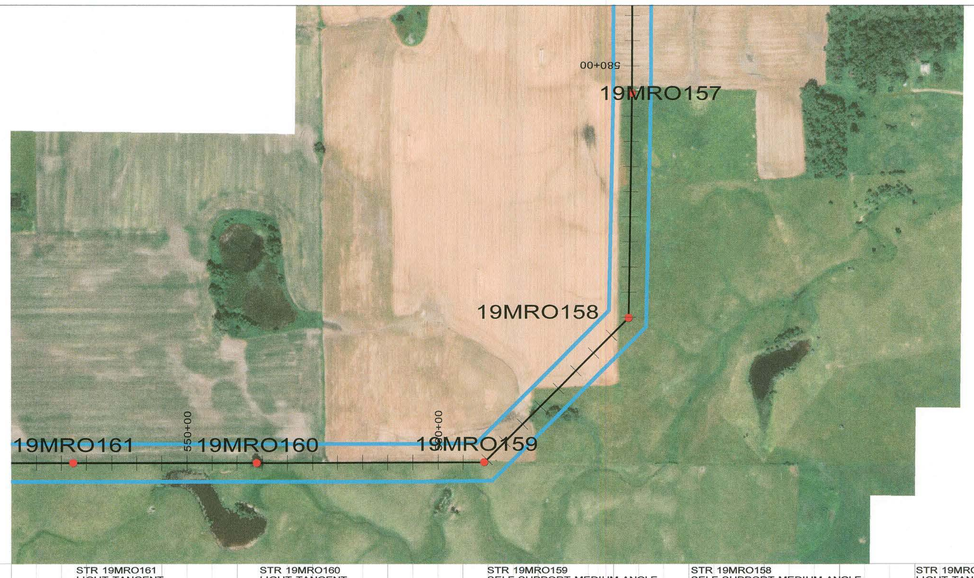
NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. SHEET 9 OF 28 REV E



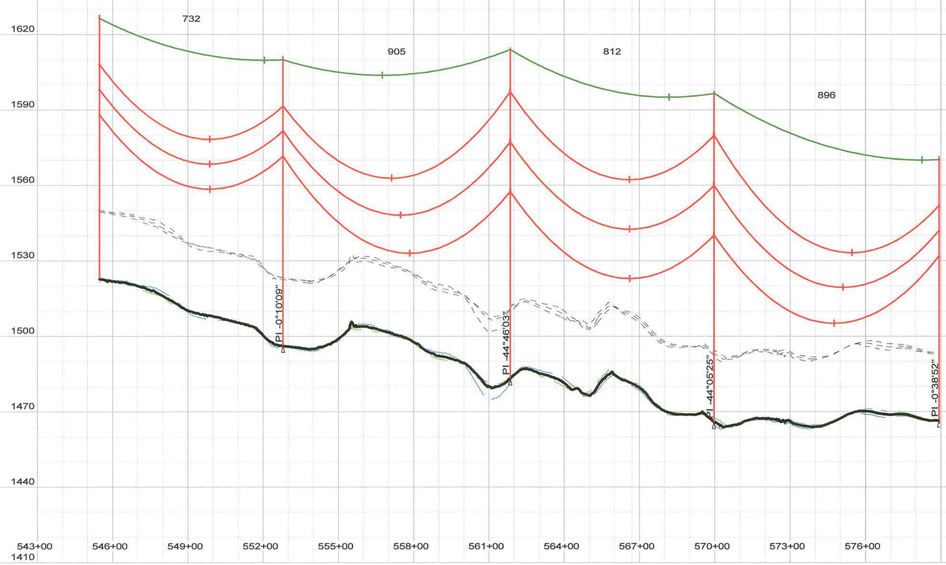
STR 19MRO161
LIGHT TANGENT
CR1-01001
HT=105.00
ELEV=1522.87
EMBED=28.00
POLE LENGTH = 133

STR 19MRO160
LIGHT TANGENT
CR1-01001
HT=115.00
ELEV=1496.27
EMBED=28.00
POLE LENGTH = 143
LINE ANGLE=-0°10'09"

STR 19MRO159
SELF-SUPPORT MEDIUM ANGLE
CR1-01009
HT=131.50
ELEV=1483.26
POLE LENGTH = 130
LINE ANGLE=-44°46'03"

STR 19MRO158
SELF-SUPPORT MEDIUM ANGLE
CR1-01009
HT=131.50
ELEV=1485.89
POLE LENGTH = 130
LINE ANGLE=-44°05'25"

STR 19MRO157
LIGHT TANGENT
CR1-01001
HT=105.00
ELEV=1466.51
EMBED=24.00
POLE LENGTH = 129
LINE ANGLE=-0°38'52"



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
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   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
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REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE 5/24/17
DETAILED A. HERRMANN
DESIGNED A. HERRMANN
CHECKED J. CANNON

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B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
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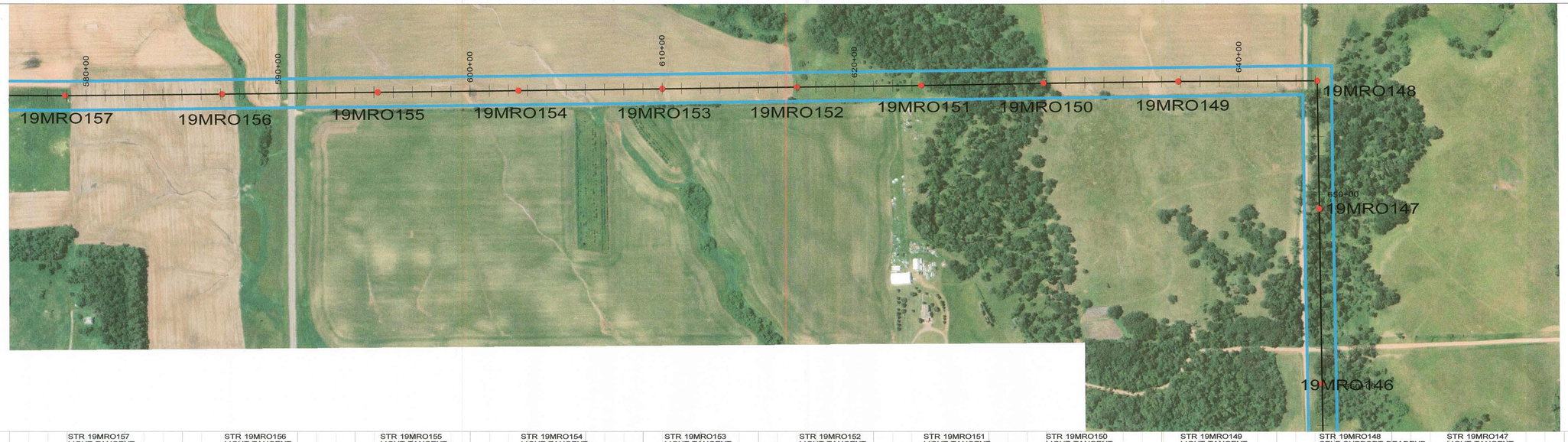
CROWNED RIDGE WIND, LLC

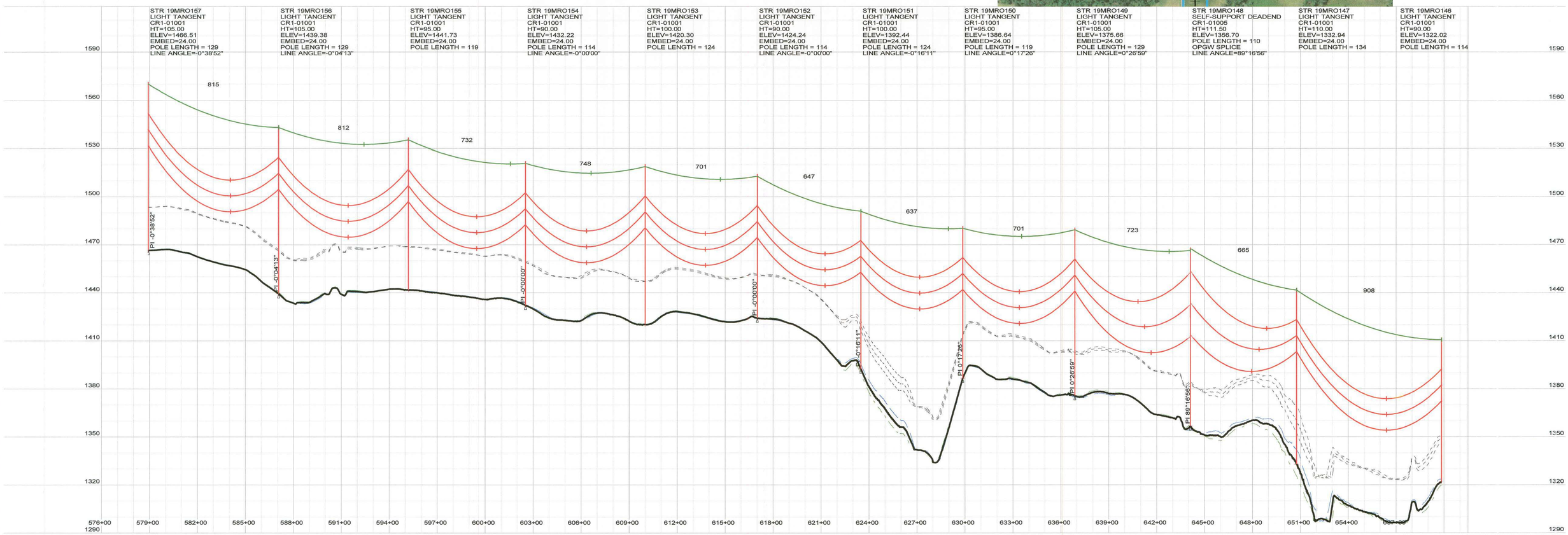
TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. | SHEET 10 OF 28 | REV E

PLS-CADD DRAWING





300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING" HORIZONTAL BUNDLED CONDUCTOR DISPLAYED: 167°F, "FINAL" CONDITION DESIGN TENSION: 10,550 LBS (25% RBS) AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW DISPLAYED: 0°F "INITIAL" CONDITION DESIGN TENSION: 4,700 LBS (25% RBS) AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001, US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
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   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
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7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE 5/24/17
DETAILED A. HERRMANN
DESIGNED A. HERRMANN
CHECKED J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

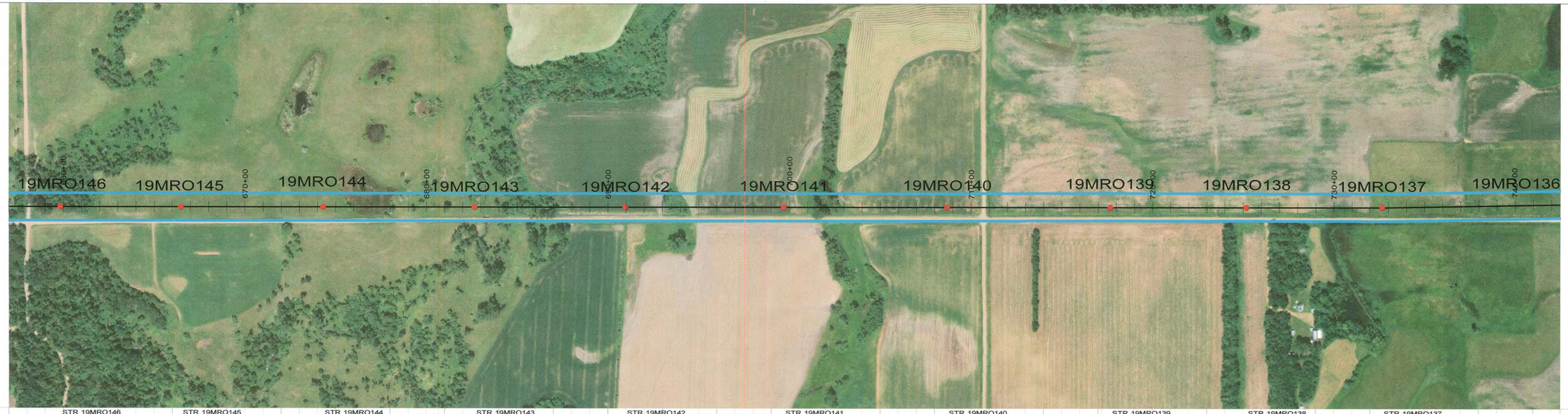
CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

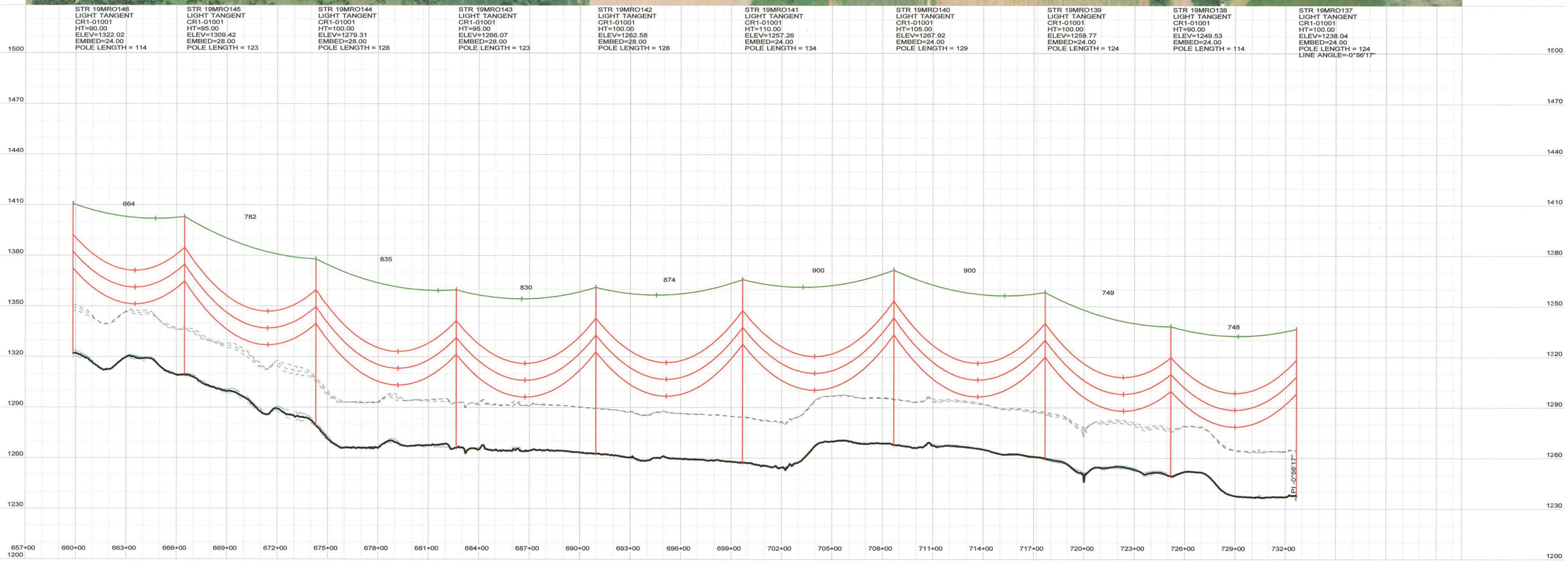
PLAN & PROFILE

DWG. NO. SHEET 11 OF 28 REV E

PLS-CADD DRAWING



STR 19MRO146	STR 19MRO145	STR 19MRO144	STR 19MRO143	STR 19MRO142	STR 19MRO141	STR 19MRO140	STR 19MRO139	STR 19MRO138	STR 19MRO137
LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT
CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001
HT=90.00	HT=95.00	HT=100.00	HT=95.00	HT=100.00	HT=110.00	HT=105.00	HT=100.00	HT=90.00	HT=100.00
ELEV=1322.02	ELEV=1309.42	ELEV=1279.31	ELEV=1266.07	ELEV=1262.58	ELEV=1257.26	ELEV=1267.92	ELEV=1259.77	ELEV=1249.53	ELEV=1238.04
EMBED=24.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=24.00	EMBED=24.00	EMBED=24.00	EMBED=24.00	EMBED=24.00
POLE LENGTH = 114	POLE LENGTH = 123	POLE LENGTH = 128	POLE LENGTH = 123	POLE LENGTH = 128	POLE LENGTH = 134	POLE LENGTH = 129	POLE LENGTH = 124	POLE LENGTH = 114	POLE LENGTH = 124
									LINE ANGLE=-0°56'17"



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

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DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

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   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
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REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
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B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
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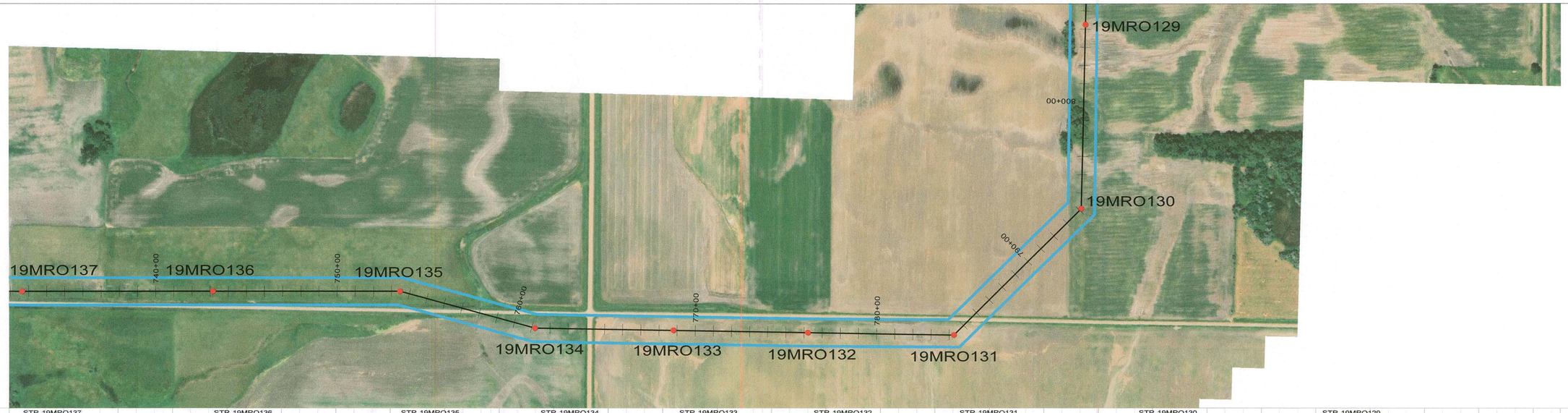
CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

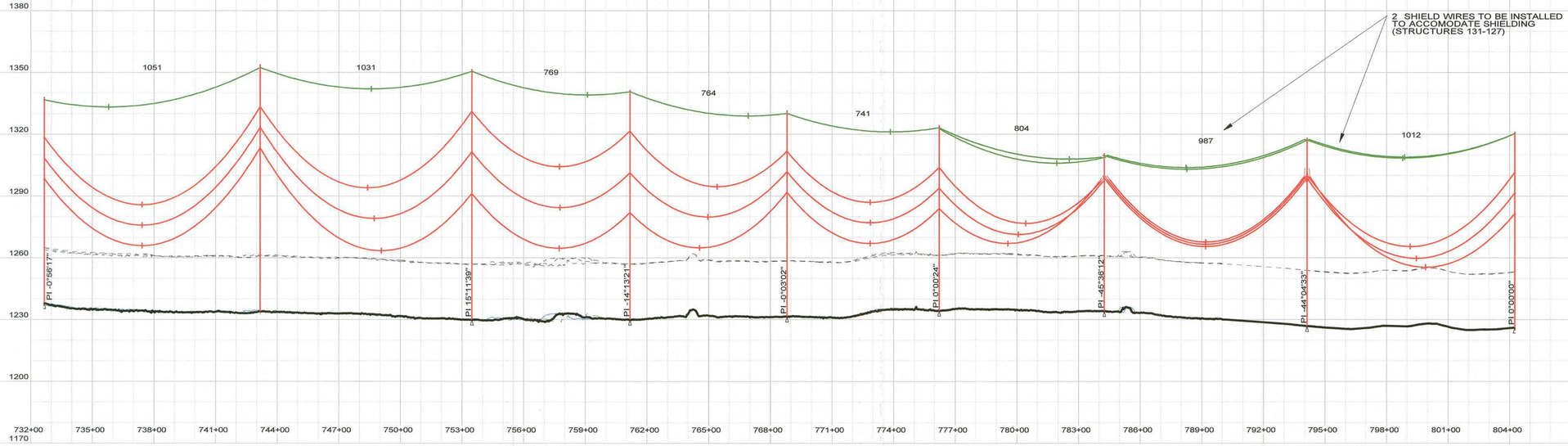
PLAN & PROFILE

DWG. NO. SHEET 12 OF 28 REV E

PLS-CADD DRAWING



STR 19MRO137	STR 19MRO136	STR 19MRO135	STR 19MRO134	STR 19MRO133	STR 19MRO132	STR 19MRO131	STR 19MRO130	STR 19MRO129
LIGHT TANGENT	HEAVY TANGENT	SELF-SUPPORT LIGHT ANGLE	SELF-SUPPORT LIGHT ANGLE	LIGHT TANGENT	HEAVY TANGENT	BURNS & MCDONNELL, 65.0' AGH, CR1-01017, 05/01/19	SELF-SUPPORT MEDIUM ANGLE	LIGHT TANGENT
CR1-01001	CR1-01002	CR1-01010	CR1-01010	CR1-01001	CR1-01002	CR1-01017	CR1-01015	CR1-01001
HT=100.00	HT=120.00	HT=121.50	HT=111.50	HT=100.00	HT=90.00	HT=76.50	HT=91.42	HT=95.00
ELEV=1238.04	ELEV=1233.89	ELEV=1229.98	ELEV=1230.00	ELEV=1231.49	ELEV=1234.40	ELEV=1234.18	ELEV=1226.86	ELEV=1226.17
EMBED=24.00	EMBED=30.00	POLE LENGTH = 120	POLE LENGTH = 110	EMBED=28.00	EMBED=28.00	POLE LENGTH = 75	POLE LENGTH = 90	EMBED=24.00
POLE LENGTH = 124	POLE LENGTH = 150	LINE ANGLE=15°11'39"	LINE ANGLE=-14°13'21"	POLE LENGTH = 128	POLE LENGTH = 118	OPGW SPLICE	LINE ANGLE=-44°04'33"	POLE LENGTH = 119
LINE ANGLE=-0°56'17"				LINE ANGLE=-0°03'02"	SEE DWG CR1-00541, DETAIL 2	LINE ANGLE=-45°36'12"		SEE DWG CR1-00541, DETAIL 1
					LINE ANGLE=0°00'24"			LINE ANGLE=0°00'00"



CABLE DATA (UNLESS OTHERWISE NOTED):

300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

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4/29/19

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A. HERRMANN	J. CANNON

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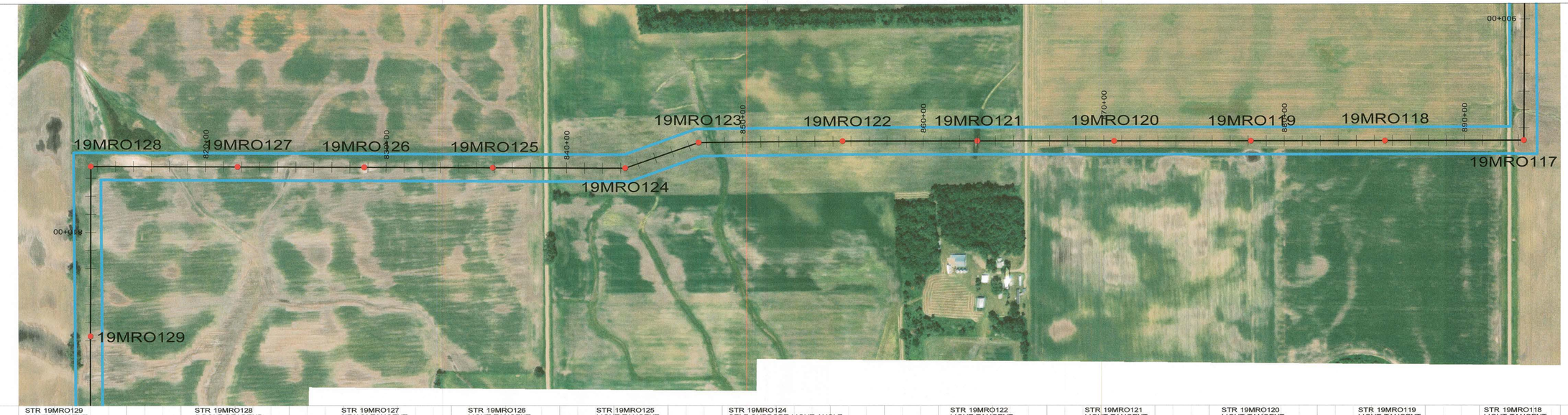
CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

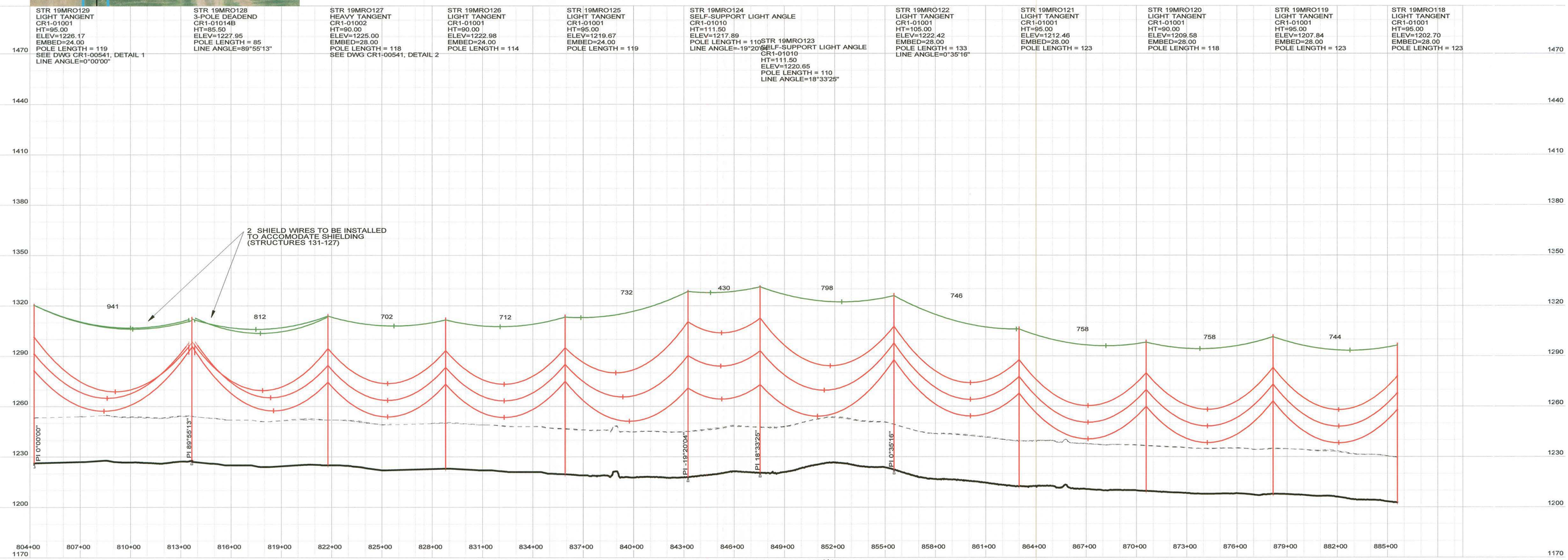
PLAN & PROFILE

DWG. NO. | SHEET 13 OF 28 | REV E

PLS-CADD DRAWING



STR 19MRO129	STR 19MRO128	STR 19MRO127	STR 19MRO126	STR 19MRO125	STR 19MRO124	STR 19MRO123	STR 19MRO122	STR 19MRO121	STR 19MRO120	STR 19MRO119	STR 19MRO118
LIGHT TANGENT	3-POLE DEADEND	HEAVY TANGENT	LIGHT TANGENT	LIGHT TANGENT	SELF-SUPPORT LIGHT ANGLE	SELF-SUPPORT LIGHT ANGLE	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT
CR1-01001	CR1-01014B	CR1-01002	CR1-01001	CR1-01001	CR1-01010	CR1-01010	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001
HT=95.00	HT=85.50	HT=90.00	HT=90.00	HT=95.00	HT=111.50	HT=111.50	HT=105.00	HT=95.00	HT=90.00	HT=95.00	HT=95.00
ELEV=1226.17	ELEV=1227.95	ELEV=1225.00	ELEV=1222.98	ELEV=1219.67	ELEV=1217.89	ELEV=1220.65	ELEV=1222.42	ELEV=1212.46	ELEV=1209.58	ELEV=1207.84	ELEV=1202.70
EMBED=24.00	LINE ANGLE=89°55'13"	EMBED=28.00	EMBED=24.00	EMBED=24.00	POLE LENGTH = 110	POLE LENGTH = 110	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=28.00
POLE LENGTH = 119	POLE LENGTH = 85	POLE LENGTH = 118	POLE LENGTH = 114	POLE LENGTH = 119	LINE ANGLE=-19°20'04"	LINE ANGLE=18°33'25"	POLE LENGTH = 133	POLE LENGTH = 123	POLE LENGTH = 118	POLE LENGTH = 123	POLE LENGTH = 123
SEE DWG CR1-00541, DETAIL 1		SEE DWG CR1-00541, DETAIL 2					LINE ANGLE=0°35'16"				
LINE ANGLE=0°00'00"											



300.0 FT. HORIZ. SCALE
30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
4. STRUCTURE NAMES DISPLAYED IN STRUCTURE LABELS CORRESPOND TO THE FOLLOWING STRUCTURE TYPES:
   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE 5/24/17
DETAILED A. HERRMANN
DESIGNED A. HERRMANN
CHECKED J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

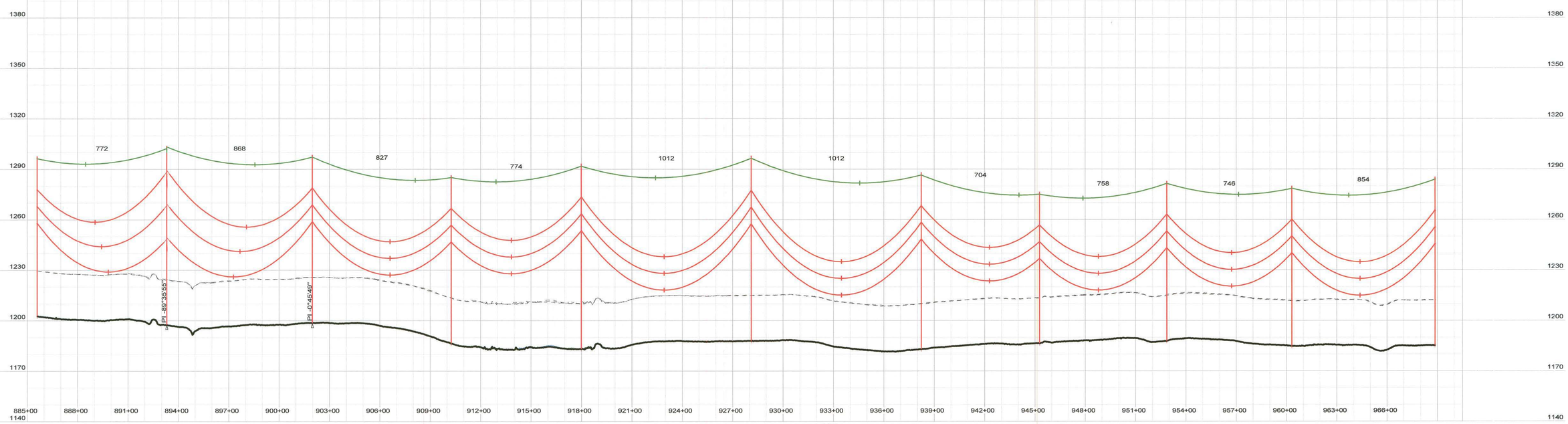
CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. SHEET 14 OF 28 REV E

STR 19MRO118	STR 19MRO117	STR 19MRO116	STR 19MRO115	STR 19MRO114	STR 19MRO113	STR 19MRO112	STR 19MRO111	STR 19MRO110	STR 19MRO109	STR 19MRO108
LIGHT TANGENT	SELF-SUPPORT DEADEND	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	HEAVY TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT
CR1-01001	CR1-01005	CR1-01001	CR1-01001	CR1-01001	CR1-01002	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001
HT=95.00	HT=106.50	HT=100.00	HT=100.00	HT=110.00	HT=110.00	HT=105.00	HT=90.00	HT=95.00	HT=95.00	HT=100.00
ELEV=1202.70	ELEV=1197.45	ELEV=1198.52	ELEV=1186.44	ELEV=1183.22	ELEV=1188.01	ELEV=1182.99	ELEV=1186.45	ELEV=1187.90	ELEV=1184.97	ELEV=1185.32
EMBED=28.00	POLE LENGTH = 105	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=24.00	EMBED=24.00	EMBED=28.00	EMBED=28.00
POLE LENGTH = 123	LINE ANGLE=-89°35'55"	POLE LENGTH = 128	POLE LENGTH = 128	POLE LENGTH = 138	POLE LENGTH = 138	POLE LENGTH = 133	POLE LENGTH = 114	POLE LENGTH = 119	POLE LENGTH = 123	POLE LENGTH = 128
		LINE ANGLE=-0°45'49"								



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
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   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. | SHEET 15 OF 28 | REV E

PLS-CADD DRAWING

STR 19MRO108
LIGHT TANGENT
CR1-01001
HT=100.00
ELEV=1185.32
EMBED=28.00
POLE LENGTH = 128

STR 19MRO107
LIGHT TANGENT
CR1-01001
HT=100.00
ELEV=1184.16
EMBED=28.00
POLE LENGTH = 128
LINE ANGLE=0°21'14"

STR 19MRO106
SELF-SUPPORT DEADEND
CR1-01005
HT=101.50
ELEV=1183.58
POLE LENGTH = 100
OPGW SPLICE
LINE ANGLE=90°03'59"

STR 19MRO105
LIGHT TANGENT
CR1-01001
HT=100.00
ELEV=1181.24
EMBED=28.00
POLE LENGTH = 128

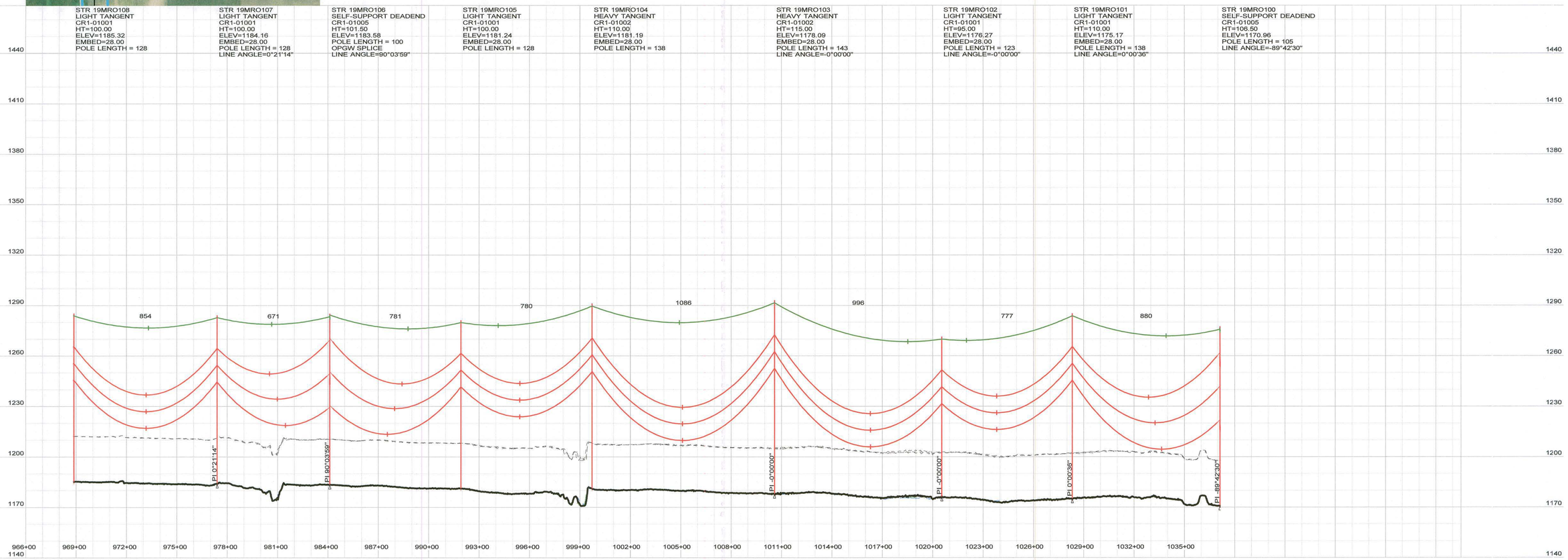
STR 19MRO104
HEAVY TANGENT
CR1-01002
HT=110.00
ELEV=1181.19
EMBED=28.00
POLE LENGTH = 138

STR 19MRO103
HEAVY TANGENT
CR1-01002
HT=115.00
ELEV=1178.09
EMBED=28.00
POLE LENGTH = 143
LINE ANGLE=-0°00'00"

STR 19MRO102
LIGHT TANGENT
CR1-01001
HT=95.00
ELEV=1176.27
EMBED=28.00
POLE LENGTH = 123
LINE ANGLE=-0°00'00"

STR 19MRO101
LIGHT TANGENT
CR1-01001
HT=110.00
ELEV=1175.17
EMBED=28.00
POLE LENGTH = 138
LINE ANGLE=0°00'36"

STR 19MRO100
SELF-SUPPORT DEADEND
CR1-01005
HT=106.50
ELEV=1170.96
POLE LENGTH = 105
LINE ANGLE=-89°42'30"



300.0 FT. HORIZ. SCALE
30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING" HORIZONTAL BUNDLED CONDUCTOR DISPLAYED: 167°F, "FINAL" CONDITION DESIGN TENSION: 10,550 LBS (25% RBS) AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW DISPLAYED: 0°F "INITIAL" CONDITION DESIGN TENSION: 4,700 LBS (25% RBS) AT 0°F, NO WIND, NO ICE, "FINAL"

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   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
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REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

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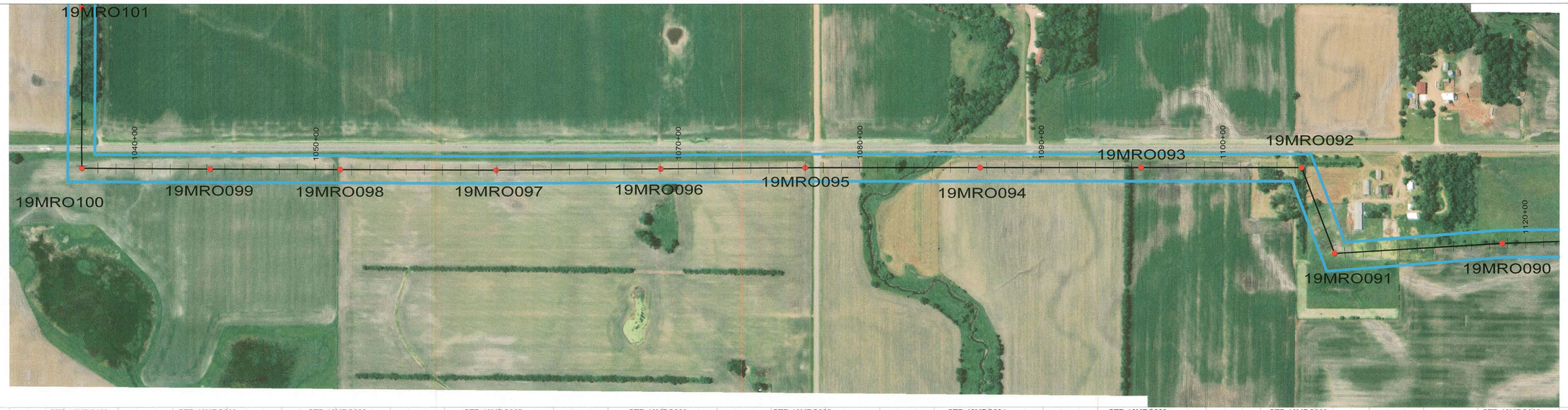
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

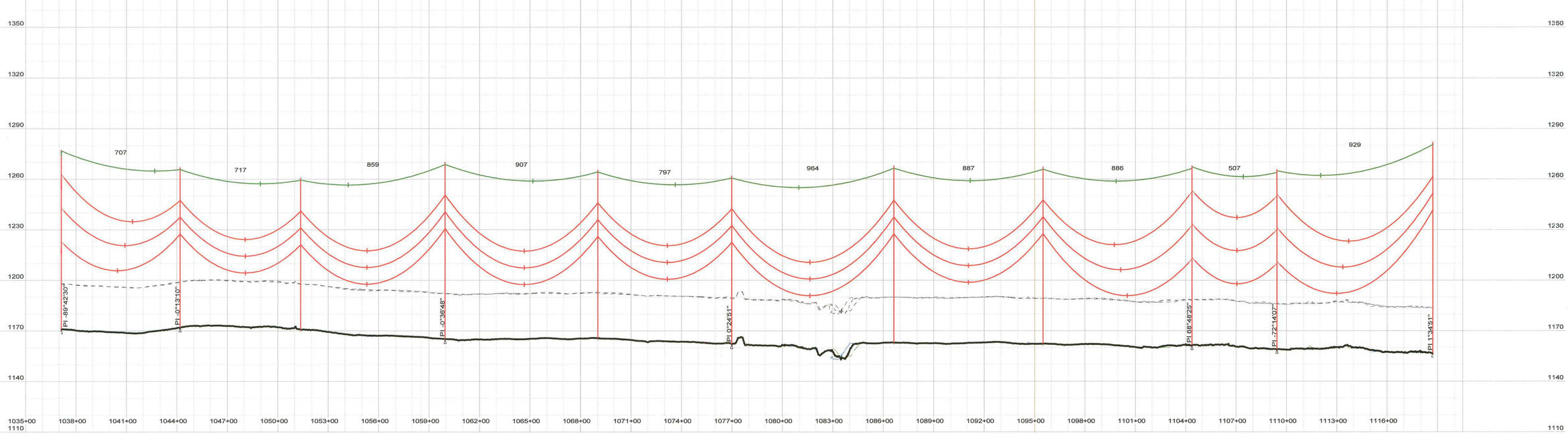
TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. | SHEET 16 OF 28 | REV E



STR 19MRO100	STR 19MRO099	STR 19MRO098	STR 19MRO097	STR 19MRO096	STR 19MRO095	STR 19MRO094	STR 19MRO093	STR 19MRO092	STR 19MRO091	STR 19MRO090
SELF-SUPPORT DEADEND	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	HEAVY TANGENT	LIGHT TANGENT	SELF-SUPPORT DEADEND	SELF-SUPPORT DEADEND	HEAVY TANGENT
CR1-01005	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01002	CR1-01001	CR1-01005	CR1-01005	CR1-01002
HT=106.50	HT=95.00	HT=90.00	HT=105.00	HT=100.00	HT=100.00	HT=105.00	HT=105.00	HT=106.50	HT=106.50	HT=125.00
ELEV=1170.96	ELEV=1172.05	ELEV=1170.78	ELEV=1165.21	ELEV=1165.65	ELEV=1162.11	ELEV=1163.01	ELEV=1162.29	ELEV=1161.51	ELEV=1159.16	ELEV=1156.94
POLE LENGTH = 105	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=32.00	EMBED=28.00	POLE LENGTH = 105	POLE LENGTH = 105	EMBED=32.00
LINE ANGLE=-89°42'30"	POLE LENGTH = 123	POLE LENGTH = 118	POLE LENGTH = 133	POLE LENGTH = 128	POLE LENGTH = 128	POLE LENGTH = 137	POLE LENGTH = 133	OPGW SPLICE	LINE ANGLE=-72°14'07"	POLE LENGTH = 157
	LINE ANGLE=-0°13'10"		LINE ANGLE=-0°36'48"		LINE ANGLE=0°24'51"			LINE ANGLE=68°48'25"		LINE ANGLE=1°34'51"



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

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HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
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4/29/19

ZACHARY T. WEISS
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SD PE NO: 13471

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9400 WARD PARKWAY, KANSAS CITY, MO 64114

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DESIGNED A. HERRMANN
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D	3/21/19	ISSUED FOR REVIEW	ARL	STE
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B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
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CROWNED RIDGE WIND, LLC

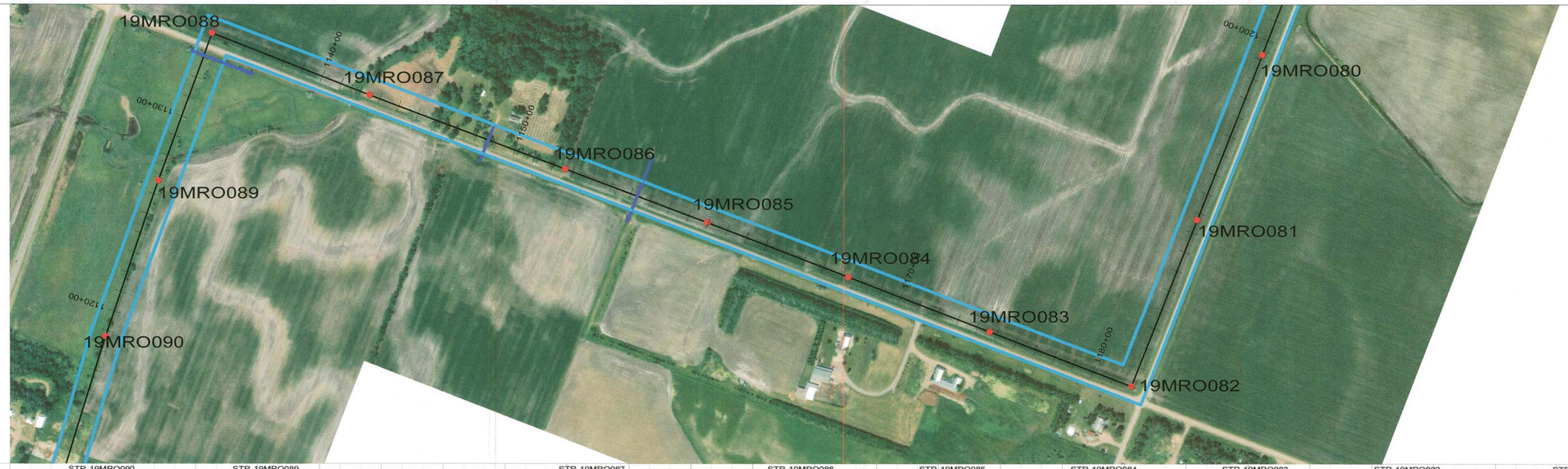
TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

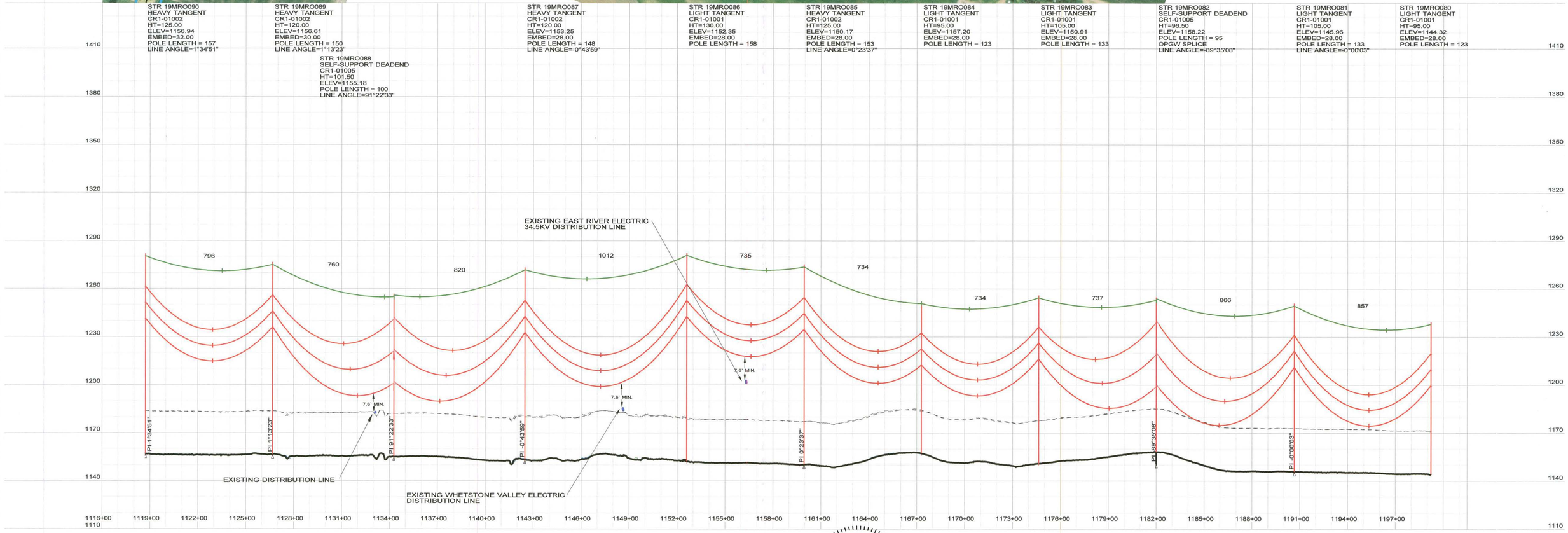
DWG. NO.

SHEET 17 OF 28

REV E



STR 19MRO090	STR 19MRO089	STR 19MRO088	STR 19MRO087	STR 19MRO086	STR 19MRO085	STR 19MRO084	STR 19MRO083	STR 19MRO082	STR 19MRO081	STR 19MRO080
HEAVY TANGENT	HEAVY TANGENT	SELF-SUPPORT DEADEND	HEAVY TANGENT	LIGHT TANGENT	HEAVY TANGENT	LIGHT TANGENT	LIGHT TANGENT	SELF-SUPPORT DEADEND	LIGHT TANGENT	LIGHT TANGENT
CR1-01002	CR1-01002	CR1-01005	CR1-01002	CR1-01001	CR1-01002	CR1-01001	CR1-01001	CR1-01005	CR1-01001	CR1-01001
HT=125.00	HT=120.00	HT=101.50	HT=120.00	HT=130.00	HT=125.00	HT=95.00	HT=105.00	HT=96.50	HT=105.00	HT=95.00
ELEV=1156.94	ELEV=1156.61	ELEV=1155.18	ELEV=1153.25	ELEV=1152.35	ELEV=1150.17	ELEV=1157.20	ELEV=1150.91	ELEV=1158.22	ELEV=1145.96	ELEV=1144.32
EMBED=32.00	EMBED=30.00	POLE LENGTH = 100	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	POLE LENGTH = 95	EMBED=28.00	EMBED=28.00
POLE LENGTH = 157	POLE LENGTH = 150	LINE ANGLE=91°22'33"	POLE LENGTH = 148	POLE LENGTH = 158	POLE LENGTH = 153	POLE LENGTH = 123	POLE LENGTH = 133	OPGW SPLICE	POLE LENGTH = 133	POLE LENGTH = 123
LINE ANGLE=1°34'51"	LINE ANGLE=1°13'23"		LINE ANGLE=-0°43'59"		LINE ANGLE=0°23'37"			LINE ANGLE=-89°35'08"	LINE ANGLE=-0°00'03"	



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
4. STRUCTURE NAMES DISPLAYED IN STRUCTURE LABELS CORRESPOND TO THE FOLLOWING STRUCTURE TYPES:
   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. | SHEET 18 OF 28 | REV E

NORTH

STR 19MRO080
LIGHT TANGENT
CR1-01001
HT=95.00
ELEV=1144.32
EMBED=28.00
POLE LENGTH = 123

STR 19MRO079
LIGHT TANGENT
CR1-01001
HT=95.00
ELEV=1149.17
EMBED=24.00
POLE LENGTH = 119
LINE ANGLE=-0°11'26"

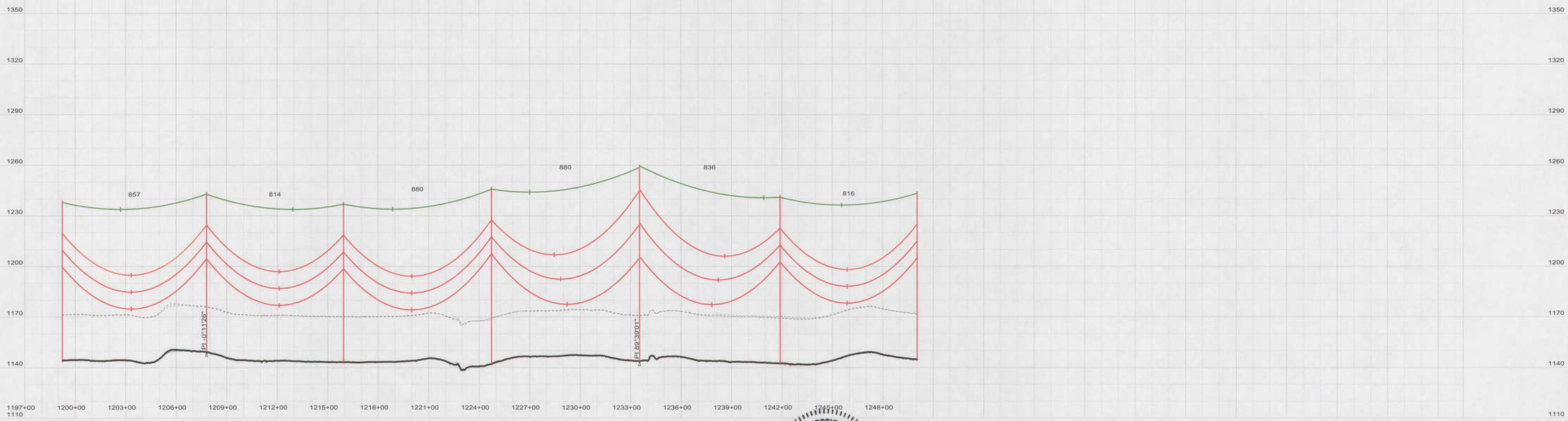
STR 19MRO078
LIGHT TANGENT
CR1-01001
HT=95.00
ELEV=1143.24
EMBED=28.00
POLE LENGTH = 123

STR 19MRO077
LIGHT TANGENT
CR1-01001
HT=105.00
ELEV=1142.24
EMBED=28.00
POLE LENGTH = 133

STR 19MRO076
SELF-SUPPORT DEADEND
CR1-01005
HT=116.50
ELEV=1143.77
POLE LENGTH = 115
LINE ANGLE=89°39'01"

STR 19MRO075
LIGHT TANGENT
CR1-01001
HT=100.00
ELEV=1142.39
EMBED=28.00
POLE LENGTH = 128

STR 19MRO074
LIGHT TANGENT
CR1-01001
HT=100.00
ELEV=1144.78
EMBED=28.00
POLE LENGTH = 128



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
4. STRUCTURE NAMES DISPLAYED IN STRUCTURE LABELS CORRESPOND TO THE FOLLOWING STRUCTURE TYPES:
   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

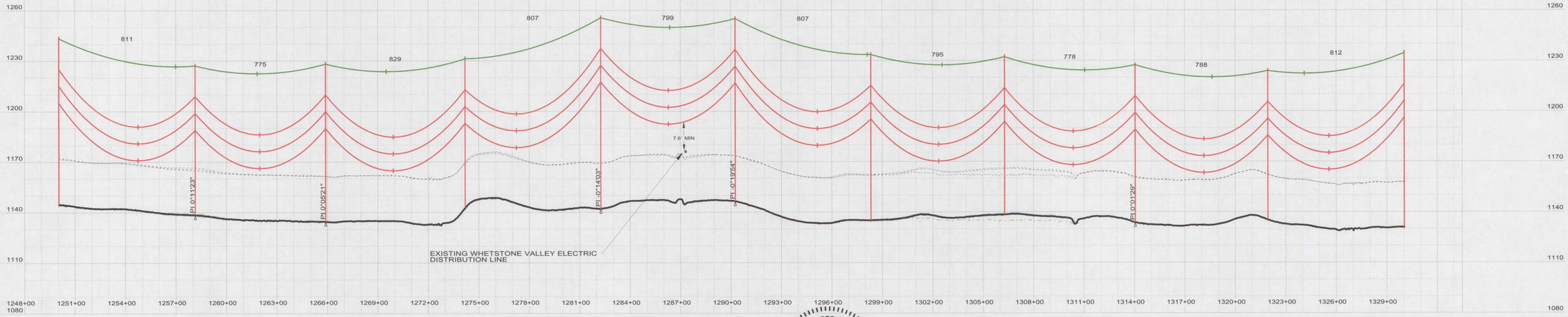
CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. SHEET 19 OF 28 REV E

STR 19MRO074	STR 19MRO073	STR 19MRO072	STR 19MRO071	STR 19MRO070	STR 19MRO069	STR 19MRO068	STR 19MRO067	STR 19MRO066	STR 19MRO065	STR 19MRO064
LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT
CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001
HT=100.00	HT=90.00	HT=95.00	HT=90.00	HT=115.00	HT=110.00	HT=100.00	HT=95.00	HT=95.00	HT=90.00	HT=105.00
ELEV=1144.78	ELEV=1138.53	ELEV=1134.54	ELEV=1142.64	ELEV=1142.08	ELEV=1146.48	ELEV=1135.04	ELEV=1138.56	ELEV=1133.76	ELEV=1135.35	ELEV=1130.95
EMBED=28.00	EMBED=24.00	EMBED=24.00	EMBED=24.00	EMBED=28.00	EMBED=28.00	EMBED=28.00	EMBED=24.00	EMBED=24.00	EMBED=24.00	EMBED=24.00
POLE LENGTH = 128	POLE LENGTH = 114	POLE LENGTH = 119	POLE LENGTH = 114	POLE LENGTH = 143	POLE LENGTH = 138	POLE LENGTH = 128	POLE LENGTH = 119	POLE LENGTH = 119	POLE LENGTH = 114	POLE LENGTH = 129
	LINE ANGLE=0°11'23"	LINE ANGLE=0°05'21"		LINE ANGLE=-0°14'03"	LINE ANGLE=-0°19'54"			LINE ANGLE=0°01'29"		



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
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   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY U.TEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

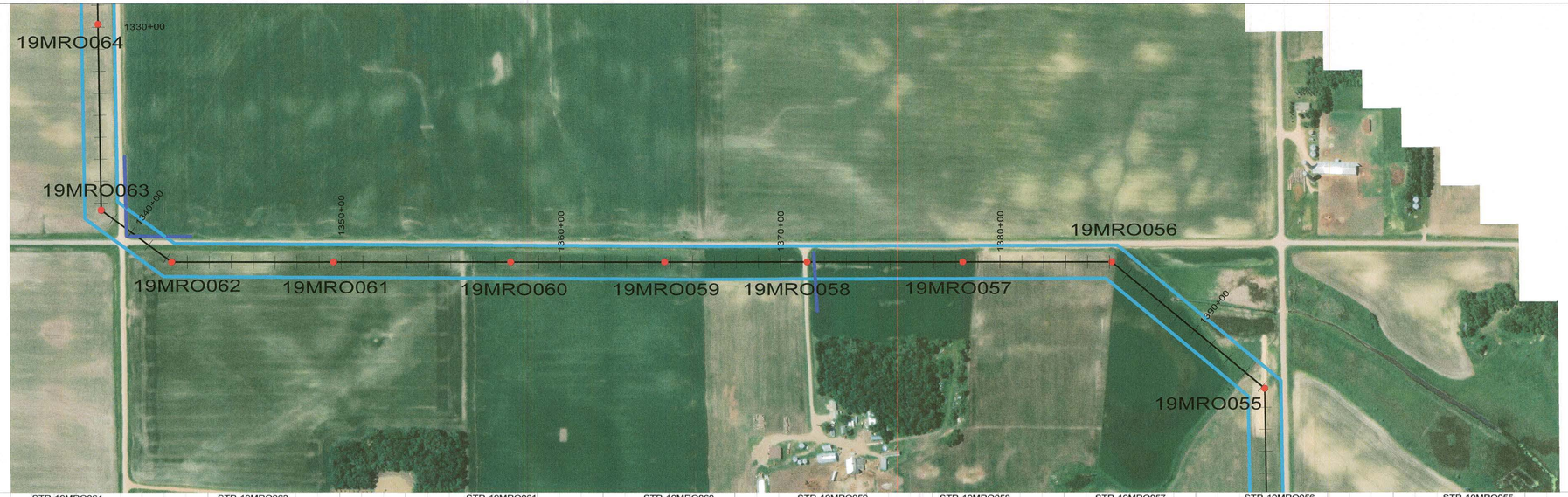
NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. | SHEET 20 OF 28 | REV E



STR 19MRO064
LIGHT TANGENT
CR1-01001
HT=105.00
ELEV=1130.95
EMBED=24.00
POLE LENGTH = 129

STR 19MRO063
SELF-SUPPORT DEADEND
CR1-01005
HT=111.50
ELEV=1128.41
POLE LENGTH = 110
OPGW SPLICE
LINE ANGLE=-52°44'54"

STR 19MRO062
SELF-SUPPORT MEDIUM ANGLE
CR1-01009
HT=111.50
ELEV=1127.62
POLE LENGTH = 110
LINE ANGLE=-36°13'04"

STR 19MRO061
LIGHT TANGENT
CR1-01001
HT=100.00
ELEV=1122.85
EMBED=30.00
POLE LENGTH = 130

STR 19MRO060
LIGHT TANGENT
CR1-01001
HT=95.00
ELEV=1114.80
EMBED=28.00
POLE LENGTH = 123

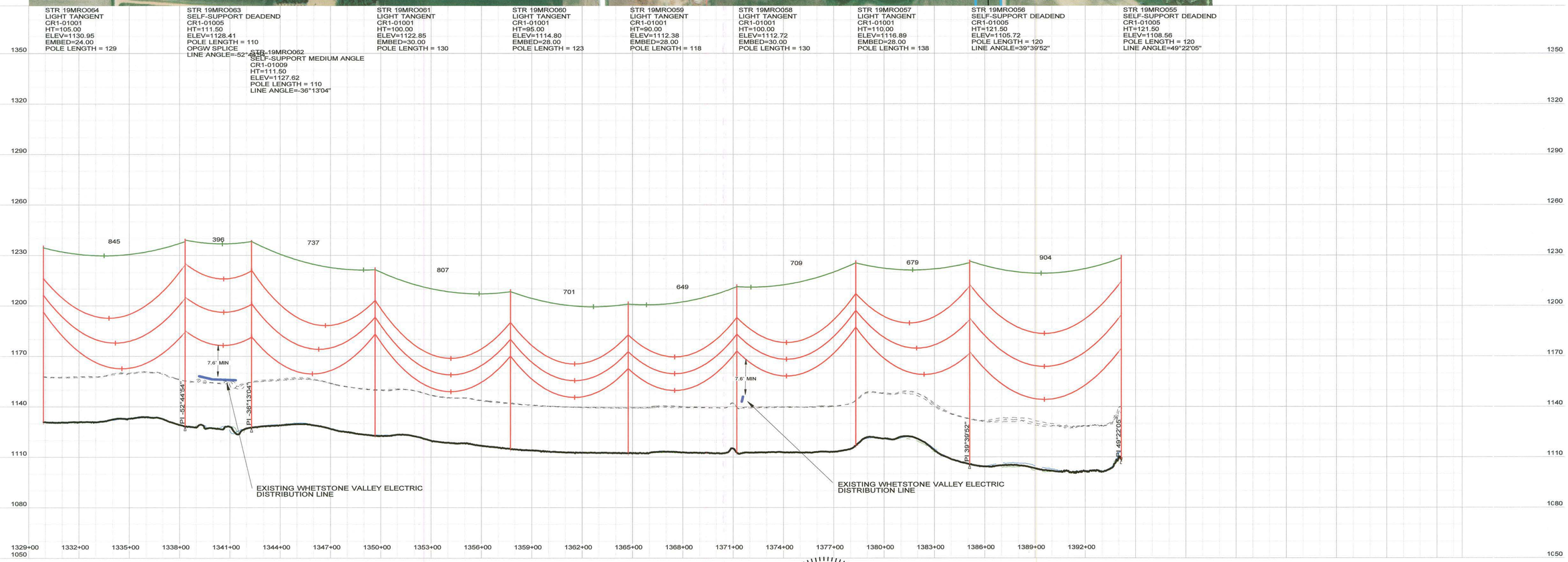
STR 19MRO059
LIGHT TANGENT
CR1-01001
HT=90.00
ELEV=1112.38
EMBED=28.00
POLE LENGTH = 118

STR 19MRO058
LIGHT TANGENT
CR1-01001
HT=100.00
ELEV=1112.72
EMBED=30.00
POLE LENGTH = 130

STR 19MRO057
LIGHT TANGENT
CR1-01001
HT=110.00
ELEV=1116.89
EMBED=28.00
POLE LENGTH = 138

STR 19MRO056
SELF-SUPPORT DEADEND
CR1-01005
HT=121.50
ELEV=1105.72
POLE LENGTH = 120
LINE ANGLE=39°39'52"

STR 19MRO055
SELF-SUPPORT DEADEND
CR1-01005
HT=121.50
ELEV=1108.56
POLE LENGTH = 120
LINE ANGLE=49°22'05"



300.0 FT. HORIZ. SCALE
30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
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   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
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SD PE NO: 13471

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9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

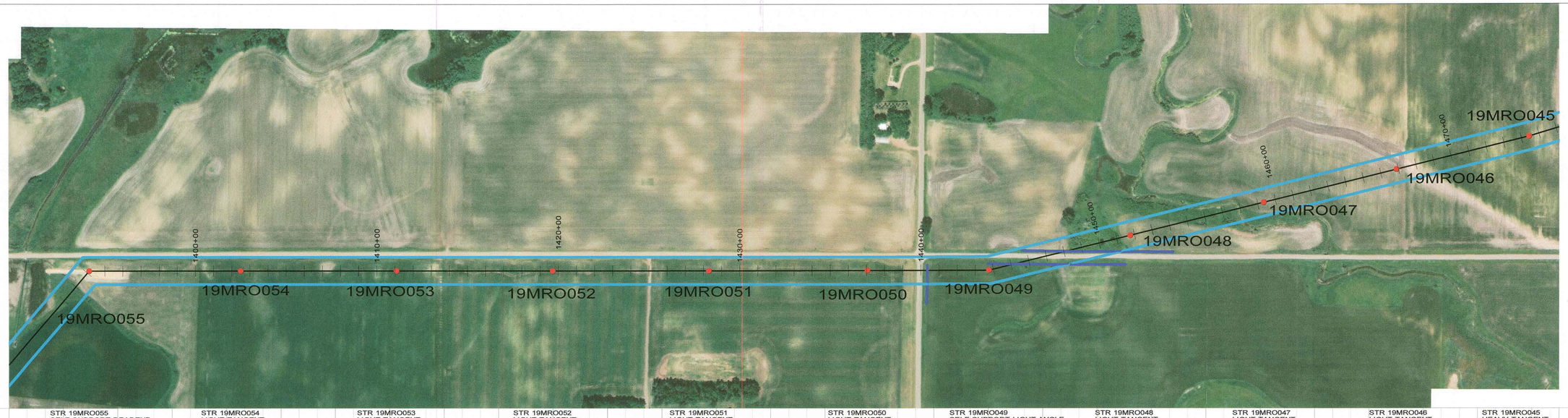
CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

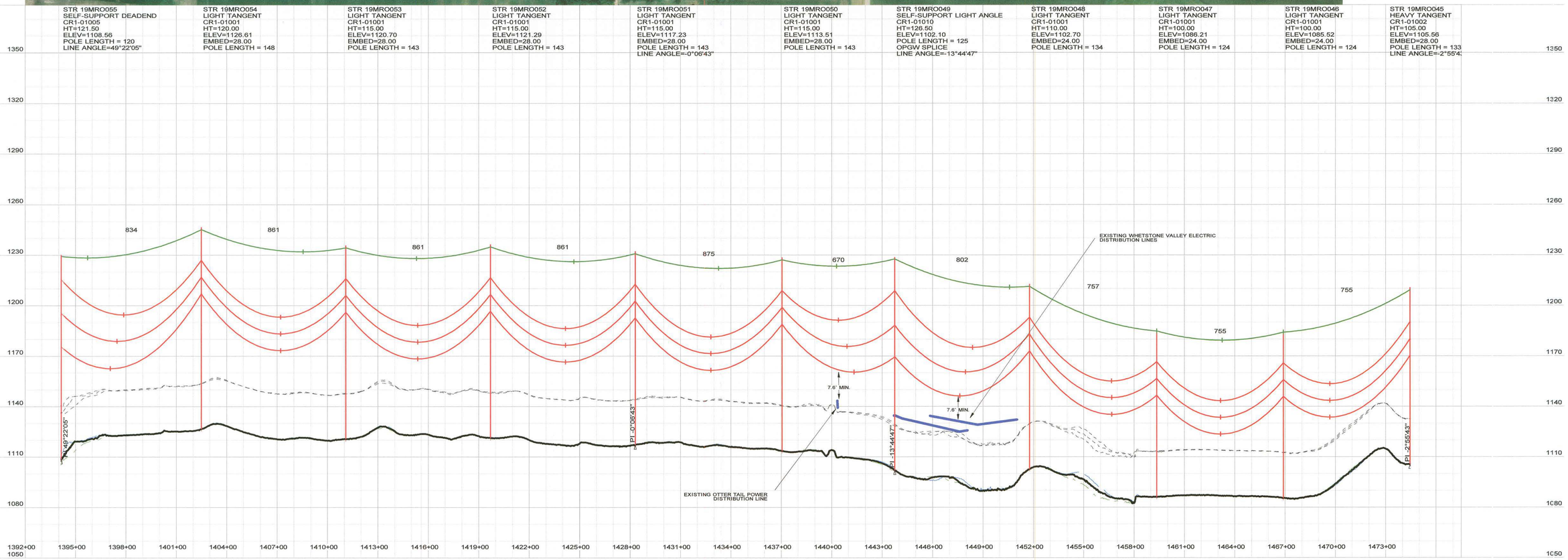
PLAN & PROFILE

DWG. NO. | SHEET 21 OF 28 | REV E

PLS-CADD DRAWING



STR 19MRO055	STR 19MRO054	STR 19MRO053	STR 19MRO052	STR 19MRO051	STR 19MRO050	STR 19MRO049	STR 19MRO048	STR 19MRO047	STR 19MRO046	STR 19MRO045
SELF-SUPPORT DEADEND	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	SELF-SUPPORT LIGHT ANGLE	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	HEAVY TANGENT
CR1-01005	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01010	CR1-01001	CR1-01001	CR1-01001	CR1-01002
HT=121.50	HT=120.00	HT=115.00	HT=115.00	HT=115.00	HT=115.00	HT=126.50	HT=110.00	HT=100.00	HT=100.00	HT=105.00
ELEV=1108.56	ELEV=1126.61	ELEV=1120.70	ELEV=1121.29	ELEV=1117.23	ELEV=1113.51	ELEV=1102.10	ELEV=1102.70	ELEV=1086.21	ELEV=1085.52	ELEV=1105.56
POLE LENGTH = 120	POLE LENGTH = 148	POLE LENGTH = 143	POLE LENGTH = 143	POLE LENGTH = 143	POLE LENGTH = 143	POLE LENGTH = 125	POLE LENGTH = 134	POLE LENGTH = 124	POLE LENGTH = 124	POLE LENGTH = 133
LINE ANGLE=49°22'05"				LINE ANGLE=-0°06'43"		OPGW SPLICE LINE ANGLE=-13°44'47"				LINE ANGLE=-2°55'4



300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING" HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
4. STRUCTURE NAMES DISPLAYED IN STRUCTURE LABELS CORRESPOND TO THE FOLLOWING STRUCTURE TYPES:
   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE 5/24/17
DETAILED A. HERRMANN
DESIGNED A. HERRMANN
CHECKED J. CANNON

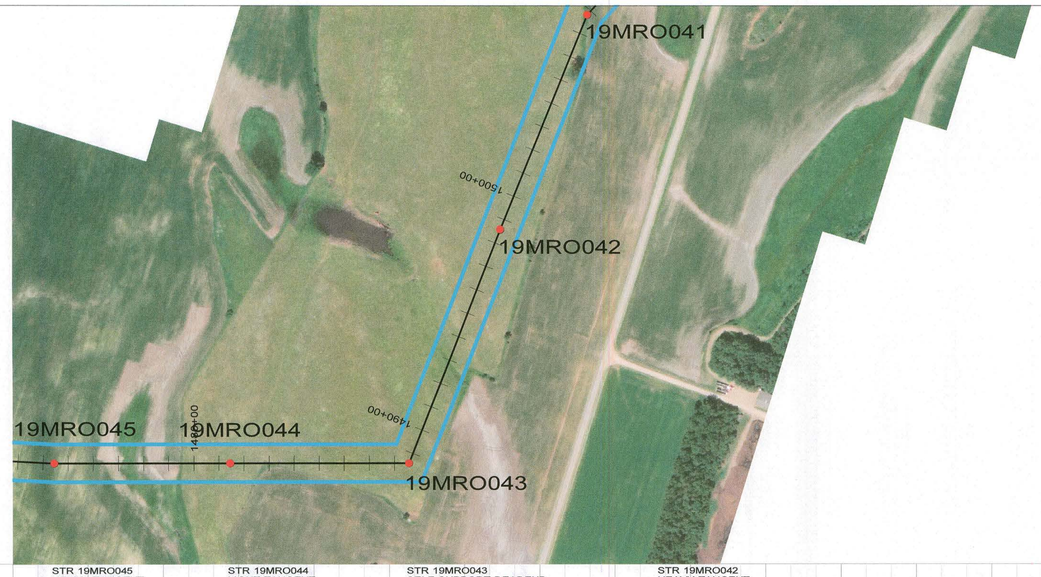
NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. SHEET 22 OF 28 REV E



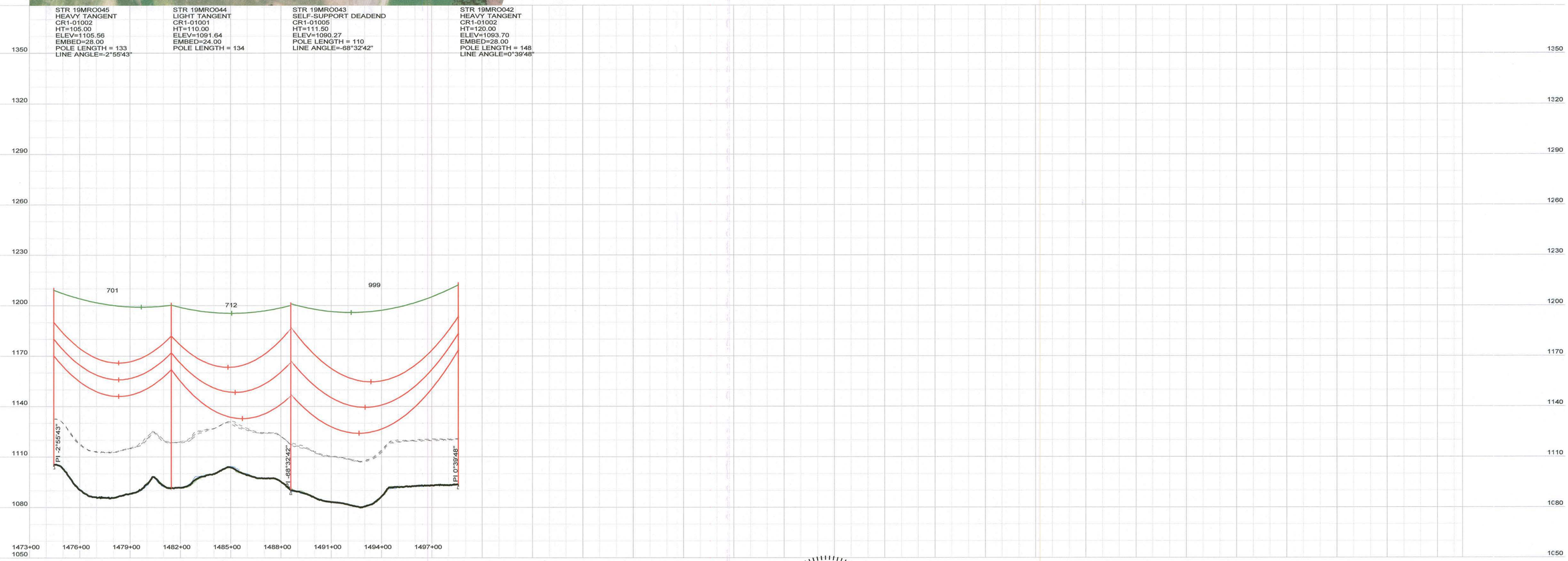
NORTH

STR 19MRO045
HEAVY TANGENT
CR1-01002
HT=105.00
ELEV=1105.56
EMBED=28.00
POLE LENGTH = 133
LINE ANGLE=-2°55'43"

STR 19MRO044
LIGHT TANGENT
CR1-01001
HT=110.00
ELEV=1091.64
EMBED=24.00
POLE LENGTH = 134

STR 19MRO043
SELF-SUPPORT DEADEND
CR1-01005
HT=111.50
ELEV=1090.27
POLE LENGTH = 110
LINE ANGLE=-68°32'42"

STR 19MRO042
HEAVY TANGENT
CR1-01002
HT=120.00
ELEV=1093.70
EMBED=28.00
POLE LENGTH = 148
LINE ANGLE=0°39'48"



CABLE DATA (UNLESS OTHERWISE NOTED):

300.0 FT. HORIZ. SCALE
30.0 FT. VERT. SCALE

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING" HORIZONTAL BUNDLED CONDUCTOR DISPLAYED: 167°F, "FINAL" CONDITION DESIGN TENSION: 10,550 LBS (25% RBS) AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW DISPLAYED: 0°F "INITIAL" CONDITION DESIGN TENSION: 4,700 LBS (25% RBS) AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001: US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
4. STRUCTURE NAMES DISPLAYED IN STRUCTURE LABELS CORRESPOND TO THE FOLLOWING STRUCTURE TYPES:
   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
9/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. | SHEET 23 OF 28 | REV E

STR 19MRO042
HEAVY TANGENT
CR1-01002
HT=120.00
ELEV=1093.70
EMBED=28.00
POLE LENGTH = 148
LINE ANGLE=0°39'48"

STR 19MRO041
SELF-SUPPORT LIGHT ANGLE
CR1-01010
HT=141.50
ELEV=1084.04
POLE LENGTH = 140
LINE ANGLE=20°18'56"

STR 19MRO040
SELF-SUPPORT MEDIUM ANGLE
CR1-01009
HT=111.50
ELEV=1082.38
POLE LENGTH = 110
LINE ANGLE=-24°48'29"

STR 19MRO039
HEAVY TANGENT
CR1-01002
HT=105.00
ELEV=1086.42
EMBED=24.00
POLE LENGTH = 129
LINE ANGLE=-0°22'42"

STR 19MRO038
HEAVY TANGENT
CR1-01002
HT=120.00
ELEV=1084.68
EMBED=24.00
POLE LENGTH = 144
LINE ANGLE=-3°09'57"

STR 19MRO037
HEAVY TANGENT
CR1-01002
HT=130.00
ELEV=1071.38
EMBED=28.00
POLE LENGTH = 158
LINE ANGLE=-2°54'31"

STR 19MRO036
SELF-SUPPORT LIGHT ANGLE
CR1-01010
HT=106.50
ELEV=1068.75
POLE LENGTH = 105
LINE ANGLE=13°03'23"

STR 19MRO035
HEAVY TANGENT
CR1-01002
HT=115.00
ELEV=1068.58
EMBED=28.00
POLE LENGTH = 143
LINE ANGLE=-2°04'33"

STR 19MRO034
HEAVY TANGENT
CR1-01002
HT=115.00
ELEV=1067.30
EMBED=28.00
POLE LENGTH = 143
LINE ANGLE=-2°16'08"

STR 19MRO033
HEAVY TANGENT
CR1-01002
HT=110.00
ELEV=1067.50
EMBED=28.00
POLE LENGTH = 138
LINE ANGLE=-2°17'26"

STR 19MRO032
LIGHT TANGENT
CR1-01001
HT=105.00
ELEV=1071.77
EMBED=28.00
POLE LENGTH = 133
LINE ANGLE=-0°50'51"

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

300.0 FT. HORIZ. SCALE
30.0 FT. VERT. SCALE

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
4. STRUCTURE NAMES DISPLAYED IN STRUCTURE LABELS CORRESPOND TO THE FOLLOWING STRUCTURE TYPES:
   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

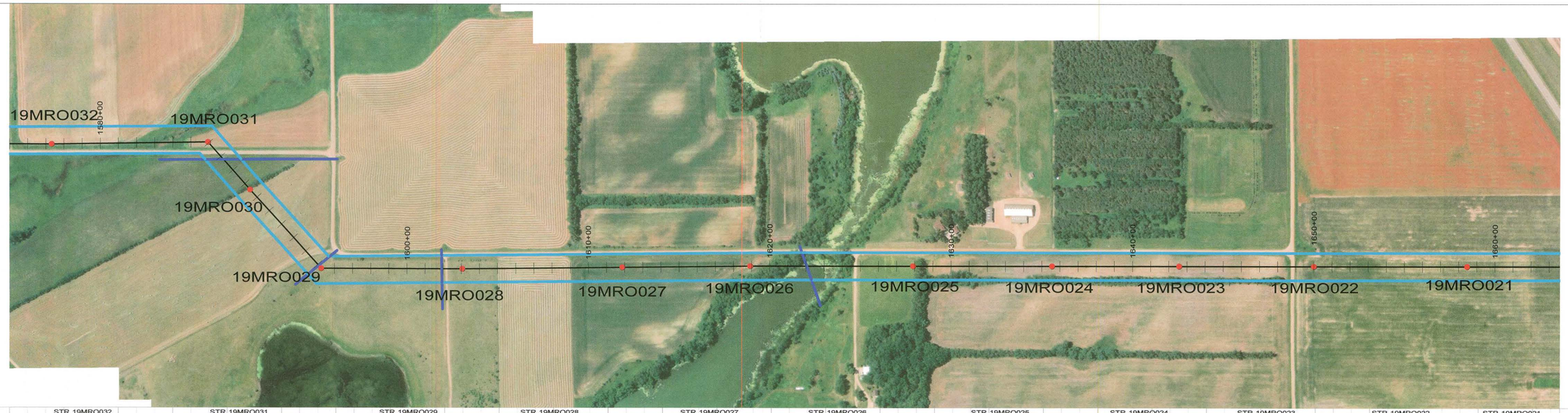
NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. | SHEET 24 OF 28 | REV E



STR 19MRO032
LIGHT TANGENT
CR1-01001
HT=105.00
ELEV=1071.77
EMBED=28.00
POLE LENGTH = 133
LINE ANGLE=-0°50'51"

STR 19MRO031
SELF-SUPPORT DEADEND
CR1-01005
HT=101.50
ELEV=1068.28
POLE LENGTH = 100
LINE ANGLE=49°12'30"

STR 19MRO030
HEAVY TANGENT
CR1-01002
HT=100.00
ELEV=1088.79
EMBED=28.00
POLE LENGTH = 128
LINE ANGLE=-0°35'57"

STR 19MRO029
SELF-SUPPORT DEADEND
CR1-01005
HT=106.50
ELEV=1080.63
POLE LENGTH = 105
OPGW SPLICE
LINE ANGLE=-47°35'38"

STR 19MRO028
LIGHT TANGENT
CR1-01001
HT=100.00
ELEV=1082.86
EMBED=24.00
POLE LENGTH = 124
LINE ANGLE=-0°50'07"

STR 19MRO027
LIGHT TANGENT
CR1-01001
HT=90.00
ELEV=1077.04
EMBED=24.00
POLE LENGTH = 114

STR 19MRO026
LIGHT TANGENT
CR1-01001
HT=105.00
ELEV=1077.43
EMBED=24.00
POLE LENGTH = 129
LINE ANGLE=0°34'31"

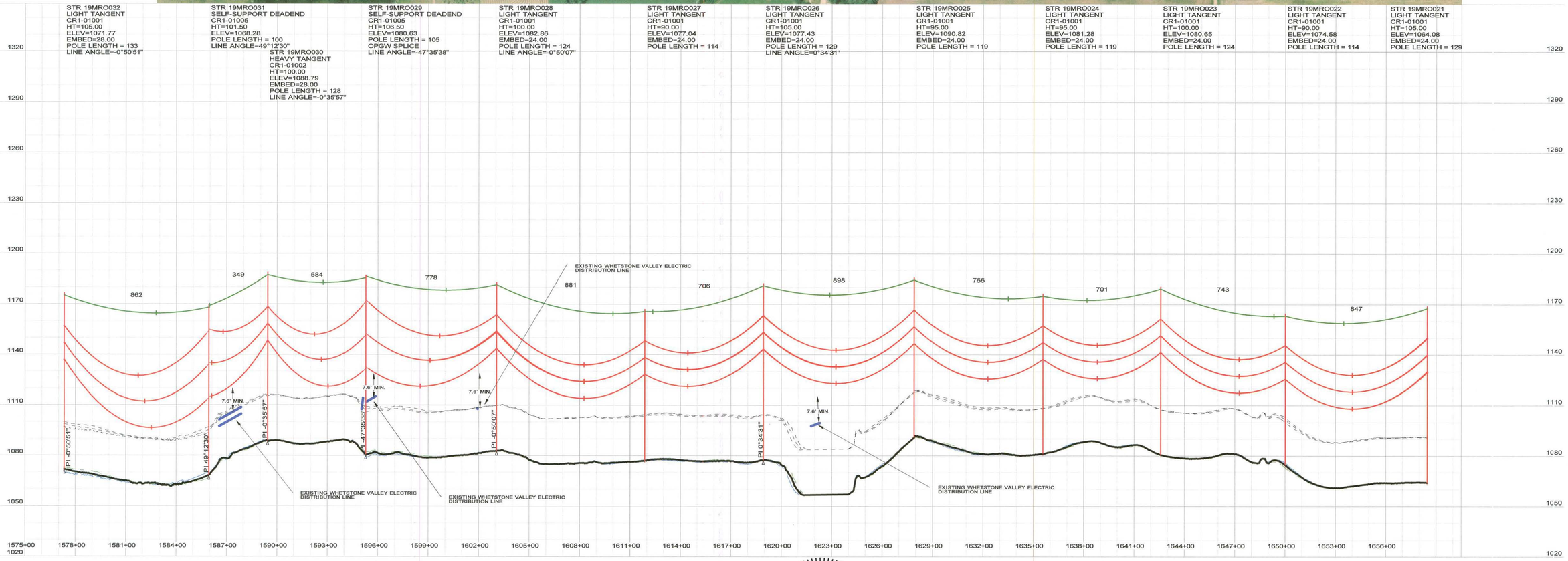
STR 19MRO025
LIGHT TANGENT
CR1-01001
HT=95.00
ELEV=1090.82
EMBED=24.00
POLE LENGTH = 119

STR 19MRO024
LIGHT TANGENT
CR1-01001
HT=95.00
ELEV=1081.28
EMBED=24.00
POLE LENGTH = 119

STR 19MRO023
LIGHT TANGENT
CR1-01001
HT=100.00
ELEV=1080.65
EMBED=24.00
POLE LENGTH = 124

STR 19MRO022
LIGHT TANGENT
CR1-01001
HT=90.00
ELEV=1074.58
EMBED=24.00
POLE LENGTH = 114

STR 19MRO021
LIGHT TANGENT
CR1-01001
HT=105.00
ELEV=1064.08
EMBED=24.00
POLE LENGTH = 129



300.0 FT. HORIZ. SCALE
30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-I-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
4. STRUCTURE NAMES DISPLAYED IN STRUCTURE LABELS CORRESPOND TO THE FOLLOWING STRUCTURE TYPES:
   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

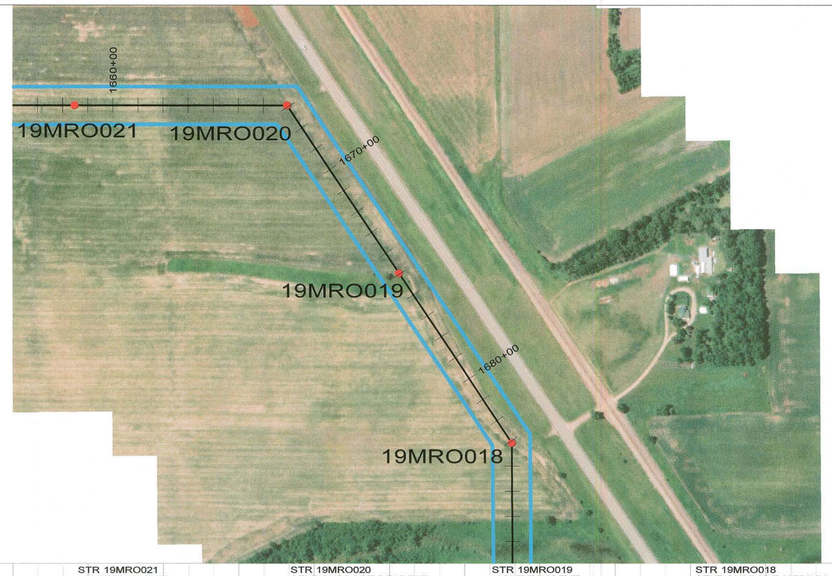
CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. | SHEET 25 OF 28 | REV E

1 2 3 4 5 6 7 8 9 10 11 12 13



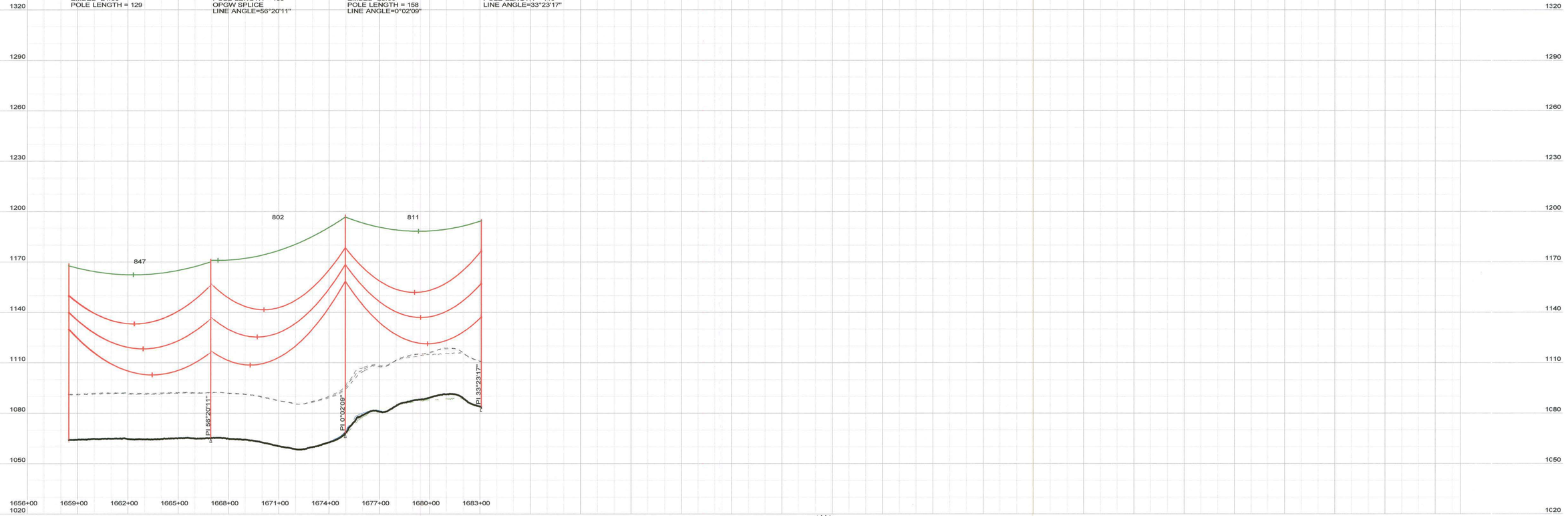
NORTH

STR 19MRO021
LIGHT TANGENT
CR1-01001
HT=105.00
ELEV=1064.08
EMBED=24.00
POLE LENGTH = 129

STR 19MRO020
SELF-SUPPORT DEADEND
CR1-01005
HT=106.50
ELEV=1065.29
POLE LENGTH = 105
OPGW SPLICE
LINE ANGLE=56°20'11"

STR 19MRO019
LIGHT TANGENT
CR1-01001
HT=130.00
ELEV=1068.12
EMBED=28.00
POLE LENGTH = 158
LINE ANGLE=0°02'09"

STR 19MRO018
SELF-SUPPORT MEDIUM ANGLE
CR1-01009
HT=111.50
ELEV=1083.81
POLE LENGTH = 110
LINE ANGLE=33°23'17"



300.0 FT. HORIZ. SCALE
30.0 FT. VERT. SCALE

CABLE DATA (UNLESS OTHERWISE NOTED):

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167°F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001; US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
4. STRUCTURE NAMES DISPLAYED IN STRUCTURE LABELS CORRESPOND TO THE FOLLOWING STRUCTURE TYPES:
   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

NO.	DATE	DESIGN REVISIONS	BY	CHK
E	4/29/19	ISSUED FOR PERMITTING	ARL	STE
D	3/21/19	ISSUED FOR REVIEW	ARL	STE
C	5/4/18	ISSUED FOR REVIEW	ARL	JPC
B	9/1/17	IFR: REVISED 30% DESIGN REVIEW	ARL	ANO
A	5/24/17	IFR: 30% DESIGN REVIEW	ANO	JPC

CROWNED RIDGE WIND, LLC

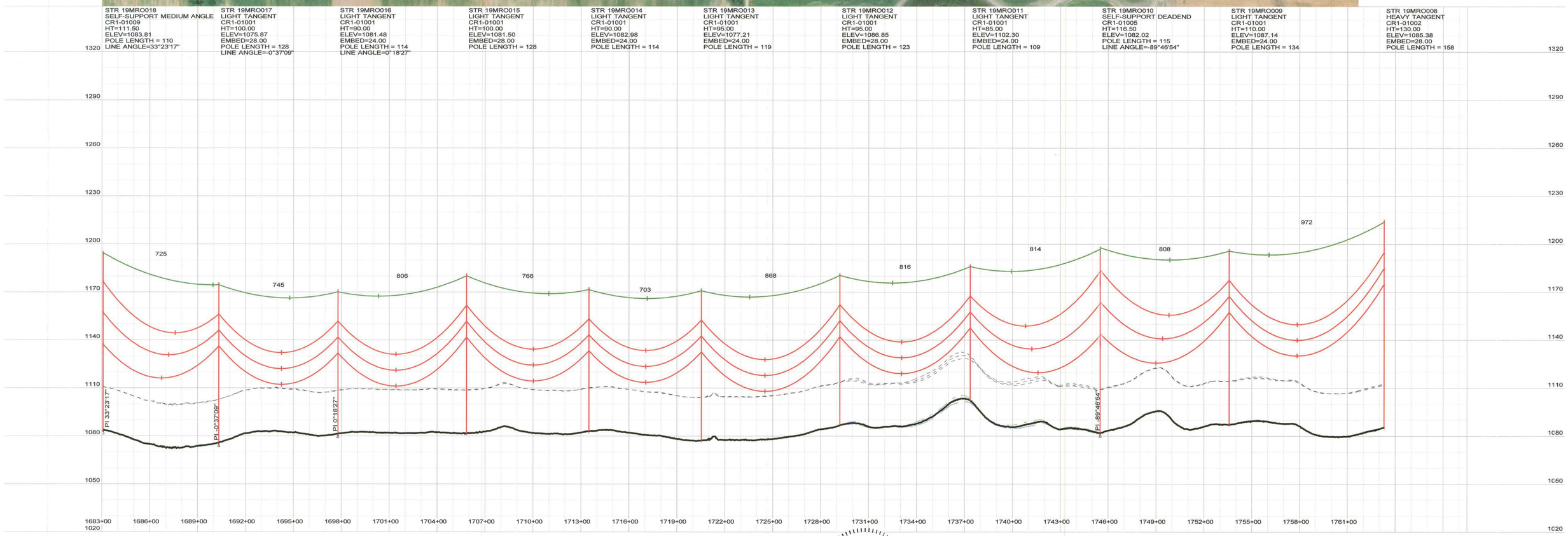
TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. SHEET 26 OF 28 REV E

PLS-CADD DRAWING

STR 19MRO018	STR 19MRO017	STR 19MRO016	STR 19MRO015	STR 19MRO014	STR 19MRO013	STR 19MRO012	STR 19MRO011	STR 19MRO010	STR 19MRO009	STR 19MRO008
SELF-SUPPORT MEDIUM ANGLE	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	LIGHT TANGENT	SELF-SUPPORT DEADEND	LIGHT TANGENT	HEAVY TANGENT
CR1-01009	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01001	CR1-01005	CR1-01001	CR1-01002
HT=111.50	HT=100.00	HT=90.00	HT=100.00	HT=90.00	HT=95.00	HT=95.00	HT=85.00	HT=116.50	HT=110.00	HT=130.00
ELEV=1083.81	ELEV=1075.87	ELEV=1081.48	ELEV=1081.50	ELEV=1082.98	ELEV=1077.21	ELEV=1086.85	ELEV=1102.30	ELEV=1082.02	ELEV=1087.14	ELEV=1085.38
POLE LENGTH = 110	POLE LENGTH = 128	POLE LENGTH = 114	POLE LENGTH = 128	POLE LENGTH = 114	POLE LENGTH = 119	POLE LENGTH = 123	POLE LENGTH = 109	POLE LENGTH = 115	POLE LENGTH = 134	POLE LENGTH = 158
LINE ANGLE=33°23'17"	LINE ANGLE=-0°37'09"	LINE ANGLE=0°18'27"						LINE ANGLE=-89°46'54"		



CABLE DATA (UNLESS OTHERWISE NOTED):

300.0 FT. HORIZ. SCALE

30.0 FT. VERT. SCALE

CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
HORIZONTAL BUNDLED CONDUCTOR
DISPLAYED: 167'F, "FINAL" CONDITION
DESIGN TENSION: 10,550 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

SHIELD WIRE: SFPOC/SFSJ-J-4388R2 OPGW
DISPLAYED: 0°F "INITIAL" CONDITION
DESIGN TENSION: 4,700 LBS (25% RBS)
AT 0°F, NO WIND, NO ICE, "FINAL"

NOTES:
1. COORDINATES IN STRUCTURE LABEL ARE X (EASTING) AND Y (NORTHING) PER SOUTH DAKOTA STATE PLANE NAD83, NORTH ZONE 4001: US SURVEY FEET
2. DISPLAYED CLEARANCE LINE IS 27FT (NESC REQUIREMENT AT 230KV + 3.5 FT. BUFFER)
3. ABOVE GROUND HEIGHT (AGH) AND EMBEDMENT (EMBED) DISPLAYED IN THE STRUCTURE LABEL ARE IN UNITS OF FEET. EMBEDMENT DEPTHS SHOWN DO NOT INCLUDE ANY OVEREXCAVATION THAT MAY BE NECESSARY. FOR FOUNDATION DETAILING AND SCHEDULING SEE DRAWINGS CR1-00401, CR1-00402, & CR1-00403.
4. STRUCTURE NAMES DISPLAYED IN STRUCTURE LABELS CORRESPOND TO THE FOLLOWING STRUCTURE TYPES:
   - LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT WITH DAVIT ARMS
   - HEAVY TANGENT=0-3° SINGLE CIRCUIT "HEAVY" TANGENT WITH DAVIT ARMS
   - SELF-SUPPORT LIGHT ANGLE=3-20° SINGLE CIRCUIT LIGHT RUNNING ANGLE WITH DAVIT ARMS
   - SELF-SUPPORT MEDIUM ANGLE=20-45° SINGLE CIRCUIT MEDIUM RUNNING ANGLE
   - SELF-SUPPORT DEADEND=45-90° SINGLE CIRCUIT DEADEND
   - 3-POLE DEADEND=SINGLE CIRCUIT 3 POLE DEADEND SELF SUPPORTED
   - H-FRAME LIGHT TANGENT=0-1° SINGLE CIRCUIT "LIGHT" TANGENT H- FRAME SELF-SUPPORTED
   - 3-POLE MEDIUM ANGLE=20-45° SINGLE CIRCUIT 3 POLE MEDIUM RUNNING ANGLE SELF-SUPPORTED
   - 3-POLE STRAIN=0-3° SINGLE CIRCUIT 3 POLE INLINE STRAIN SELF-SUPPORTED
5. MINIMUM CLEARANCES INDICATED IN-SPAN BASED ON NESC REQUIREMENTS FOR 230KV.
6. GROUND AND BOUNDARY SURVEY PROVIDED BY ULTEIG. LIDAR SURVEY PROVIDED BY SAM INC.
7. SEE DRAWING CR1-00505 FOR HARDWARE MODIFICATIONS AT OPGW SPLICE LOCATIONS.

REGISTERED PROFESSIONAL ENGINEER
REG. No. 13471
ZACHARY THOMAS WEISS
SOUTH DAKOTA
4/29/19

ZACHARY T. WEISS
ENGINEER
SD PE NO: 13471

BURNS McDONNELL
9400 WARD PARKWAY, KANSAS CITY, MO 64114

DATE	DETAILED
5/24/17	A. HERRMANN
DESIGNED	CHECKED
A. HERRMANN	J. CANNON

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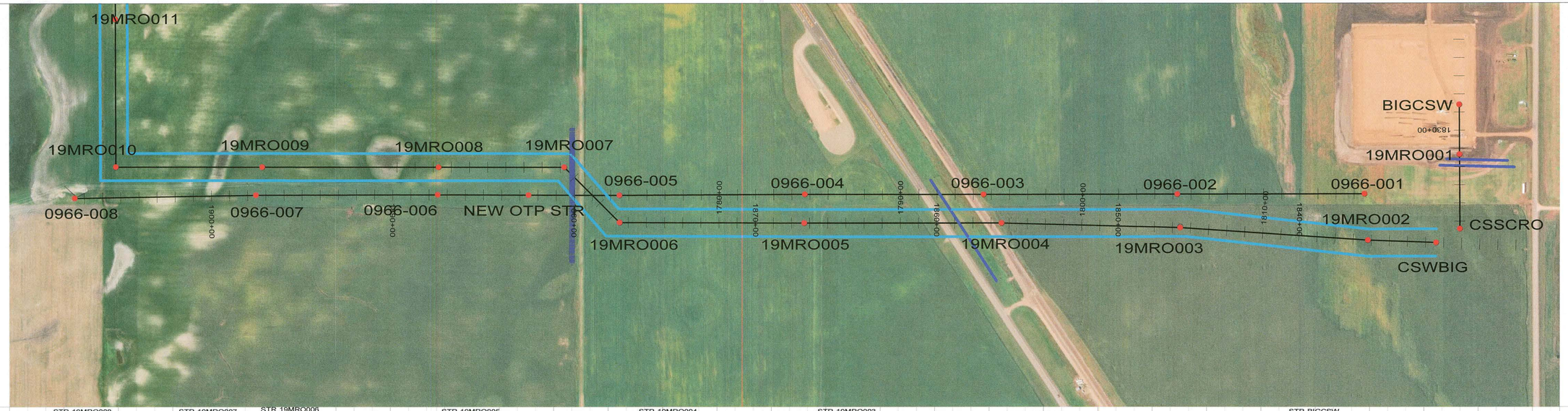
CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE

PLAN & PROFILE

DWG. NO. | SHEET 27 OF 28 | REV E

PLS-CADD DRAWING



STR 19MRO008
HEAVY TANGENT
CR1-01002
HT=130.00
ELEV=1085.38
EMBED=28.00
POLE LENGTH = 158

STR 19MRO007
3-POLE DEADEND
CR1-01008
HT=47.92
ELEV=1080.24
POLE LENGTH = 47
OPGW SPLICE
LINE ANGLE=44°56'53"

STR 19MRO006
3-POLE DEADEND
CR1-01008
HT=52.00
ELEV=1070.17
POLE LENGTH = 50.5
LINE ANGLE=-44°47'49"

STR 19MRO005
HEAVY TANGENT
CR1-01002
HT=145.00
ELEV=1066.23
EMBED=32.00
POLE LENGTH = 177
LINE ANGLE=-0°11'38"

STR 19MRO004
HEAVY TANGENT
CR1-01002
HT=135.00
ELEV=1085.25
EMBED=30.00
POLE LENGTH = 165
LINE ANGLE=1°27'10"

STR 19MRO003
HEAVY TANGENT
CR1-01002
HT=120.00
ELEV=1072.67
EMBED=30.00
POLE LENGTH = 150
LINE ANGLE=2°21'40"

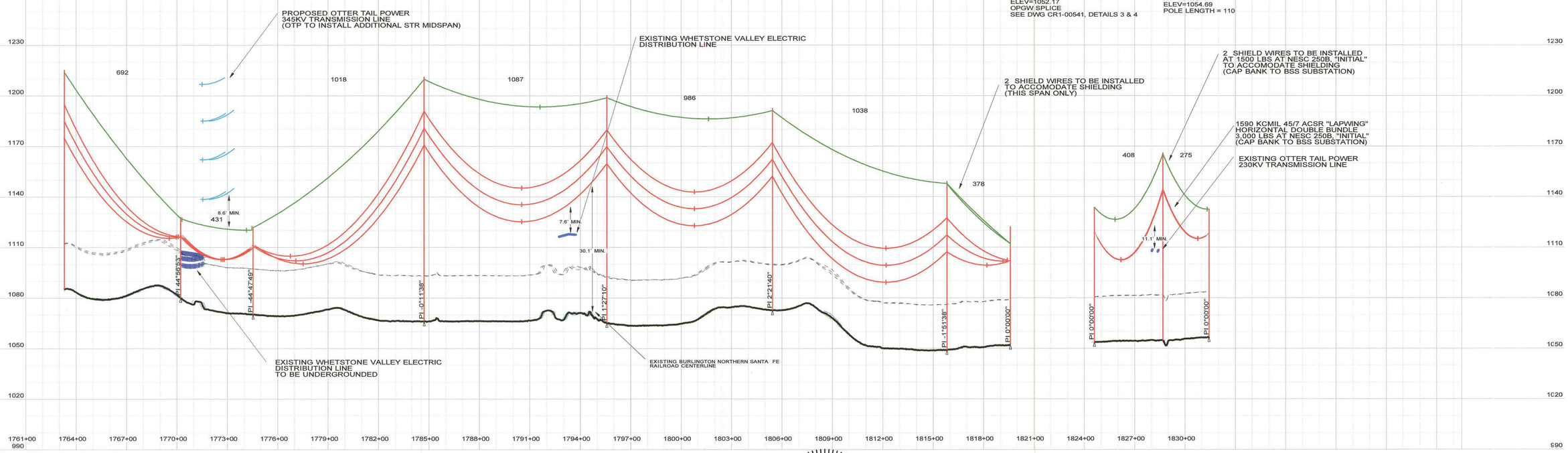
STR 19MRO002
HEAVY TANGENT
CR1-01002
HT=100.00
ELEV=1049.07
EMBED=28.00
POLE LENGTH = 128
SEE DWG CR1-00541, DETAIL 2
LINE ANGLE=-1°51'38"

STR CSWBIG
SUBSTATION DEADEND
BY OTHERS
HT=80.00
ELEV=1063.78
OPGW SPLICE
SEE DWG CR1-00541, DETAILS 3 & 4

STR BIGCSW
SUBSTATION DEADEND
BY OTHERS
HT=76.00
ELEV=1056.68
OPGW SPLICE
SEE DWG CR1-00541, DETAILS 3 & 4

STR CSSCRO
SUBSTATION DEADEND
BY OTHERS
HT=70.00
ELEV=1052.17
OPGW SPLICE
SEE DWG CR1-00541, DETAILS 3 & 4

STR 19MRO001
H-FRAME LIGHT TANGENT
CR1-01011
HT=111.50
ELEV=1054.69
POLE LENGTH = 110



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CROWNED RIDGE WIND, LLC

TITLE CROWNED RIDGE I 230KV TRANSMISSION LINE
PLAN & PROFILE

DWG. NO. SHEET 28 OF 28 REV E