BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE APPLICATION FOR THE LOCATION OF THE CLINES CORNERS WIND FARM AND GEN-TIE SYSTEM IN TORRANCE AND GUADALUPE COUNTIES PURSUANT TO THE PUBLIC UTILITY ACT, NMSA 1978, §§62-9-3 AND 62-9-3.2	)	Case No. 19 -_____
CLINES CORNERS WIND FARM, LLC	)	
APPLICANT.	)	

DIRECT TESTIMONY
OF
GREG PARENT

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE APPLICATION FOR THE LOCATION OF THE CLINES CORNERS WIND FARM AND GEN-TIE SYSTEM IN TORRANCE AND GUADALUPE COUNTIES PURSUANT TO THE PUBLIC UTILITY ACT, NMSA 1978, §§62-9-3 AND 62-9-3.2	)	**Case No. 19 -00139-UT**
CLINES CORNERS WIND FARM LLC	)	
APPLICANT.	)	

DIRECT TESTIMONY OF

GREG PARENT

ON BEHALF OF CLINES CORNERS WIND FARM LLC

Q. PLEASE STATE YOUR NAME.

A. Gregory Parent, P.E., S.E. The P.E. stands for licensed Professional Engineer and the S.E. stands for licensed Structural Engineer.

Q. BY WHOM AND IN WHAT CAPACITY ARE YOU EMPLOYED?

A. I am employed by Ulteig Engineers, Inc. as a Senior Engineer in the Transmission and Distribution Department. My business address is 5575 DTC Parkway, Suite 200, Greenwood Village, CO 80111.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. I am providing testimony on behalf of Clines Corners Wind Farm LLC ("Clines Corners" or "Applicant") which is a wholly owned subsidiary of Orion Wind Resources LLC ("Orion Wind Resources"). Orion Wind Resources is owned by a joint venture between Orion Renewable Energy Group LLC ("Orion"), and MAP Energy®. The purpose of my testimony is to provide information regarding the requested approval of a 150-foot right-of-way ("ROW") located within a 1-mile-wide corridor ("Clines Corners Gen-Tie System Corridor") for the development and permitting of a 18.72 mile 345-kilovolt ("kV") alternating current lines transmission system and associated transmission facilities ("Clines Corners Gen-Tie System" or "Gen-Tie System"). The Clines Corners Gen-Tie System will connect a wind generation facility of up to approximately 600 megawatts ("MW") ("Clines Corners Wind Farm") to the proposed Western Spirit transmission line ("Western Spirit") at a point that is approximately 11 miles west-northwest of Encino (34.689855, -105.647307). Collectively, the Clines Corners Wind Farm and the Gen-Tie System will be referred to herein as the "Clines Corners Wind Farm Project" or "Project".

I will also provide information about the interconnection facilities where the Gen-Tie System will connect the Clines Corners Wind Farm to Western Spirit.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND WORK EXPERIENCE.

A. I have a Master of Science in Structural Engineering from Lehigh University. I am a licensed P.E. in 18 states and am also a licensed Structural Engineer in Illinois, Hawaii, Nevada and Utah. I am a New Mexico Professional Engineer and my license number is 24890. I have 10 years of transmission line design experience and have designed approximately 675 miles of transmission line.

Q. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY IN ANY OTHER PROCEEDING?

A. Yes. In July 2018, I provided direct testimony before the Commission to support the application of Ancho Wind LLC, Cowboy Mesa LLC, Duran Mesa LLC, Red Cloud Wind LLC, Tecolote Wind LLC and Viento Loco LLC for location control approval of the Corona Wind Projects under development by Pattern Energy Group 2 LP in Guadalupe, Lincoln and Torrance Counties and its 345-kV transmission system and associated facilities, including a 180-foot ROW located within a 1 mile-wide corridor. My supplemental testimony was in support of the proposed ROW width for the Corona Gen-Tie System.

Q. ARE YOU FAMILIAR WITH THE PROPOSED PROJECT AND SPECIFICALLY THE PROPOSED GEN-TIE SYSTEM?

A. Yes. I have worked closely with Orion personnel, including Michael Kurnik and Ryan McGraw, in the preliminary design of transmission facilities for this Project. More

specifically, the ROW width requirement calculation for the Clines Corners Gen-Tie System was performed by Ulteig Engineers, Inc.

Q. WHAT ROW WIDTH WAS DETERMINED TO BE NEEDED FOR THE CLINES CORNERS GEN-TIE SYSTEM ACCORDING TO YOUR CALCULATIONS?

A. A 150-foot ROW width was determined to be necessary for the Gen-Tie System to connect the Clines Corners Wind Farm to Western Spirit and the electric transmission grid, in a safe and reliable manner. The 150-foot ROW width is necessary to provide sufficient space for variation in design, while addressing electrical safety code requirements and construction and operation considerations according to prudent and standard industry practice.

Q. CAN YOU ELABORATE ON THE BASIC DESIGN CONDITIONS YOU EVALUATED IN DETERMINING THAT A 150-FOOT ROW WAS REQUIRED FOR THIS PROJECT?

A. Yes. Preliminary design considerations include geotechnical soil studies, topographical surveys, conductor analysis and wind and weather patterns to determine a range of preliminary specifications for equipment and infrastructure for the proposed location for transmission and interconnection facilities. The loading conditions for the transmission lines meet or exceed the requirements stated in the National Electric Safety Code (NESC-2017). We analyzed the required ROW width for the following load cases:

1. NESC 234.C.1.a (At Rest)
    a. 0 psf wind pressure acting perpendicular to the conductor
    b. 60 deg Fahrenheit ambient temperature.
2. NESC 234.C.1.b (6 psf Wind)

a. 6 psf wind pressure acting perpendicular to the conductor

b. 60 deg Fahrenheit ambient temperature

3. NESC 250B –Loading District. According to the NESC 250B Loading District Map the district where the Clines Corners Gen-Tie System, transmission line, is located is in the NESC 250B "Medium" loading district. However, Clines Corners has requested that this transmission line be designed to resist the loads from the NESC 250B "Heavy" loading district. Below are the loading conditions for the NESC 250B "Heavy" loading district.

   a. 4 psf wind pressure acting perpendicular to the conductor

   b. ½" of radial ice

   c. 0 deg Fahrenheit ambient temperature

4. NESC 250C – Extreme Wind. The wind load map in NESC 250C matches the basic wind speed map in the American Society of Civil Engineers – Minimum Design Loads for Building and Other Structures - ASCE 7-05. The Clines Corners Wind Farm extends over a large region. The extreme wind speed varies over this region. Part of the Clines Corners Wind Farm is in the 90-mph wind speed region but also extends into a "Special Wind Region". Special wind regions experience higher wind speeds than 90 mph. Orion has determined that the extreme wind speed for these special wind regions should be set at 100 mph. For consistency, the extreme wind speed for the entire project has been set to 100 mph whether it is inside or outside the special wind regions.

   a. 100 mph wind speed (25.6psf) acting perpendicular to the conductor

b. 60 deg Fahrenheit ambient temperature

Under these conditions, and the aforementioned considerations, I evaluated the clearances, conductor movement, and structure deflection to calculate span lengths and structure types and configurations.

Q. DO YOU BELIEVE THAT THE CRITERIA YOU RELIED UPON IN DETERMINING THE NECESSITY FOR A 150-FOOT ROW TO BE REASONABLE?

A. Yes. These criteria are appropriate and consistent with the accepted practice within the industry. I have designed approximately fifteen 345-kV transmission lines and the right of way widths for those projects ranged between 150ft – 200ft. The variations in right of way width for these projects depended on design spans, number of circuits supported by the structure, structure types, conductor type and conductor tension, audible noise requirements that were used on each line, and the aforementioned considerations.

Q. DO YOU HAVE EXHIBITS SUPPORTING YOUR CALCULATIONS THAT WARRANT THE 150-FOOT ROW WIDTH THAT THE APPLICANT REQUESTS IN THIS PROCEEDING?

A. Yes. Please see the attached exhibit titled Exhibit GP-1.

Q. PLEASE EXPLAIN THE INFORMATION CONTAINED IN EXHIBIT GP-1.

A. Page 1 of this exhibit provides the calculations for the NESC required horizontal clearances from the transmission line conductor to building structures for NESC Rules 234B1a, 234B1b. Also provided is the recommended horizontal clearance when the transmission line is subject to 100 mph wind speed. The above clearances have been adjusted for an elevation of 6,650 ft. The following pages of this Exhibit GP-1 illustrate the results of the blowout analysis for a single circuit steel monopole tangent structure type.

To determine conductor blowouts and pole deflections, the structure was modeled using a bundled (2) 1272kcmil ASCR "Bittern" conductor per phase. To calculate the conductor blowout, a 1,300 ft design span between structures was modeled. Actual design spans could vary depending on the topography. A design span of 1,300 ft would be a maximum design span. Pole heights were determined to provide adequate vertical clearance under the conductor during maximum operating temperatures at mid-span assuming flat terrain. Pole heights will vary due to the natural topography and the varying span length between structures, but typical structures will be between 95ft and 120ft above grade.

Each structure type was analyzed under the following four different load cases:

1. NESC Rule 234B1a – [At Rest Condition, 0 psf wind, 60 degF]
2. NESC Rule 234B1b – [6psf Condition, 6 psf wind, 60 degF]
3. NESC Rule 250B – Heavy Region [4psf wind, ½" Radial Ice, 0 degF]
4. NESC Rule 250C – Extreme Wind [100 mph (25.6 psf), 60 degF]

To determine the conductor blowouts and pole deflections, each structure type and each load case was modeled in the transmission line design software PLS-CADD. The results of the required right of way width for each of the above load cases are illustrated in Exhibit GP-1. The controlling load case was under NESC Rule 250C – Extreme Wind [100 mph (25.6 psf), 60 degF]. This structure type and load case would require a minimum right of way width approximately 131'-11" wide, which is less than requested 150'-0" ROW width. A detailed analysis of the steel monopole structure under the 250C – Extreme Wind case is provided on pages 5 and 6 of Exhibit GP-1.

Page 7 of Exhibit GP-1 illustrates the "footprint" of a guyed heavy angle monopole structure. A guyed heavy angle monopole structure uses guywires to resist the lateral loads that are applied to the structure from the tensioned conductors. The guywires extend down at an angle from the pole structure to the ground. Each guywire connects to a ground anchor. For the guywires to remain within the 150ft ROW the pole structure would need to be offset approximately 25 ft towards the inside edge of the ROW. Offsetting of the structures from the centerline is not unusual within the transmission line industry. Page 7 of Exhibit GP-1 shows a 150ft ROW is wide enough to fit a guyed heavy angle monopole. Page 8 of Exhibit GP-1 calculates the required ROW for the span between the 25 ft offset guyed heavy angle monopole structure and the adjacent tangent structure under load case NESC Rule 250C – Extreme Wind [100 mph (25.6 psf), 60 degF]. The blowout of the conductor is largest at the midspan and therefore the blowout analysis was performed at midspan. Since the guyed heavy angle monopole structure is offset 25ft from the centerline, at the midspan between the adjacent tangent structure the conductors are offset 12ft 6in towards the inside edge of the ROW. The results show that even with this offset the requested 150ft ROW is adequate, but the spans between the guyed heavy angle monopole structure and the tangent structures should not exceed 1200ft.

Another calculation that was performed was the audible noise volume that would be heard at the edge of the right of way. In 1974, the Environmental Protection Agency ("EPA") published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* in which the EPA set 55dBA as the outdoor noise threshold that would prevent activity interference or annoyance. Many

utilities I have worked with have a 50dBA noise threshold limit at the edge of the right of way.

Audible noise calculations were completed for the following structure types:

- Typical Tangent Monopole Structure (Page 9 of GP-1)
- Guyed Heavy Angle Monopole Structure (Page 10 of GP-1)

Page 9 of Exhibit GP-1 shows the calculations of the audible noise for the typical Steel Tangent Monopole Structure. In this analysis the audible noise produced by the transmission line, at midspan between two tangents, would be 49.9 dBA 75ft from the transmission line center line (75ft x 2 = 150ft ROW). When the typical tangent is centered in a right of way having a width of 150ft, the audible noise produced at the edge of the ROW is just under the recommended 50dBA limit.

Page 10 of Exhibit GP-1 shows the calculations of the audible noise for the Guyed Heavy Angle Steel Monopole Structure. As illustrated on page 7 of GP-1, the steel pole is offset 25ft toward the inside edge of the ROW. This locates the conductors only 50ft from the inside edge of the ROW. In this analysis the audible noise produced by the conductors of the Guyed Heavy Angle Steel Monopole Structure would be 49.97 dBA 75ft from the transmission line center line (75ft x 2 = 150ft ROW). When the Guyed Heavy Angle Steel Monopole Structure is offset 25ft from the centerline of a 150ft ROW, the audible noise produced at the edge of the ROW is just under the recommended 50dBA limit.

Q. BASED UPON YOUR ANALYSIS WHAT IS YOUR CONCLUSION WITH RESPECT TO THE PROPOSED ROW WIDTH IN THE APPLICATION?

A. From the analysis I performed to determine required ROW widths, it is my professional opinion that a right of way of 150ft is adequate for this line.

Q. HOW WILL THE GEN-TIE SYSTEM INTERCONNECT THE CLINES CORNERS WIND FARM TO WESTERN SPIRIT?

Page 1 of exhibit GP-2 displays an Interconnection Map. This map is intended to illustrate the different electrical systems used to connect the proposed Clines Corners Wind Farm to the proposed Western Spirit transmission line. The electrical systems are made up of the following three components:

1. The Clines Corners 34.5kV/345kV Collection Substation
   (Please refer to CCW-SUB-EQ1 & CCS-SUB-OL1 drawings within exhibit GP-2)
2. The Clines Corners 345kV 18.7-mile-long Transmission Line
   (Please refer to GP-1)
3. The Western Spirit 345kV Switchyard / Point of Interconnect
   (Please refer to CCW-INT-EQ1 & CCS-INT-OL1 drawings within exhibit GP-2)

The Clines Corners 34.5kV/345kV collection substation contains numerous 34.5kV feeders, and a 34.5kV/345kV transformer along with circuit breakers and switches. This collection substation collects the power from the wind turbines and boosts the voltage from 34.5kV to 345kV so that the power can be transmitted over large distances without experiencing large amounts of electrical loss. The Clines Corners 34.5kV/345kV collection substation connects to the Clines Corners 345kV transmission line which carries

the power a distance of approximately 18.7 miles within a ROW width of 150ft. The Clines Corners 345kV transmission line then connects to a Western Spirit 345kV switchyard / point of interconnect ("POI"). This POI is a three-breaker ring bus that consists of 3 bays, 3 breakers, 6 switches, and 9 metering units. The three-breaker ring bus can electrically isolate any one of the three lines that connect to the switchyard. This three-breaker ring bus will be the electrical system that connects the Clines Corners 345kV transmission line to the Western Spirit 345kV line.

Q. HAVE YOU DISCUSSED YOUR ANALYSIS WITH THE COMMISSION STAFF?

A. Yes. I have provided copies of my analysis to the Commission staff and had the opportunity to obtain their feedback and suggestions which I believe that I have addressed in this testimony.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE APPLICATION FOR THE LOCATION OF THE CLINES CORNERS WIND FARM AND GEN-TIE SYSTEM IN TORRANCE AND GUADALUPE COUNTIES PURSUANT TO THE PUBLIC UTILITY ACT, NMSA 1978, §§62-9-3 AND 62-9-3.2	)	Case No. 19 -_____
CLINES CORNERS WIND FARM, LLC	)	
APPLICANT.	)	

EXHIBIT GP-1

Ulteig Engineering
Project Name: Clines Corners Wind Farm Project
Required NESC Horizontal Clearances - Rule 234B1a & 234B1b
Engineer: Greg Parent
Date: 03-25-19

Ulteig
We listen. We solve.™

(VN) = Nominal Opperating Voltage Phase-Phase (kV) $V_N := 345\ kV$

(VM) = Max Transient Overvoltage Phase-Phase (kV) $V_M := 1.05 \cdot V_N = 362.25\ kV$

(Elev) = Design Elevation (ft) $Elev := 6650\ ft$

(CHAR) = Required Horizontal Clearance At Rest (ft) NESC RULE 234B1a

(CH@6psf) = Required Horizontal Clearance under 6psf (ft) NESC RULE 234B1b

(CH@100mph) = Recomended Horizontal Clearance under 100mph

$$CH_{AR} := 7.5\ ft + ((50\ kV - 22\ kV)) \cdot \left(\frac{0.4\ \frac{in}{kV}}{12\ \frac{in}{ft}} \right) + \left(\left(\frac{V_M}{\sqrt{3}} - 50\ kV \right) \cdot \left(\frac{0.4\ \frac{in}{kV}}{12\ \frac{in}{ft}} \right) \cdot 1.03^{\frac{Elev - 3300\ ft}{1000\ ft}} \right)$$

$$CH_{AR} = 14.29\ ft$$

$$CH_{@6psf} := 4.5\ ft + ((50\ kV - 22\ kV)) \cdot \left(\frac{0.4\ \frac{in}{kV}}{12\ \frac{in}{ft}} \right) + \left(\left(\frac{V_M}{\sqrt{3}} - 50\ kV \right) \cdot \left(\frac{0.4\ \frac{in}{kV}}{12\ \frac{in}{ft}} \right) \cdot 1.03^{\frac{Elev - 3300\ ft}{1000\ ft}} \right)$$

$$CH_{@6psf} = 11.29\ ft$$

$$CH_{@100mph} := 345\ kV \cdot \frac{0.1\ \frac{in}{kV}}{12\ \frac{in}{ft}} \cdot 1.03^{\frac{Elev - 3300\ ft}{1000\ ft}}$$

$$CH_{@100mph} = 3.174\ ft$$

Assuming 10kV per inch dielectric constant for air

CLINES CORNER WIND FARM
TORRANCE COUNTY, NEW MEXICO

Rev.	Date	Description	By
A	03/02/19	PERMIT SUPPORT	UEI
B	05/03/19	REVISED	UEI
C	05/07/19	REVISED	UEI

ORION RENEWABLE ENERGY GROUP
155 GRAND AVE, SUITE 706
OAKLAND, CA 94612

ORION RENEWABLE ENERGY GROUP LLC

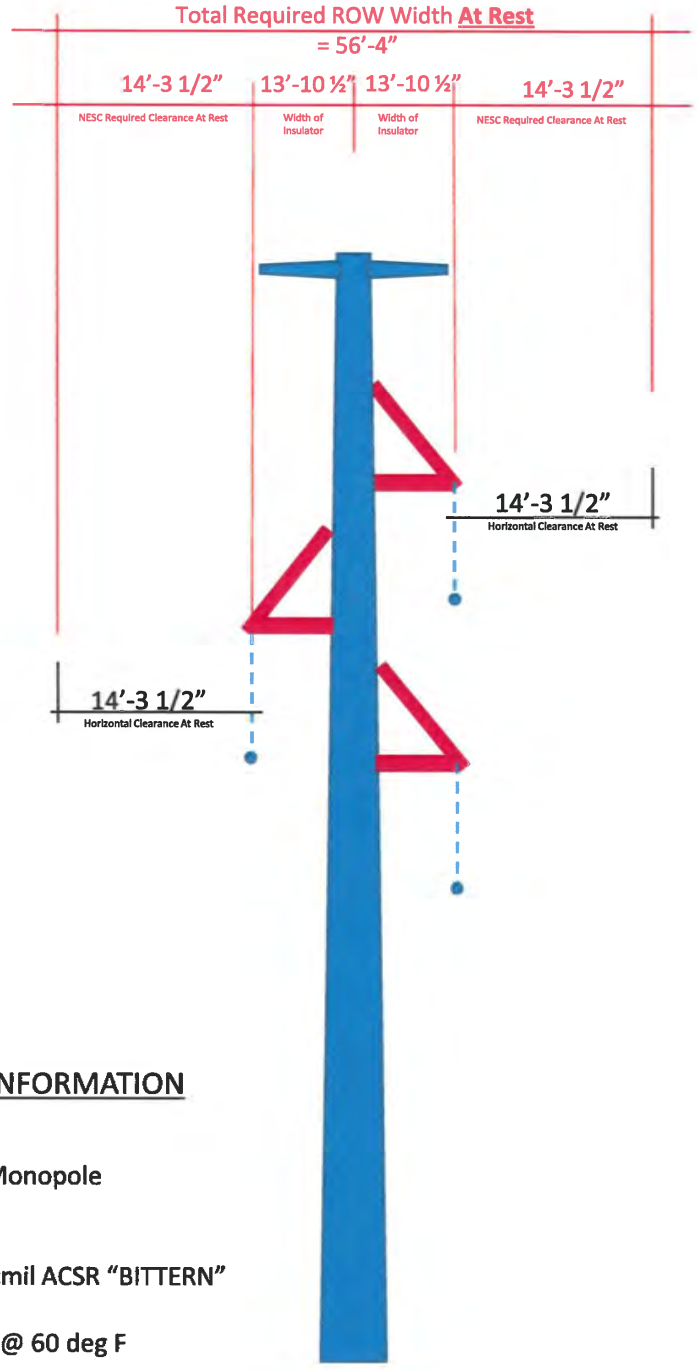
GREG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.5191
www.ulteig.com
We listen. We solve.™
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul
New Mexico Registration:
Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By: G. PARENT
Project Number:

NESC HORIZONTAL CLEARANCES UNDER BLOWOUT

DWG #: CCW-TRN-ROW-001
REVISION: C

Exhibit GP-1



SCALE: NTS

STRUCTURE AND CONDUCTOR INFORMATION

Operational Voltage: 345kV
Structure Type = Single Circuit Steel Monopole
Insulator Type = Brace-Post Insulator
Maximum Design Span = 1300ft
Conductor Type = Bundled (2) 1272kcmil ACSR "BITTERN"
NESC Rule Analyzed: 234B1a
Weather Condition Displayed = 0 PSF @ 60 deg F

CLINES CORNER
WIND FARM
TORRANCE COUNTY,
NEW MEXICO

Rev.	Date	Description	By
A	03/02/19	PERMIT SUPPORT	UEI
B	05/03/19	REVISED	UEI
C	05/07/19	REVISED	UEI

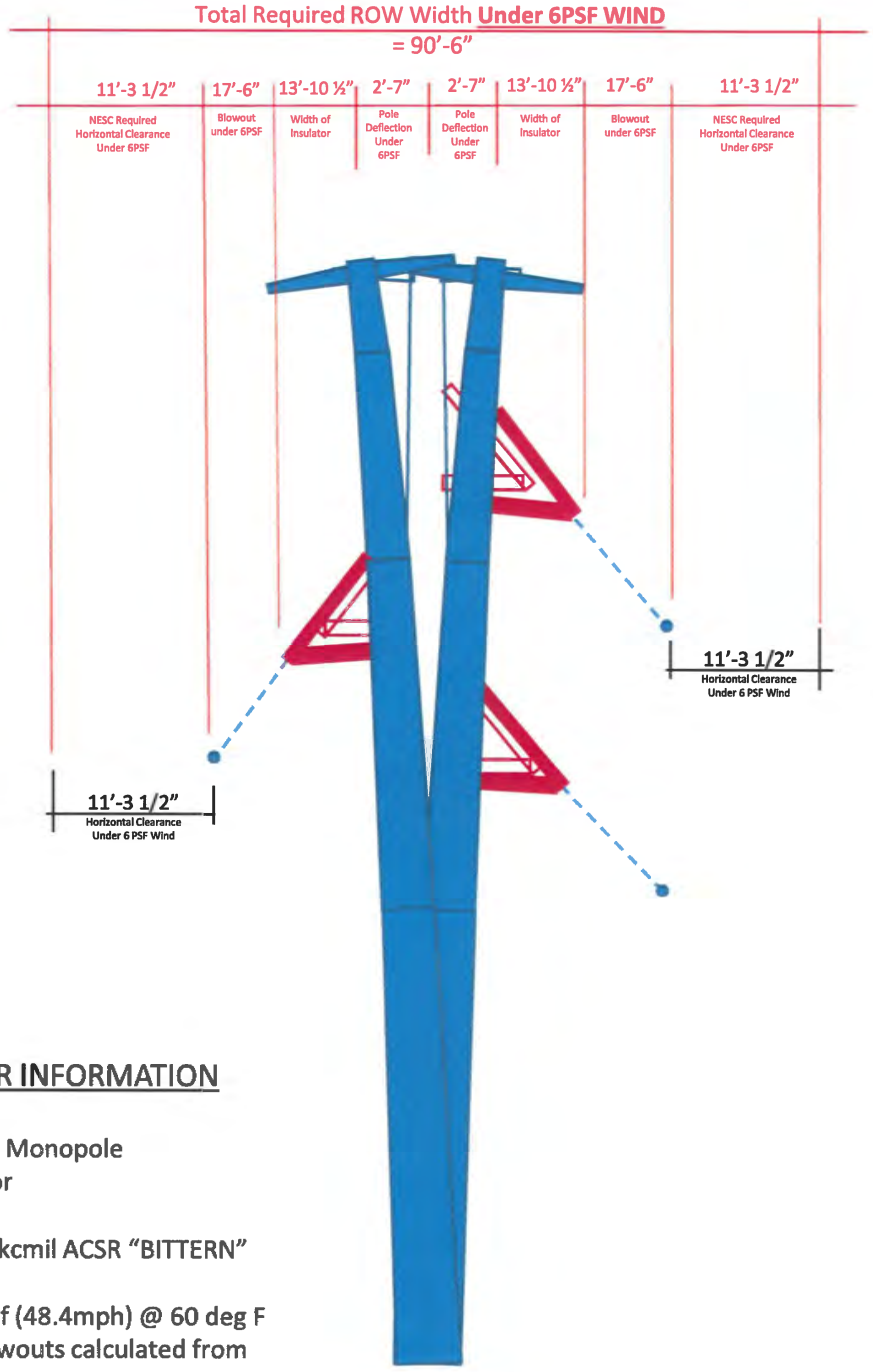
ORION RENEWABLE ENERGY GROUP
155 GRAND AVE, SUITE 706
OAKLAND, CA 94612

GREG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.ulteig.com
We listen. We solve.™
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul
New Mexico Registration:
Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By: G. PARENT
Project Number:

SINGLE CIRCUIT STEEL MONOPOLE

DWG #: CCW-TRN-ROW-002
REVISION: C



SCALE: NTS

STRUCTURE AND CONDUCTOR INFORMATION

Operational Voltage: 345kV
Structure Type = Single Circuit Steel Monopole
Insulator Type = Brace-Post Insulator
Maximum Design Span = 1300ft
Conductor Type = Bundled (2) 1272kcmil ACSR "BITTERN"
NESC Rule Analyzed: 234B1b
Weather Condition Displayed = 6 psf (48.4mph) @ 60 deg F
Pole Deflections and Conductor Blowouts calculated from analysis of pole models in PLS-CADD.

CLINES CORNER
WIND FARM
TORRANCE COUNTY,
NEW MEXICO

Rev.	Date	Description	By
A	03/02/19	PERMIT SUPPORT	UEI
B	05/03/19	REVISED	UEI
C	05/07/19	REVISED	UEI

ORION RENEWABLE ENERGY GROUP
155 GRAND AVE, SUITE 706
OAKLAND, CA 94612

ORION RENEWABLE ENERGY GROUP LLC

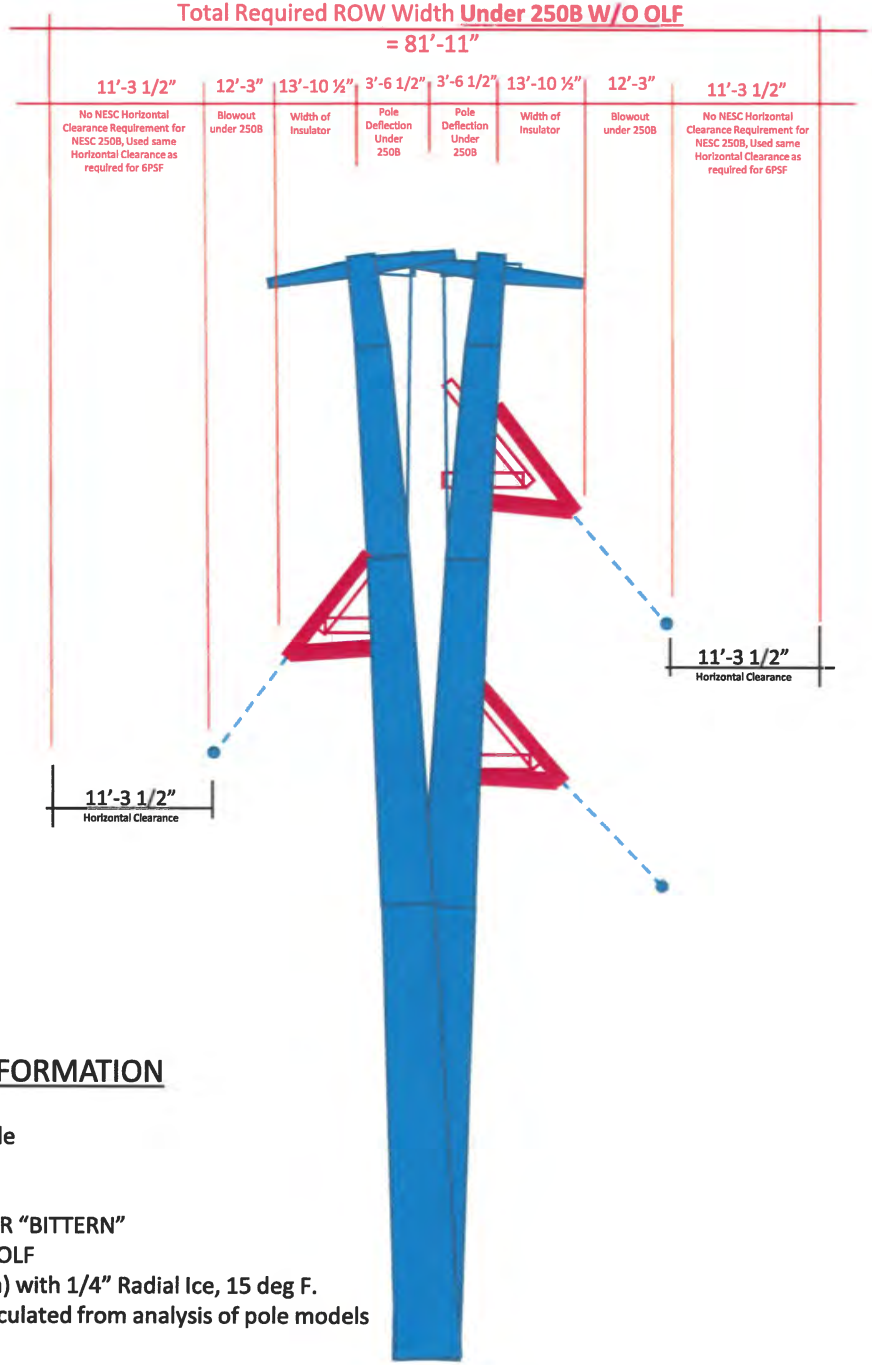
GREG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.ulteig.com
We listen. We solve.
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul

New Mexico Registration:
Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By: G. PARENT
Project Number:

SINGLE CIRCUIT STEEL MONOPOLE

DWG #: CCW-TRN-ROW-003
REVISION: C



STRUCTURE AND CONDUCTOR INFORMATION

Operational Voltage: 345kV
Structure Type = Single Circuit Steel Monopole
Insulator Type = Brace-Post Insulator
Maximum Design Span = 1300ft
Conductor Type = Bundled (2) 1272kcmil ACSR "BITTERN"
NESC Rule Analyzed: 250B – MEDIUM - W/O OLF
Weather Condition Displayed = 4 PSF (40mph) with 1/4" Radial Ice, 15 deg F.
Pole Deflections and Conductor Blowouts calculated from analysis of pole models in PLS-CADD.

SCALE: NTS

CLINES CORNER
WIND FARM
TORRANCE COUNTY,
NEW MEXICO

Rev.	Date	Description	By
A	03/02/19	PERMIT SUPPORT	UEI
B	05/03/19	REVISED	UEI
C	05/07/19	REVISED	UEI

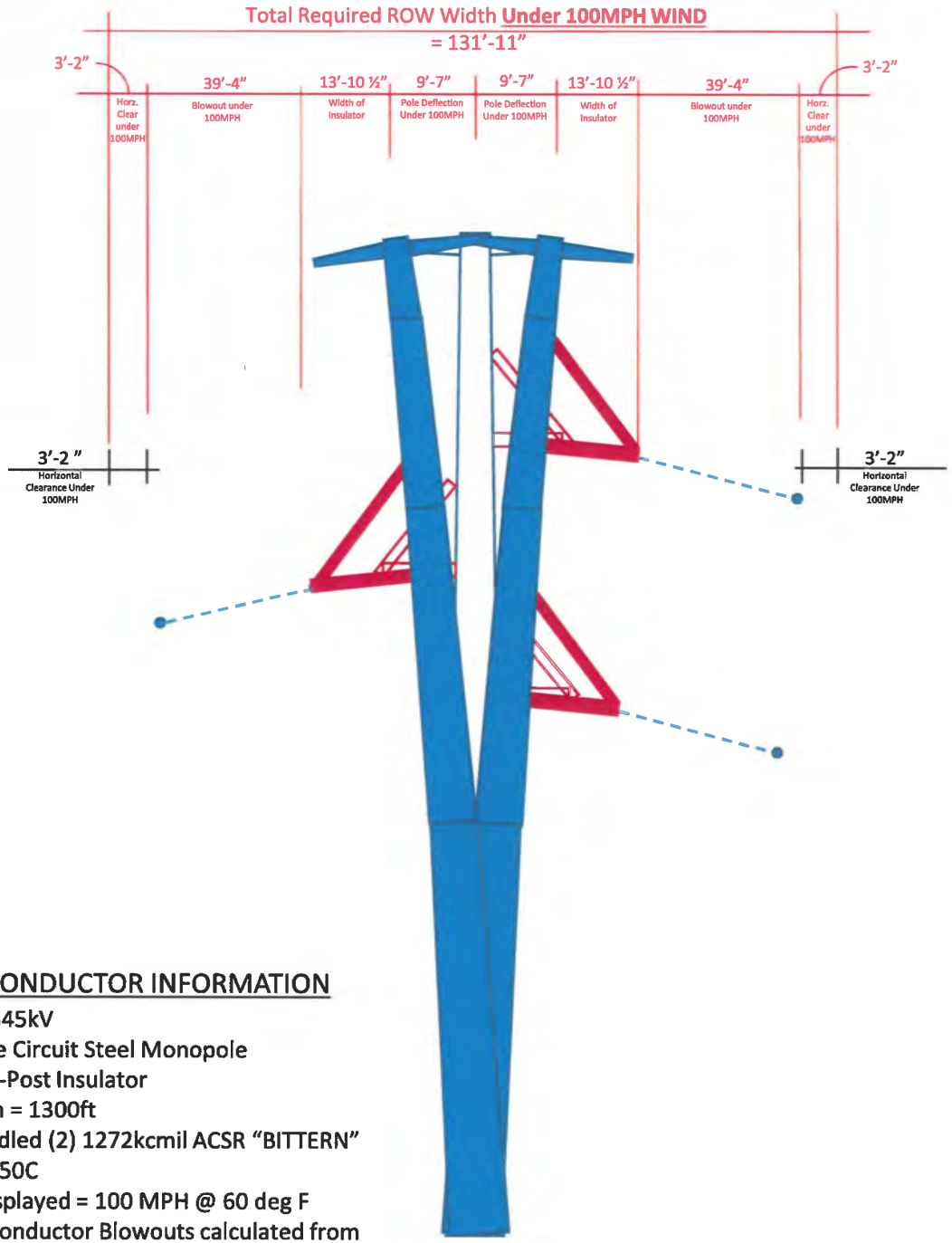
ORION RENEWABLE ENERGY GROUP
155 GRAND AVE, SUITE 706
OAKLAND, CA 94612

GREG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.ulteig.com
We listen. We solve.
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul
New Mexico Registration:
Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By: G. PARENT
Project Number:

SINGLE CIRCUIT STEEL MONOPOLE

DWG #: CCW-TRN-ROW-004
REVISION: C



SCALE: NTS

STRUCTURE AND CONDUCTOR INFORMATION

Operational Voltage: 345kV
Structure Type = Single Circuit Steel Monopole
Insulator Type = Brace-Post Insulator
Maximum Design Span = 1300ft
Conductor Type = Bundled (2) 1272kcmil ACSR "BITTERN"
NESC Rule Analyzed: 250C
Weather Condition Displayed = 100 MPH @ 60 deg F
Pole Deflections and Conductor Blowouts calculated from analysis of pole models in PLS-CADD.

CLINES CORNER
WIND FARM
TORRANCE COUNTY,
NEW MEXICO

Rev.	Date	Description	By
A	03/02/19	PERMIT SUPPORT	UEI
B	05/03/19	REVISED	UEI
C	05/07/19	REVISED	UEI

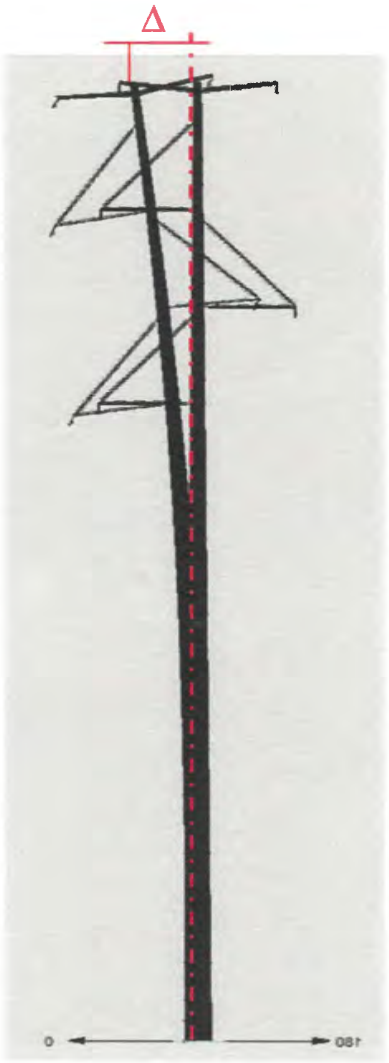
ORION RENEWABLE ENERGY GROUP
155 GRAND AVE, SUITE 706
OAKLAND, CA 94612

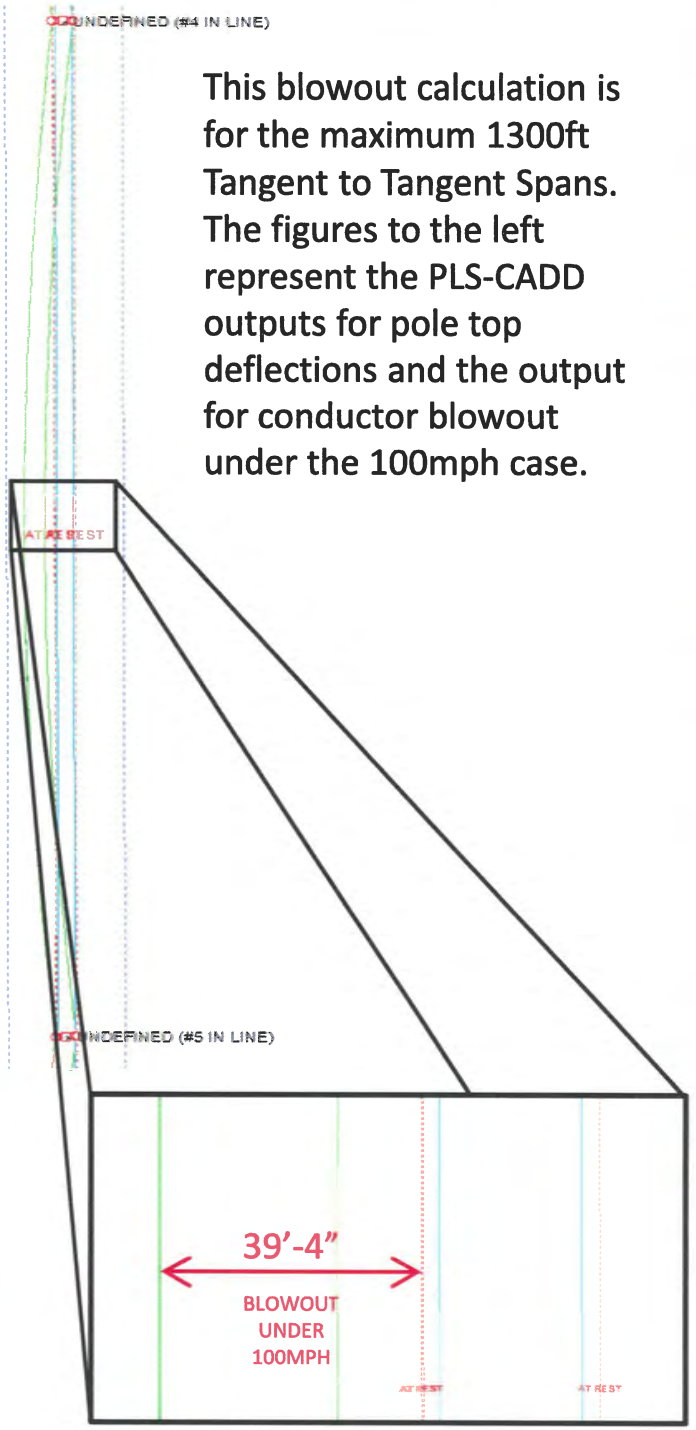
GREG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.ulteig.com
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul
New Mexico Registration:
Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By: G. PARENT
Project Number:

SINGLE CIRCUIT STEEL MONOPOLE

DWG #: CCW-TRN-ROW-005
REVISION: C





This blowout calculation is for the maximum 1300ft Tangent to Tangent Spans. The figures to the left represent the PLS-CADD outputs for pole top deflections and the output for conductor blowout under the 100mph case.

Summary of Tip Deflections For All Load Cases:

Note: positive tip load results in positive deflection

Load Case	Joint Label		Long. Defl. (in)	Tran. Defl. (in)	Vert. Defl. (in)	Resultant Defl. (in)	Long. Rot. (deg)	Tran. Rot. (deg)	Twist (deg)
DEFLECTION, NA+,I NA+		P:t	0.07	31.17	-0.47	31.17	0.00	-2.36	0.00
DEFLECTION, NA-,I NA-		P:t	0.07	-23.39	-0.26	23.39	0.00	1.47	-0.00
NESC 250B HEAVY NO OLF W/K, NA+,I NA+		P:t	0.07	42.69	-0.89	42.70	0.00	-3.41	0.00
NESC 250B HEAVY NO OLF W/K, NA-,I NA-		P:t	0.07	-28.57	-0.39	28.59	0.00	1.81	-0.00
NESC 250C EXTREME WIND, NA+,I NA+		P:t	0.08	114.74	-5.88	114.90	0.00	-8.20	0.00
NESC 250C EXTREME WIND, NA-,I NA-		P:t	0.08	-107.80	-5.12	107.92	0.00	7.41	-0.00

CLINES CORNER WIND FARM
TORRANCE COUNTY, NEW MEXICO

Rev	Date	Description	By
A	03/02/19	PERMIT SUPPORT	UEI
B	05/03/19	REVISED	UEI
C	05/07/19	REVISED	UEI

ORION RENEWABLE ENERGY GROUP
155 GRAND AVE, SUITE 706
OAKLAND, CA 94612

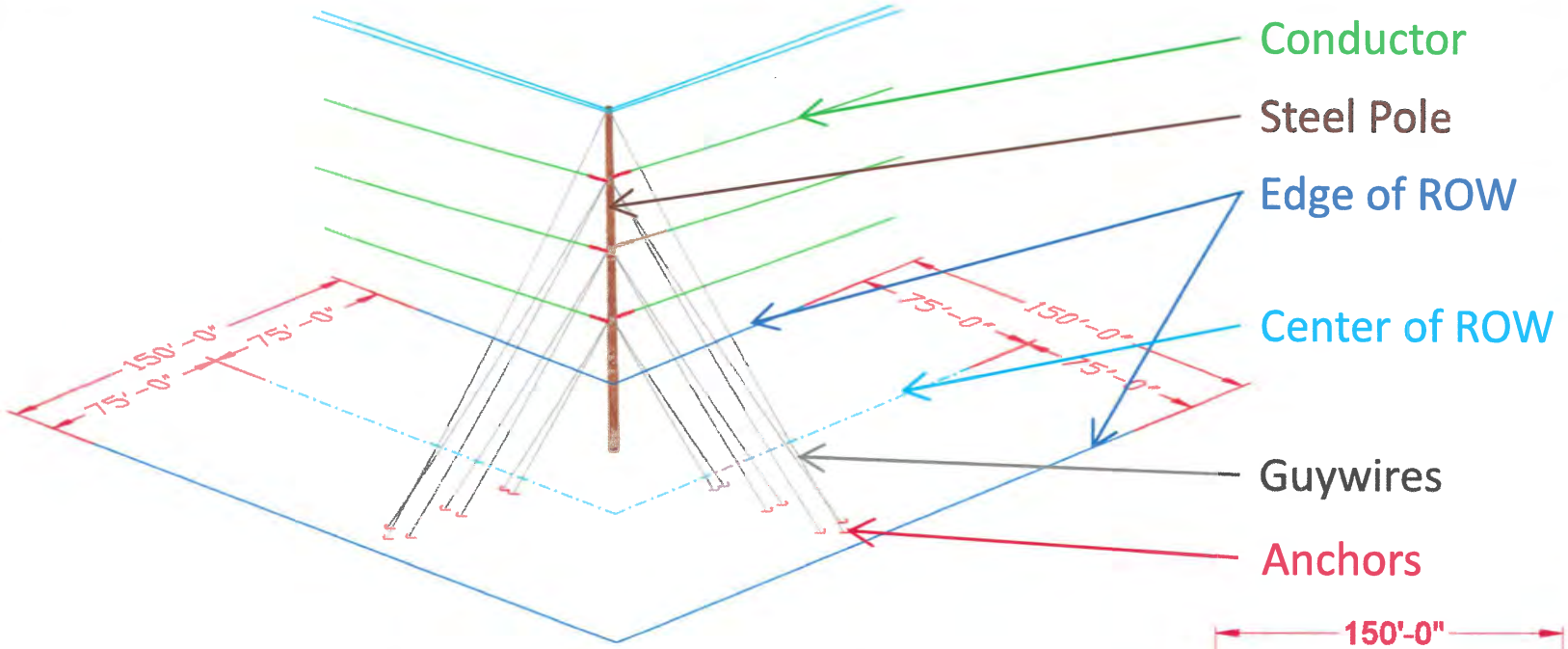
ORION RENEWABLE ENERGY GROUP LLC

GREG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

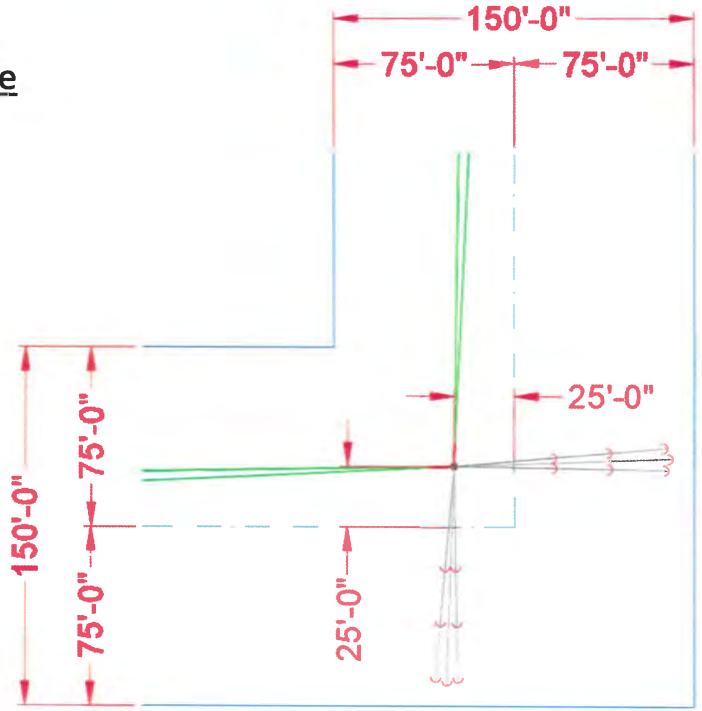
Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.ulteig.com
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul
New Mexico Registration:
Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By: G. PARENT
Project Number:

TANGENT POLE TOP DEFLECTION AND COUNDUCTOR BLOWOUT RESULTS

CCW-TRN-ROW-006 C



Isometric View of Guyed Heavy Angle



Plan View of Guyed Heavy Angle

STRUCTURE AND CONDUCTOR INFORMATION

Operational Voltage: 345kV
Structure Type = Single Circuit Guyed Heavy Angle Monopole
Insulator Type = Suspension Insulators
Typical Design Span = 800ft
Maximum Design Span = 1200ft

A guyed heavy angle monopole structure uses guywires to resist the lateral loads that are applied to the structure from the tensioned conductors. These guywires extend down at an angle from the pole structure to the groundline. Each guywire connects to an anchor structure.

To fit the "Guywire Footprint" in a 150ft ROW the pole structure is typically offset towards the inside edge of the ROW. Please see the drawings above and to the right which illustrate this structure/ROW geometry.

CLINES CORNER
WIND FARM
TORRANCE COUNTY,
NEW MEXICO

Rev.	Date	Description	By
A	03/02/19	PERMIT SUPPORT	UEI
B	05/03/19	REVISED	UEI
C	05/07/19	REVISED	UEI

ORION RENEWABLE ENERGY GROUP
155 GRAND AVE, SUITE 706
OAKLAND, CA 94612

GREG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.ulteig.com
We listen. We solve.
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul

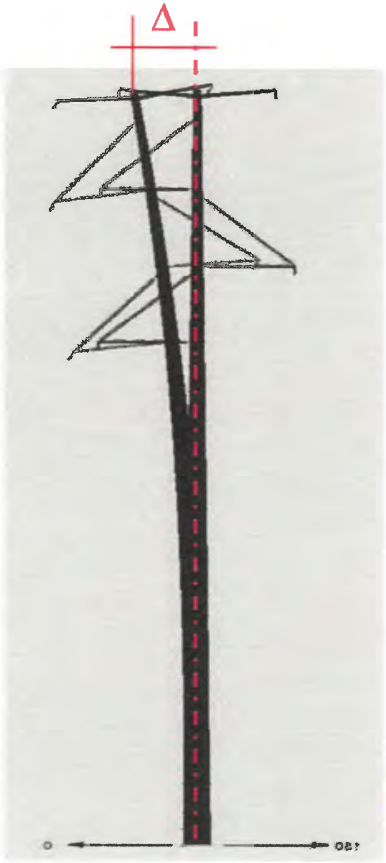
New Mexico Registration:
Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By: G. PARENT
Project Number:

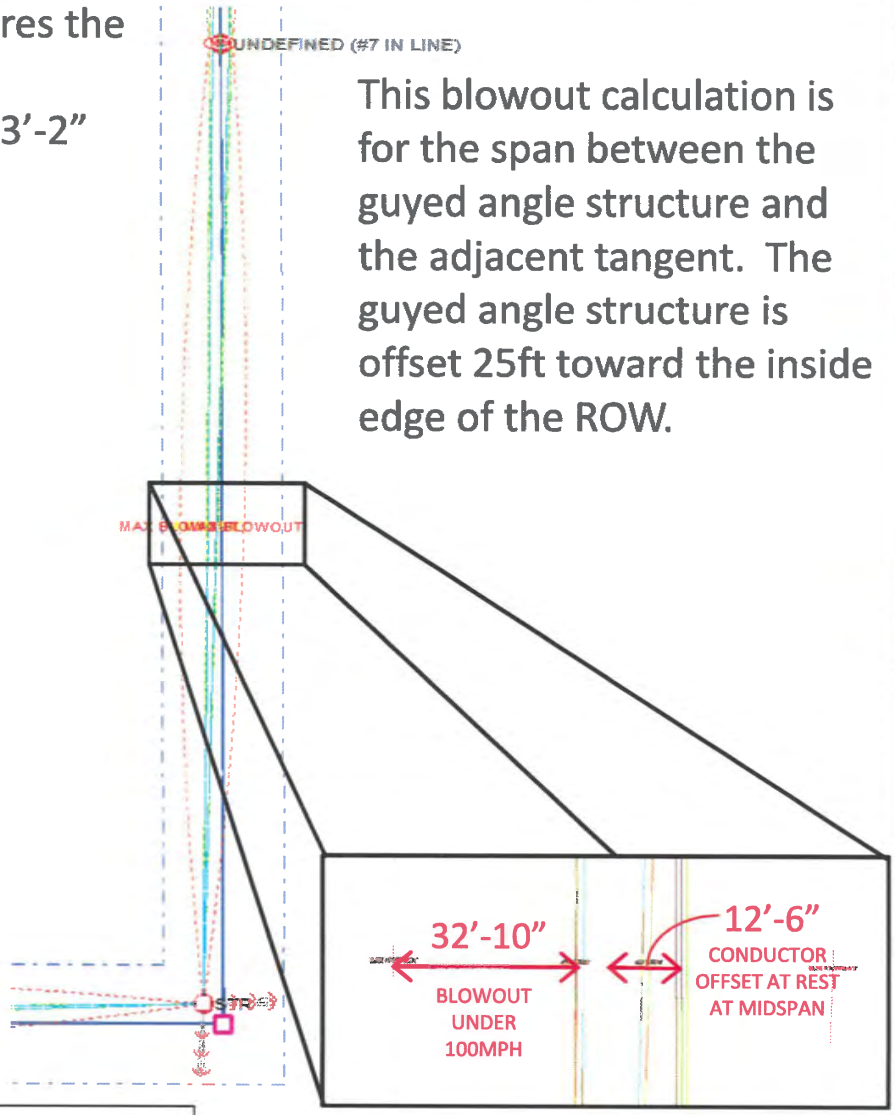
SINGLE CIRCUIT
GUYED HEAVY ANGLE
MONOPOLE

DWG #: CCW-TRN-ROW-007
REVISION: C

For a 1200 ft span between these structures the Conductors Blowout from center of ROW
= 8'-9 1/2" + 12'-6" + 13'-10 ½"+32'-10"+3'-2"
= **71'- 2"** < **75'- 0"** O.K.

The spans between the guyed angles and the tangents will need to be limited to 1200ft to stay within the 150ft ROW.





This blowout calculation is for the span between the guyed angle structure and the adjacent tangent. The guyed angle structure is offset 25ft toward the inside edge of the ROW.

Summary of Tip Deflections For All Load Cases:

Note: positive tip load results in positive deflection

Load Case	Joint Label		Long. Defl. (in)	Tran. Defl. (in)	Vert. Defl. (in)	Resultant Defl. (in)	Long. Rot. (deg)	Tran. Rot. (deg)	Twist (deg)
NESC 250C EXTREME WIND, NA+,I NA+		P:t	0.91	105.48	-4.97	105.60	0.07	-7.54	0.01
NESC 250C EXTREME WIND, NA-,I NA-		P:t	-0.63	-80.98	-2.87	81.03	-0.05	5.47	-0.01
NESC 250D ICE W/ WIND, NA+,I NA+		P:t	0.40	37.27	-0.67	37.28	0.03	-2.90	0.01
NESC 250D ICE W/ WIND, NA-,I NA-		P:t	-0.05	-10.54	-0.08	10.54	-0.00	0.53	-0.00
HEAVY ICE,I NA+		P:t	0.26	25.68	-0.39	25.68	0.02	-2.35	0.00
UPLIFT,I NA+		P:t	0.17	10.33	-0.08	10.33	0.01	-0.91	0.00
NESC RULE 261A (wind towards 192),I Max		P:t	-20.92	3.87	-0.20	21.28	-1.37	-0.25	0.00
DEFLECTION, NA+,I NA+		P:t	0.34	31.64	-0.48	31.64	0.02	-2.38	0.00
DEFLECTION, NA-,I NA-		P:t	-0.05	-13.16	-0.09	13.16	-0.00	0.74	-0.00

CLINES CORNER WIND FARM
TORRANCE COUNTY, NEW MEXICO

Rev.	Date	Description	By
A	03/02/19	PERMIT SUPPORT	UEI
B	05/03/19	REVISED	UEI
C	05/07/19	REVISED	UEI

ORION RENEWABLE ENERGY GROUP
155 GRAND AVE, SUITE 706
OAKLAND, CA 94612

Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.ulteig.com
We listen. We solve.
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul
New Mexico Registration:
Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By: G. PARENT
Project Number:

GUYED ANGLE POLE TOP DEFLECTION AND COUNDUCTOR BLOWOUT RESULTS

CCW-TRN-ROW-008 C

Audiable Noise Calculation For Typical Tangent

Project Name: Clines Corners Wind Project

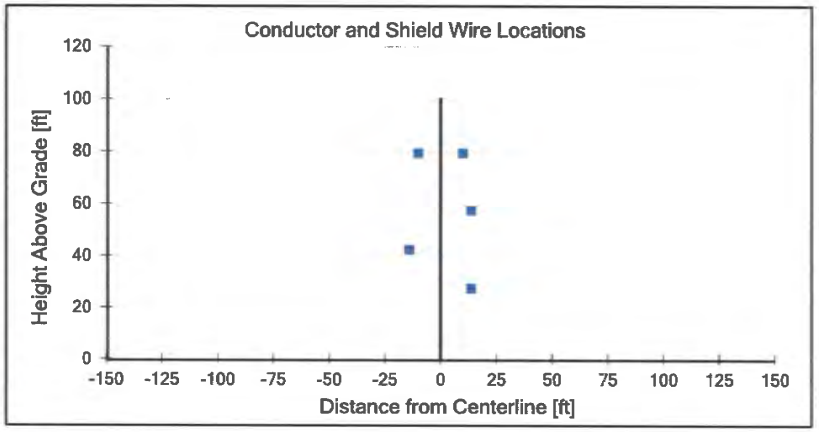
Engineer: Greg Parent

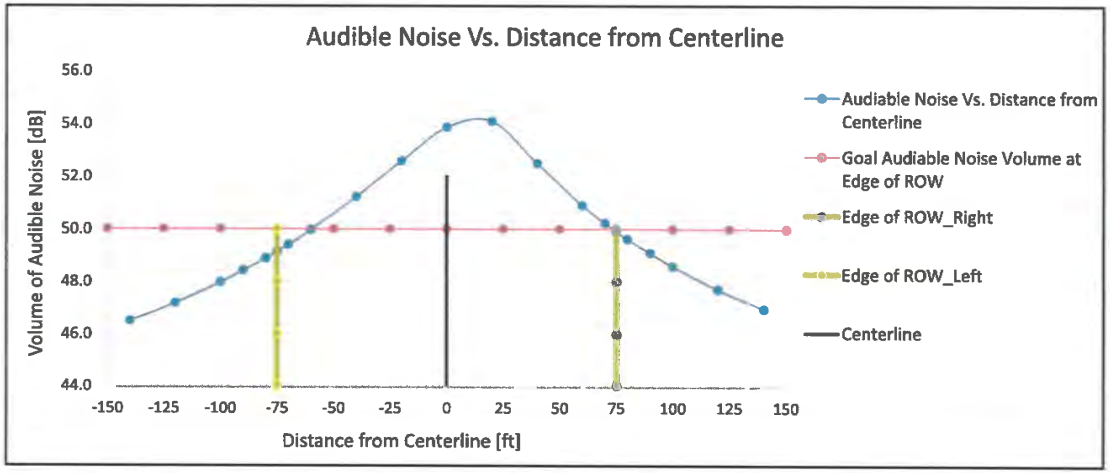
Bundle	x-feet	y-feet	n cond	cond dia	spacing	l-n voltage	phase	Kv/cm
1	13.875	57.25	2	1.196	18	205	0	15.4498
2	-13.875	42.25	2	1.196	18	205	120	15.3010
3	13.875	27.25	2	1.196	18	205	240	16.0878
4	10	79.25	1	0.6		0	0	5.5614
5	-10	79.25	1	0.6		0	0	3.3127
6								0.0000
7								0.0000
8								0.0000

NPH= 5.00 Calculated **Altitude ft=** 6650

(Inverse 7995.91 Dummy Output) **Note: Use "Paste Special" and "values" to copy data**

Dist Away from Center Line (ft)	Vert	L50 rain Decibles at distance away from centerline [db]	
-300	5	42.93	O.K.
-280	5	43.26	O.K.
-260	5	43.62	O.K.
-240	5	44.00	O.K.
-220	5	44.41	O.K.
-200	5	44.85	O.K.
-180	5	45.34	O.K.
-160	5	45.89	O.K.
-140	5	46.49	O.K.
-120	5	47.18	O.K.
-100	5	47.97	O.K.
-90	6	48.43	O.K.
-80	5	48.89	O.K.
-75	5	49.14	O.K.
-70	5	49.41	O.K.
-60	5	49.97	O.K.
-40	5	51.23	N.G.
-20	5	52.58	N.G.
0	5	53.86	N.G.
20	5	54.08	N.G.
40	5	52.49	N.G.
60	5	50.90	N.G.
70	5	50.23	N.G.
75	5	49.92	O.K.
80	5	49.63	O.K.
90	6	49.10	O.K.
100	5	48.58	O.K.
120	5	47.70	O.K.
140	5	46.95	O.K.
160	5	46.29	O.K.
180	5	45.71	O.K.
200	5	45.18	O.K.
220	5	44.71	O.K.
240	5	44.27	O.K.
260	5	43.87	O.K.
280	5	43.50	O.K.
300	5	43.16	O.K.





Max Decibles = 54.08 **Goal: output in C column < 50 DB AT EDGE OF ROW**

Ulteig

We listen. We solve.™

CLINES CORNER WIND FARM
TORRANCE COUNTY, NEW MEXICO

Rev.	Date	Description	By
A	03/02/19	PERMIT SUPPORT	UEI
B	05/03/19	REVISED	UEI
C	05/07/19	REVISED	UEI

ORION RENEWABLE ENERGY GROUP
155 GRAND AVE, SUITE 706
OAKLAND, CA 94612

ORION RENEWABLE ENERGY GROUP LLC

GREG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.ulteig.com
We listen. We solve.™
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul
New Mexico Registration:
Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By: G. PARENT
Project Number:

TANGENT AUDIBLE NOISE AT EDGE OF ROW

DWG #: CCW-TRN-ROW-009

REVISION: C

Audiable Noise Calculation - Guyed Deadend

Project Name: Clines Corners Wind Project

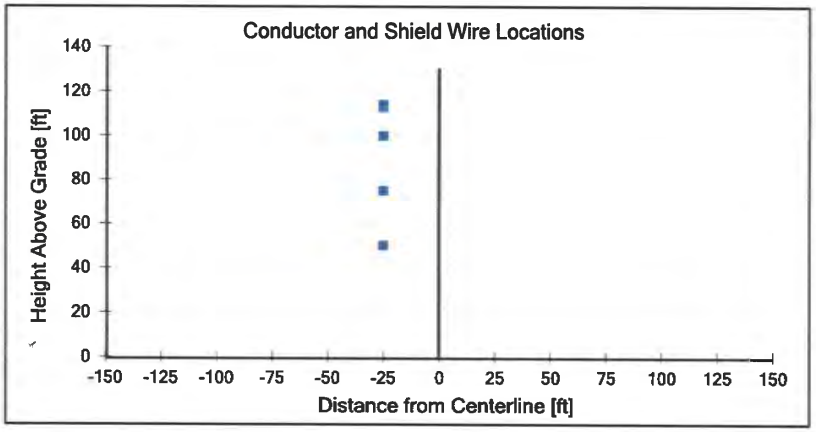
Engineer: Greg Parent

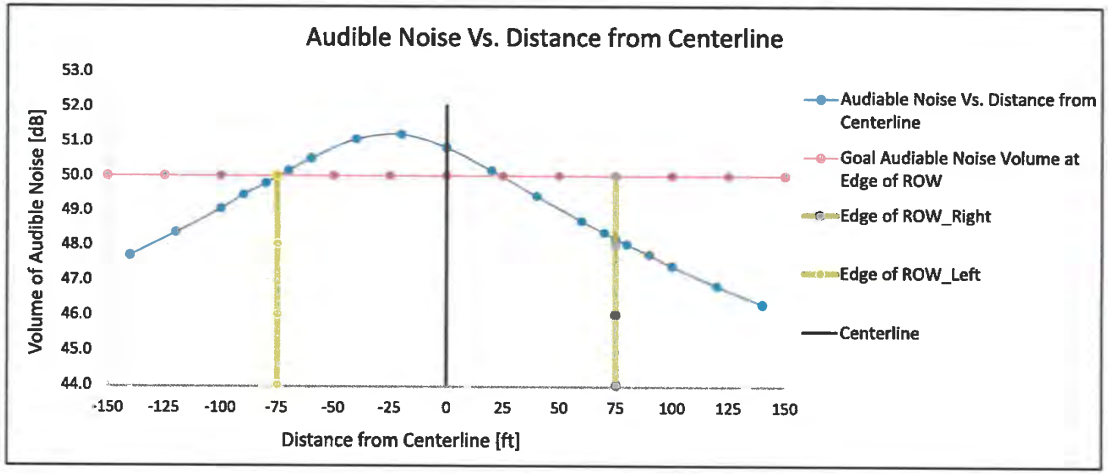
Bundle	x-feet	y-feet	n cond	cond dia	spacing	l-n voltage	phase	Kv/cm
1	-25	50	2	1.196	18	205	0	15.3505
2	-25	75	2	1.196	18	205	120	16.2685
3	-25	100	2	1.196	18	205	240	15.8528
4	-25	113	1	0.6		0	0	6.9300
5	-25	114	1	0.6		0	0	6.0427
6								0.0000
7								0.0000
8								0.0000

NPH= 5.00 Calculated **Altitude ft=** 6650

(Inverse 8023.79 Dummy Output) **Note: Use "Paste Special" and "values" to copy data**

Dist		L50 rain	
Away from Center Line (ft)	Vert	Decibles at distance away from centerline [db]	
-300	5	44.04	O.K.
-280	5	44.39	O.K.
-260	5	44.76	O.K.
-240	5	45.16	O.K.
-220	5	45.59	O.K.
-200	5	46.05	O.K.
-180	5	46.55	O.K.
-160	5	47.10	O.K.
-140	5	47.70	O.K.
-120	5	48.35	O.K.
-100	5	49.05	O.K.
-90	6	49.45	O.K.
-80	5	49.78	O.K.
-75	5	49.97	O.K.
-70	5	50.15	N.G.
-60	5	50.50	N.G.
-40	5	51.05	N.G.
-20	5	51.19	N.G.
0	5	50.81	N.G.
20	5	50.15	N.G.
40	5	49.41	O.K.
60	5	48.69	O.K.
70	5	48.35	O.K.
75	5	48.18	O.K.
80	5	48.02	O.K.
90	6	47.72	O.K.
100	5	47.39	O.K.
120	5	46.82	O.K.
140	5	46.30	O.K.
160	5	45.81	O.K.
180	5	45.37	O.K.
200	5	44.96	O.K.
220	5	44.57	O.K.
240	5	44.21	O.K.
260	5	43.88	O.K.
280	5	43.56	O.K.
300	5	43.26	O.K.





Max Decibles = 51.19 **Goal: output in C column < 50 DB AT EDGE OF ROW**

Ulteig

We listen. We solve.™

CLINES CORNER WIND FARM
TORRANCE COUNTY, NEW MEXICO

Rev.	Date	Description	By
A	03/02/19	PERMIT SUPPORT	UEI
B	05/03/19	REVISED	UEI
C	05/07/19	REVISED	UEI

ORION RENEWABLE ENERGY GROUP
155 GRAND AVE, SUITE 706
OAKLAND, CA 94612

ORION RENEWABLE ENERGY GROUP LLC

GREG G. PARENT NEW MEXICO 24890 PROFESSIONAL ENGINEER
05-07-19

Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.ulteig.com
We listen. We solve.™
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul

New Mexico Registration:
Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By: G. PARENT
Project Number:

GUYED HEAVY ANGLE AUDIBLE NOISE AT EDGE OF ROW

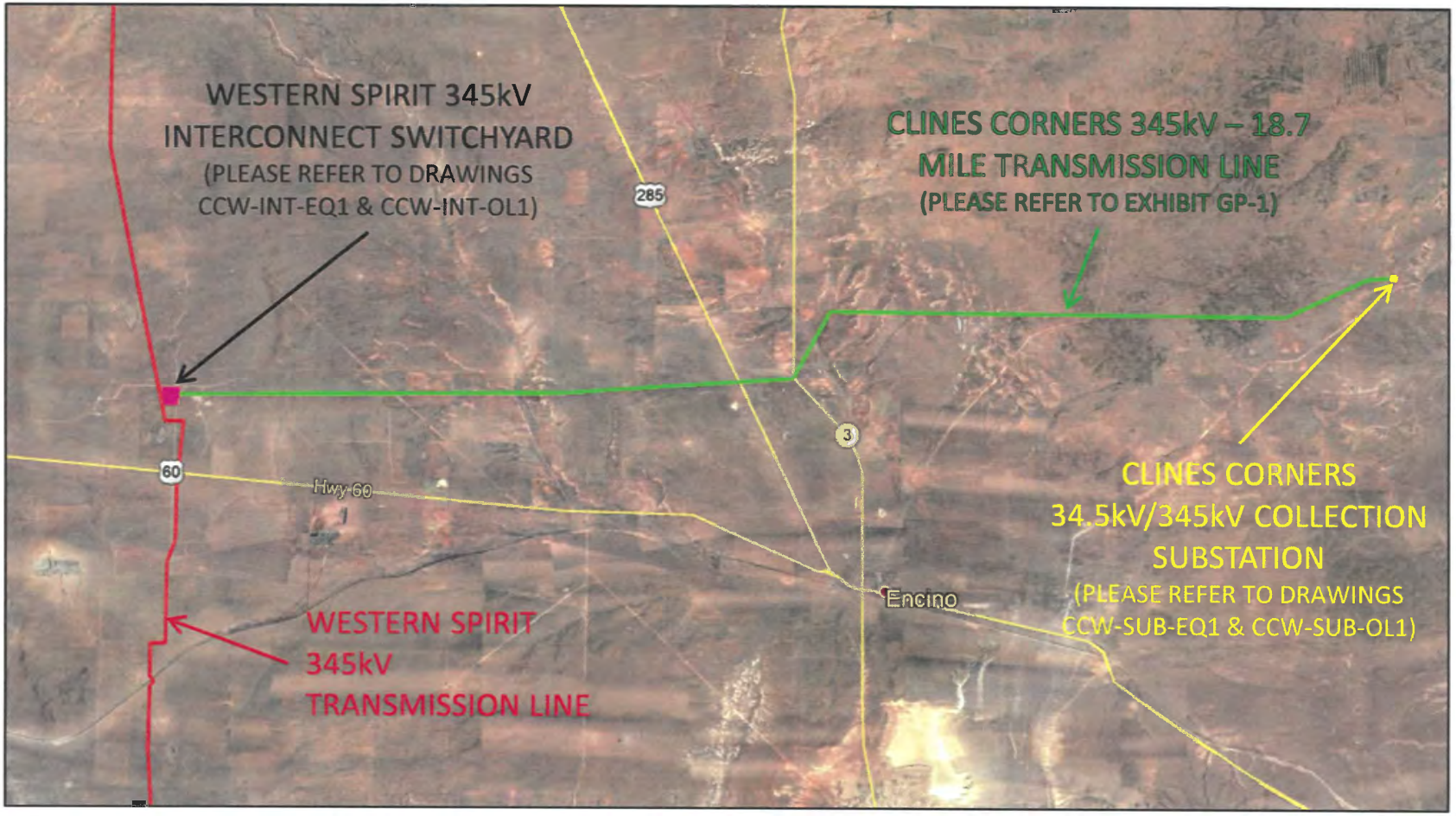
DWG #: CCW-TRN-ROW-010
REVISION: C

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE APPLICATION FOR THE LOCATION OF THE CLINES CORNERS WIND FARM AND GEN-TIE SYSTEM IN TORRANCE AND GUADALUPE COUNTIES PURSUANT TO THE PUBLIC UTILITY ACT, NMSA 1978, §§62-9-3 AND 62-9-3.2	)	**Case No. 19 -_____**
CLINES CORNERS WIND FARM, LLC	)	
APPLICANT.	)	

EXHIBIT GP-2

CLINES CORNERS WIND FARM
INTERCONNECTION WITH THE
WESTERN SPIRIT 345KV TRANSMISSION LINE



CLINES CORNER
WIND FARM
TORRANCE COUNTY,
NEW MEXICO

Rev.	Date	Description	By
A	05/03/19	REVISED	UEI

ORION RENEWABLE ENERGY GROUP
155 GRAND AVE, SUITE 706
OAKLAND, CA 94612

ORION RENEWABLE ENERGY GROUP LLC

GREG C. PARENT
NEW MEXICO
24890
05-07-A
PROFESSIONAL ENGINEER

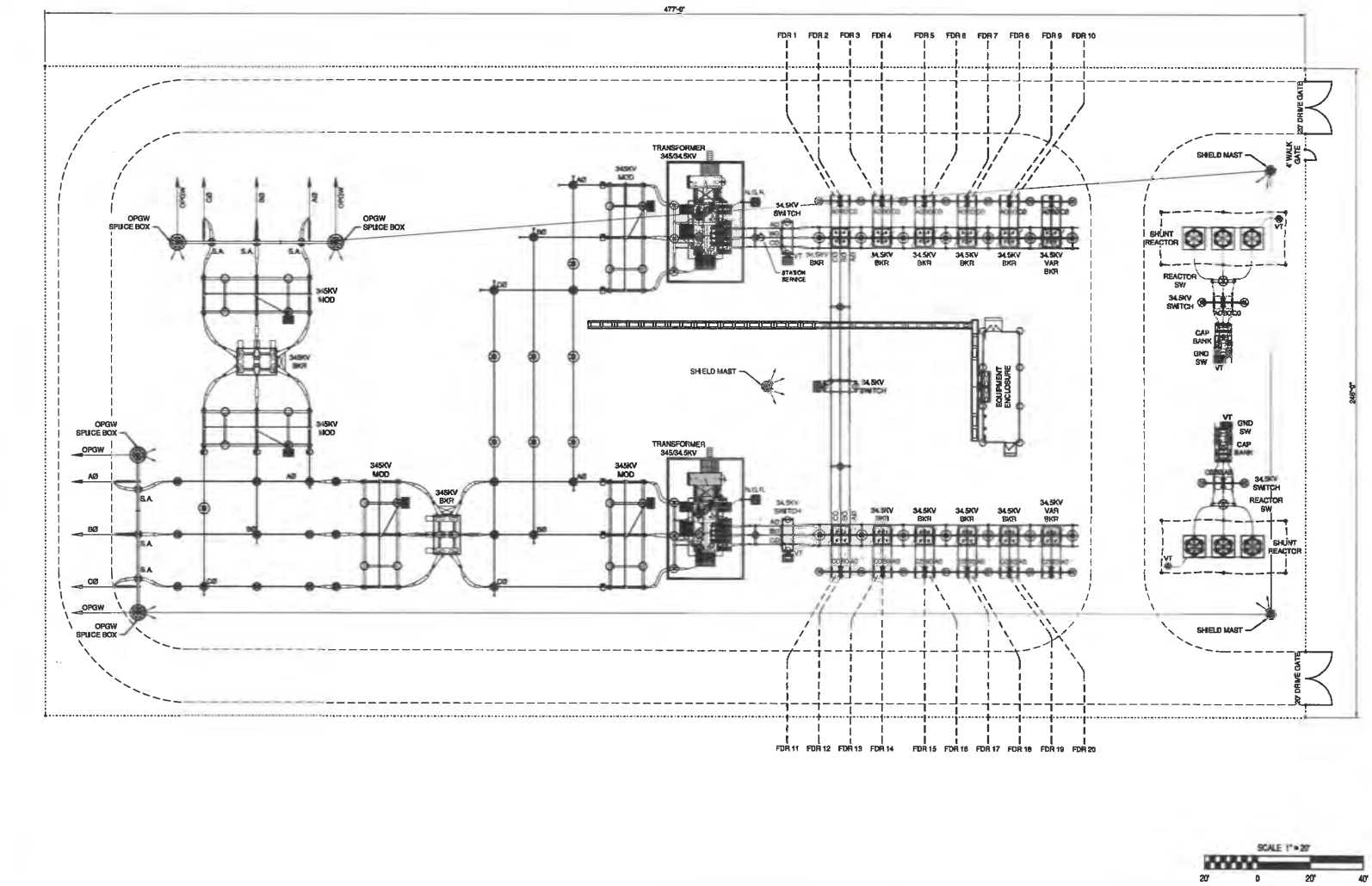
Exhibit GP-2

Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.ulteig.com
We listen. We solve.
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul

New Mexico Registration:
Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By: G. PARENT
Project Number:

CLINES CORNERS &
WESTERN SPIRIT
INTERCONNECTION MAP

DWG #: CCW-TRN-ICM
REVISION: A



CLINES CORNERS WIND PROJECT
TORRANCE COUNTY, NEW MEXICO

Rev.	Date	Description	By
A	05/03/19	PRELIMINARY DESIGN PKG	UEI

ORION RENEWABLE ENERGY GROUP
155 GRAND AVE. SUITE 706
OAKLAND, CA 94612

LEGEND:
- OPERATOR PLATFORM
- INDICATES SECTION VIEW
- DRAWING ON WHICH SECTION APPEARS
- CABLE TRENCH
- AREA LIGHT
- BASE LINE INTERSECTION
- FENCE W/ GATES

GREG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

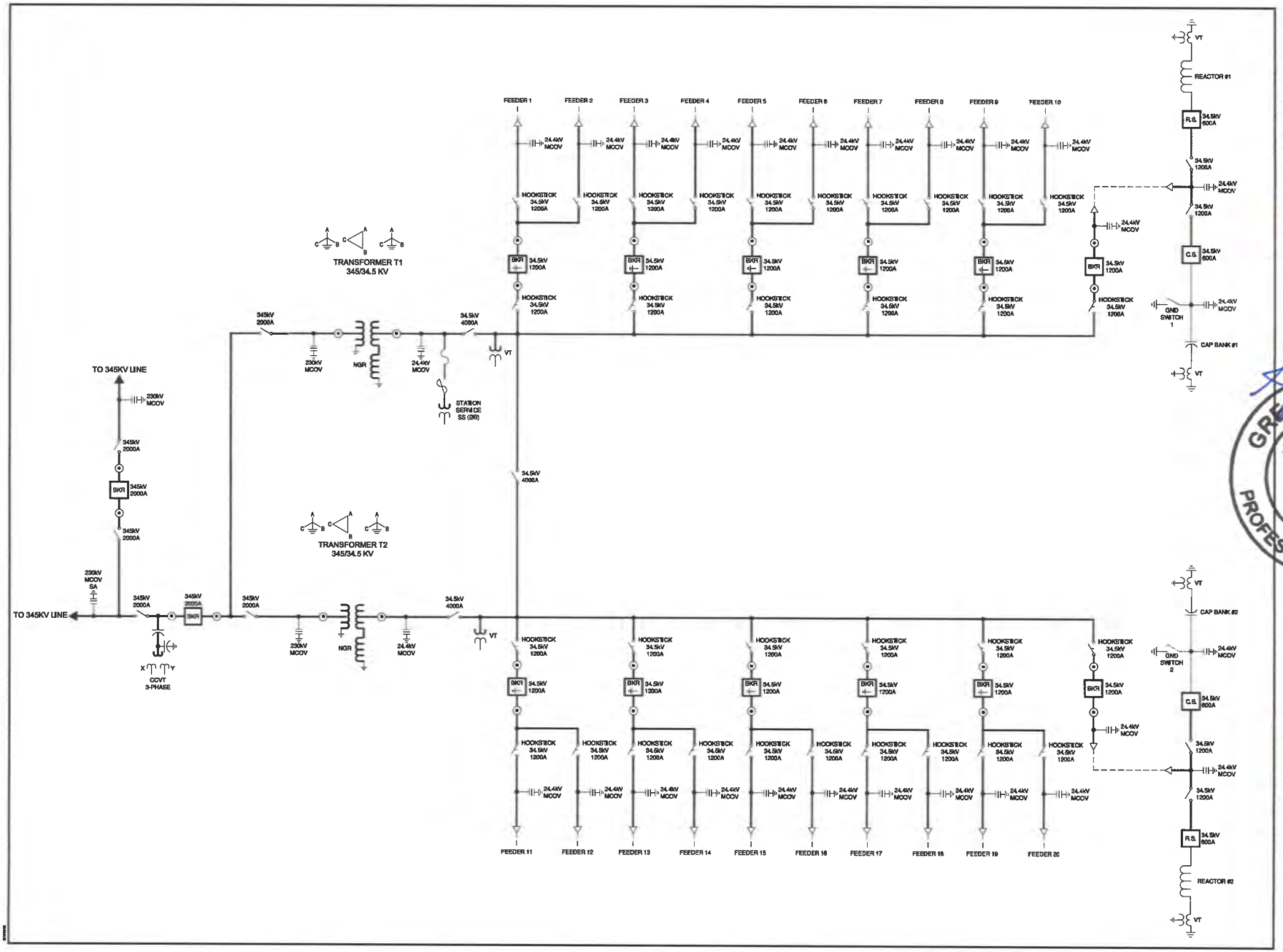
PRELIMINARY
NOT FOR CONSTRUCTION

3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.uhdg.com
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul

Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By:
Project Number: 19.00486

SUBSTATION GENERAL ARRANGEMENT

REVISION: A
DWG #: CCW-SUB-EQ1



CLINES CORNERS WIND PROJECT
TORRANCE COUNTY, NEW MEXICO

Rev.	Date	Description	By
A	05/03/19	PRELIMINARY DESIGN PKG	UEI

ORION RENEWABLE ENERGY GROUP
155 GRAND AVE. SUITE 706
OAKLAND, CA 94612

GREG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

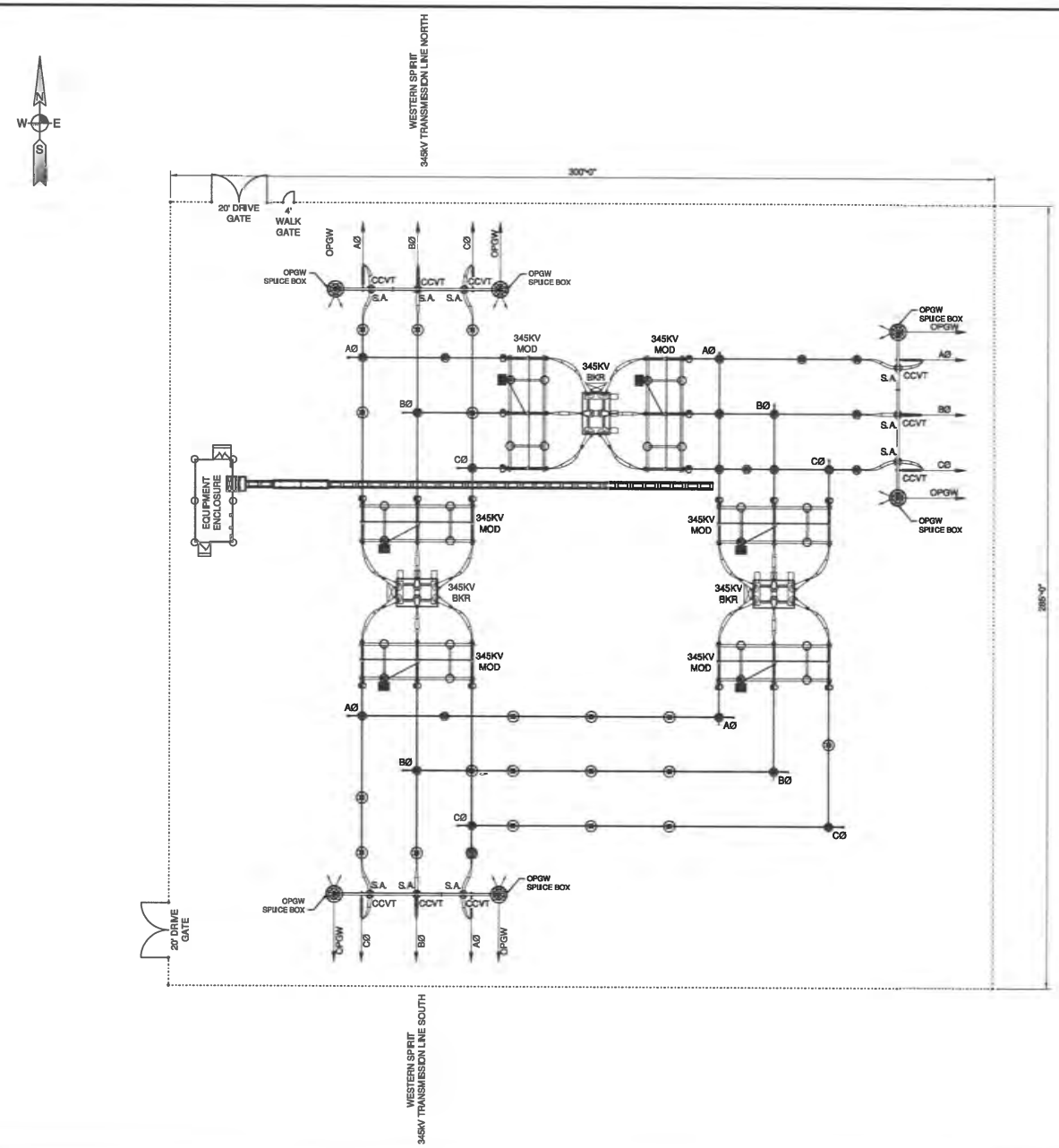
PRELIMINARY
NOT FOR CONSTRUCTION

3350 38th Avenue South
Fargo, North Dakota 58104
Phone 701.280.8500
Fax 701.237.3191
www.ulteig.com
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul

Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By:
Project Number: 19.00486

SUBSTATION SWITCHING DIAGRAM

REVISION:
A
DWG #:
CCW-SUB-OL1



CLINES CORNERS
WIND PROJECT
TORRANCE COUNTY,
NEW MEXICO

Rev.	Date	Description	By
A	05/07/19	PRELIMINARY DESIGN PKG	UBI

ORION RENEWABLE
ENERGY GROUP
155 GRAND AVE. SUITE 706
OAKLAND, CA 94612

LEGEND:
- OPERATOR PLATFORM
- INDICATES SECTION VIEW
- DRAWING ON WHICH SECTION APPEARS
- CABLE TRENCH
- AREA LIGHT
- BASE LINE INTERSECTION
- FENCE w/ BARBS

GREG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

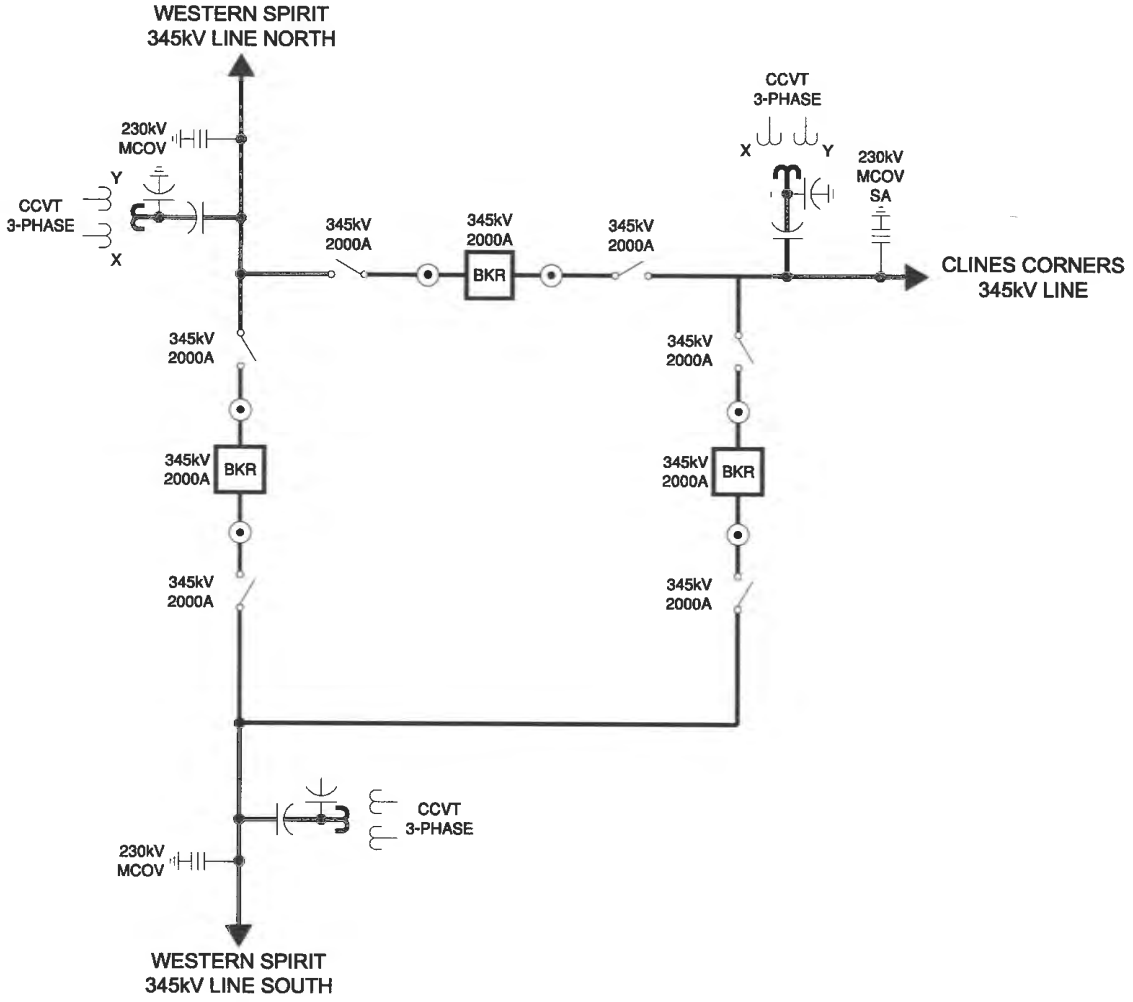
PRELIMINARY
NOT FOR CONSTRUCTION

3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.uhlig.com
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul

Design By: G. PARENT
Drawn By: S. CAMPBELL
Approved By:
Project Number: 18.00486

SWITCH YARD GENERAL
ARNG. (3) BREAKER RING
BUS INTERCONNECT
WITH WESTERN SPIRIT

REVISION:
A
DWG #:
CCW-INT-EQ1



CLINES CORNERS
WIND PROJECT
TORRANCE COUNTY,
NEW MEXICO

Rev.	Date	Description	By
A	05/07/19	PRELIMINARY DESIGN PKG	UEI

ORION RENEWABLE
ENERGY GROUP
155 GRAND AVE. SUITE 706
OAKLAND, CA 94612

ORION
RENEWABLE ENERGY GROUP LLC

GREGG C. PARENT
NEW MEXICO
24890
05-07-19
PROFESSIONAL ENGINEER

PRELIMINARY
NOT FOR CONSTRUCTION

Ulteig
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.293.8500
Fax: 701.237.3191
www.ulteig.com
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul

Design By: G. PARENT
Drawn By: B. CAMPBELL
Approved By:
Project Number: 18.00486

SWITCH YARD SWITCHING DIAGRAM (3) BREAKER RING BUS INTERCONNECT WITH WESTERN SPIRIT

REVISION:
A

CCW-INT-OL1

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE APPLICATION FOR THE LOCATION OF THE CLINES CORNERS WIND FARM AND GEN-TIE SYSTEM IN TORRANCE AND GUADALUPE COUNTIES PURSUANT TO THE PUBLIC UTILITY ACT, NMSA 1978, §§62-9-3 AND 62-9-3.2	)	Case No. 19 -_____
CLINES CORNERS WIND FARM, LLC	)	
APPLICANT.	)	

AFFIDAVIT OF GREG PARENT

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE APPLICATION FOR THE LOCATION OF THE CLINES CORNERS WIND FARM AND GEN-TIE SYSTEM IN TORRANCE AND GUADALUPE COUNTIES PURSUANT TO THE PUBLIC UTILITY ACT, NMSA 1978, §§62-9-3 AND 62-9-3.2	)	**Case No. 19 -_____**
CLINES CORNERS WIND FARM, LLC	)	
APPLICANT.	)	

AFFIDAVIT OF GREGORY PARENT

STATE OF COLORADO)
) ss.
COUNTY OF Arapahoe)

I have read the foregoing Direct Testimony, and it is true and accurate based on my own knowledge and belief.

Gregory Parent

SUBSCRIBED and sworn to me before this 8th of May 2019.

NOTARY PUBLIC

December 14, 2022
My Commission Expires.

JENNIFER SIEVERT
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20144047228
MY COMMISSION EXPIRES 12/14/22