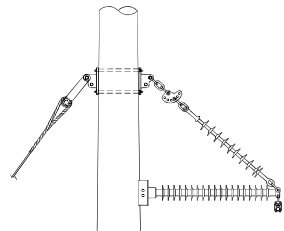


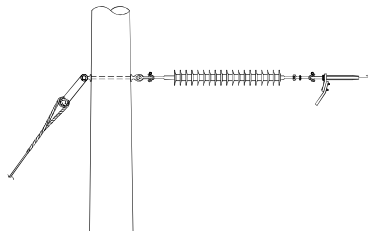
Union Ridge Solar, LLC, Case No. 20-1757-EL-BGN
Updated Responses to OPSB Staff Data Request - Part 2

Appendix A

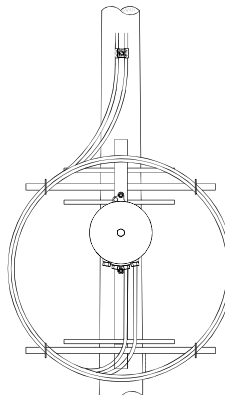
UNION RIDGE SOLAR 138 kV OVERHEAD LINE



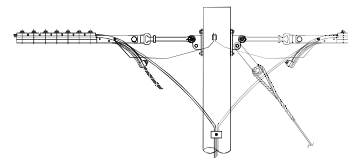
TANGENT BRACE POST ASSEMBLY
WITH DOWN GUY (AS REQ.)



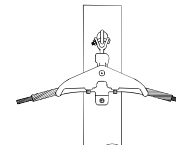
COMPRESSION DEADEND ASSEMBLY
WITH DOWN GUY



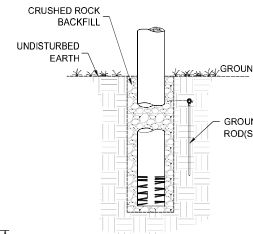
OPGW SPLICER ASSEMBLY
WITH COIL AND RACK



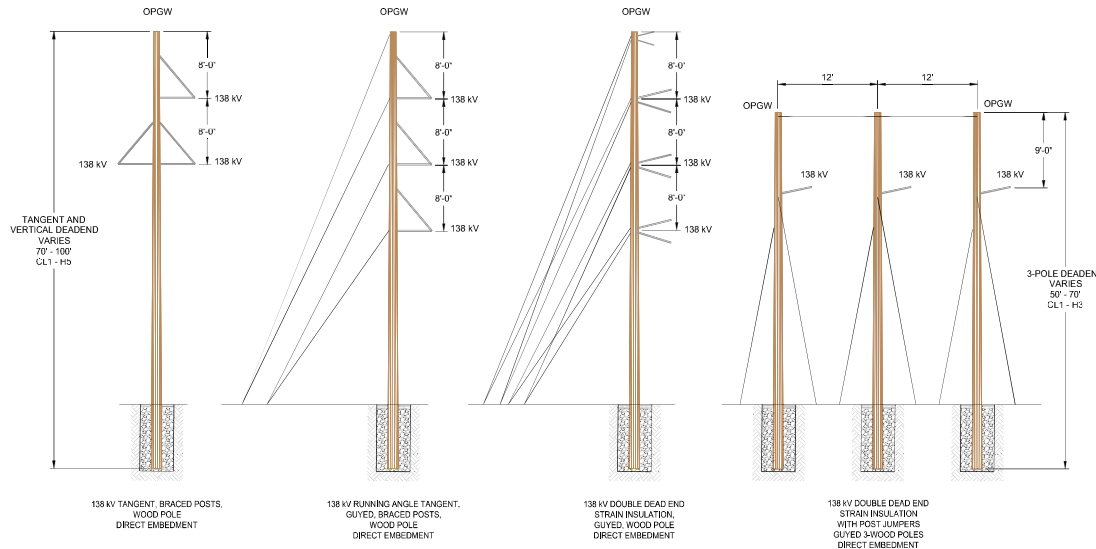
OPGW DEADEND ASSEMBLY
SINGLE OR DOUBLE DEAD END
WITH DOWN GUY (AS REQ.)



OPGW SUSPENSION ASSEMBLY
TOP LEVEL FIBER OPTIC CABLE



EMBEDEDMENT AND GROUNDING
SEE NOTES 2 & 3



POLE CONFIGURATION OPTIONS
DIRECT EMBED WOOD POLES

NOTES:

- POLES SHALL BE STANDARD CLASSED WOOD OR STEEL STRUCTURES SELECTED FOR THE LOADING REQUIREMENTS OF EACH STRUCTURE.
- FOR DIRECT EMBED POLYCARBONATE BACKFILL SHALL BE 40-40-20 #47 GRAVEL AND SHALL BE COMPACTED TO 95% MAXIMUM DRY DENSITY PER ASTM D 1557.
- POLES WILL BE DIRECTLY EMBEDDED IN THE SOIL AT A DEPTH REQUIRED TO SUPPORT THE POLE BASED ON THE GEOTECHNICAL INVESTIGATION DATA. THE MINIMUM EMBEDMENT WILL BE 10% OF THE POLE CIRCUMFERENCE PLUS TWO FEET. THE DIAMETER OF THE EXCAVATED HOLE WILL BE SUFFICIENT TO ALLOW FOR PROPER PLACEMENT OF BACKFILL.
- CONTACT MIGRATORY BIRD PERMIT EXAMINER LOCATED IN THE USFWS REGION FOR AVIAN CONSIDERATION RECOMMENDATIONS.
- LINE DESIGN ENGINEERS SHALL COORDINATE WITH SUBSTATION, LAND, CIVIL, PERMITTING, CONSTRUCTION, VEGETATION MANAGEMENT, THIRD-PARTY JOINT USE OWNERS, AND OTHER PERSONNEL REQUIRED TO COORDINATE ALL REQUIREMENTS FOR THE PROJECT. THIS SHALL INCLUDE CONDUCTOR AND COMMUNICATION CONNECTIONS AT SUBSTATIONS.
- FAA MARKING AND LIGHTING SCHEMING IS REQUIRED AND STRUCTURES MAY REQUIRE FAA NOTIFICATION.
- UNIT OF MEASURE FOR SPAN LENGTHS, DISTANCES, AND ELEVATIONS IS FEET.
- CONTRACTOR MUST COMPLY WITH ALL ENVIRONMENTAL REGULATIONS DURING THE CONSTRUCTION OF THIS PROJECT.
- CONTACT STATE ONE CALL SYSTEM (811) BEFORE DIGGING.
- ADHERE TO ALL APPLICABLE REGULATIONS FOR ALL OVERHEAD AND UNDERGROUND CROSSINGS.

CRITERIA:

- POLE DESIGNS SHALL HAVE A MAXIMUM POLE DEFLECTION OF 1% OF THE POLE HEIGHT ABOVE GROUND AT 60 °F. NO ICE, NO WIND, AFTER CREEP. POLES SHALL HAVE A MAXIMUM POLE DEFLECTION OF 5% THE POLE HEIGHT ABOVE GROUND AT ALL REQUIRED LOAD CASES.
- OPGW AND STATIC SHIELD/GROUND WIRE SHALL MATCH 80% SAG OF CONDUCTOR AT 60 °F. NO WIND, NO ICE, INITIAL CREEP, AND LOAD CONDITIONS.
- STRUCTURE LOAD REQUIREMENTS SHALL INCLUDE A MINIMUM ADDITIONAL 5% CONSTRUCTION TOLERANCE LOAD FACTOR BUFFER.
- BROKEN WIRE LOADING SHALL BE CONSIDERED FOR ALL DEADEND STRUCTURES AND UNDER ALL LOAD CASES.
- STRUCTURES SHALL BE DESIGNED FOR CONSTRUCTION AND MAINTENANCE LOADS UNDER 1.5 PSF WIND AND 60 °F. INITIAL CONDITIONS. CONSTRUCTION AND MAINTENANCE LOADS SHALL INCLUDE A LOAD FACTOR OF 1.5 PLUS 250 LBS FOR WORKER & TOOLS.
- CLEARANCES REQUIREMENTS TO GROUND AND OTHER STRUCTURES SHALL INCLUDE A MINIMUM ADDITIONAL 5% CONSTRUCTION TOLERANCE BUFFER, AND NO LESS THAN 8 INCHES.

REFERENCES:

- RUS BULLETIN 1724E-200, DESIGN MANUAL FOR HIGH VOLTAGE TRANSMISSION LINES
- NATIONAL ELECTRICAL SAFETY CODE (NEC 2017)
- ASCE MANUALS AND REPORTS ON ENGINEERING PRACTICE NO. 74
- GUIDELINES FOR ELECTRICAL TRANSMISSION LINE STRUCTURAL LOADING
- IEEE 13.13.2-1999 IEEE GUIDE FOR THE APPLICATION OF INSULATION COORDINATION

DESIGN PARAMETERS	
LINE RATING (MW)	125
LINE VOLTAGE (KV)	138
PHASE AMPERAGE (A)	556
CONDUCTOR TYPE	795 KCMIL ACSR "DRAKE"
CONDUCTOR AMPACITY at 75 °C (A)	905
MAX CONDUCTOR OPERATING TEMP (°F)	212
AVERAGE SPAN LENGTH (FT)	350-400
LEVEL SPAN AVG SAG AT MAX OP TEMP (FT)	10-12
BLOWOUT - 6 PSF WIND (FT)	15
BLOWOUT - EXTREME WIND	20
RIGHT-OF-WAY WIDTH (FT)	100

138 kV INSULATOR REQUIREMENTS		
	SUSP/DE	POST
LEAKAGE DISTANCE (IN)	140	138
50 HZ DRY FLASHOVER (KV)	302	461
50 HZ WET FLASHOVER (KV)	447	427
CRITICAL IMPULSE FLASHOVER, POSITIVE (KV)	857	800
CRITICAL IMPULSE FLASHOVER, NEGATIVE (KV)	906	854

CONDUCTOR AND OPGW SPECIFICATIONS				
NAME	SIZE (KCMIL)	STRANDING	RTS (LBS)	DIA. (IN)
ACSR "DRAKE"	795	61	31,500	1.108
OPGW	S1-9043	24 FIBER	18,089	0.612

138 kV CLEARANCE REQUIREMENTS* (FT)		
	NEC MIN.	
GROUND	23	20.7
RAILROAD	33	28.7
WATER	47	42.7
ROAD	23	20.7
PARALLEL WIRE (233B/G)	10	7.2
CROSSING WIRE (233C/G)	7	6.5
OTHER STRUCTURE (234B/C)	10	6.7
OTHER PHASE (235B/C)	8	5.0
SUPPORT STRUCTURE (235E)	4	3.8

WIRE TENSION LIMITS - GRADE B		
CONDITION	INITIAL	FINAL
250B	60%	60%
250C/D	INITIAL	80%
*	INITIAL	35%
*	FINAL	25%

* 10 °F HWY, 15 °F MED, 30 °F LIGHT



RRC POWER & ENERGY, LLC
7591 SW MOHAWK ST.
TUALATIN, OR 97062
PHONE: (503) 342-4064
www.RRCcompanies.com

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PREPARED FOR:



PRELIMINARY
NOT FOR CONSTRUCTION

PROJECT NUMBER: -
DRAWING NAME:
UNION RIDGE SOLAR
138 kV OVERHEAD LINE

PRELIMINARY
PROJECT DETAILS
AND GENERAL NOTES

DRAWING No. SHEET REVISION
UNRS-T-000-00 1 OF 1 A

CADFILE:UNRS-T-000-00

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Case No(s). 20-1757-EL-BGN

Summary: Text Response of Union Ridge Solar, LLC to OPSB Staff First Data Request Part
2 - Appendix A electronically filed by Teresa Orahod on behalf of Dylan F. Borchers