

Rocky Mountain Power
Exhibit RMP___(RAV-2)
Docket No. 20000-___-EA-17
Witness: Rick A. Vail

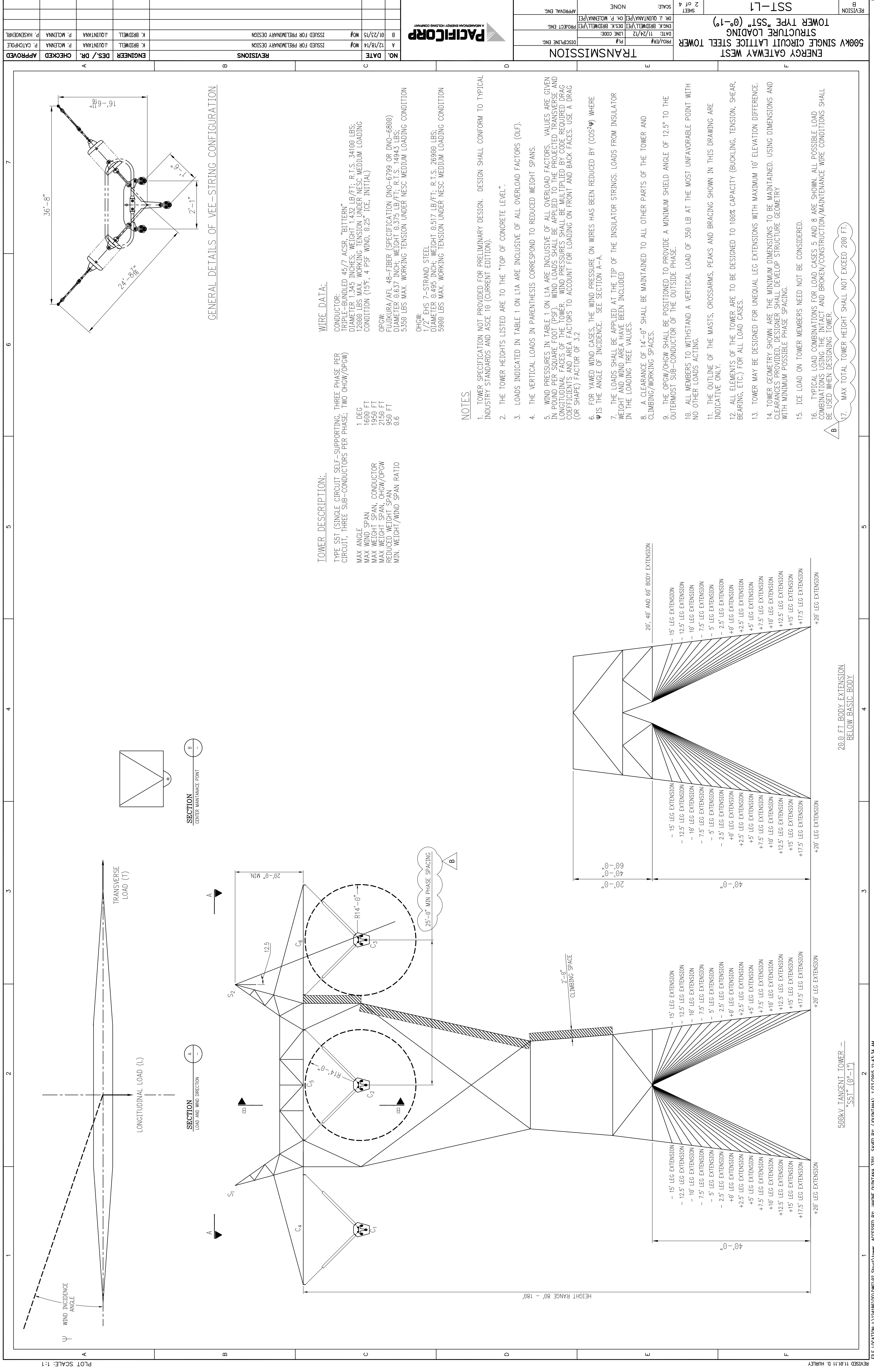
BEFORE THE WYOMING PUBLIC SERVICE
COMMISSION

ROCKY MOUNTAIN POWER

Exhibit Accompanying Direct Testimony of Rick A. Vail

500 kV Tower Design

June 2017



TOWER DESCRIPTION:

TYPE SST (SINGLE CIRCUIT SELF-SUPPORTING, THREE PHASE PER CIRCUIT, THREE SUB-CONDUCTORS PER PHASE, TWO OHGW/OPGW)
 MAX ANGLE 1 DEG
 MAX WIND SPAN 1600 FT
 MAX WEIGHT SPAN, CONDUCTOR 1950 FT
 MAX WEIGHT SPAN, OHGW/OPGW 2150 FT
 REDUCED WEIGHT SPAN 950 FT
 MIN. WEIGHT/WIND SPAN RATIO 6.6

WIRE DATA:

CONDUCTOR:
 TRIPLE-BUNDLED 45/7 ACSR, "BITTERN"
 DIAMETER 1345 INCHES, WEIGHT 1.432 LB/FT, R.T.S. 34100 LBS;
 12000 LBS MAX. WORKING TENSION UNDER NESC MEDIUM LOADING
 CONDITION (15T, 4 PSF WIND, 0.25" ICE, INITIAL)
 OPGW:
 FUJIKURA/AFL 48-FIBER (SPECIFICATION DNO-6799 OR DNO-6800)
 DIAMETER 0.637 INCH, WEIGHT 0.375 LB/FT; R.T.S. 14943 LBS;
 5350 LBS MAX. WORKING TENSION UNDER NESC MEDIUM LOADING CONDITION
 OHGW:
 1/2" EHS 7-STRAND STEEL
 DIAMETER 0.495 INCH, WEIGHT 0.517 LB/FT; R.T.S. 26900 LBS;
 5900 LBS MAX. WORKING TENSION UNDER NESC MEDIUM LOADING CONDITION

NOTES

- TOWER SPECIFICATION NOT PROVIDED FOR PRELIMINARY DESIGN. DESIGN SHALL CONFORM TO TYPICAL INDUSTRY STANDARDS AND ASCE 10 (CURRENT EDITION).
- THE TOWER HEIGHTS LISTED ARE TO THE "TOP OF CONCRETE LEVEL".
- LOADS INDICATED IN TABLE 1 ON L1A ARE INCLUSIVE OF ALL OVERLOAD FACTORS (OLF).
- THE VERTICAL LOADS IN PARENTHESIS CORRESPOND TO REDUCED WEIGHT SPANS.
- WIND PRESSURES IN TABLE 1 ON L1A ARE INCLUSIVE OF ALL OVERLOAD FACTORS. VALUES ARE GIVEN IN POUND PER SQUARE FOOT (PSF). WIND LOADS SHALL BE APPLIED TO THE PROJECTED TRANSVERSE AND LONGITUDINAL FACES OF THE TOWER. WIND PRESSURES SHALL BE MULTIPLIED BY CODE REQUIRED DRAG COEFFICIENTS AND AREA FACTORS TO ACCOUNT FOR LOADING ON FRONT AND BACK FACES. USE A DRAG (OR SHAPE) FACTOR OF 3.2
- FOR YAWED WIND CASES, THE WIND PRESSURE ON WIRES HAS BEEN REDUCED BY $(\cos^2\psi)$ WHERE ψ IS THE ANGLE OF INCIDENCE. SEE SECTION A-A.
- THE LOADS SHALL BE APPLIED AT THE TIP OF THE INSULATOR STRINGS. LOADS FROM INSULATOR WEIGHT AND WIND AREA HAVE BEEN INCLUDED IN THE LOADING TREE VALUES.
- A CLEARANCE OF 14'-0" SHALL BE MAINTAINED TO ALL OTHER PARTS OF THE TOWER AND CLIMBING/WORKING SPACES.
- THE OPGW/OHGW SHALL BE POSITIONED TO PROVIDE A MINIMUM SHIELD ANGLE OF 12.5° TO THE OUTERMOST SUB-CONDUCTOR OF THE OUTSIDE PHASE.
- ALL MEMBERS TO WITHSTAND A VERTICAL LOAD OF 350 LB AT THE MOST UNFAVORABLE POINT WITH NO OTHER LOADS ACTING.
- THE OUTLINE OF THE MASTS, CROSSARMS, PEAKS AND BRACING SHOWN IN THIS DRAWING ARE INDICATIVE ONLY.
- ALL ELEMENTS OF THE TOWER ARE TO BE DESIGNED TO 100% CAPACITY (BUCKLING, TENSION, SHEAR, BEARING, ETC.) FOR ALL LOAD CASES.
- TOWER MAY BE DESIGNED FOR UNEQUAL LEG EXTENSIONS WITH MAXIMUM 10' ELEVATION DIFFERENCE. CLEARANCES PROVIDED; DESIGNER SHALL DEVELOP STRUCTURE GEOMETRY WITH MINIMUM POSSIBLE PHASE SPACING.
- ICE LOAD ON TOWER MEMBERS NEED NOT BE CONSIDERED.
- TYPICAL LOAD COMBINATIONS FOR LOAD CASES 5 AND 8 ARE SHOWN. ALL POSSIBLE LOAD COMBINATIONS USING THE INTACT AND BROKEN/CONSTRUCTION/MAINTENANCE WIRE CONDITIONS SHALL BE USED WHEN DESIGNING TOWER.
- MAX TOTAL TOWER HEIGHT SHALL NOT EXCEED 200 FT.

NO.	DATE	REVISIONS	ENGINEER	DES / DR.	CHECKED	APPROVED
A	12/18/14	WORK ISSUED FOR PRELIMINARY DESIGN	K. BRIDWELL	J. QUINANA	P. MCLENNAN	P. CATCHPOLE
B	01/22/15	WORK ISSUED FOR PRELIMINARY DESIGN	K. BRIDWELL	J. QUINANA	P. MCLENNAN	P. HASENGERL

PACIFICORP
 A MICHIGAN ENERGY HOLDING COMPANY

PROJ/CR#	DATE	LIVE CODE	DISCIPLINE ENG.
	11/24/12		
ENGR. BRIDWELL/PEL	ENGR. BRIDWELL/PEL	ENGR. BRIDWELL/PEL	ENGR. BRIDWELL/PEL
DR. J. QUINANA/PEL	DR. J. QUINANA/PEL	DR. J. QUINANA/PEL	DR. J. QUINANA/PEL
SCALE: NONE	APPROVAL ENG.		

REVISION	SHEET	SCALE	TOWER TYPE "SST" (0°-1°)
B	2 OF 4		
SST-L1			
ENERGY GATEWAY WEST STRUCTURE LATTICE STEEL TOWER 500KV SINGLE CIRCUIT LATTICE STEEL TOWER			