ENERGY GATEWAY SOUTH TRANSMISSION PROJECT

Revised Standard Form 299 Right-of-Way Application
Attachment B – Project Description

Revised from October 2010 Submittal

Submitted to:

Bureau of Land Management
Wyoming State Office
5353 Yellowstone Road
Cheyenne, Wyoming 82003

Submitted by:

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Per request of the Bureau of Land Management (BLM), PacifiCorp/Rocky Mountain Power is providing a more detailed description of the Energy Gateway South Project (Project).

1.0 PROJECT DESCRIPTION

1.1 Substation and Ancillary Facilities Descriptions

Table 1-1 describes the anticipated components of each substation.

TABLE 1-1
SUBSTATION AND ANCILLARY FACILITIES DESCRIPTIONS

Substation	Description
Aeolus Substation	▪ *Planned* substation to be constructed as part of proposed Energy Gateway West Project ▪ Planned access road is gravel and would not need extension ▪ 500kV circuit breakers and related switching equipment ▪ Bus and support structures ▪ 500kV line termination structures approximately 125 to 135 feet in height ▪ 500kV shunt reactor bank(s) ▪ 500kV shunt capacitor bank(s) ▪ Potential and current transformers ▪ Control, protection, and communications equipment
Series Compensation Substation #1	▪ *Proposed* Substation ▪ Access road required ▪ Perimeter security fence ▪ 500 kV circuit breakers and related switching equipment ▪ 500kV line termination structures approximately 125 to 135 feet in height ▪ Bus and support structures ▪ 500kV shunt reactor banks ▪ 500kV series capacitors ▪ Emergency generator ▪ Potential transformers ▪ Control, protection, and communications equipment ▪ Control building
Series Compensation Substation #2	▪ *Proposed* Substation ▪ Access road required ▪ Perimeter security fence ▪ 500kV circuit breakers and related switching equipment ▪ 500kV line termination structures approximately 125 to 135 feet in height ▪ Bus and support structures ▪ 500kV shunt reactor banks ▪ 500kV series capacitors ▪ Emergency generator ▪ Potential transformers ▪ Control, protection, and communications equipment ▪ Control building
Clover Substation	▪ *Existing* substation constructed as part of the Mona to Oquirrh Project ▪ Gravel access road ▪ Perimeter security fence ▪ 500kV and 345kV circuit breakers and related switching equipment

TABLE 1-1 SUBSTATION AND ANCILLARY FACILITIES DESCRIPTIONS	
Substation	**Description**
	▪ Bus and support structures ▪ 500kV/345kV transformer bank ▪ 500kV shunt reactor bank ▪ 500kV series capacitors ▪ Emergency generator ▪ Potential and current transformers ▪ Control, protection, and communications equipment ▪ Control building
Ancillary Facilities	
Communications and Control Facilities	▪ Regenerator sites are required to amplify the system control and monitoring signals carried over the fiber optic cable attached to the transmission towers ▪ A total of 10 regenerator sites will be needed ▪ Regenerator sites will be located either within a substation or at another location along the route remote from a substation ▪ Regenerator sites remote from a substation are 100 X 100 feet with a 75 X 75-foot fenced area ▪ Typical building dimensions within the fenced area are 12 feet wide X 32 feet long X 9 feet tall ▪ The fiber OPGW cable supported on the transmission structures would be routed in and out of the regenerator site building from the nearest transmission structure either underground or overhead along two independent diverse paths ▪ Electronic equipment, required to support the fiber optic cable installation would be located inside the building ▪ At sites not within a substation, an LP fueled emergency generator would be installed to provide backup power during an outage of the local electric distribution system supply ▪ Maximum regenerator site spacing is 55 miles or less depending on access and proximity to local electric distribution lines ▪ The primary siting criteria for a regenerator site located outside of a substation would be: adjacent to the transmission line right-of-way, proximity to existing low voltage electric distribution lines to provide power to the facility, and the ability to easily access the site by vehicle
Other	▪ Distribution line extensions are required to provide operational power and station service power at: o Regenerator Sites – for standalone regeneration stations o Series Compensation Substation #1 o Series Compensation Substation #2 ▪ Typically provided from an existing distribution line located in proximity to the site ▪ Not required for Aeolus and Clover Substations since these are currently planned and/or will exist at the time of Project construction

1.2 Transmission Line Descriptions

The following section describes the typical transmission line components.

TABLE 1-2 TRANSMISSION LINE DESCRIPTIONS	
Transmission Line	**Description**
500 kV Transmission Line Facilities	▪ Three-phase 500kV construction for all tower designs, conductor spacing, and clearances ▪ Nominal Voltage: 500kV AC line-to-line ▪ Capacity: 1,500 MW per circuit ▪ Conductors: bundled 1949.6 kcmil 42/7 ACSR/TWD "Athabaska/TW", with three subconductors per phase o Non-specular finish o Subconductor triple bundle configuration: triangular o Estimated subconductor diameter: 1.504 inches ▪ One OPGW - wire diameter: 0.637 inches, containing 48 fibers ▪ One EHS steel overhead ground wire - estimated shield wire diameter: approximately 0.495 inches ▪ Typical minimum design conductor ground clearance: 35 feet ▪ Proposed structure types: o lattice steel single- circuit structures; dulled galvanized steel finish ▪ Alternative structure variation types: o guyed "delta" structures ▪ Typical structure heights varies between 140 and 190 feet ▪ Approximate distance between structures: 1,000 to 1,500 feet ▪ Right-of-way width: 250 feet ▪ The exact quantity, structure type and height, distance between and placement of the structures would depend on the final detailed design of the transmission line, which is influenced by the terrain, land use, and economics. Alignment options may also slightly increase or decrease the quantity, location, and height of structures ▪ Regeneration stations located at maximum spacing of 55 miles common to all segments (see ancillary facilities description in Table 1-1) ▪ Two series capacitor substations would be located along the line ▪ Line length: approximately 400 miles
345 kV Transmission Line Facilities	▪ Three-phase 345kV construction for all tower designs, conductor spacing, and clearances ▪ Nominal Voltage: 345kV AC line-to-line ▪ Capacity: 700 MW per circuit ▪ Conductors for Mona to Clover lines: bundled 1,272 kcmil 45/7 ACSR "Bittern", with two subconductors per phase o Non-specular finish o Subconductor bundle configuration: vertical o Estimated subconductor diameter: 1.345 inches ▪ Conductors for Mona to Huntington line: bundled 954 kcmil 54/7 ACSR "Cardinal", with two subconductors per phase o Non-specular finish

TABLE 1-2 TRANSMISSION LINE DESCRIPTIONS	
Transmission Line	**Description**
	o Subconductor double bundle configuration o Estimated subconductor diameter: 1.196 inches ▪ One OPGW - wire diameter: 0.637 inches, containing 48 fibers ▪ One EHS steel overhead ground wire - estimated shield wire diameter: approximately 0.495 inches ▪ Typical minimum design conductor ground clearance: 30 feet ▪ Proposed structure types: o steel H-frame single- circuit structures; self-weathering steel or dulled galvanized steel finish o steel mono-pole single circuit o steel mono-pole double circuit ▪ Typical structure heights varies between 80 and 140 feet ▪ Approximate distance between structures: 800 to 1,200 feet ▪ Right-of-way width: 150 feet ▪ The exact quantity, structure type and height, distance between and placement of the structures would depend on the final detailed design of the transmission line, which is influenced by the terrain, land use, and economics. Alignment options may also slightly increase or decrease the quantity, location, and height of structures

TABLE 1-3 TYPICAL DIMENSIONS FOR 500kV and 345kV TRANSMISSION LINE COMPONENTS	
Feature	**Description**
	500kV Lattice
Land Temporarily Disturbed	
Structure Work Area	250 x 250 feet per structure
Wire-pulling and Tensioning Sites	250 x 600 feet per approximately 9000 feet
Construction Yards	Approximately one 30-acre site every 20 miles, location to be determined
Fly Yards	Approximately one 15-acre site every 5 miles, locations to be determined
Land Permanently Required	
Structure Pad Work Area	0-5% slope: 250 feet x 250 feet 5-10% slope: 375 feet x 300 feet 10-20% slope: 450 feet x 300 feet >20% slope: 600 feet x 350 feet
Right-of-way width	250 feet
Access Roads	
New Roads Required	Approximately 1.25 to 2.5 miles of new road per mile of transmission line where new roads are required depending on local terrain, slope, geology, etc. Existing roads will be used wherever possible.
New Spur Roads Required	Approximately 0.625 mile of new spur roads per mile of transmission line where new spur roads are needed.
Improve Existing Roads	Existing roads will be improved to 14 feet wide or smoothed to width of berm.
Other	
Typical Structure Heights	Between 140 and 190 feet
Approximate distance between Structures	1,000 to 1,500 feet
Regeneration Stations	Maximum spacing of 55 miles common to all segments
	345kV H-frame
Land Temporarily Disturbed	
Structure Work Area	150 x 200 feet per structure
Wire-pulling and Tensioning Sites	250 x 600 feet per approximately 9000 feet
Construction Yards	One 10-acre site, location to be determined
Fly Yards	Approximately one 15-acre site every 5 miles, locations to be determined
Land Permanently Required	
Structure Pad Work Area	100 feet x 150 feet
Right-of-way width	150 feet
Access Roads	
New Roads Required	Approximately 1.25 to 2.5 miles of new road per mile of transmission line where new roads are required depending on local terrain, slope, geology, etc. Existing roads will be used wherever possible.
New Spur Roads Required	Approximately 0.625 mile of new spur roads per mile of transmission line where new spur roads are needed.
Improve Existing Roads	Existing roads will be improved to 14 feet wide or smoothed to width of berm.
Other	
Typical Structure Heights	Between 80 and 150 feet
Approximate distance between Structures	800 to 1,200 feet

Notes:
[a]The exact quantity, structure type and height, distance between and placement of the structures would depend on the final detailed design of the transmission line, which is influenced by the terrain, land use, and economics. Alignment options may also slightly increase or decrease the quantity, location, and height of structures