Appendix A
Design Data Report

DESIGN DATA REPORT

Project

- Approximately 250-mile transmission line.
- Final layout and structure types to be completed after design is finalized.

TRANSMISSION LINE GENERAL SPECIFICATIONS	
345 kV Transmission Line	Details
Voltage (kV)	345
Average Height Range (feet)	95 - 180
Capacity (MW)	598 MW
Operating Capacity (MW)	292 MW summer/404 MW winter
Average Span Length (feet)	1,000
Structure Types	- Single Pole self-supporting Davit Arm - Two Pole self-supporting H-frame (South of GFI Airport) - Three Pole self-supporting (Missouri River Crossing)
Conductor Size	Two 959.6 kcmil (thousand circular mils) Suwannee TW (trapezoidal wire) type ACSR (aluminum conductor steel reinforced)
Shield Wire	Optical ground wire (OPGW) and 0.5-inch Extra High Strength (EHS)
Right-of-Way (feet)	150-feet-wide and 250-feet-wide (Missouri River Crossing)
Average Footing Depth (feet)	30 - 40
Average Footing Diameter (feet)	7 - 15
Foundation Type	Drilled pier

ASSOCIATED FACILITIES GENERAL SPECIFICATIONS	
Center 345 kV Substation Upgrades	
Equipment	This will involve installing new 345 kV circuit breakers, 345 kV dead-end structures, one new and one replacement 345/230 kV transformer and associated bus work, new 345 kV switches and associated foundations, steel structures, and control panels. A line reactor for open line voltage control will also be required.
Right-of-Way to be Acquired	N/A. Upgrades will occur within existing substation's fenced boundary (ownership shared with Otter Tail Power Company). Reactor will require a 22,500-square-foot (0.5 acre) expansion to north end of substation, beyond existing fenced boundary but on Minnkota-owned property.
New 230 kV Tie Line	
Equipment	1,500-foot-long 230 kV Tie Line to parallel existing tie line.
Right-of-Way to be Acquired	N/A. Activity completed on Minnkota-owned property.
Existing 230 kV Tie Line Upgrades	
Equipment	The existing Square Butte 230 kV Substation to Center 345 kV Substation Tie Line modifications will include: terminating the existing line to a new transformer (T2) terminal at the Center 345 kV Substation, new 1272/Pheasant ASCR aluminum conductor, steel overhead ground wire and associated line hardware, installing 1 new deadend structure for the T2 terminal location, removal of an existing deadend structure at the T1 terminal location.

ASSOCIATED FACILITIES GENERAL SPECIFICATIONS	
Right-of-Way to be Acquired	N/A. Activity completed on Minnkota-owned property.
Square Butte 230 kV Substation	
Equipment	Existing 230 kV circuit breakers and line terminal equipment re-allocated from existing HVDC tie line to new 345 kV interconnect.
Right-of-Way to be Acquired	N/A. Activity completed within existing substation footprint.
Prairie Substation Upgrades	
Equipment	Installing new 345 kV circuit breakers, 345 kV dead-end structures, one new and one relocated 345/230 kV transformer and associated bus work, new 345 kV switches and associated foundations, steel structures, and control panels. New 230 kV circuit breakers added to accommodate interconnecting with the existing 230 kV ring bus. Existing transmission line termination moved to convert ring bus into breaker-and-a-half bus arrangement.
Right-of-Way to be Acquired	N/A. Upgrades occur on existing Minnkota-operated substation's fenced boundary.
Fiber Optic Regeneration Stations	
Equipment	Four fiber optic regeneration stations will be required along the transmission line route to re-amplify the protection and control signals carried in the OPGW. The stations will be about 50 to 55 miles apart. Permanent access roads will be constructed for each fiber optic regeneration station.
Right-of-Way to be Acquired	Will be located within the 150-foot-wide Project ROW adjacent to a transmission structure