APPENDIX D. PROJECT WORK AREA REQUIREMENTS, TYPICALS, AND DESIGNS

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APPENDIX D. PROJECT WORK AREA REQUIREMENTS, TYPICALS, AND DESIGNS

This appendix provides various North Plains Connector Project (Project) work area and design requirements, including transmission line design characteristics; structure foundation and installation specifications; and estimates of ground disturbance at a typical structure site, pulling and tensioning site, right-of-way (ROW) widths, construction easements, access road and overland travel requirements, and land use restrictions.

D.1. PROPOSED CENTERLINE

North Plains Connector LLC (the Proponent—a Grid United LLC Company) would use tubular steel monopole structures as the default design. However, multi-pole and lattice structures may be used in some situations. Multi-pole structures may be used at dead-ends and in locations where the alignment changes direction between 2 and 8 degrees, provided there is reasonable access. Lattice structures would generally be used in topographically challenging areas with poor access; where the turning angle is between 2 and 8 degrees; and/or the structure height is greater than 165 feet for the Rosebud Transmission Line, 180 feet for Morton and Oliver Transmission Lines, or 175 feet for the High-voltage Direct Current (HVDC) Transmission Line.

The Proponent estimates the following percentages by line would be monopole structures:

- 50 to 75 percent of the Rosebud Transmission Line and HVDC Transmission Line in Montana;
- 45 to 70 percent of the Morton and Oliver Transmission Line segments in North Dakota; and
- 65 to 90 percent of the HDVC Transmission Line in North Dakota.

The remaining structures would be multi-pole or lattice structures. Surface finish on monopole and multi-pole structures would typically be a self-weathered steel, and dulled galvanized steel would typically be used on the lattice structures, although other finishes may also be used in specific areas to minimize visual intrusion.

The height and span of the structures would generally consist of 100- to 195-foot monopole steel structures with average spans of 1,200 feet; however, they would vary between the four proposed transmission line segments. Some lattice steel structures may be used where required for safe construction and operation, such as areas of steep topography.

D.2. FOUNDATIONS

The Proponent would typically install each tubular steel monopole structure on drilled pier concrete foundations for the HVDC Transmission Line. For tubular structures, foundation dimensions would be approximately 7 to 15 feet in diameter and 20 to 60 feet deep (Figures D-1 and D-2). For lattice structures, foundations would be installed for each of the four legs. The foundations for each leg would be approximately 3 to 6 feet in diameter and 20 to 50 feet deep. The approximate base of lattice structures at ground level would be between 25 feet by

25 feet and 55 feet by 55 feet in area (Figures D-3 and D-4). Angle and dead-end structure foundations would be on the larger and deeper side of the range.

The Proponent would typically install monopole structures on the Rosebud, Morton, and Oliver Transmission Line segments on drilled pier concrete foundations. Tangent monopole structures (structures with little to no line angle between them) would have foundation dimensions 5 to 10 feet in diameter and 20 to 60 feet deep (Figures D-5 and D-9).

The dead-end monopole structures for the Rosebud Transmission Line would consist of multi-pole structures to reduce steel and foundation sizes. Each individual structure would have a foundation approximately 6 to 15 feet in diameter and 20 to 60 feet deep (Figure D-6). The dead-end structures for the Oliver and Morton Transmission Line segments would be single self-supporting steel monopoles with a foundation of 6 to 12 feet in diameter and depth between 20 to 60 feet (Figure D-10).

For lattice structures on the Rosebud, Morton, and Oliver Transmission Line segments, the Proponent would install foundations for each of the four legs. Dimensions of the foundations for each leg would be approximately 3 to 6 feet in diameter and 20 to 50 feet deep. The approximate base of lattice structures at ground level would be between 25 feet by 25 feet and 55 feet by 55 feet in area (Figures D-7, D-8, D-11, and D-12).

Table D-1
Project Work Area Requirements

Feature	Proposed Value or Description
Land Required during Construction	
Structure work area	1,935.4 total acres of structure pads; typically, 200 by 200 feet per structure (0.92 acre)
Wire pulling/tensioning site	1,363.0 total acres of wire pulling/tensioning area; 200 by 500 feet per structure (2.3 acres)
Fiber splicing/line splicing site	290.6 total acres for fiber/line splicing, 300 by 200 feet per site (1.4 acres); approximately every 2 miles
Fiber repeater station	100 by 100 feet per site (0.23 acre); approximately every 50 to 60 miles
Guard structures	29.4 total acres for guard structures; 80 by 80 feet per structure (0.14 acre); and approximately 30 structures at road and railroad crossings and other sensitive areas
Multi-purpose construction yard	20 acres per site; approximately every 30 miles
Helicopter fly yard	5 acres per fly yard to be located adjacent to construction yards
Overland travel for construction access	301 total miles (899.4 acres) of overland travel; 25 feet wide (3.03 acres per mile)
Temporary Access roads (improved, existing, and new)	127 total miles (360.4 acres) of temporary access roads (numbers include temporary access roads, existing temporary access roads with improvements needed, and turnaround areas); 25 feet wide (3.03 acres per mile), unless otherwise required by landowners or agencies
Temporary Work Area Requirements for Construction of Auxiliary Facilities	17.7 acres for Rosebud County Converter Station, 40.6 acres for Morton County Converter Station, and 91.1 acres for Morton County Switchyard
Land Permanently Required	
Permanent ROW	10,125 total acres of ROW. 200 feet (HVDC, Morton, and Oliver transmission lines) and 320 feet (Rosebud transmission line) wide, but a wider ROW may be needed in specific locations to accommodate rough terrain or long spans.

Feature	Proposed Value or Description
Area occupied by structures	2,071 total structures required (8.3 total acres of structure footprint; 263 structures on federally/state managed lands, 1.1 acres) • HVDC Transmission Line: 1,635 structures, total of 6.5 acres of structure footprint (based on 15-foot maximum diameter) • Rosebud Transmission Line (EHV AC): 46 structures, total of 0.2 acre of structure footprint (based on 15-foot maximum diameter) • Oliver Transmission Line: 278 structures, total of 1.1 acres of structure footprint • Morton Transmission Line: 112 structures, total of 0.5 acres of structure footprint
Fiber repeater stations	0.4 total acre of permanent ROW required for fiber repeater stations; 80 by 40 feet per site (0.07 acre), approximately every 50–60 miles, 5 to 6 repeater stations required
Permanent Access roads (improved, existing, and new)	104.2 total miles (314.9 acres) of permanent access roads required; 25 feet wide (3.03 acres per mile)
Colstrip Substation Expansion	Approximately 4.2 acres to the northwest and approximately 9 acres to the south and east
Rosebud County Converter Station	22.7 acres
Morton County Converter Station	24.1 acres
Morton County Switchyard	4.3 acres

Source: Grid United 2024, 2025a

AC = alternating current; EHV = extra-high voltage; HVAC = high-voltage alternating current; HVDC = high-voltage direct current; ROW = right-of-way

Table D-2
Features Crossed by the No Action Alternative and Proposed Alternative

	Centerline Length (miles)	Maintained ROW (acres) [b]	Collocation/Crossover With Existing Rights-of-Way	Greater Sage-Grouse General Habitat (miles)	Greater Sage Grouse Leks (within 2-mile Buffer) (miles)	Greater Sage Grouse No Surface Occupancy Zone (within 0.25-mile buffer)	Highly Erodible Soils (mi)	Prime Farmlands (miles)	Total Wetlands (miles)	Perennial Waterbodies (number)	Intermittent/Ephemeral Waterbodies (number)	U.S. Bureau of Land Management Visual Resource Management Class II Land (miles)	Tribal/Cultural Resources Within 1 mile (number) [c]	Irrigated Farmland (miles)	Open Land, Rangeland, & Pasture (miles)	Public Lands Crossed (miles) [d]	Vicinity to Airports (within 1 mile)	Slopes <15% (miles)	Slopes 15 to 30% (miles)	Slopes >30% (miles)	New Access Roads (miles)	Residences Within 1,000 feet of the Centerline (number)
No Action Alternative [a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proposed Alternative (Alternative D)	421.7	10,125.0	26.6	180.1	22.0	0.0	136.6	11.2	5.7	34.0	573.0	0.6	308.0	30.3	421.6	49.5	1.0	376.9	38.5	6.3	162.5	15.0

Source: Grid United 2025a

BLM = Bureau of Land Management; ROW = right-of-way

Notes:
[a] The No Action Alternative must be carried forward into the Environmental Impact Statement analysis per National Environmental Policy Act and Montana Environmental Policy Act regulations.
[b] Described as 200-foot-wide ROW
[c] Cultural Resource Sites—Class I File Search
[d] BLM-administered, National Forest System, U.S. Department of Agriculture Research Service-administered, and State-owned Lands

Table D-3
Length of Proposed Centerline by County and State

Segment	Montana (length in miles)			North Dakota (length in miles)						Total Length (miles) [c]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
HVDC Transmission Line	36.7	81.1	55.6	13.1	56.2	50.8	41.3	6.6	0.0	**341.4**
Rosebud Transmission Line [a]	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**6.6**
Oliver Transmission Line [b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.2	10.5	**51.7**
Morton Transmission Line [b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.8	0.0	**21.8**
Project Total [c]	**43.3**	**81.1**	**55.6**	**13.1**	**56.2**	**50.8**	**41.3**	**69.6**	**10.5**	**421.5**

Source: Grid United 2025a

HVDC = high-voltage direct current
Notes:
[a] The Rosebud Transmission Line consists of four single-circuit transmission line segments consisting of one 2.8-mile segment and another 3.2-mile segment connecting with the northeast side of Rosebud County Converter Station, in addition to two 0.3- and 0.4-mile single-circuit lines connecting the converter station to the substation.
[b] The Oliver Transmission Line and Morton Transmission Line are collocated for approximately 3.4 miles.
[c] Totals may not add up due to rounding.

Table D-4
Summary of Structures by Transmission Line Segment and by County and State

Segment	Montana			North Dakota						Total [a]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
HVDC Transmission Line										
No. of Structures	189	405	272	59	256	232	189	33	0	**1,635**
Structure Footprint (acres) [b]	0.8	1.6	1.1	0.2	1.0	0.9	0.8	0.1	0	**6.5**
Rosebud Transmission Line										
No. of Structures	46	0	0	0	0	0	0	0	0	**46**
Structure Footprint (acres) [b]	0.2	0	0	0	0	0	0	0	0	**0.2**
Oliver Transmission Line										
No. of Structures	0	0	0	0	0	0	0	217	61	**278**
Structure Footprint (acres) [b]	0	0	0	0	0	0	0	0.9	0.2	**1.1**
Morton Transmission Line										
No. of Structures	0	0	0	0	0	0	0	112	0	**112**
Structure Footprint (acres) [b]	0	0	0	0	0	0	0	0.5	0.0	**0.5**
Project Total										
No. of Structures	**235**	**405**	**272**	**59**	**256**	**232**	**189**	**362**	**61**	**2,071**
Structure Footprint (acres) [b]	**1.0**	**1.6**	**1.1**	**0.2**	**1.0**	**0.9**	**0.8**	**1.5**	**0.2**	**8.3**

Source: Grid United 2025a

HVDC = high-voltage direct current; No. = number
Notes:
[a] Totals may not add up due to rounding.
[b] Structure footprint area is calculated using a 15-foot maximum diameter.

Table D-5
Length of the Proposed Centerline on Federal- and State-Managed Lands

Agency / Segment	Montana (length in miles)			North Dakota (length in miles)					Total Length (miles) [a]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
BLM – Miles City Field Office									
HVDC Transmission Line	0.3	4.1	5.3	0.0	0.0	0.0	0.0	0.0	9.8
U.S. Department of Agriculture Forest Service – Little Missouri National Grassland									
HVDC Transmission Line	0.0	0.0	0.0	3.1	7.1	0.0	0.0	0.0	10.2
U.S. Department of Agriculture Agricultural Research Service – Fort Keogh									
HVDC Transmission Line	0.0	7.9	0.0	0.0	0.0	0.0	0.0	0.0	7.9
Federal Lands Subtotal [a]	0.3	12.0	5.3	3.1	7.1	0.0	0.0	0.0	27.8
Montana State Trust Lands									
HVDC Transmission Line	6.4	4.4	3.9	0.0	0.0	0.0	0.0	0.0	14.7
Rosebud Transmission Line	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2
North Dakota State Trust Lands									
HVDC Transmission Line	0.0	0.0	0.0	0.0	1.0	2.1	1.5	0.0	4.6
Oliver Transmission Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
State Lands Subtotal [a]	8.6	4.4	3.9	0.0	1.0	2.1	1.5	0.1	21.6
Project Total [a]	**8.9**	**16.4**	**9.2**	**3.1**	**8.1**	**2.1**	**1.5**	**0.1**	**49.4**

Source: Grid United 2025a

BLM = Bureau of Land Management; HVDC = high-voltage direct current
Notes:
[a] Totals may not add up due to rounding.

Table D-6
Summary of Structures by Transmission Line Segment on Federal- and State-Managed Lands

Agency / Facility	Montana			North Dakota					Total [a]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
BLM – Miles City Field Office									
HVDC Transmission Line									
No. of Structures	3	21	26	0	0	0	0	0	50
Footprint (acres) [b]	<0.1	<0.1	0.1	0	0	0	0	0	0.2
U.S. Department of Agriculture Forest Service – Little Missouri National Grassland									
HVDC Transmission Line									
No. of Structures	0	0	0	13	34	0	0	0	47
Footprint (acres) [b]	0	0	0	<0.1	0.1	0	0	0	0.2
U.S. Department of Agriculture Agricultural Research Service – Fort Keogh									
HVDC Transmission Line									
No. of Structures	0	43	0	0	0	0	0	0	43
Footprint (acres) [b]	0	0.2	0	0	0	0	0	0	0.2
Montana State Trust Lands									
HVDC Transmission Line									
No. of Structures	36	23	20	0	0	0	0	0	79
Footprint (acres) [b]	0.1	<0.1	<0.1	0	0	0	0	0	0.3
Rosebud Transmission Line									
No. of Structures	22	0	0	0	0	0	0	0	22
Footprint (acres) [a]	<0.1	0	0	0	0	0	0	0	<0.1
North Dakota State Trust Lands									
HVDC Transmission Line									
No. of Structures	0	0	0	0	5	10	7	0	22
Footprint (acres) [b]	0	0	0	0	<0.1	<0.1	<0.1	0	<0.1

Agency / Facility	Montana			North Dakota					Total [a]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
Oliver Transmission Line									
No. of Structures	0	0	0	0	0	0	0	0	0
Footprint (acres) [b]	0	0	0	0	0	0	0	0	0.0
Project Total [a]									
No. of Structures	**61**	**87**	**46**	**13**	**39**	**10**	**7**	**0**	**263**
Footprint (acres) [b]	**0.2**	**0.4**	**0.2**	**<0.1**	**0.2**	**<0.1**	**<0.1**	**0**	**1.1**

Source: Grid United 2025a

BLM = Bureau of Land Management; HVDC = high-voltage direct current; No. = number
Notes:
[a] Totals may not add up due to rounding.
[b] Structure footprint area is calculated using a 15-foot maximum diameter.

Table D-7
Transmission Line Right-of-Way Area by County and State

Segment	Montana (acres)			North Dakota (acres)						Total Acres [c]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
HVDC Transmission Line										
ROW	890.6	1,967.6	1,324.5	317.4	1,363.3	1,230.1	1,000.2	159.6	0.0	8,253.2
ROW clearing areas	251.9	221.1	32.4	17.6	48.5	5.8	25.0	15.6	0.0	618.0
Rosebud Transmission Line [a]										
ROW	134.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	134.1
ROW clearing areas	13.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.9
Oliver Transmission Line [b]										
ROW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	975.4	251.3	1,226.7
ROW clearing areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.2	19.0	62.2
Morton Transmission Line [b]										
ROW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	511.0	511.0
ROW clearing areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	12.5
Project Total [c]										
ROW	**1,024.7**	**1,967.6**	**1,324.5**	**317.4**	**1,363.3**	**1,230.1**	**1,000.2**	**1,135.0**	**762.3**	**10,125.1**
ROW clearing areas	**265.8**	**221.1**	**32.4**	**17.6**	**48.5**	**5.8**	**25.0**	**58.8**	**31.5**	**706.5**

Source: Grid United 2025a

HVDC = high-voltage direct current; ROW = right-of-way
Notes:
[a] The Rosebud Transmission Line consists of four single-circuit transmission line segments consisting of one 2.8-mile segment and another 3.2-mile segment connecting with the northeast side of Rosebud County Converter Station, in addition to two 0.3- and 0.4-mile single-circuit lines connecting the converter station to the substation.
[b] The Oliver Transmission Line and Morton Transmission Line are collocated for approximately 3.4 miles.
[c] Totals may not add up due to rounding.

Table D-8
Transmission Line Right-of-Way on Federal- and State-Managed Lands

Land Management Agency / Segment	Montana (acres)			North Dakota (acres)					Total Acres [a]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
BLM – Miles City Field Office									
HVDC Transmission Line									
ROW	8.2	99.8	128.6	0.0	0.0	0.0	0.0	0.0	236.5
ROW clearing areas	1.4	23.0	0.8	0.0	0.0	0.0	0.0	0.0	25.2
U.S. Department of Agriculture Forest Service Little Missouri National Grassland									
HVDC Transmission Line									
ROW	0.0	0.0	0.0	76.2	172.1	0.0	0.0	0.0	248.2
ROW clearing areas	0.0	0.0	0.0	7.9	12.3	0.0	0.0	0.0	20.2
U.S. Department of Agriculture Agricultural Research Service – Fort Keogh									
HVDC Transmission Line									
ROW	0.0	191.7	0.0	0.0	0.0	0.0	0.0	0.0	191.7
ROW clearing areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Montana State Trust Lands									
HVDC Transmission Line									
ROW	157.0	107.5	94.1	0.0	0.0	0.0	0.0	0.0	358.6
ROW clearing areas	37.3	15.6	0.0	0.0	0.0	0.0	0.0	0.0	52.9
Rosebud Transmission Line									
ROW	41.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.7
ROW clearing areas	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5
North Dakota State Trust Lands									
HVDC Transmission Line									
ROW	0.0	0.0	0.0	0.0	24.1	50.0	36.2	0.0	110.3
ROW clearing areas	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.8
Oliver Transmission Line									
ROW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	2.9
ROW clearing areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Project Total [a]									
ROW	**206.9**	**399.0**	**222.7**	**76.2**	**196.2**	**50.0**	**36.2**	**2.9**	**1,190.1**
ROW clearing areas	**46.2**	**38.6**	**0.8**	**7.9**	**12.3**	**0.0**	**1.8**	**0.0**	**107.6**

Source: Grid United 2025a

BLM = Bureau of Land Management; HVDC = high-voltage direct current; ROW = right-of-way
Notes:
[a] Totals may not add up due to rounding.

Table D-9
Typical Design Characteristics—Transmission Line Segments

Voltage / Segment	Circuit Configuration	Capacity (MW)	Minimum Ground Clearance (feet at 100 degrees Celsius)	Approximate Structure Number and Type	Structures				Conductors	
					Height Range (feet)	Average Height (feet)	Average Span Length (feet)	Conductor	Conductor Configuration	Figure Reference
525-kV +/- HVDC Transmission Line	Vertical and Horizontal	3,000	36	1,635 Tubular Steel Monopole and Lattice Steel Structures in difficult terrain	100-195	130–165	1,200	3-2156 Bluebird	2 poles (+/-) per structure, 3 subconductors per pole, and 2 DMR conductors	D-1 through D-5
500-kV Rosebud Transmission Line	Vertical and Horizontal	3,000	34	46 Tubular Steel Monopole and Lattice Steel Structures in difficult terrain	90-195	110–195	1,200	3-1590 Lapwing	2 single circuit with 3 phases per structure and 3 subconductors per phase	D-6 through D-9
345-kV Oliver Transmission Line	Vertical and Horizontal	1,500	30	278 Tubular Steel Monopole and Lattice Steel Structures in difficult terrain	120-195	140–190	1,200	2-1590 Lapwing	Double circuit with 6 phases per structure and 3 subconductors per phase	D-10 through D-14
345-kV Morton Transmission Line	Vertical and Horizontal	1,500	30	112 Tubular Steel Monopole and Lattice Steel Structures in difficult terrain	120-195	140–190	1,200	2-1590 Lapwing	Double circuit with 6 phases per structure and 3 subconductors per phase	D-10 through D-14

Source: Grid United 2025a

DMR = dedicated metallic return; HVDC = high-voltage direct current; kV = kilovolt; MW = megawatt; N/A = not applicable

Table D-10
Foundation and Installation Specifications by Structure Type and Transmission Line Segment

Segment	Structure Type	Foundation / Installation Type	Approximate Diameter Range (feet)	Depth Range (feet)	Figure Reference
HVDC Transmission Line	Tubular steel monopole (tangent and dead-end)	Drilled concrete pier	7-15	20-60	D-1 and D-2
	Tubular Steel – dead-end (two-pole)	Drilled Concrete Pier	7-15	20-60	D-2
	Steel lattice (tangent and dead-end)	Drilled concrete pier (4 legs) with between 30- by 30-foot and 55 by 55-foot base	3-6	20-50	D-4 and D-5
Rosebud Transmission Line	Tubular steel monopole (tangent)	Drilled concrete pier	5-10	20-60	D-6
	Tubular Steel – dead-end (multi- pole)	Drilled concrete pier	6-15	20-60	D-7
	Steel lattice (tangent and dead-end)	Drilled concrete pier (4 legs) with between 25 by 25-foot and 55 by 55-foot base	3-6	20-50	D-8 and D-9
Oliver Transmission Line and Morton Transmission Line	Tubular steel monopole (tangent)	Drilled concrete pier	5-10	20-60	D-10
	Tubular Steel (dead-end)	Drilled concrete pier	6-15	20-60	D-11
	Tubular Steel – dead-end (two-pole)	Drilled Concrete Pier	6-15	20-60	D-12
	Steel lattice (tangent and dead-end)	Drilled concrete pier (4 legs) with between 25 by 25-foot and 55 by 55-foot base	3-6	20-50	D-13 and D-14

Source: Grid United 2025a
HVDC = high-voltage direct current

Table D-11
Permanent Facility Land Requirements

Facility	Montana (acres)			North Dakota (acres)						Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
Colstrip Substation Expansion	13.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2
Rosebud County Converter Station	22.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.7
Morton County Converter Station	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.1	0.0	24.1
Morton County Switchyard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	4.3
Repeater Stations – HVDC Transmission Line [a]	0.0	0.1	<0.1	0.0	<0.1	<0.1	<0.1	0.0	0.0	0.4
Project Total [b]	**35.9**	**0.1**	**<0.1**	**0.0**	**<0.1**	**<0.1**	**<0.1**	**28.4**	**0.0**	**64.7**

Source: Grid United 2025a, 2025b

HVDC = high-voltage direct current
Notes:
[a] Locations of the fiber repeater stations along the HVDC Transmission Line are yet to be determined; however, the Proponent estimates that one would be needed approximately every 50 to 60 miles and would occupy an area approximately 0.07 acre in size. Therefore, approximately 5 to 6 repeater stations would be required occupying a total of approximately 0.4 acre along the HVDC Transmission Line.
[b] Totals may not add up due to rounding.

Table D-12
Permanent Facility Land Requirements on Federal- and State-Management Lands

Facility	Montana (acres)			North Dakota (acres)						Total Acres
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
Montana State Trust Lands										
Rosebud County Converter Station	22.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.7
Project Total	**22.7**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**22.7**

Source: Grid United 2025a

Table D-13
Temporary Work Area Land Requirements along the Transmission Line Segments

Segment	Montana (acres)			North Dakota (acres)						Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
HVDC Transmission Line										
Structure Pads	187.7	393.4	266.3	54.0	237.3	214.3	175.5	30.0	0.0	1,558.2
Wire Pulling / Tensioning	119.8	223.9	211.3	22.9	184.6	197.9	87.7	19.9	0.0	1,067.9
Fiber / Line Splicing [a]	24.6	56.8	38.9	9.2	39.8	34.2	29.6	4.6	0.0	237.6
Guard Structures	0.3	1.2	5.5	0.0	2.6	3.7	3.7	0.6	0.0	17.6
Rosebud Transmission Line										
Structure Pads	30.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.5
Wire Pulling / Tensioning	30.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.4
Fiber / Line Splicing [a]	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9
Guard Structures	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Oliver Transmission Line [c]										
Structure Pads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	204.5	52.4	256.9
Wire Pulling / Tensioning	0.0	0.0	0.0	0.0	0.0	0.0	0.0	169.0	60.3	229.3
Fiber / Line Splicing [a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.8	7.1	35.8
Guard Structures	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	1.2	8.9
Morton Transmission Line [c]										
Structure Pads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.8	0.0	89.8
Wire Pulling / Tensioning	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.4	0.0	35.4
Fiber / Line Splicing [a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.3	0.0	15.3
Guard Structures	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	1.7

Source: Grid United 2025a

HVDC = high-voltage direct current

Notes:
[a] Locations of the fiber/line splicing areas have not been identified; the Proponent will provide these designs in supplemental filings. The Proponent estimates a temporary work area measuring approximately 300 feet by 200 feet (1.4 acres) would be required every 2 miles on each transmission line segment. This acreage estimate is calculated based on length of each transmission line segment by county and the approximated temporary work area.
[b] Totals may not add up due to rounding.
[c] The acreages associated with the 3.4 miles where the Morton and Oliver Transmission Lines are collocated have been included with the Oliver Transmission Line only.

Table D-14
Temporary Work Area Land Requirements along the Transmission Line Segments on Federal- and State-Managed Lands

Land Management Agency / Segment	Montana (acres)			North Dakota (acres)					Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
BLM – Miles City Field Office									
HVDC Transmission Line									
Structure pads	2.0	21.7	27.4	0.0	0.0	0.0	0.0	0.0	51.1
Wire pulling / tensioning	0.1	15.8	27.5	0.0	0.0	0.0	0.0	0.0	43.4
Fiber / line splicing [a]	0.2	2.9	3.7	0.0	0.0	0.0	0.0	0.0	6.8
Guard structures	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.6
U.S. Department of Agriculture Forest Service Little Missouri National Grassland									
HVDC Transmission Line									
Structure pads	0.0	0.0	0.0	11.9	32.5	0.0	0.0	0.0	44.4
Wire pulling / tensioning	0.0	0.0	0.0	0.0	27.1	0.0	0.0	0.0	27.1
Fiber / line splicing [a]	0.0	0.0	0.0	2.2	5.0	0.0	0.0	0.0	7.2
Guard structures	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3
U.S. Department of Agriculture Agricultural Research Service – Fort Keogh									
HVDC Transmission Line									
Structure pads	0.0	42.2	0.0	0.0	0.0	0.0	0.0	0.0	42.2
Wire pulling / tensioning	0.0	18.2	0.0	0.0	0.0	0.0	0.0	0.0	18.2

Land Management Agency / Segment	Montana (acres)			North Dakota (acres)					Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
Fiber / line splicing [a]	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	5.5
Guard structures	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Montana State Trust Lands									
HVDC Transmission Line									
Structure pads	32.9	21.5	20.5	0.0	0.0	0.0	0.0	0.0	75.0
Wire pulling / tensioning	20.7	23.8	20.9	0.0	0.0	0.0	0.0	0.0	65.4
Fiber / line splicing [a]	4.1	3.1	2.7	0.0	0.0	0.0	0.0	0.0	9.9
Guard structures	0.3	0.0	1.2	0.0	0.0	0.0	0.0	0.0	1.5
Rosebud Transmission Line									
Structure pads	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3
Wire pulling / tensioning	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.1
Fiber / line splicing [a]	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
Guard structures	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
North Dakota State Trust Lands									
HVDC Transmission Line									
Structure pads	0.0	0.0	0.0	0.0	4.6	9.1	6.5	0.0	20.3
Wire pulling / tensioning	0.0	0.0	0.0	0.0	0.1	6.6	0.0	0.0	6.7
Fiber / line splicing [a]	0.0	0.0	0.0	0.0	1.3	1.4	1.1	0.0	3.8
Guard structures	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.4
Oliver Transmission Line									
Structure pads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Wire pulling / tensioning	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fiber / line splicing [a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1
Guard structures	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Grid United 2025a

BLM = Bureau of Land Management; HVDC = high-voltage direct current
Notes:
[a] Locations of the fiber/line splicing areas have not been identified; the Proponent will provide these designs in supplemental filings. The Proponent estimates a temporary work area measuring approximately 300 feet by 200 feet (1.4 acres) would be required every 2 miles. This acreage estimate is calculated based on length of the transmission line segment by federal- and state-managed property and county and the approximated temporary work area.
[b] Totals may not add up due to rounding.

Table D-15
Temporary Work Areas Associated with Facilities

Facility	Montana (acres)			North Dakota (acres)						Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
Rosebud County Converter Station	19.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.3
Morton County Converter Station	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.6	0.0	40.6
Morton County Switchyard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.1	0.0	91.1
Repeater Stations – HVDC Transmission Line [a]	0.0	0.5	0.2	0.0	0.2	0.2	0.2	0.0	0.0	1.4
Project Total [b]	**19.3**	**0.5**	**0.2**	**0.0**	**0.2**	**0.2**	**0.2**	**131.7**	**0.0**	**152.4**

Source: Grid United 2025a, 2025b

HVDC = high-voltage direct current
Note:
[a] Locations of the fiber repeater stations along the HVDC Transmission Line are to be determined; however, the Proponent estimates that one would be needed approximately every 50 to 60 miles and a temporary work area approximately 0.23 acre in size would be required to install each station. Therefore, approximately 5 to 6 repeater stations would be required occupying a total of approximately 1.4 acres along the HVDC Transmission Line.
[b] Totals may not add up due to rounding.

Table D-16
Temporary Work Area Associated with Facilities on Federal- and State-Managed Lands

Facility	Montana (acres)			North Dakota (acres)						Total
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	Acres
Montana State Trust Lands										
Rosebud County Converter Station	19.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.3
Project Total	**19.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**19.3**

Source: Grid United 2025a

Table D-17
Access Road and Overland Travel Lengths Along Transmission Line Segments and Facilities [a]

Segment or Facility / Impact Type / Access Road Type	Montana (miles)			North Dakota (miles)						Total Miles [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
HVDC Transmission Line										
Temporary										
Overland travel	16.5	32.6	47.6	9.1	43.6	48.3	40.5	4.2	0.0	242.4
Temporary access roads	25.7	30.8	13.1	5.2	11.8	0.0	0.2	2.0	0.0	88.8
Turnaround areas	5.8	5.8	1.4	0.3	0.9	0.2	0.2	<0.1	0.0	14.6
Existing road, improvements needed	0.0	0.0	1.2	0.0	0.0	0.3	0.0	0.0	0.0	1.5
Permanent										
Existing road, improvements needed	30.0	5.5	2.4	1.9	1.0	0.0	1.1	0.0	0.0	41.9
Permanent access roads	2.7	48.8	0.3	0.0	0.4	0.0	0.0	0.0	0.0	52.2
Rosebud Transmission Line										
Temporary										
Overland travel	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3

Segment or Facility / Impact Type / Access Road Type	Montana (miles)			North Dakota (miles)						Total Miles [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
Permanent										
Existing road, improvements needed	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Oliver Transmission Line [c]										
Temporary										
Overland travel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.5	2.0	33.5
Temporary access roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.9	8.6	20.5
Turnaround areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.9
Permanent										
Existing road, improvements needed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.5	2.9
Morton Transmission Line [c]										
Temporary										
Overland travel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.3	0.0	20.3
Turnaround areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5
Permanent										
Existing road, improvements needed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.0	5.7
Rosebud County Converter Station										
Temporary										
Overland travel	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Turnaround areas	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Permanent										
Existing road, improvements needed	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Permanent access roads	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Morton County Converter Station										
Permanent										
Permanent access roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Segment or Facility / Impact Type / Access Road Type	Montana (miles)			North Dakota (miles)						Total Miles [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
Morton County Switch Yard										
Permanent										
Permanent access roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3
Repeater Stations – HVDC Transmission Line [d]										
Permanent										
Permanent access roads	0.0	TBD	TBD	0.0	TBD	TBD	TBD	0.0	0.0	TBD

Source: Grid United 2025a

HVDC = high-voltage direct current; TBD = to be determined

Notes:

[a] Access road design will continue to be refined based on engineering and civil survey data and input from the agencies where applicable; additional turnaround areas may be required at sharp curves and intersections.

[b] Totals may not add up due to rounding.

[c] The access road acreages associated with the 3.4 miles where the Morton and Oliver Transmission Lines are collocated have been included with the Oliver Transmission Line only.

[d] Locations of the fiber repeater stations along the HVDC Transmission Line are to be determined; however, the Proponent estimates that one would be needed approximately every 50 to 60 miles for a total of 5 to 6 repeater stations. Locations of fiber repeater stations and associated access roads will be provided in supplemental filings.

Table D-18
Access Road and Overland Travel Land Requirements Along Transmission Line Segments [a]

Segment or Facility / Impact Type / Access Road Type	Montana (acres)			North Dakota (acres)						Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
HVDC Transmission Line										
Temporary										
Overland travel	47.4	89.2	144.0	26.9	135.1	146.2	122.1	12.5	0.0	723.4
Temporary access roads	77.3	93.4	39.8	15.6	35.1	0.0	0.8	7.1	0.0	269.1
Turnaround areas	9.3	9.2	2.3	0.5	1.5	0.3	0.3	0.1	0.0	23.5

Segment or Facility / Impact Type / Access Road Type	Montana (acres)			North Dakota (acres)						Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
Existing road, improvements needed	0.0	0.0	2.9	0.0	0.0	0.9	0.0	0.0	0.0	3.8
Permanent										
Existing road, improvements needed	94.4	16.7	4.5	5.8	3.1	0.0	3.2	0.0	0.0	127.7
Permanent access roads	7.4	146.6	0.9	0.0	1.3	0.0	0.0	0.0	0.0	156.2
Rosebud Transmission Line										
Temporary										
Overland travel	12.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.7
Turnaround areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oliver Transmission Line [c]										
Temporary										
Overland travel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	95.5	6.3	101.8
Temporary access roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.7	25.7	61.4
Turnaround areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.4	1.4
Permanent										
Existing road, improvements needed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4	1.6	9.0
Morton Transmission Line [c]										
Temporary										
Overland travel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	0.0	60.0
Turnaround areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.9
Permanent										
Existing road, improvements needed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.2	0.0	17.2
Permanent access roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rosebud County Converter Station										
Temporary										
Overland travel	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5

Segment or Facility / Impact Type / Access Road Type	Montana (acres)			North Dakota (acres)						Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
Turnaround areas	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Permanent										
Existing road, improvements needed	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6
Permanent access roads	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Morton County Converter Station										
Permanent										
Permanent Access Roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Morton County Switch Yard										
Permanent										
Permanent access roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0
Repeater Stations – HVDC Transmission Line [d]										
Permanent										
Permanent access roads	0.0	TBD	TBD	0.0	TBD	TBD	TBD	0.0	0.0	TBD

Source: Grid United 2025a

HVDC = high-voltage direct current; TBD = to be determined

Notes:

[a] Access road design will continue to be refined based on engineering and civil survey data and input from the agencies where applicable; additional turnaround areas may be required at sharp curves and intersections.

[b] Totals may not add up due to rounding.

[c] The access road acreages associated with the 3.4 miles where the Morton and Oliver Transmission Lines are collocated have been included with the Oliver Transmission Line only.

[d] Locations of the fiber repeater stations along the HVDC Transmission Line are to be determined; however, the Proponent estimates that one would be needed approximately every 50 to 60 miles for a total of 5 to 6 repeater stations. Locations of fiber repeater stations and associated access roads will be provided in supplemental filings.

Table D-19
Access Road and Overland Travel Lengths along the Transmission Line Segments on Federal- and State-Managed Lands [a]

Agency / Segment / Impact Type / Access Road Type	Montana (miles)			North Dakota (miles)					Total Miles [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
BLM – Miles City Field Office									
HVDC Transmission Line									
Existing Road, No Improvements Needed [c]	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	2.6
Temporary									
Overland travel	0.0	3.5	3.2	0.0	0.0	0.0	0.0	0.0	6.7
Temporary access roads	0.4	1.0	4.5	0.0	0.0	0.0	0.0	0.0	5.8
Turnaround Areas	0.0	1.1	0.3	0.0	0.0	0.0	0.0	0.0	1.4
Permanent									
Existing road, improvements needed	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Permanent access roads	0.0	6.3	<0.1	0.0	0.0	0.0	0.0	0.0	6.3
U.S. Department of Agriculture Forest Service – Little Missouri National Grassland									
HVDC TRANSMISSION LINE									
Temporary									
Overland travel	0.0	0.0	0.0	3.3	2.4	0.0	0.0	0.0	5.7
Temporary access roads	0.0	0.0	0.0	0.0	6.8	0.0	0.0	0.0	6.8
Turnaround Areas	0.0	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.5
Permanent									
Existing Road, Improvements Needed	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	1.2
U.S. Department of Agriculture Agricultural Research Service – Fort Keogh									
HVDC TRANSMISSION LINE									
Temporary									
Overland travel	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	1.3
Temporary access roads	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	3.6

Agency / Segment / Impact Type / Access Road Type	Montana (miles)			North Dakota (miles)					Total Miles [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
Turnaround Areas	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Permanent									
Permanent access roads	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	5.9
Montana State Trust Lands									
HVDC Transmission Line									
Existing Road, No Improvements Needed	0.7	0.6	1.0	0.0	0.0	0.0	0.0	0.0	2.3
Temporary									
Overland Travel	2.8	0.8	4.5	0.0	0.0	0.0	0.0	0.0	8.1
Temporary Access Roads	4.1	2.1	0.3	0.0	0.0	0.0	0.0	0.0	6.6
Turnaround Areas	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	1.0
Permanent									
Existing Road, Improvements Needed	3.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	3.6
Permanent Access Roads	1.5	3.1	0.0	0.0	0.0	0.0	0.0	0.0	4.6
Rosebud Transmission Line									
Temporary									
Overland Travel	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Permanent									
Existing Road, Improvements Needed	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Rosebud County Converter Stations									
Existing Road, No Improvements Needed	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Temporary									
Overland Travel	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Turnaround Areas	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1

Agency / Segment / Impact Type / Access Road Type	Montana (miles)			North Dakota (miles)					Total Miles [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
North Dakota State Trust Lands									
HVDC Transmission Line									
Existing Road, No Improvements Needed	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2
Temporary									
Overland Travel	0.0	0.0	0.0	0.0	1.3	2.1	1.6	0.0	5.0
Turnaround Areas	0.0	0.0	0.0	0.0	<0.1	0.0	<0.1	0.0	0.1
Permanent									
Existing Road, Improvements Needed	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0	<0.1
Oliver Transmission Line									
Temporary									
Overland Travel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Permanent									
Existing Road, Improvements Needed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3

Source: Grid United 2025a

BLM = Bureau of Land Management; HVDC = high-voltage direct current

Notes:

[a] Access road design will continue to be refined based on engineering and civil survey data and input from the agencies where applicable; additional turnaround areas may be required at sharp curves and intersections.

[b] Totals may not add up due to rounding.

[c] Tree trimming/tree clearing may be needed on approximately 1.6 acres of existing roads with no further improvements required occurring on BLM-managed lands.

Table D-20
Access Road and Overland Travel Land Requirements along the Transmission Line Segments on Federal- and State-Managed Lands [a]

Agency / Segment / Impact Type / Access Road Type	Montana (acres)			North Dakota (acres)					Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
BLM – Miles City Field Office									
HVDC TRANSMISSION LINE									
Temporary									
Overland Travel	0.0	10.4	9.7	0.0	0.0	0.0	0.0	0.0	20.1
Temporary Access Roads	1.0	2.9	13.7	0.0	0.0	0.0	0.0	0.0	17.6
Turnaround Areas	0.0	1.7	0.5	0.0	0.0	0.0	0.0	0.0	2.3
Permanent									
Existing Road, Improvements Needed	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Permanent Access Roads	0.0	17.9	<0.1	0.0	0.0	0.0	0.0	0.0	18.0
U.S. Department of Agriculture Forest Service – Little Missouri National Grassland									
HVDC TRANSMISSION LINE									
Temporary									
Overland Travel	0.0	0.0	0.0	9.9	7.3	0.0	0.0	0.0	17.2
Temporary Access Roads	0.0	0.0	0.0	0.0	19.8	0.0	0.0	0.0	19.8
Turnaround Areas	0.0	0.0	0.0	0.3	0.5	0.0	0.0	0.0	0.8
Permanent									
Existing Road, Improvements Needed	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	3.7
U.S. Department of Agriculture Agricultural Research Service – Fort Keogh									
HVDC TRANSMISSION LINE									
Temporary									
Overland Travel	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0
Temporary Access Roads	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0

Agency / Segment / Impact Type / Access Road Type	Montana (acres)			North Dakota (acres)					Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
Turnaround Areas	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Permanent									
Permanent Access Roads	0.0	17.8	0.0	0.0	0.0	0.0	0.0	0.0	17.8
Montana State Trust Lands									
HVDC TRANSMISSION LINE									
Temporary									
Overland Travel	7.8	2.4	13.5	0.0	0.0	0.0	0.0	0.0	23.7
Temporary Access Roads	12.4	6.5	1.0	0.0	0.0	0.0	0.0	0.0	19.9
Turnaround Areas	1.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	1.6
Existing Road, Improvements Needed	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0
Permanent									
Existing Road, Improvements Needed	9.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9
Permanent Access Roads	4.4	9.4	0.0	0.0	0.0	0.0	0.0	0.0	13.8
Rosebud Transmission Line									
Temporary									
Overland Travel	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Rosebud County Converter Station									
Temporary									
Overland Travel	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5
Turnaround Areas	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Permanent									
Existing Road, Improvements Needed	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9

Agency / Segment / Impact Type / Access Road Type	Montana (acres)			North Dakota (acres)					Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
North Dakota State Trust Lands									
HVDC TRANSMISSION LINE									
Temporary									
Overland Travel	0.0	0.0	0.0	0.0	3.8	6.4	4.7	0.0	14.9
Turnaround Areas	0.0	0.0	0.0	0.0	<0.1	0.0	0.1	0.0	0.2
Permanent									
Existing Road, Improvements Needed	0.0	0.0	0.0	0.0	<0.1	0.0	0.6	0.0	0.6
Oliver Transmission Line									
Temporary									
Overland Travel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
Permanent									
Existing Road, Improvements Needed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1

Source: Grid United 2025a

BLM = Bureau of Land Management; HVDC = high-voltage direct current
Notes:
[a] Access road design will continue to be refined based on engineering and civil survey data and input from the agencies where applicable; additional turnaround areas may be required at sharp curves and intersections.
[b] Totals may not add up due to rounding.

Table D-21
Summary of Land Requirements along Transmission Line Segments and Facilities

Segment or Facility / Impact Type	Montana (acres)			North Dakota (acres)						Total Acres [c]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
HVDC Transmission Line										
Temporary [a]	413.2	772.2	633.0	118.4	580.0	541.9	383.1	68.4	0.0	3,510.2

Segment or Facility / Impact Type	Montana (acres)			North Dakota (acres)						Total Acres [c]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
Permanent	102.6	160.8	6.6	6.1	5.4	1.0	4.0	0.1	0.0	286.6
Subtotal [c]										**3,796.8**
Rosebud Transmission Line										
Temporary [a]	64.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.9
Permanent	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Subtotal										**65.1**
Oliver Transmission Line [b]										
Temporary [a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	484.7	135.1	619.8
Permanent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	1.8	7.2
Subtotal [c]										**627.0**
Morton Transmission Line [b]										
Temporary [a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	186.0	0.0	186.0
Permanent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.6	0.0	17.6
Subtotal [c]										**203.6**
Rosebud County Converter Station										
Temporary	19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.0
Permanent	25.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.6
Subtotal [c]										**44.6**
Morton County Converter Station										
Temporary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.6	0.0	40.6
Permanent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.1	0.0	24.1
Subtotal										**64.7**
Morton County Switch Yard										
Temporary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.1	0.0	90.1
Permanent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	5.3

Segment or Facility / Impact Type	Montana (acres)			North Dakota (acres)						Total Acres [c]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	Oliver	
Subtotal [c]										**95.4**
Colstrip Substation Expansion										
Temporary	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Permanent	13.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2
Subtotal										**13.2**
Fiber Repeater Stations – HVDC Transmission Line [d]										
Temporary	0.0	0.5	0.2	0.0	0.2	0.2	0.2	0.0	0.0	1.4
Permanent	0.0	0.1	<0.1	0.0	<0.1	<0.1	<0.1	0.0	0.0	0.4
Subtotal [c]										**1.8**
Project Total [c]										
Temporary	497.1	772.1	633.2	118.4	580.2	542.1	383.3	869.8	135.1	4,531.9
Permanent	128.4	160.9	6.7	6.1	5.5	1.1	4.1	52.5	1.8	367.1
Project Total [c, e]										**4,912.2**

Source: Grid United 2025a
HVDC = high-voltage direct current
Notes:
[a] Locations of the fiber/line splicing areas have not been identified; the Proponent will provide these designs in supplemental filings. The Proponent estimates a temporary work area measuring approximately 300 feet by 200 feet (1.4 acres) would be required every 2 miles on each transmission line segment. This conservative estimate provided in Table D-13 calculated based on length of each transmission line segment by county and the approximated temporary work area is included in this table.
[b] The acreages associated with the 3.4 miles where the Morton and Oliver Transmission Lines are collocated have been included with the Oliver Transmission Line only.
[c] Totals may not add up due to rounding.
[d] Locations of the fiber repeater stations and associated permanent access roads to the fiber repeater stations along the HVDC Transmission Line are to be determined; however, the Proponent estimates that one would be needed approximately every 50 to 60 miles. Therefore, approximately 5 to 6 repeater stations would be required along the HVDC Transmission Line. The estimated permanent and temporary work areas identified in Tables D-11 and D-15 are included in this table.
[e] The Proponent does not plan on siting fiber repeater stations, access roads to fiber repeater stations, contractor yards, or helicopter fly yards or landing areas on federally managed lands.

Table D-22
Summary of Land Requirements along the Transmission Line Segments on Federal- and State-Managed Lands

Agency / Segment / Impact Type	Montana (acres)			North Dakota (acres)					Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
BLM – Miles City Field Office									
HVDC Transmission Line									
Temporary [a]	2.8	50.0	72.1	0.0	0.0	0.0	0.0	0.0	124.9
Permanent	<0.1	19.6	0.2	0.0	0.0	0.0	0.0	0.0	19.8
Subtotal [b]									**144.7**
U.S. Department of Agriculture Forest Service Little Missouri National Grassland									
HVDC Transmission Line									
Temporary [a]	0.0	0.0	0.0	22.7	84.4	0.0	0.0	0.0	107.1
Permanent	0.0	0.0	0.0	3.7	0.1	0.0	0.0	0.0	3.8
Subtotal [b]									**110.9**
U.S. Department of Agriculture Agricultural Research Service – Fort Keogh									
HVDC Transmission Line									
Temporary [a]	0.0	71.3	0.0	0.0	0.0	0.0	0.0	0.0	71.3
Permanent	0.0	17.9	0.0	0.0	0.0	0.0	0.0	0.0	17.9
Subtotal [b]									**89.2**
Montana State Trust Lands									
HVDC Transmission Line									
Temporary [a]	65.5	50.9	56.2	0.0	0.0	0.0	0.0	0.0	172.6
Permanent	14.5	9.4	<0.1	0.0	0.0	0.0	0.0	0.0	24.0
Subtotal [b]									**196.6**
Rosebud Transmission Line									
Temporary [a]	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.8
Permanent	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1
Subtotal [b]									**18.9**
Rosebud County Converter Station									
Temporary [a]	18.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.7

Agency / Segment / Impact Type	Montana (acres)			North Dakota (acres)					Total Acres [b]
	Rosebud	Custer	Fallon	Golden Valley	Slope	Hettinger	Grant	Morton	
Permanent	22.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.7
Subtotal [b]									**41.4**
North Dakota State Trust Lands									
HVDC Transmission Line									
Temporary [a]	0.0	0.0	0.0	0.0	9.4	21.8	11.7	0.0	42.9
Permanent	0.0	0.0	0.0	0.0	<0.1	<0.1	0.6	0.0	0.7
Subtotal [b]									**43.6**
Oliver Transmission Line									
Temporary [a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7
Permanent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1
Subtotal [b]									**1.8**
Project Total									
Temporary [a]	105.8	172.2	128.3	22.7	93.8	21.8	11.7	0.7	557.0
Permanent	37.3	46.9	0.3	3.7	0.1	<0.1	0.6	1.1	90.0
Total [b]									**647.0**

Source: Grid United 2025a

BLM = Bureau of Land Management; HVDC = high-voltage direct current

Notes:

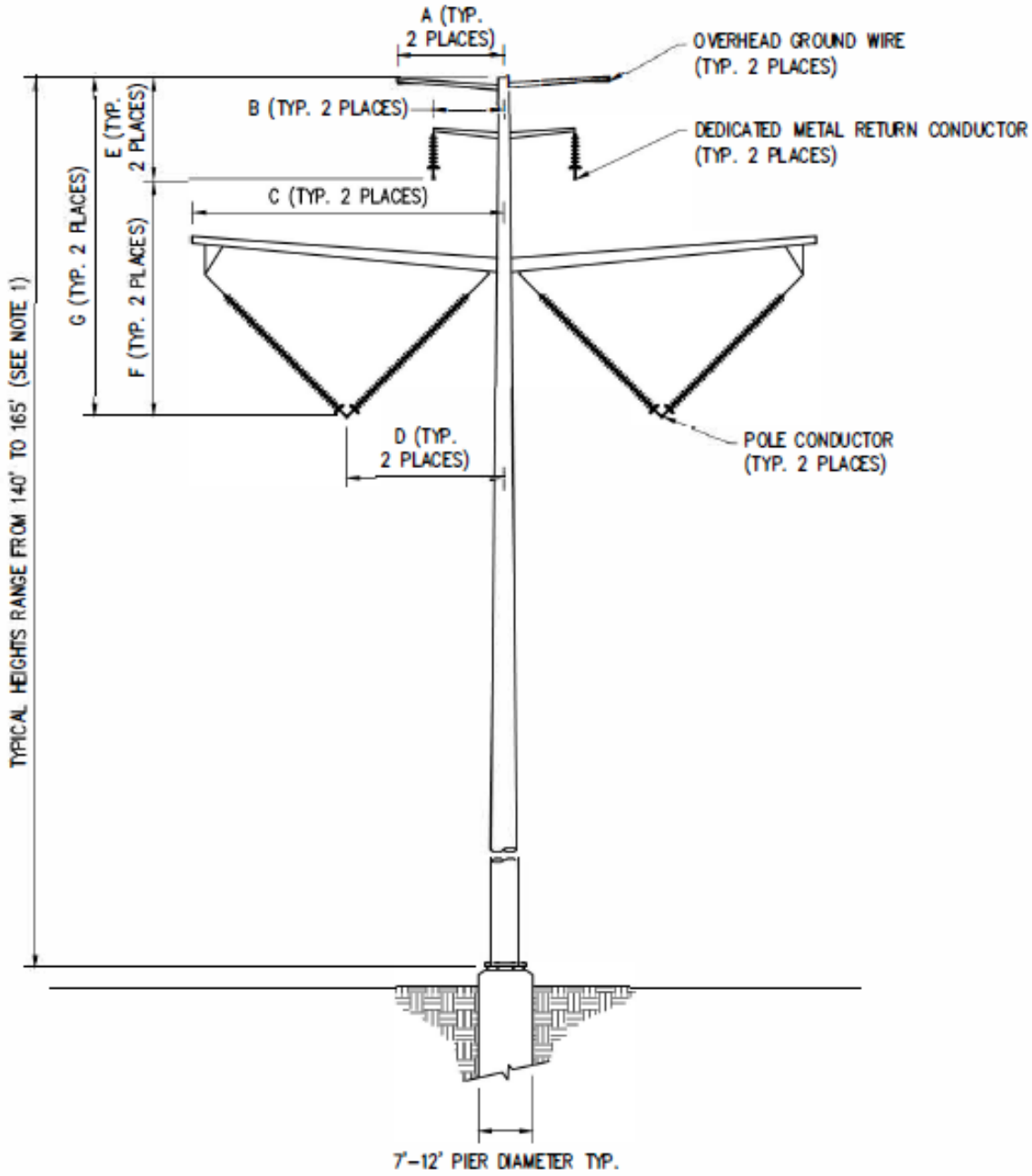
[a] Locations of the fiber/line splicing areas have not been identified; the Proponent will provide these designs in supplemental filings. The Proponent estimates a temporary work area measuring approximately 300 feet by 200 feet (1.4 acres) would be required every 2 miles on each transmission line segment. This conservative estimate provided in Table D-14 calculated based on length of each transmission line segment by federal- and state-managed property and county and the approximated temporary work area is included in this table.

[b] Totals may not add up due to rounding.

[c] The Proponent does not plan on siting fiber repeater stations, access roads to fiber repeater stations, contractor yards, or helicopter fly yards or landing areas on federally managed lands.

Figure D-1

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	15-25
B	Dedicated Metal Return Conductor Horizontal Offset from Structure Centerline	10-20
C	Pole Conductor Support Arm Length from Structure Centerline	40-50
D	Pole Conductor Horizontal Offset from Structure Centerline	20-30
E	OPGW/ Dedicated Metal Return Conductor Vertical Separation at Structure	10-20
F	Dedicated Metal Return Conductor / Pole Conductor Vertical Separation at Structure	30-40
G	OPGW / Pole Conductor Vertical Separation at Structure	40-50

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 140' TO 165'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 100' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC

GRID UNITED

ENGINEERING RECORD		DATE
DRAWN	C. ELLIS	06/06/24
SCALED	S. REED	06/06/24
CHECKED	B. MATTHIES	06/06/24
APPROVED	M. BRIDGENS	06/06/24

ENG SCALE: NTS PLT SCALE: 1:1

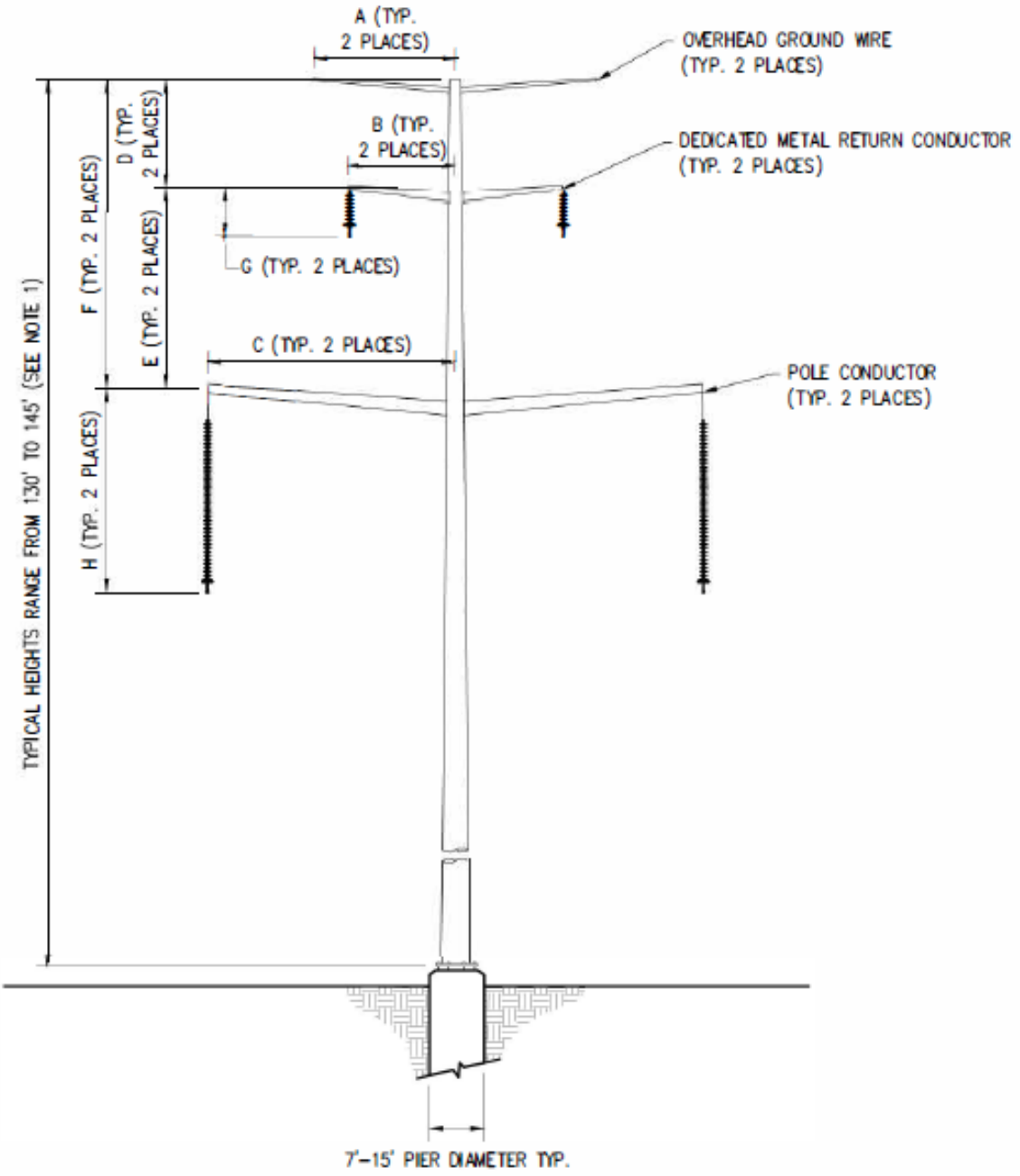
NORTH PLAINS CONNECTOR

SELF SUPPORTING STEEL MONOPOLE TYPICAL +/- 525kV HVDC TANGENT

ENG NAME: SPC-S-1009-50 REVISION NO: 0

Figure D-2

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	15-25
B	Dedicated Metal Return Conductor Horizontal Offset from Structure Centerline	10-20
C	Pole Conductor Horizontal Offset from Structure Centerline	20-30
D	OPGW/ Dedicated Metal Return Conductor Vertical Separation at Structure	10-20
E	Dedicated Metal Return Conductor / Pole Conductor Vertical Separation at Structure	30-40
F	OPGW / Pole Conductor Vertical Separation at Structure	40-50
G	Dedicated Metal Return Conductor Jumper String Length	5-10
H	Pole Conductor Jumper String Length	25-30

NOTES:
1. MOST STRUCTURE HEIGHTS RANGE FROM 130' TO 145'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 120' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC.

GRID UNITED

ENGINEERING RECORD		DATE
DRAWN	C. ELLIS	03/14/25
REVIEWED	S. REED	03/14/25
CHECKED	B. MATTHEWS	03/14/25
APPROVED	M. HEKKENS	03/14/25
DWG SCALE: NTS	PLT SCALE: 1:1	

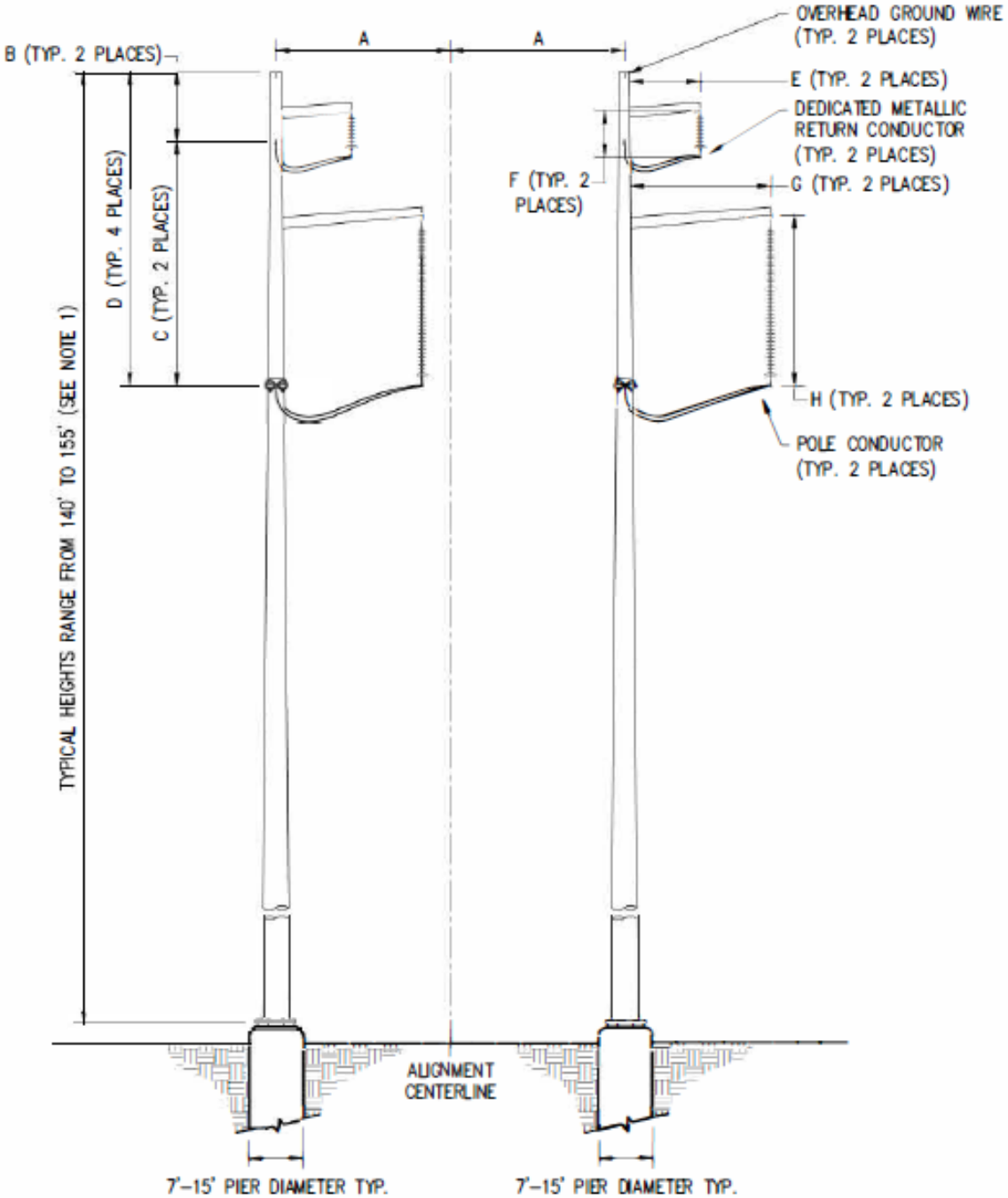
NORTH PLAINS CONNECTOR

SELF SUPPORTING STEEL MONOPOLE
TYPICAL +/- 525kV HVDC DEADEND

DWG NAME: NPC-X-1009-S01 REVISION NO.: 0

Figure D-3

Approximate Dimensions



Dimension	Description	Range (ft)
A	Pole Offset from Alignment Centerline	20-30
B	OPGW / Dedicated Metal Return Conductor Vertical Separation at Structure	10-20
C	Dedicated Metal Return Conductor / Pole Conductor Vertical Separation at Structure	35-50
D	OPGW / Pole Conductor Vertical Separation at Structure	45-60
E	Dedicated Metal Return Conductor Jumper Arm Length	10-15
F	Dedicated Metal Return Conductor Jumper String Length	5-10
G	Pole Conductor Jumper Arm Length	20-30
H	Pole Conductor Jumper String Length	25-30

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 130' TO 155'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 120' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC.

GRID UNITED

ENGINEERING RECORD		DATE
DRAWN	C. ELLIS	03/14/25
DESIGNED	S. REED	03/14/25
CHECKED	B. MATHIES	03/14/25
APPROVED	M. EHRENS	03/14/25
DWG SCALE: NTS	PLT SCALE: 1:1	

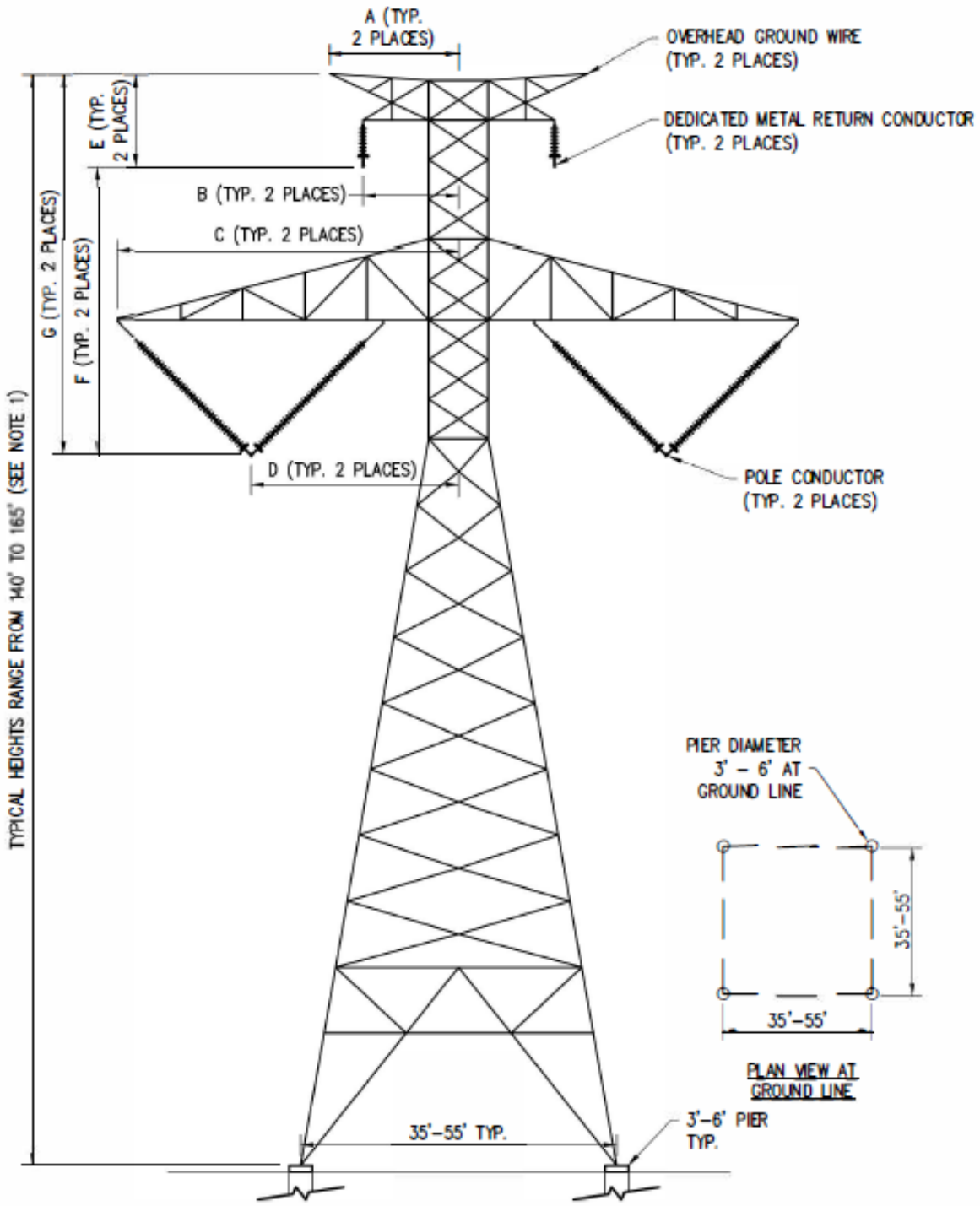
NORTH PLAINS CONNECTOR

SELF SUPPORTING STEEL TWO POLE TYPICAL +/- 525kV HVDC DEADEND

DWG NAME: NPC-A-T009-S35 REVISION NO: 0

Figure D-4

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	15-30
B	Dedicated Metal Return Conductor Horizontal Offset from Structure Centerline	10-20
C	Pole Conductor Support Arm Length from Structure Centerline	40-50
D	Pole Conductor Horizontal Offset from Structure Centerline	20-35
E	OPGW/ Dedicated Metal Return Conductor Vertical Separation at Structure	10-20
F	Dedicated Metal Return Conductor / Pole Conductor Vertical Separation at Structure	30-40
G	OPGW / Pole Conductor Vertical Separation at Structure	40-50

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 140' TO 165'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 100' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC

GRID UNITED

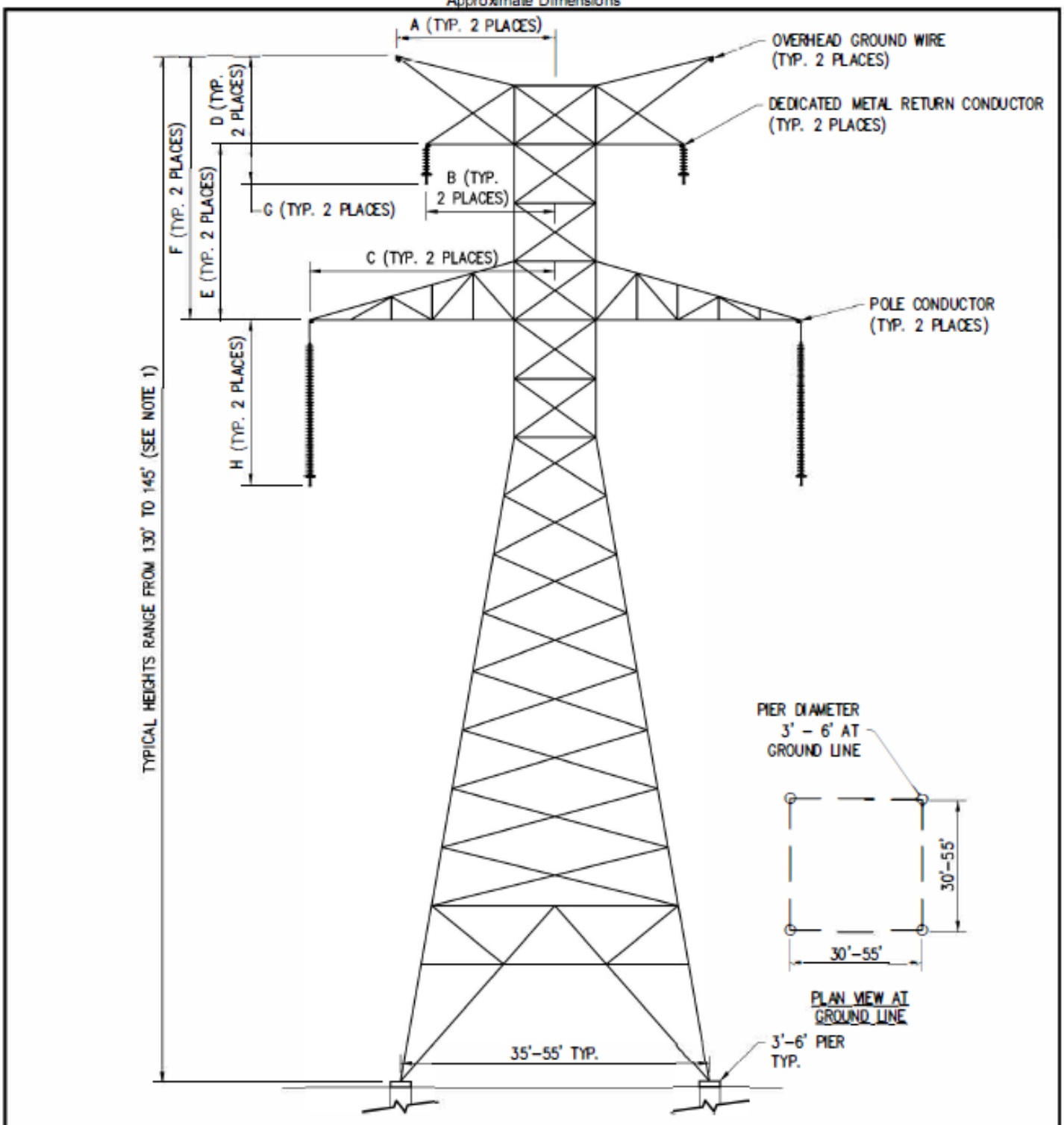
ENGINEERING RECORD		DATE
DRAWN	C. ELLIS	06/06/24
DESIGNED	S. REED	06/06/24
CHECKED	B. MATTHIES	06/06/24
APPROVED	M. HEKKENS	06/06/24
DWG SCALE: NTS	PLT SCALE: 1:1	DWG NAME: NPC-S-1009-S01

NORTH PLAINS CONNECTOR

SELF SUPPORTING STEEL LATTICE TOWER TYPICAL +/- 525kV HVDC TANGENT

Figure D-5

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	15-30
B	Dedicated Metal Return Conductor Horizontal Offset from Structure Centerline	10-20
C	Pole Conductor Horizontal Offset From Structure Centerline	35-50
D	OPGW / Dedicated Metal Return Conductor Vertical Separation at Structure	10-20
E	Dedicated Metal Return Conductor / Pole Conductor Vertical Separation at Structure	30-40
F	OPGW / Pole Conductor Vertical Separation at Structure	40-50
G	Dedicated Metal Return Conductor Jumper String Length	5-10
H	Pole Conductor Jumper String Length	25-30

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 130' TO 145'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 120' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ECI ELECTRICAL CONSULTANTS, INC.

GRID UNITED

DESIGNED/DRAWN RECORD		DATE
DRAWN	C. ELLIS	06/06/24
DESIGNED	S. REED	06/06/24
CHECKED	B. MATTHIES	06/06/24
APPROVED	M. HEKKENS	06/06/24

DWG SCALE: NTS PLT SCALE: 1:1

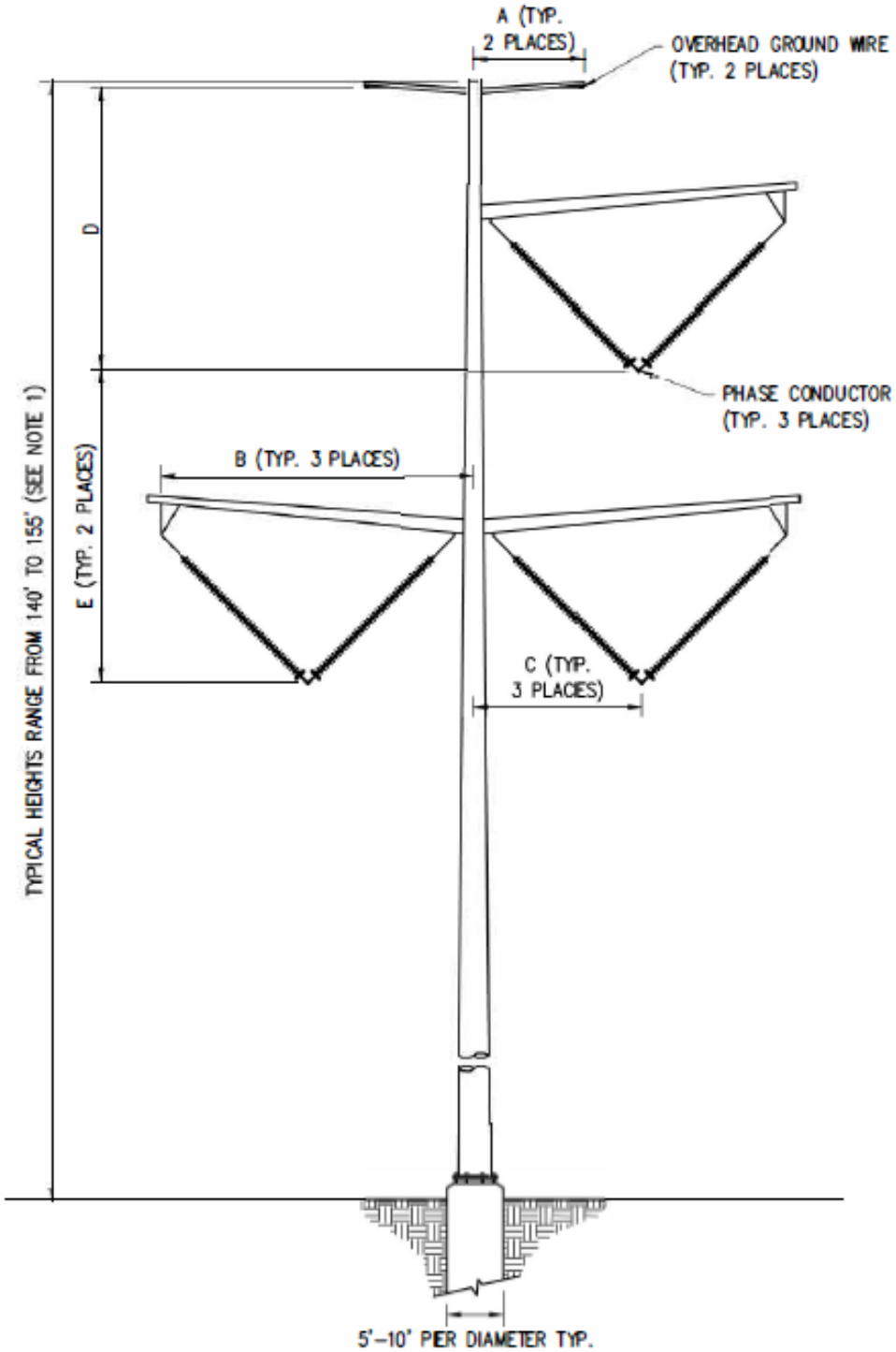
NORTH PLAINS CONNECTOR

SELF SUPPORTING STEEL LATTICE TOWER TYPICAL +/- 525kV HVDC DEADEND

DWG NAME: NPC-A-1009-315 REVISION NO: 0

Figure D-6

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	15-30
B	Phase Conductor Support Arm Length from Structure Centerline	40-50
C	Phase Conductor Horizontal Offset from Structure Centerline	20-35
D	OPGW / Phase Conductor Vertical Separation at Structure	20-35
E	Phase Conductor / Phase Conductor Vertical Separation at Structure	30-45

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 140' TO 155'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 120' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC.

GRID UNITED

DESIGNED RECORD		DATE
DRAWN	C. ELLIS	06/06/24
DESIGNED	S. REED	06/06/24
CHECKED	B. MATTHIES	06/06/24
APPROVED	M. HEKKENS	06/06/24

DWG SCALE: NTS | PLT SCALE: 1:1

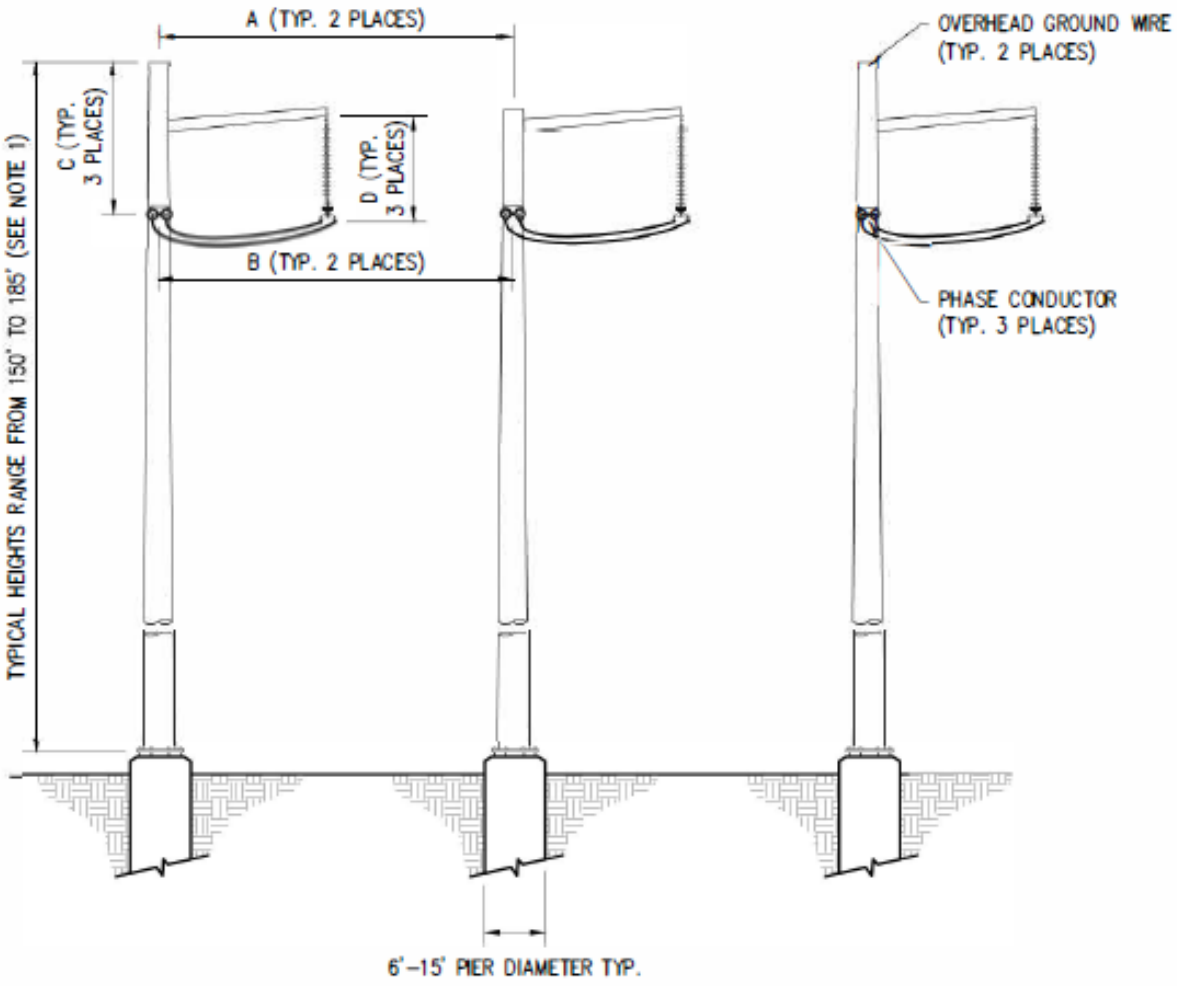
NORTH PLAINS CONNECTOR

SELF SUPPORTING STEEL MONOPOLE
TYPICAL 500kV EHV AC TANGENT

DWG NAME: SPC-A-70.0-61 | REVISION NO.: 0

Figure D-7

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	40-55
B	Phase Conductor Horizontal Offset from Structure Centerline	40-55
C	OPGW/ Phase Conductor Vertical Separation at Structure	20-30
D	Phase Conductor Jumper String Length	15-25

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 150' TO 185'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 130' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC.

GRID UNITED

ENGINEERING RECORD		DATE
DRAWN	C. ELLIS	03/14/25
DESIGNED	S. REED	03/14/25
CHECKED	R. MATHIES	03/14/25
APPROVED	M. HEIKENS	03/14/25
D WG SCALE: ANSI	PLT SCALE: 1:1	

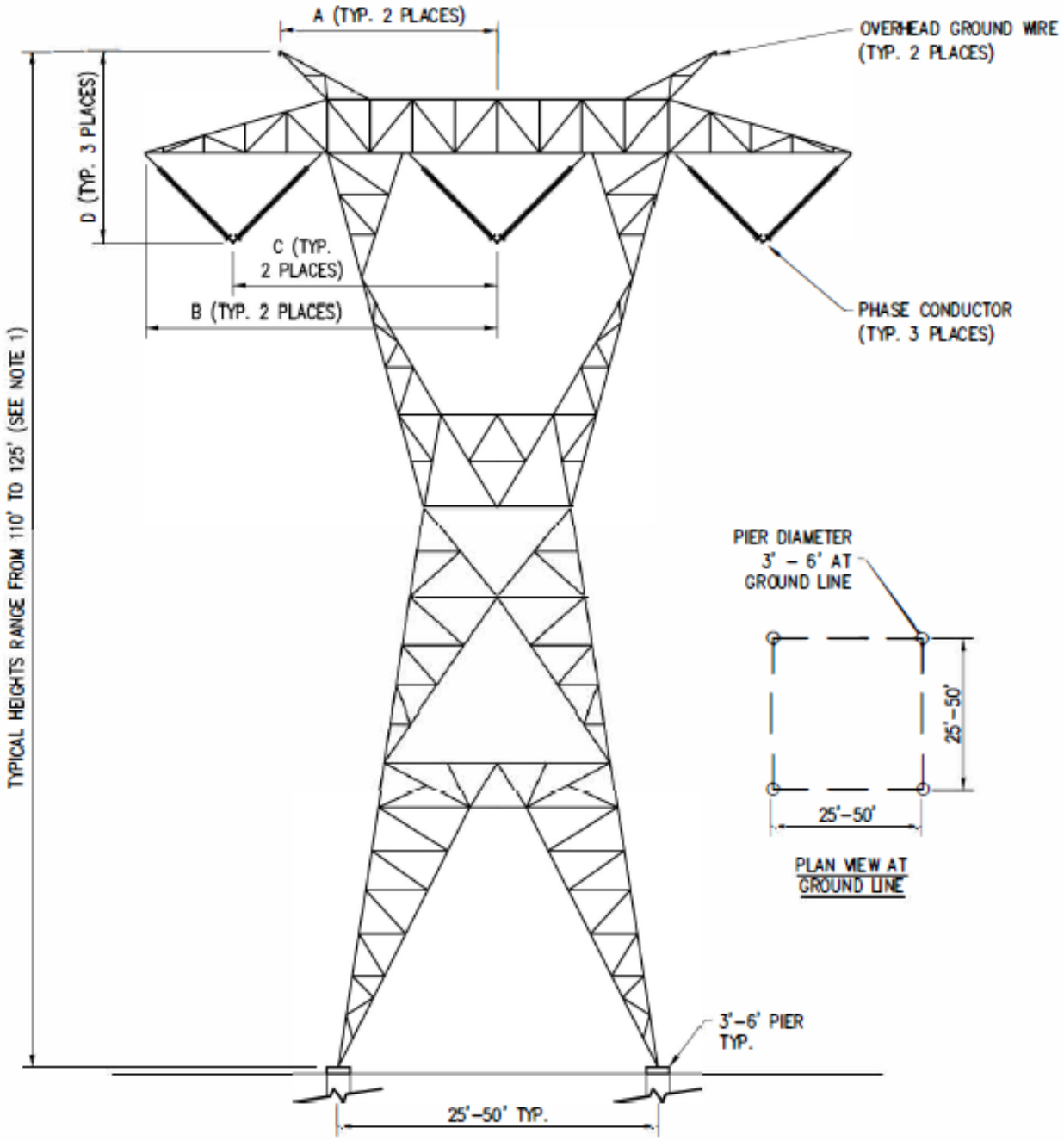
NORTH PLAINS CONNECTOR

SELF SUPPORTING STEEL MONOPOLE TYPICAL 500kV EHV AC DEADEND

DWG NAME: NPC-A-T009-415 REVISION NO: 0

Figure D-8

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	20-40
B	Phase Conductor Support Arm Length from Structure Centerline	35-55
C	Phase Conductor Horizontal Offset from Structure Centerline	35-50
D	OPGW/ Phase Conductor Vertical Separation at Structure	20-30

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 110' TO 125'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 90' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ECI ELECTRICAL CONSULTANTS, INC.

GRID UNITED

ENGINEERING RECORD		DATE
DRAWN	C. ELLIS	06/06/24
DESIGNED	S. REED	06/06/24
CHECKED	B. MATTHIES	06/06/24
APPROVED	M. HEIKENS	06/06/24
ENG SCALE: NTS	PLT SCALE: 1:1	

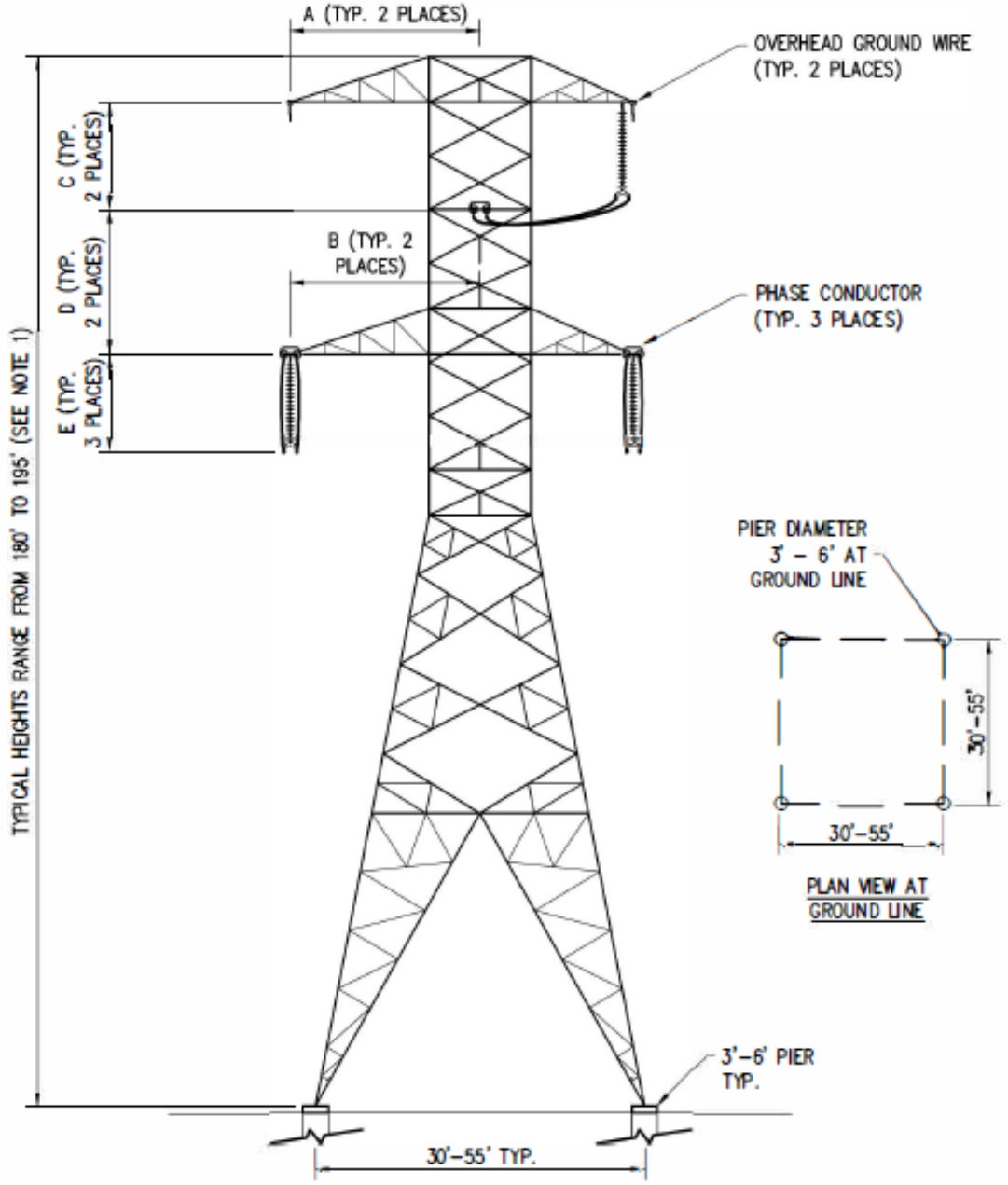
NORTH PLAINS CONNECTOR

SELF SUPPORTING STEEL LATTICE TOWER
TYPICAL 500kV EHV AC TANGENT

ENG NAME: GPC-A-1009-T2 REVISION NO: C

Figure D-9

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	30-45
B	Phase Conductor Horizontal Offset from Structure Centerline	30-45
C	OPGW / Phase Conductor Vertical Separation at Structure	20-30
D	Phase Conductor / Phase Conductor Vertical Separation at Structure	25-35
E	Phase Conductor Jumper String Length	15-25

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 180' TO 195'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 130' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC.

GRID UNITED

ENGINEERING RECORD		DATE
DRAWN	C. ELLIS	06/06/24
DESIGNED	S. REED	06/06/24
CHECKED	E. MATTHIES	06/06/24
APPROVED	M. HEKKENS	06/06/24
DWG SCALE: NTS	PLT SCALE: 1:1	

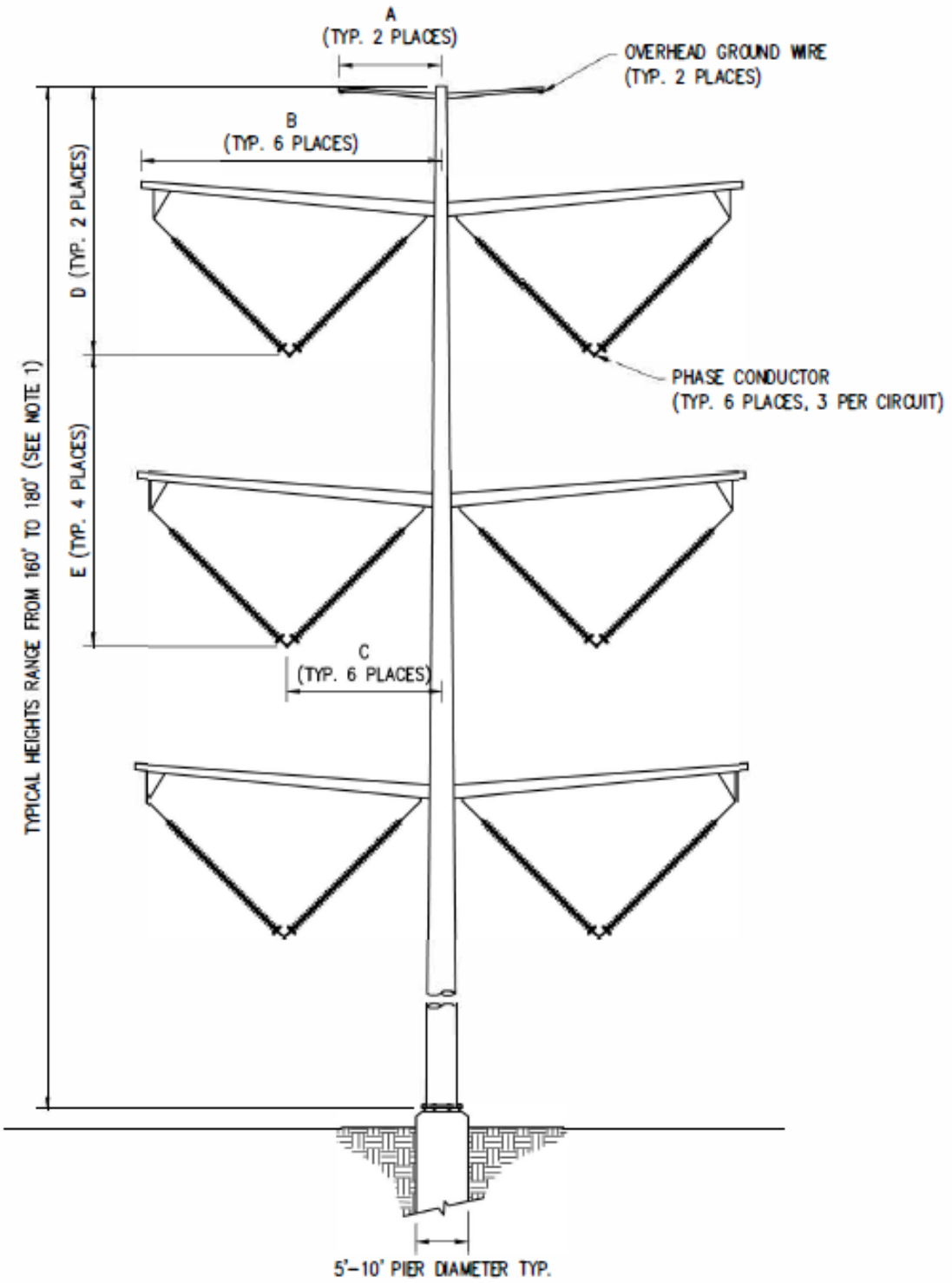
NORTH PLAINS CONNECTOR

SELF SUPPORTING STEEL LATTICE TOWER
TYPICAL 500kV EHV AC DEADEND

DWG NAME: NPC-A-1000-425 REVISION NO: C

Figure D-10

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	10-20
B	Phase Conductor Support Arm Length from Structure Centerline	25-35
C	Phase Conductor Horizontal Offset from Structure Centerline	15-25
D	OPGW / Phase Conductor Vertical Separation at Structure	15-30
E	Phase Conductor / Phase Conductor Vertical Separation at Structure	20-35

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 160' TO 180'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 120' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC.

GRID UNITED

ENGINEERING RECORD		DATE
DRAWN	C. ELLIS	06/06/24
CHECKED	S. REED	06/06/24
DESIGNED	R. MATTHIES	06/06/24
APPROVED	M. HICKENS	06/06/24
DWG SCALE: NTS	PLT SCALE: 1:1	

NORTH PLAINS CONNECTOR

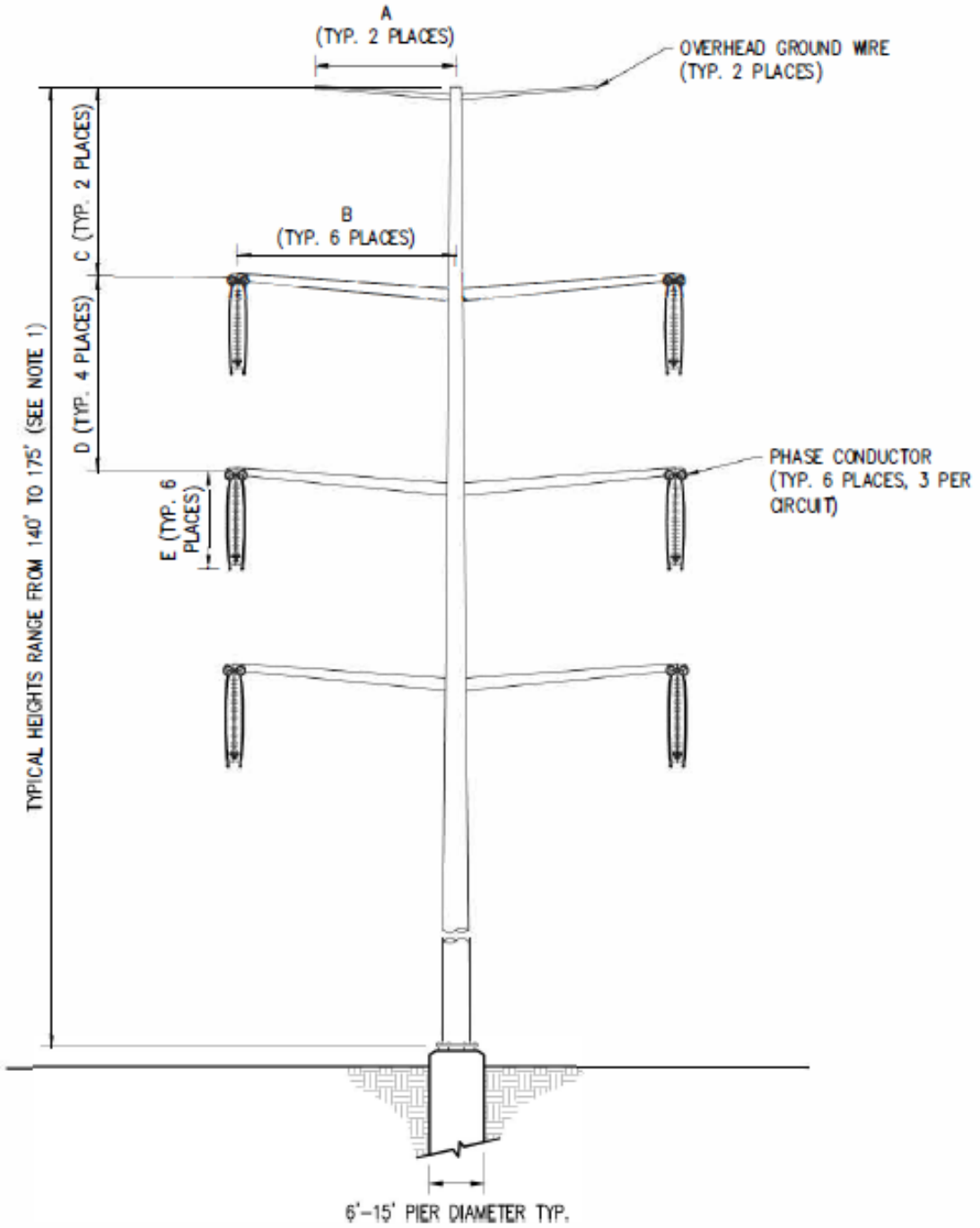
SELF SUPPORTING STEEL MONOPOLE

TYPICAL 345kV EHV AC DOUBLE CIRCUIT TANGENT

DWG NAME: NPC-A-1009-01 REVISION NO.: 0

Figure D-11

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	10-20
B	Phase Conductor Horizontal Offset from Structure Centerline	15-25
C	OPGW / Phase Conductor Vertical Separation at Structure	15-25
D	Phase Conductor / Phase Conductor Vertical Separation at Structure	20-30
E	Phase Conductor Jumper String Length	15-20

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 140' TO 175'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 120' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC

GRID UNITED

ENGINEERING RECORD		DATE
DRAWN	C. ELLIS	03/14/25
DESIGNED	S. REED	03/14/25
CHECKED	B. MATTHIES	03/14/25
APPROVED	M. HEIKENS	03/14/25

DWG SCALE: NTS PDF SCALE: 1:1

NORTH PLAINS CONNECTOR

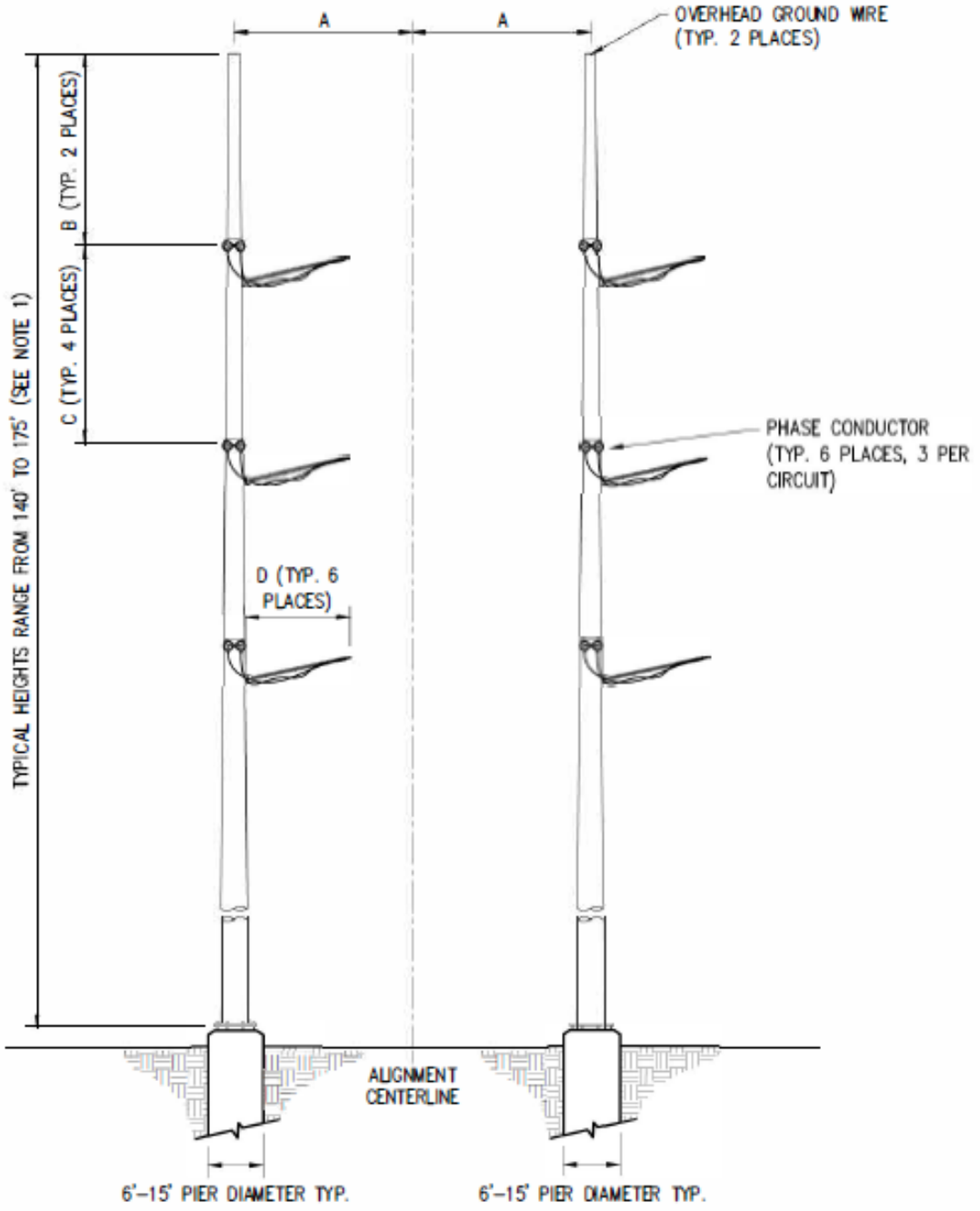
SELF SUPPORTING STEEL MONOPOLE

TYPICAL 345kV EHV AC DOUBLE CIRCUIT DEADEND

DWG NAME: NPC-A-TD09-345 REVISION NO: E

Figure D-12

Approximate Dimensions



NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 140' TO 175'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 120' OR AS HIGH AS 195'.

Dimension	Description	Range (ft)
A	Pole Offset from Alignment Centerline	15-25
B	OPGW / Phase Conductor Vertical Separation at Structure	15-25
C	Phase Conductor / Phase Conductor Vertical Separation at Structure	20-30
D	Jumper Post Length	10-15

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC

GRID UNITED

ENGINEERING RECORD		DATE
DRAWN	C. ELLIS	03/14/25
DESIGNED	S. REED	03/14/25
CHECKED	B. MATTHEWS	03/14/25
APPROVED	M. SEEKINS	03/14/25
DWG SCALE: NTS	PLT SCALE: 1:1	

NORTH PLAINS CONNECTOR

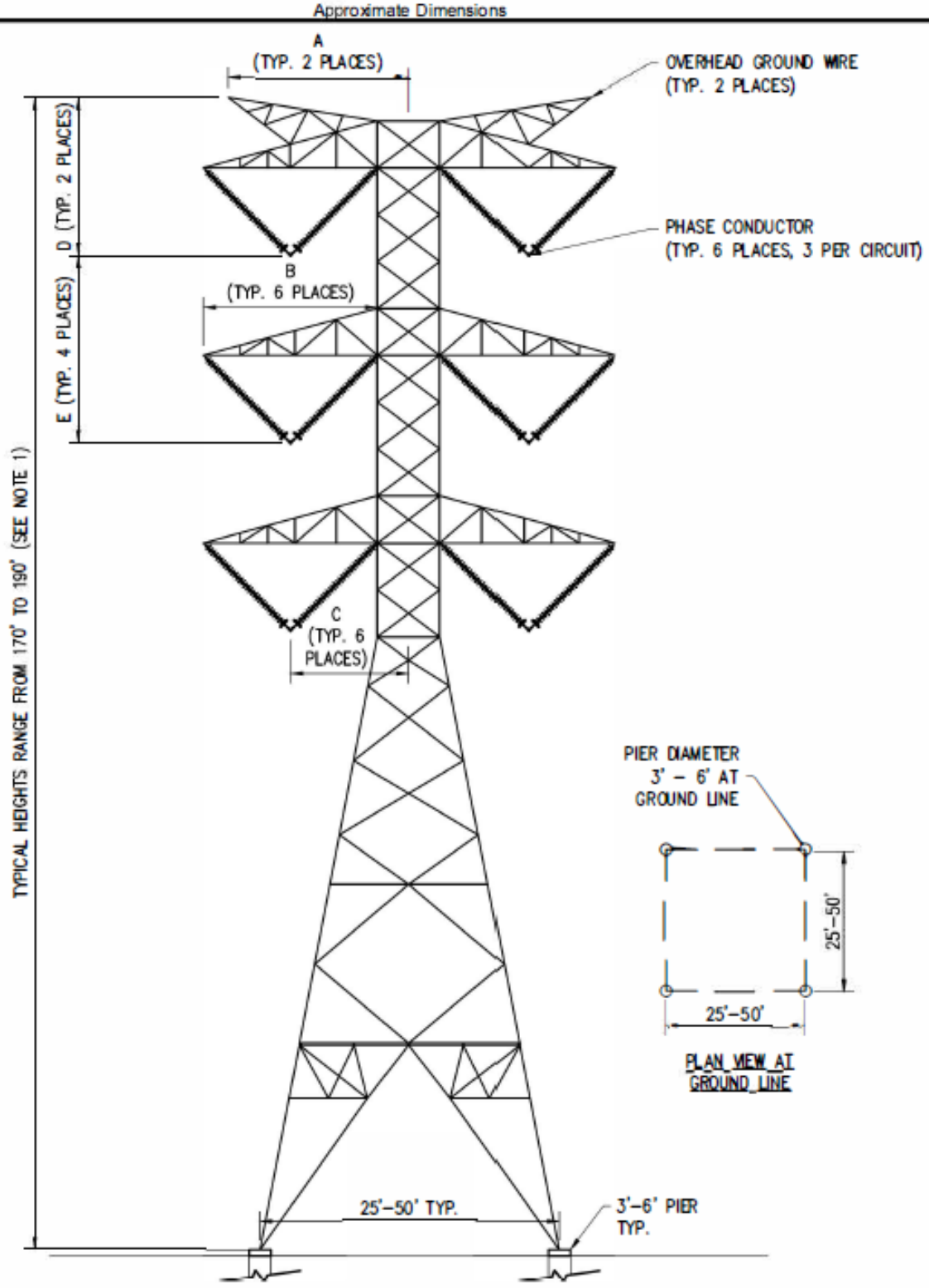
SELF SUPPORTING STEEL TWO POLE

TYPICAL 345kV EHV AC DOUBLE CIRCUIT DEADEND

DWG NAME: NPC-A-1000-3.35 REVISION NO: 0

Figure D-13

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	10-30
B	Phase Conductor Support Arm Length from Structure Centerline	25-30
C	Phase Conductor Horizontal Offset from Structure Centerline	18-23
D	OPGW / Phase Conductor Vertical Separation at Structure	20-25
E	Phase Conductor / Phase Conductor Vertical Separation at Structure	25-35

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 170' TO 190'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 130' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC.

GRID UNITED

DRAWN	C. ELLIS	06/06/24
DESIGNED	S. REED	06/06/24
CHECKED	B. MATTHIES	06/06/24
APPROVED	M. EHLERS	06/06/24

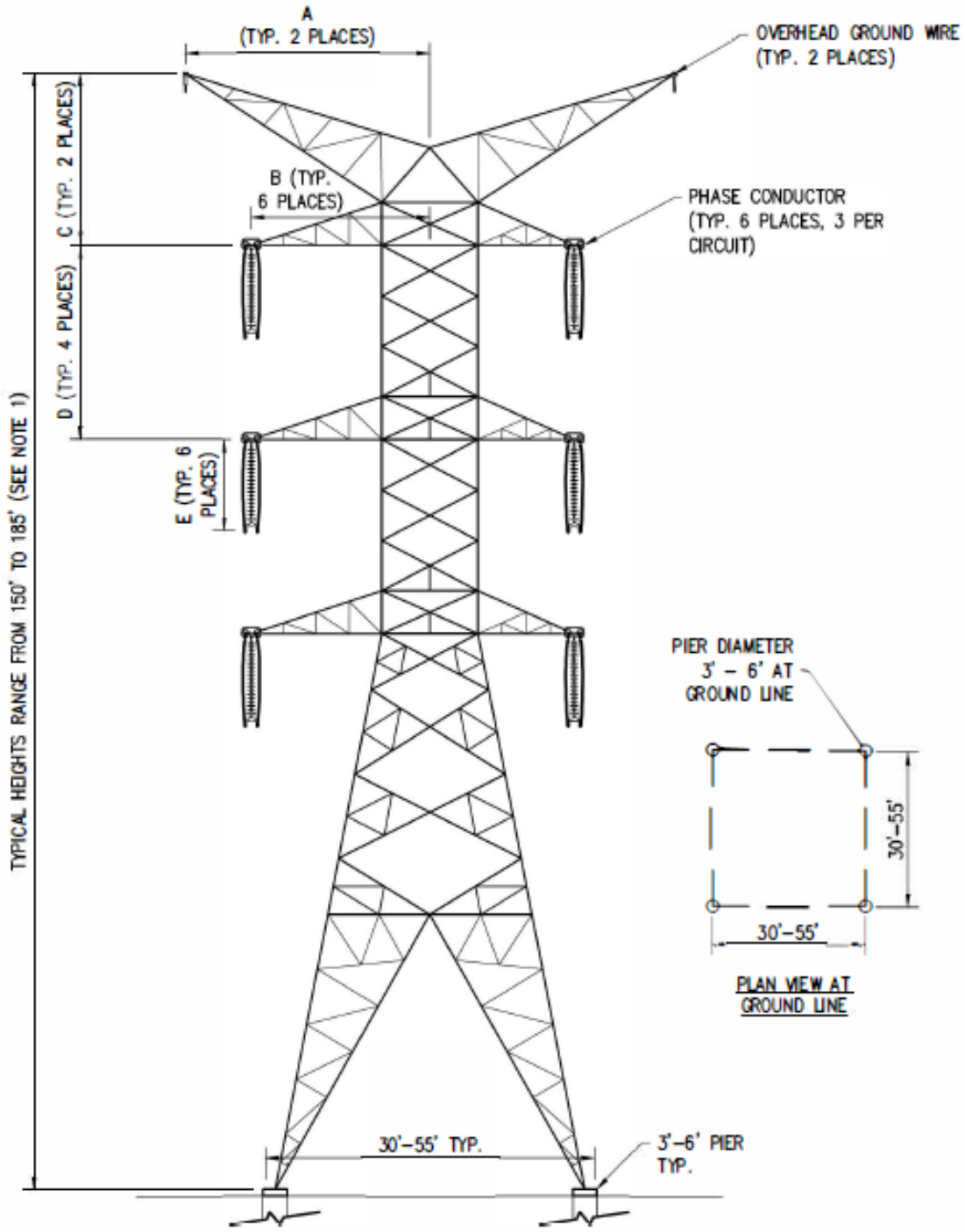
NORTH PLAINS CONNECTOR

SELF SUPPORTING STEEL LATTICE TOWER

TYPICAL 345kV EHV AC DOUBLE CIRCUIT TANGENT

Figure D-14

Approximate Dimensions



Dimension	Description	Range (ft)
A	OPGW Horizontal Offset from Structure Centerline	10-30
B	Phase Conductor Horizontal Offset from Structure Centerline	23-32
C	OPGW / Phase Conductor Vertical Separation at Structure	20-25
D	Phase Conductor / Phase Conductor Vertical Separation at Structure	25-35
E	Phase Conductor Jumper String Length	15-20

NOTES:

1. MOST STRUCTURE HEIGHTS RANGE FROM 150' TO 185'. HOWEVER, ANTICIPATED STRUCTURE HEIGHTS CAN BE AS LOW AS 130' OR AS HIGH AS 195'.

DISCLAIMER: FINAL FRAMING DIMENSIONS SUBJECT TO CHANGE PENDING DETAILED ENGINEERING.

ISSUED FOR REVIEW

ELECTRICAL CONSULTANTS, INC.

GRID UNITED

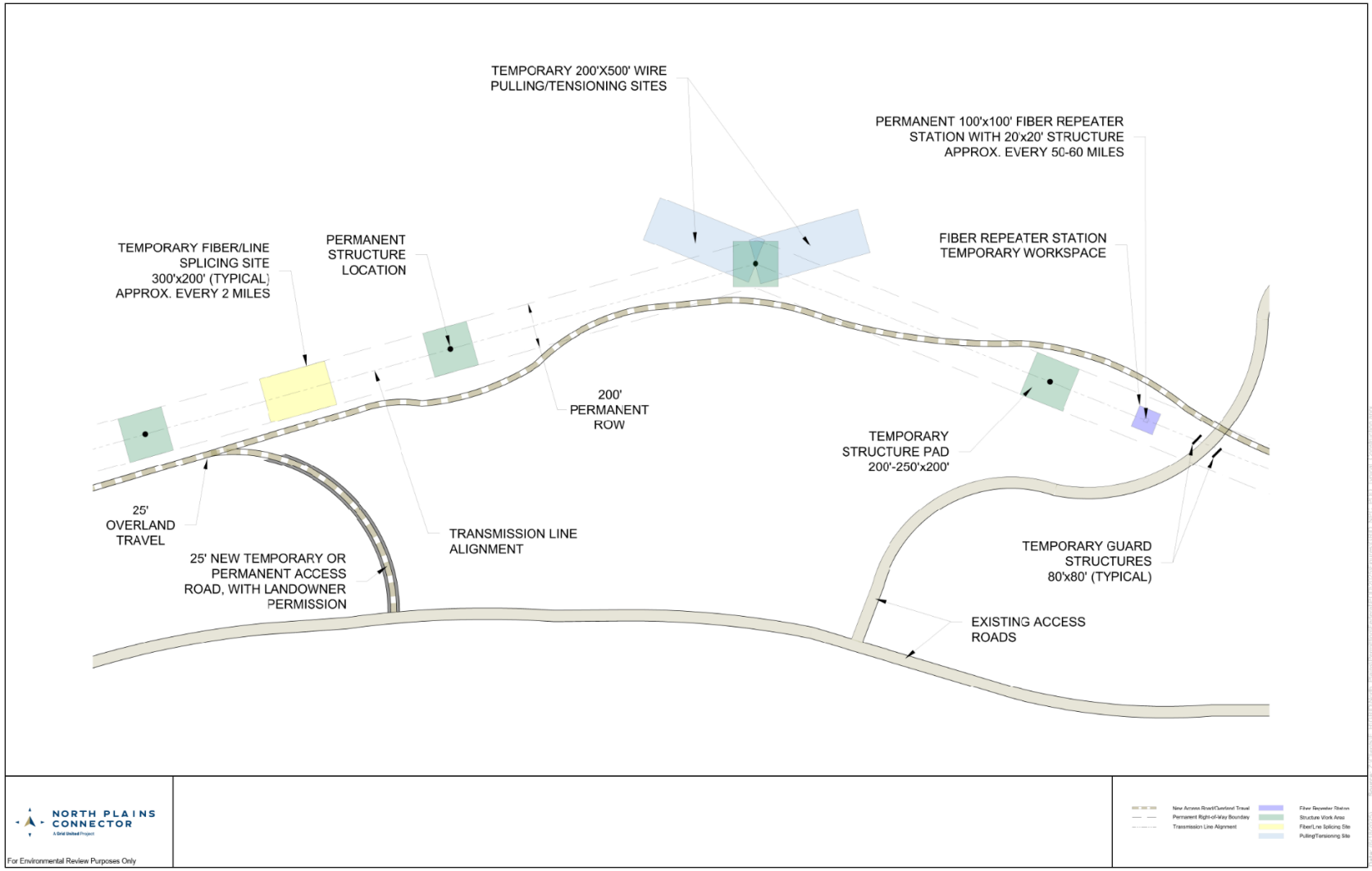
ENGINEERING RECORD		DATE
DRAWN	C. ELLIS	06/06/24
DESIGNED	S. REED	06/06/24
CHECKED	B. MATTHIES	06/06/24
APPROVED	M. HELKENS	06/06/24
ENG SCALE: NTS	PLT SCALE: 1:1	

NORTH PLAINS CONNECTOR

SELF SUPPORTING STEEL LATTICE TOWER

TYPICAL 345kV EHV AC DOUBLE CIRCUIT DEADEND

ENG NAME: EPC-A-1000-105 REVISION NO.: 0



ROW = right-of-way

Figure D-15: Typical Construction Work Areas

D.3. REFERENCES

Grid United (North Plains Connector LLC). 2024. *Montana Major Facility Siting Act Application for a Certificate of Compliance North Plains Connector Project*. North Plains Connector, A Grid United Project.

Grid United (North Plains Connector LLC). 2025a. Request for Information Response (received March 28, 2025). Table updates. Re: *Resource Report 1—General Project Description*. North Plains Connector, A Grid United Project.

Grid United (North Plains Connector LLC). 2025b. Request for Information Response (received August 26, 2025). Re: *Resource Report 1—General Project Description*. North Plains Connector, A Grid United Project.