230kV Safety Solutions

General Information

Proposing entity name	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Does the entity who is submitting this proposal intend to be the Designated Entity for this proposed project?	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Company proposal ID	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
PJM Proposal ID	390
Project title	230kV Safety Solutions
Project description	This Proposal includes the following projects: 1. 99-3189 - Line 2028 Uprate (Charlottesville to Fork Union) 2. 99-3206 - Prince George 230/115kV TX 3. 99-3219 - New 230 kV Line (Gordonville to Southall) 4. 99-3458 - Line 2083 Rebuild (Frederickburg - Birchwood) 5. 99-3413 - Line 2027 Uprate (Bremo - Midlothian) 6. 99-3418 - Line 259 Rebuild (Basin - Chesterfield) 7. 99-3419 - Line 249 (Locks - Chaparral T) 8. 99-3427 - Line 2076 & 2145 Rebuild (Northern Neck - Dahlgren & Birchwood - Dahlgren) 9. 99-3431_Alt. 1 - Lines 2054 & 2135 Reconductoring - Hollymeade to Hollymeade Junction 10. 99-3431_Alt. 2 - New 230 kV Line - Charlottesville - Gordonsville 11. 99-3432 - Line 2204 Uprate 12. 99-3450 - Line 2193 Uprate 13. 99-3315 - Line 2089 Reconductoring
Email	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Project in-service date	06/2029
Tie-line impact	No
Interregional project	No
Is the proposer offering a binding cap on capital costs?	No
Additional benefits	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Project Components

1. Line 2027 Uprate - Bremo to Midlothian (99-3413)

2. Line 249 Reconductoring - Locks to Carson (99-3419)
3. Line 259 Rebuild - Basin to Chesterfield (99-3418)
4. Basin Substation Terminal Equipment Uprate (99-3418)
5. Chesterfield Substation Terminal Equipment Uprate (99-3418)
6. Line 2204 Rebuild - Black Walnut to Edmonson (99-3432)
7. Black Walnut Substation Terminal Equipment Uprate (99-3432)
8. Edmonson Substation Substation Terminal Equipment (99-3432)
9. Line 2193 Rebuild - Fork Union to Bremo (99-3450)
10. Bremo Substation Terminal Equipment Uprate (99-3413)
11. Midlothian Substation Terminal Equipment Uprate (99-3413)
12. Carson Substation Relay Reset (99-3419)
13. Locks Substation Relay Reset (99-3419)
14. Line 2028 Uprate - Charlottesville to Fork Union (99-3189)
15. Charlottesville Substation Terminal Equipment Uprate (99-3189)
16. New 230 kV Line - Gordonsville to Southall (99-3219)
17. Gordonsville Substation Terminal Equipment Uprate (99-3219)
18. Southall Substation Terminal Equipment Uprate (99-3219)
19. Line 2054 Reconductoring - Hollymead to Hollymead Junction (993431 Alt 1)
20. Line 2135 Reconductoring - Hollymead to Hollymead Junction (993431 Alt 1)
21. Hollymeade Substation Terminal Equipment Upgrade (993431 Alt 1)
22. New 230 kV Line Terminals - Gordonsville to Charlottesville (99-3431 Alt 2)
23. Gordonsville Substation Terminal Equipment Upgrade (993431 Alt 2)
24. Charlottesville Substation Terminal Equipment Upgrade (993431 Alt 2)
25. Line 2083 Rebuild - Fredericksburg to Birchwood (99-3458)
26. Birchwood Substation Terminal Equipment Upgrade (993458)
27. Fredericksburg Substation Terminal Equipment Upgrade (993458)
28. Line 2076 Rebuild - Northern to Dahlgren (99-3427)
29. Line 2145 Rebuild - Birchwood to Dahlgren (99-3427)
30. Dahlgren Substation Terminal Equipment Upgrade (99-3427)

31. Locomotive Substation Terminal Equipment Upgrade (99-3427)
32. Northern Neck Substation Terminal Equipment Upgrade (99-3427)
33. Bremo Substation Terminal Equipment Upgrade (99-3450)
34. New 230/115kV Substation - Prince George Substation (99-3206)
35. Line 2089 Reconductoring - Ladysmith CT to Ladysmith (99-3315)

Transmission Line Upgrade Component

Component title	Line 2027 Uprate - Bremo to Midlothian (99-3413)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	2027
Point A	Bremo
Point B	Midlothian
Point C	
Terrain description	The project spans from the Piedmont region into central Virginia. The western portion consists mostly of farm land and a large quarry but as it moves east the land becomes more populated and suburban. There are numerous stream and wetlands crossing as well as minor arterial roads. There is a crossing over The James River and Midlothian Turnpike. There are elevation changes along the route with the highest being approximately 375 feet and the lowest being approximately 220 feet.
Existing Line Physical Characteristics	
Operating voltage	230
Conductor size and type	1033.5 ACSS (45/7) 200°C MOT
Hardware plan description	New hardware will be used.
Tower line characteristics	Most of the existing structures are single circuit direct-embed H-frame structures, with a mix of wood and steel structures. A majority of the structures in the line were built in 1989.
Proposed Line Characteristics	

	Designed	Operating

Voltage (kV)	230.000000	230.000000
	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	MI. 2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Shield wire size and type	Existing Shield wire will remain	
Rebuild line length	36 Miles	
Rebuild portion description	EXISTING FACILITIES TO BE REMOVED: 1. Remove approximately 35.45 miles of 3-phase single (1) 1033.5 ACSS (45/7) conductor from structure 2027/1 to 2027/257. 2. Remove approximately 0.17 miles of 3-phase bundled (2) 636 ACSR (24/7) conductor from structure 2027/1C to 2027/1. MODIFICATIONS TO EXISTING FACILITIES: 1. Remove and replace three (3) 230kV strain conductor assemblies per structure with new 230kV strain assemblies on the following structures: a. Structures 2027/1C, 257. 2. Remove and replace six (6) 230kV strain conductor assemblies per structure with new 230kV strain assemblies on the following structures: a. Structures 2027/1B, 1, 4, 15, 27, 29, 32C, 33, 43, 102A, 123, 157, 185, 186, 203, 207, 232, 235, 236, 244, 247, 249, 251, 253, 256. 3. Remove and replace three (3) 230kV suspension conductor assemblies per structure with new 230kV suspension assemblies on the following structures: a. Structures 2027/2, 3, 5-14, 16-26, 28, 30-32, 32A, 32B, 32D, 34-42, 44-102, 103-122, 124-156, 158-184, 187-202, 204-206, 208-231, 233-234, 237-243, 245-246, 248, 250, 252, 254, 255. 4. Remove and replace five (5) existing switches as follows: a. One (1) existing switch (202719M) on backbone structure 2027/1A in Midlothian Sub with one (1) 4000A vertically mounted switch on the same structure. b. One (1) existing switch (202756) on self-supporting switch structure 2027/102C near Powhatan Substation with one (1) 4000A rated horizontally mounted switch. i. This includes the replacement of the switch structure itself. c. One (1) existing switch (202759) on self-supporting switch structure 2027/103A near Powhatan Substation with one (1) 4000A rated horizontally mounted switch. i. This includes the replacement of the switch structure itself. d. One (1) existing switch (202796) on self-supporting switch structure 2027/184A near Cartersville Substation with one (1) 4000A rated horizontally mounted switch. i. This includes the replacement of the switch structure itself. e. One (1) existing switch (202799) on self-supporting switch structure 2027/186A near Cartersville Substation with one (1) 4000A rated horizontally mounted switch. i. This includes the replacement of the switch structure itself. 5. Remove and replace twelve (12) floating deadend assemblies. PERMANENT FACILITIES TO BE INSTALLED: 1. Install approximately 35.62 miles of 3-phase bundled (2) 768.2 ACSS/TW/HS (20/7) “Maumee” conductor from structure 2027/1C to 2027/257.	
Right of way	Existing Right-of-Way will be used.	

Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$77,927,310.00
Component cost (in-service year)	$83,460,149.01

Transmission Line Upgrade Component

Component title	Line 249 Reconductoring - Locks to Carson (99-3419)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	Line #249
Point A	Locks
Point B	Carson
Point C	
Terrain description	Refer to "993419 Real Estate and Permitting Summary".

Existing Line Physical Characteristics

Operating voltage	230
Conductor size and type	2-636.0 ACSR (24/7) 150°C MOT
Hardware plan description	New hardware will be used.
Tower line characteristics	A large portion of this reconductor falls on DC Galvanized Towers that were installed in 2023.

Proposed Line Characteristics

	Designed	Operating
Voltage (kV)	230.000000	230.000000
	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Shield wire size and type	Existing Shield wire will remain	
Rebuild line length	1.04	

Rebuild portion description	EXISTING FACILITIES TO BE REMOVED: 1. Remove approx. 1.04 miles of 3-ph twin bundled (2) 636 ACSR (24/7) “Rook” conductor from the ahead side of existing SC weathering steel monopole structure 249/86 to the back side of existing SC galvanized steel 3-pole structure 249/93. MODIFICATIONS TO EXISTING FACILITIES: 1. Replace three (3) 230kV bundled conductor strain insulator assemblies with three (3) 230kV bundled conductor strain assemblies [32.630] on the following two (2) structures: a. Three (3) on the ahead side of existing structure 249/86. b. Three (3) on the back side of existing structure 249/93. 2. Replace six (6) 230kV bundled conductor strain insulator assemblies with six (6) 230kV bundled conductor strain assemblies [32.630] on the Line 249 side only on the following one (1) structure: a. Structure 249/90 (238/6) 3. Replace three (3) 230kV bundled conductor V-string insulator assemblies with three (3) 230kV bundled conductor V-string insulator assemblies [32.857] on the Line 249 side only on the following four (4) structures: a. Structures 249/88 (238/8), 249/89 (238/7), 249/91 (238/5), and 249/92 (238/4). PERMANENT FACILITIES TO BE INSTALLED: 1. Install approx. 1.04 miles of 3-ph twin bundled (2) 768.2 ACSS/TW/HS (20/7) “Maumee” conductor from existing structure 249/86 to existing structure 249/93. TEMPORARY FACILITIES TO BE INSTALLED: **It is assumed temporary work will be required for Line 249 based on previous Project 992884. Engineering would anticipate similar temporary work to be required for this project. Assuming an average height of 70-ft for all temporary structures** 1. Install approx. 1.29 miles of 3-ph single (1) 795 ACSR (26/7) “Drake” conductor. 2. Install four (4) 230kV DOM DDE 3-pole structures [12.570]. 3. Install two (2) 230kV DOM DE 3-Pole structures [12.645]. 4. Install two (2) 230kV single phase DOM DDE monopole structures [12.525]. 5. Install one (1) 230kV single phase DOM suspension monopole structure [12.515]. 6. Install one (1) 230kV two phase DOM suspension 2-Pole structure [2 X 12.515]. 7. Install two (2) 230kV DOM suspension monopole structures [12.515]. 8. Install two (2) sets of 3-ph single (1) 795 ACSR (26/7) “Drake” conductor risers. 9. Install three (3) 230kV bundled conductor V-string insulator assemblies [32.857] on the vacant arms of two (2) Line 2002 adjacent towers. 10. Install six (6) 230kV bundled conductor strain assemblies [32.630] on the vacant arms of four (4) Line 2002 adjacent towers.
Right of way	Existing Right-of-Way shall be used.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$4,867,360.01
Component cost (in-service year)	$5,212,942.56

Transmission Line Upgrade Component

Component title	Line 259 Rebuild - Basin to Chesterfield (99-3418)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	Line # 259
Point A	Basin
Point B	Chesterfield
Point C	
Terrain description	The project area is in the Virginia Piedmont region with elevations ranging from approximately 9 to 146 feet. The terrain is predominately vegetated existing right-of-way consisting of minimal to moderate slopes. The line will include new crossings of Interstate 95 multiple times, Route 1, CSX Railroad multiple times, and numerous secondary roadways.
Existing Line Physical Characteristics	
Operating voltage	230
Conductor size and type	2500 ACAR (84/7) 90°C MOT [4.92 miles]; 1033.5 ACSS (45/7) 150°C MOT [3.82 miles]; 2-721 ACAR (18/19) 90°C MOT [1.99 miles]; 2-636 ACSR (24/7) 150°C MOT [0.34 miles]
Hardware plan description	New hardware will be used for line rebuild.
Tower line characteristics	Existing Structures will be removed and new structures will be used for this rebuild.
Proposed Line Characteristics	

	Designed	Operating

Voltage (kV)	230.000000	230.000000
	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Shield wire size and type	(2) DNO-11410 OPGW	
Rebuild line length	12.4 Miles	
Rebuild portion description	PERMANENT FACILITIES TO BE INSTALLED: 1. Install forty-eight (48) 230 kV double circuit monopole steel tangent structures on foundations as follows: a. Fourteen (14) Line 259 (line 2065) Structures. b. Twenty (20) Line 259 (line 282) Structures. c. Sixteen (16) Line 259 (line 208) Structures. 2. Install six (6) 230 kV double circuit steel tangent v-string structures on foundations as follows: a. Four (4) Line 259 (line 2065) Structures. b. Two (2) Line 259 (line 282) Structures. 3. Install twenty-nine (29) 230 kV double circuit steel deadend structures on foundations as follows: a. Seven (7) Line 259 (line 2065) Structures. b. Sixteen (16) Line 259 (line 282) Structures. c. Six (6) Line 259 (line 208) Structures. 4. Install three (3) 230 kV double circuit steel delta structures custom arm and v-string phase on foundations as follows: a. Three (3) Lines 259 (lines 282) Structures. 5. Install eighteen (18) 230 kV double circuit steel 2 pole deadend structures on foundations as follows: a. Three (3) Lines 259 (lines 2065) Structures. b. One (1) Lines 2065 (line 282) Structures. c. Seven (7) Line 259 (lines 282) Structures. d. Seven (7) Line 259 (lines 208) Structures. 6. Install one (1) 230 /115kV 4C double circuit steel 3 pole DDE structures on foundations as follows: a. One (1) Line 259 (line 282) Structure 56 (116) 7. Install one (1) 230kV single circuit steel DDE structure on foundations as follows: a. One (1) Line 259 Structure 30 (SC) 8. Install approximately 24.8 miles of 3-phase 2-768.2 ACSS/TW/HS (20/7) “Maumee” conductor as follows: a. 12.4 miles from structures: 259/1A-106A [LINE 259] b. 3.07 miles from structures: 2065/172-143 [LINE 2065] c. 5.35 miles from structures:282/143-94 [LINE 282] d. 3.98 miles from structures: 208/70-96 [LINE 208] 9. Install approximately 24.8 miles of two (2) DNO-11410 OPGW as follows: a. 12.4 miles from structures: 259/1A-106A [LINE 259] b. 3.07 miles from structures: 2065/172-143 [LINE 2065] c. 5.35 miles from structures: 282/143-94 [LINE 282] d. 3.98 miles from structures: 208/70-96 [LINE 208] [Refer to 99-3418 Conceptual Scope and One Line for complete description of rebuild]	
Right of way	Existing Right-of-Way shall be used.	
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	

Component Cost Details - In Current Year $

Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$97,090,642.00
Component cost (in-service year)	$103,984,077.58

Substation Upgrade Component

Component title	Basin Substation Terminal Equipment Uprate (99-3418)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Basin
Substation zone	357
Substation upgrade scope	Purchase & Install Substation Material: 1. Two (2), 230kV, 4000A Center Break Switches. 2. One (1), 230kV, 80kAIC, 4000A, SF6 Circuit Breaker. 3. One (1), 230kV, 4000A Wave Trap. 4. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Remove Substation Material: 1. Two (2), 230kV, 2000A Center Break Switches 2. One (1), 230kV, 40kAIC, 3000A, SF6 Circuit Breaker 3. One (1), 230kV, 2000A Wave Trap 4. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Purchase & Install Relay Material: 1. One (1), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel. 2. One (1), 4510 – SEL-2411 Equipment Annunciator. 3. One (1), 4526_A – Circuit Breaker Fiber Optic Makeup Box. 4. One (1), Relay Reset.

Transformer Information

None

New equipment description	1. Two (2), 230kV, 4000A Center Break Switches. 2. One (1), 230kV, 80kAIC, 4000A, SF6 Circuit Breaker. 3. One (1), 230kV, 4000A Wave Trap. 4. One (1), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel. 5. One (1), 4510 – SEL-2411 Equipment Annunciator. 6. One (1), 4526_A – Circuit Breaker Fiber Optic Makeup Box.
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 3. It was determined that the GA would not need any additional equipment or equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$1,779,500.00
Component cost (in-service year)	$1,905,844.50

Substation Upgrade Component

Component title	Chesterfield Substation Terminal Equipment Uprate (99-3418)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Chesterfield
Substation zone	357
Substation upgrade scope	Purchase & Install Substation Material: 1. Four (4), 230kV, 4000A Center Break Switches. 2. Two (2), 230kV, 80kAIC, 4000A, SF6 Circuit Breakers. 3. One (1), 230kV, 4000A Wave Trap. 4. Approximately 170 FT. of 5 in. Sch. 40 AL tube and connectors. 5. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Remove Substation Material: 1. Four (4), 230kV, 2000A Center Break Switches 2. One (1), 230kV, 40kAIC, 2000A, SF6 Circuit Breaker 3. One (1), 230kV, 40kAIC, 3000A, SF6 Circuit Breaker 4. One (1), 230kV, 3000A Wave Trap 5. Approximately 170 FT. of 3-1/2 in. Sch. 40 AL tube and connectors. 6. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Purchase & Install Relay Material: 1. Two (2), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel. 2. Two (2), 4510 – SEL-2411 Equipment Annunciator. 3. Two (2), 4526_A – Circuit Breaker Fiber Optic Makeup Box. 4. One (1), Relay Reset.

Transformer Information

None

New equipment description	1. Four (4), 230kV, 4000A Center Break Switches. 2. Two (2), 230kV, 80kAIC, 4000A, SF6 Circuit Breakers. 3. One (1), 230kV, 4000A Wave Trap. 4. Two (2), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel. 5. Two (2), 4510 – SEL-2411 Equipment Annunciator. 6. Two (2), 4526_A – Circuit Breaker Fiber Optic Makeup Box.
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 3. It was determined that the GA would not need any additional equipment or equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$2,188,500.00
Component cost (in-service year)	$2,343,883.50

Transmission Line Upgrade Component

Component title	Line 2204 Rebuild - Black Walnut to Edmonson (99-3432)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	Line #2204
Point A	Black Walnut
Point B	Edmonson
Point C	
Terrain description	The project is located in Halifax County, VA on the border with North Carolina. There is a slope change of less that 100 feet over the length off the line. This project does not cross any railroads, large waterways or major highways. Most of the land it traverses is rural/farm land.
Existing Line Physical Characteristics	
Operating voltage	230

Conductor size and type	2-636.0 ACSR (24/7) 150°C MOT [3.49 miles], 2-477 ACSR (24/7) 150°C MOT [4.50 miles]
Hardware plan description	New hardware will be used for line rebuild.
Tower line characteristics	Existing Structures will be removed and new structures will be used for this rebuild.

Proposed Line Characteristics

	Designed	Operating
Voltage (kV)	230.000000	230.000000
	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000

Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT
Shield wire size and type	(2) DNO-10410 shield wire
Rebuild line length	7.99 Miles

Rebuild portion description	EXISTING FACILITIES TO BE REMOVED: 1. Remove fifty (50) existing single circuit wood 2-pole H-frame suspension structure. 2. Remove three (3) existing single circuit wood 2-pole H-frame DDE structure. 3. Remove eight (8) existing single circuit wood 3-pole DDE structure. 4. Remove one (1) existing single circuit concrete 3-pole DDE structure. 5. Remove two (2) existing single circuit steel 2-pole H-frame suspension structure. 6. Remove approx.3.49 miles of 2-636 ACSR (24/7) 150 MOT conductor from structure 2204/381A to 2204/409. 7. Remove approx. 4.50 miles of 2-477 ACSR (24/7) 150 MOT conductor from structure 2204/409 to 2204/446. 8. Remove approx. 7.97 miles of two (2) 3#6 Alumoweld shield wire from structure 2204/382 to 2204/446. 9. Remove approx. 0.1 miles of two (2) 7#7 Alumoweld shield wire as follows: a. Approx. 0.06 miles from structure 2204/381A to 2204/382 b. Approx. 0.04 miles from structure 2204/446 to 2204/446A MODIFICATIONS TO EXISTING FACILITIES: 1. Replace three (3) existing 230kV conductor strain insulator assemblies with three (3) bundled conductor crossing strain assemblies (32.338) as follows: a. Three (3) per structure at structure 2204/381A 2. Replace three (3) existing 230kV conductor strain insulator assemblies with three (3) bundled conductor strain assemblies (32.630) as follows: a. Three (3) per structure at structure 2204/446 3. Replace eight (8) existing shield wire strain insulator assemblies with eight (8) OPGW strain assemblies (96.060) as follows: a. Two (2) per structure at structure 2204/381A, 446A b. Four (4) per structure at structure 2204/446 PERMANENT FACILITIES TO BE INSTALLED: 1. Install fifty-two (52) 230 kV double circuit steel tangent monopole structures on foundations as follows: a. Structures 2204/383-387, 389-406, 410-427, 431-432, 434, 436-439, 441-445 2. Install two (2) 230 kV double circuit 2 pole steel DDE heavy angle structures on foundations as follows: a. Structures 2204/382, 409 3. Install ten (10) 230 kV double circuit steel DDE pole structures on foundations as follows: a. Structures 2204/388, 407-408, 414, 428-430, 433, 435, 440 4. Install approx. 7.99 miles of single circuit 3-phase bundled (2)-768.2 ACSS/TW/HS (20/7) “Maumee” 250 MOT conductor from structure 2204/381A to 2204/446. 5. Install approx. 8.03 miles of two (2) DNO-11410 OPGW from structure 2204/381A to 2204/446A. a. Assumes 10 OPGW splices throughout the line.
Right of way	Existing Right-of-Way shall be used.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$43,054,980.00
Component cost (in-service year)	$46,111,883.58

Substation Upgrade Component

Component title	Black Walnut Substation Terminal Equipment Uprate (99-3432)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Black Walnut
Substation zone	358
Substation upgrade scope	Purchase & Install Substation Material: 1. Two (2), 230kV, 4000A, 80kA, SF6 Circuit Breaker. 2. Four (4), 230kV, 4000A Center Break Switches. 3. One (1), 230kV, 4000A Wave Trap. 4. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Removal Material: 1. Two (2), 230kV, 3000A, 63kA, SF6 Circuit Breaker. 2. Four (4), 230kV, 3000A Center Break Switches. 3. One (1), 230kV, 3000A Wave Trap. 4. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Re-Use Relay Material: 1. Two (2), 4510 - SEL-2411 Equipment Annunciator. 2. Two (2), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel. Purchase & Install Substation Material: 1. Two (2), 4526_A – Circuit Breaker Fiber Optic Makeup Box.

Transformer Information

None

New equipment description	1. Two (2), 230kV, 4000A, 80kA, SF6 Circuit Breaker. 2. Four (4), 230kV, 4000A Center Break Switches. 3. One (1), 230kV, 4000A Wave Trap. 4. Two (2), 4526_A – Circuit Breaker Fiber Optic Makeup Box.
Substation assumptions	1. The scope of work depicted on the drawings assumes no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 3. It was determined that the GA would not need any additional equipment or equipment relocation thus it has been omitted from the submittal.

Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$2,188,500.00
Component cost (in-service year)	$2,343,883.50

Substation Upgrade Component

Component title	Edmonson Substation Substation Terminal Equipment (99-3432)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Edmonson
Substation zone	358

Substation upgrade scope	Purchase & Install Substation Material: 1. Two (2), 230kV, 4000A, 80kA, SF6 Circuit Breaker. 2. Four (4), 230kV, 4000A Center Break Switches. 3. One (1), 230kV, 4000A Wave Trap. 4. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Removal Material: 1. Two (2), 230kV, 3000A, 63kA, SF6 Circuit Breaker. 2. Four (4), 230kV, 3000A Center Break Switches. 3. One (1), 230kV, 3000A Wave Trap. 4. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Re-Use Relay Material: 1. Two (2), 4510 - SEL-2411 Equipment Annunciator. 2. Two (2), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel. Purchase & Install Substation Material: 1. Two (2), 4526_A – Circuit Breaker Fiber Optic Makeup Box.

Transformer Information

None

New equipment description	1. Two (2), 230kV, 4000A, 80kA, SF6 Circuit Breaker. 2. Four (4), 230kV, 4000A Center Break Switches. 3. One (1), 230kV, 4000A Wave Trap. 4. Two (2), 4526_A – Circuit Breaker Fiber Optic Makeup Box.
Substation assumptions	1. The scope of work depicted on the drawings assumes no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 3. It was determined that the GA would not need any additional equipment or equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$2,188,500.00
Component cost (in-service year)	$2,343,883.50

Transmission Line Upgrade Component

Component title	Line 2193 Rebuild - Fork Union to Bremo (99-3450)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	Line 2193
Point A	Fork Union
Point B	Bremo
Point C	
Terrain description	The project is in the Piedmont region, specifically Fluvanna County. The area is mostly rural. There are a few stream and wetland crossings as well as one minor arterial roads. There are elevation changes along the route with the highest being approximately 308 feet and the lowest being approximately 220 feet.
Existing Line Physical Characteristics	
Operating voltage	230
Conductor size and type	2-721ACAR (18/19) 90°C MOT [1.63 Miles], 2-636 ACSR (24/7) 150°C MOT [0.11 Miles]
Hardware plan description	New hardware will be used for line rebuild.
Tower line characteristics	Existing Structures will be removed and new structures will be used for this rebuild.
Proposed Line Characteristics	

	Designed	Operating
Voltage (kV)	230.000000	230.000000

	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Shield wire size and type	(2) DNO-11410 OPGW	
Rebuild line length	1.74 Miles	
Rebuild portion description	EXISTING FACILITIES TO BE REMOVED: 1. Remove (8) existing 230kV single circuit wood H-frame structures. 2. Remove (2) existing 230kV single circuit wood 3-pole structures. 3. Remove (1) existing 230kV single circuit steel 3-pole structure. 4. Remove (3) existing 230kV single circuit steel H-frame structures. 5. Remove (1) 230kV standard steel self-supporting switch structure. 6. Remove approx. 0.11 miles of 3-phase twin bundled (2) 636 ACSR (24/7) conductor. 7. Remove approx. 1.63 miles of 3-phase twin bundled (2) 721 ACAR (18/19) conductor. 8. Remove approx. 1.63 miles of two (2) 3#6 Alumoweld shield wire from structure. MODIFICATIONS TO EXISTING FACILITIES: 1. Replace (3) bundled conductor crossing strain insulator assemblies. 2. Replace (3) bundled conductor strain insulator assemblies. PERMANENT FACILITIES TO BE INSTALLED: 1. Install (8) 230kV custom engineered steel double circuit suspension structures on foundations as follows: a. Structures 2193/174-181 2. Install (3) 230kV custom engineered steel double circuit dead end structures on foundations as follows: a. Structures 2193/173, 182, and 186 3. Install (1) 230kV custom engineered steel double circuit deadend 2 pole structure on foundations as follows: a. Structure 2193/185 4. Install (2) 230kV custom engineered steel double circuit double deadend H-Frame structures on foundations as follows: a. Structures 2193/183 and 184A 5. Install (1) 230kV standard steel self-supporting switch structure on foundations as follows: a. Structure 2193/184 b. This includes the installation of (1) horizontally mounted, 4000-amp switch (219326) with HD interrupter bottles. 6. Install (1) set of 3-phase (2) 768.2 ACSS/TW/HS risers to connect the switch to the main line. a. This includes the installation of (1) set of 3-phase floating deadend assemblies to be installed 7. Install approx. 1.74 miles of 3-phase twin bundled (2) 768.2 ACSS/TW/HS conductor from structure 2193/171 to 2193/186A. 8. Install approx. 1.74 miles of two (2) DNO-11410 OPGW from structure 2193/172 to 2193/186. a. Assumes 6 OPGW splices throughout the line 9. Install approx. 0.11 miles of (1) 7#7 Alumoweld shield wire as follows: a. 0.07 miles from structure 2193/171 to 2193/172. b. 0.04 miles from structure 2193/186A 10. Install approx. 0.11 miles of (1) DNO-11410 OPGW as follows: a. 0.07 miles from structure 2193/171 to 2193/172 b. 0.04 miles from structure 2193/186 to 2193/186A.	
Right of way	Existing Right-of-Way shall be used.	
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	

Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$12,109,650.00
Component cost (in-service year)	$12,969,435.15

Substation Upgrade Component

Component title	Bremo Substation Terminal Equipment Uprate (99-3413)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Bremo
Substation zone	363

Substation upgrade scope	Purchase & Install Substation Material: 1. One (1), 230kV, 4000A, 80kA, SF6 Circuit Breakers. 2. Two (2), 230kV, 4000A Center Break Switches. 3. One (1), 230kV, 4000A Wave Trap. 4. Conductors, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Removal Material: 1. One (1), 230kV, 3000A, 50kA, SF6 Circuit Breakers. 2. Two (2), 230kV, 3000A Center Break Switches. 3. One (1), 3000A Wave Trap. 4. Conductors, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Purchase & Install Relay Material: 1. One (1), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 2. One (1), 1340 – 24” Dual SEL-411L DCB/PLC Line Panel 3. One (1), 4526_D – C.B. w/ BCM Fiber Optic Makeup Box 4. One (1), 4510 – SEL-2411 Equipment Annunciator 5. Two (2), Retired Panels (Panel 25 and Panel 34)

Transformer Information

None

New equipment description	1. One (1), 230kV, 4000A, 80kA, SF6 Circuit Breakers. 2. Two (2), 230kV, 4000A Center Break Switches. 3. One (1), 230kV, 4000A Wave Trap.
Substation assumptions	1. The scope of work depicted on the drawings assumes no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 3. It was determined that the GA would not need any additional equipment or equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$1,779,500.00
Component cost (in-service year)	$1,905,844.50

Substation Upgrade Component

Component title	Midlothian Substation Terminal Equipment Uprate (99-3413)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Midlothian
Substation zone	363
Substation upgrade scope	Purchase & Install Substation Material: 1. Two (2), 230kV, 4000A, 80kA, SF6 Circuit Breakers. 2. Four (4), 230kV, 4000A Center Break Switches. 3. One (1), 230kV, 4000A Wave Trap. 4. Bus, conductors, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Removal Material: 1. One (1), 230kV, 3000A, 40kA, SF6 Circuit Breaker. 2. One (1), 230kV, 2000A, 40kA, SF6 Circuit Breaker. 3. Two (2), 230kV, 3000A Center Break Switches. 4. Two (2), 230kV, 2000A Center Break Switches. 5. One (1), 3000A Wave Trap. 6. Bus, conductors, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Purchase & Install Relay Material: 1. Two (2), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 2. One (1), 1340 – 24” Dual SEL-411L DCB/PLC Line Panel 3. Two (2), 4526_D – C.B. w/ BCM Fiber Optic Makeup Box 4. Two (2), 4510 – SEL-2411 Equipment Annunciator 5. Three (3), Retired Panels (Panel 12, Panel 54, and Panel 69)

Transformer Information

None

New equipment description	1. Two (2), 230kV, 4000A, 80kA, SF6 Circuit Breakers. 2. Four (4), 230kV, 4000A Center Break Switches. 3. One (1), 230kV, 4000A Wave Trap.
Substation assumptions	1. The scope of work depicted on the drawings assumes no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 3. It was determined that the GA would not need any additional equipment or equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.

Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$2,188,500.00
Component cost (in-service year)	$2,343,883.50

Substation Upgrade Component

Component title	Carson Substation Relay Reset (99-3419)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Carson
Substation zone	357
Substation upgrade scope	Relay Reset only.

Transformer Information

None

New equipment description	NA

Substation assumptions	1. Relay Settings and protection & control design will be revised as part of the SPE scope of work. 2. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$19,210.00
Component cost (in-service year)	$20,573.91

Substation Upgrade Component

Component title	Locks Substation Relay Reset (99-3419)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Locks
Substation zone	357
Substation upgrade scope	Relay Reset only.

Transformer Information

None

New equipment description	NA
Substation assumptions	1. Relay Settings and protection & control design will be revised as part of the SPE scope of work. 2. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$19,210.00
Component cost (in-service year)	$20,573.91

Transmission Line Upgrade Component

Component title	Line 2028 Uprate - Charlottesville to Fork Union (99-3189)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Impacted transmission line	Line 2028
Point A	Charlottesville
Point B	Fork Union
Point C	
Terrain description	This project spans approximately 24 miles in the Piedmont region of Virginia. The project crosses several major arterial roads as well as I-64. There are 4 crossings of the Rivanna River. The slope change is minimal over the length of the span.

Existing Line Physical Characteristics

Operating voltage	230
Conductor size and type	2-636 ACSR (24/7) 150°C MOT
Hardware plan description	New hardware will be used for line rebuild
Tower line characteristics	Existing Structures will be removed and new structures will be used for this rebuild.

Proposed Line Characteristics

	Designed	Operating
Voltage (kV)	230.000000	230.000000
	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Shield wire size and type	(2) DNO-11410 shield wire	
Rebuild line length	23.5 Miles	

Rebuild portion description	EXISTING FACILITIES TO BE REMOVED: 1. Remove (17) existing single circuit 2 pole H-frame concrete suspension strs. 2. Remove (2) existing single circuit 2 pole H-frame steel suspension strs. 3. Remove (1) existing single circuit 2 pole H-frame steel double deadend strs. 4. Remove (116) existing single circuit 2 pole H-frame wood suspension strs. 5. Remove (3) existing single circuit 2 pole H-frame wood double deadend strs. 6. Remove (9) existing single circuit wood 3 pole double deadend strs. 7. Remove (22) existing double circuit steel tower strs on foundations. 8. Remove (1) self-supporting switch str. on foundations. 9. Remove 2-636 ACSR (24/7) conductor. 10. Remove approx. 13.48 miles of 2-721 ACSR (18/19) conductor from str. 2028/74 to 2028/173. 11. Remove approx. 23.90 miles of (2) 3#6 Alumoweld shield wire from str. 2028/1A (I5/1A) to 2028/92 and from 2028/93 to 2028/176. 12. Remove approx. 0.23 miles of (1) 3#6 Alumoweld shield wire from str. 2028/22 (I5/122) to I5/23. 13. Remove approx. 0.17 miles of (2) 7#7 Alumoweld shield wire from str. 2028/92 to 2028/93. MODIFICATIONS TO EXISTING FACILITIES: 1. Replace (15) existing 230kV conductor strain insulator assemblies with (15) 230kV bundled conductor crossing strain assemblies. 2. Replace (21) existing 230kV conductor strain insulator assemblies with (21) 230kV bundled conductor strain assemblies. 3. Replace (32) existing shield wire strain insulator assemblies with (32) OPGW strain assemblies. PERMANENT FACILITIES TO BE INSTALLED: 1. Install (137) 230 kV double circuit monopole steel monopole tangent strs. 2. Install (28) 230 kV double circuit steel monopole dead end strs. on foundations as follows: a. Structures 2028/1, 3-5, 9, 11, 13, 16, 21-23, 31, 34, 48, 54, 68, 73, 86, 99-100, 102, 120, 125, 129, 137, 157, 168, 173 3. Install (4) 230 kV double circuit steel 2 pole deadend strs. on foundations as follows: a. Strs. 2028/12, 14-15, 20 4. Install (1) 230kV double circuit steel backbone DDE str. with switch attachments on foundations as follows: a. Strs. 2028/43B 5. Install approx. 23.90 miles of single circuit 3-phase 2-768.2 ACSS/TW/HS 250 MOT conductor from str. 2028/1A (I5/1A) to 2028/92 and from 2028/93 to 2028/176. 6. Install approx. 24.08 miles of(2) DNO-11410 OPGW from str. 2028/1A to 2028/176. a. Assumes20 OPGW splices throughout the line.
Right of way	Existing Right-of-Way will be used.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$119,348,869.89
Component cost (in-service year)	$127,822,639.64

Substation Upgrade Component

Component title	Charlottesville Substation Terminal Equipment Uprate (99-3189)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Charlottesville
Substation zone	355
Substation upgrade scope	Purchase & Install Substation Material: 1. Two (2), 230 kV, 80kAIC, 4000A, SF6 Circuit Breakers. 2. Four (4), 230 kV, 4000A Center Break Switches. 3. One (1), 230 kV, 4000 A Wave Trap. 4. Three (3), 230 kV Capacitive Coupled Voltage Transformers. 5. Approximately 90 FT 5 in. Sch. 40 AL tube bus. 6. Foundations and steel structures as required. 7. Conductor, connectors, conduit, control cable, and grounding material as necessary per engineering standards. Remove Substation Material: 1. Two (2), 230kV, 50kAIC, 3000A, SF6 Circuit Breaker. 2. Four (4), 230 kV, 3000A Center Break Switches. 3. One (1), 230 kV, 2000 A Wave Trap 4. Three (3), 230 kV Capacitive Coupled Voltage Transformer 5. Approximately 90 FT 3.5 in. Sch. 40 AL tube bus. Purchase & Install Relay Material: 1. Two (2), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 2. One (1), 4506 – 3Ø CCVT Potential Makeup Box 3. Two (2), 4526_D – C.B. w/ BCM Fiber Optic Makeup Box 4. Two (2), 4510 – SEL-2411 Equipment Annunciator 5. One (1), 5203 – 24” Traveling Wave Fault Locator Panel (Panel 57) 6. Three (3), Retired Panels (Panel 40, Panel 41, and Panel 53)

Transformer Information

None

New equipment description	1. Two (2), 230 kV, 80kAIC, 4000A, SF6 Circuit Breakers. 2. Four (4), 230 kV, 4000A Center Break Switches. 3. One (1), 230 kV, 4000 A Wave Trap. 4. Three (3), 230 kV Capacitive Coupled Voltage Transformers.

Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and protection & control design will be revised as part of the SPE scope of work. 3. It was determined that the GA would not need any additional equipment or equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$2,188,500.00
Component cost (in-service year)	$2,343,883.50

Greenfield Transmission Line Component

Component title	New 230 kV Line - Gordonsville to Southall (99-3219)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Point A	Gordonsville
Point B	Southall

Point C

	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Nominal voltage	AC	
Nominal voltage	230	
Line construction type	Overhead	
General route description	New structures shall be placed in expanded ROW adjacent to existing lines 255 and 202 using primarily custom engineered double circuit 230kV steel structures on concrete foundations. It is assumed an additional 60’ of ROW to the North of the existing corridor will be acquired for this project to install this circuit.	
Terrain description	The project area is in the central Virginia Piedmont region with elevations ranging from approximately 350 to 600 feet. The terrain is predominately vegetated existing right-of-way consisting of moderate slopes. The line will cross Route 15, 33, and 522 and some smaller roads, a railroad track, and several small streams.	
Right-of-way width by segment	New structures shall be placed in expanded ROW adjacent to existing lines 255 and 202 using primarily custom engineered double circuit 230kV steel structures on concrete foundations. It is assumed an additional 60’ of ROW to the North of the existing corridor will be acquired for this project to install this circuit.	
Electrical transmission infrastructure crossings	To be determined in detailed design.	
Civil infrastructure/major waterway facility crossing plan	Refer to section A.5 of 993219 Real Estate and Permitting Summary.	
Environmental impacts	Refer to section A.4 of 993219 Real Estate and Permitting Summary.	
Tower characteristics	New structures shall be primarily custom engineered double circuit 230kV steel structures on concrete foundations.	
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	

Component Cost Details - In Current Year $

Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$232,492,710.00
Component cost (in-service year)	$248,999,692.41

Substation Upgrade Component

Component title	Gordonsville Substation Terminal Equipment Uprate (99-3219)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Gordonsville
Substation zone	363
Substation upgrade scope	Purchase & Install Substation Material: 1. One (1), 230kV, 80kAIC, 4000A, SF6 Circuit Breaker. 2. Two (2), 230kV, 4000A, Double End Break Switches. 3. Three (3), 230kV Coupling Capacitor Voltage Transformers. 4. Three (3), 180 kV MO(s), 144 kV MCOV Surge Arrester. 5. Conductors, connectors, conduit, foundation, steel, control cables, and grounding materials as needed per engineering standards. Purchase & Install Relay Material: 1. One (1), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 2. One (1), 1340 – 24” Dual SEL-411L CD/Fiber Line Panel 3. One (1), 4506 – 3Ø CCVT Potential Makeup Box 4. One (1), 4510 - SEL-2411 Equipment Annunciator 5. One (1), 4526_A – Circuit Breaker Fiber Optic Makeup Box

Transformer Information

None

New equipment description	1. One (1), 230kV, 80kAIC, 4000A, SF6 Circuit Breaker. 2. Two (2), 230kV, 4000A, Double End Break Switches. 3. Three (3), 230kV Coupling Capacitor Voltage Transformers. 4. Three (3), 180 kV MO(s), 144 kV MCOV Surge Arrester.
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 3. It was determined that the GA would not need any equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$1,426,157.30
Component cost (in-service year)	$1,527,414.00

Substation Upgrade Component

Component title	Southall Substation Terminal Equipment Uprate (99-3219)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Substation name	Southall
Substation zone	357
Substation upgrade scope	Purchase & Install Substation Material: 1. One (1), 230kV, 80kAIC, 4000A, SF6 Circuit Breaker. 2. Two (2), 230kV, 4000A, Double End Break Switches. 3. Three (3), 230kV Coupling Capacitor Voltage Transformers. 4. Three (3), 180 kV MO(s), 144 kV MCOV Surge Arrester. 5. Conductors, connectors, conduit, foundation, steel, control cables, and grounding materials as needed per engineering standards. Purchase & Install Relay Material: 1. One (1), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 2. One (1), 1340 – 24” Dual SEL-411L CD/Fiber Line Panel 3. One (1), 4506 – 3Ø CCVT Potential Makeup Box 4. One (1), 4510 - SEL-2411 Equipment Annunciator 5. One (1), 4526_A – Circuit Breaker Fiber Optic Makeup Box

Transformer Information

None

New equipment description	1. One (1), 230kV, 80kAIC, 4000A, SF6 Circuit Breaker. 2. Two (2), 230kV, 4000A, Double End Break Switches. 3. Three (3), 230kV Coupling Capacitor Voltage Transformers. 4. Three (3), 180 kV MO(s), 144 kV MCOV Surge Arrester.
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 3. It was determined that the GA would not need any equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$1,426,157.30
Component cost (in-service year)	$1,527,414.00

Transmission Line Upgrade Component

Component title	Line 2054 Reconductoring - Hollymead to Hollymead Junction (993431 Alt 1)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	Line 2054
Point A	Hollymead
Point B	Hollymead Junction
Point C	
Terrain description	The project is in the Piedmont region, specifically Albemarle. The western mostly suburban, but as it moves east the more rural. There are numerous stream and wetlands crossing as well as minor arterial roads. There is one railroad crossing as well. There are elevation changes along the route with the highest being approximately 1178 feet and the lowest being approximately 340 feet.
Existing Line Physical Characteristics	
Operating voltage	230
Conductor size and type	2-636.0 ACSR (24/7) 150°C MOT
Hardware plan description	Existing hardware will be reused and is assumed to be in good condition.
Tower line characteristics	Existing structures will be reused. Most of the existing structures from Hollymead Substation to Hollymead Junction were built in 2014, and are a mix of H-frames, monopoles, and 2-pole double circuit engineered steel structures on foundations.
Proposed Line Characteristics	

	Designed	Operating
Voltage (kV)	230.000000	230.000000
	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Shield wire size and type	Existing Shield wire will remain	
Rebuild line length	8.39 Miles	
Rebuild portion description	Refer to "993431 ALT 1 - Conceptual Scope & one lines" for complete description.	
Right of way	A right of way width of 120’ is assumed based on existing plan and profiles, map viewer, or right of way extents provided by Dominion. It is assumed no additional ROW will be required. A land rights review will be required for detailed engineering.	
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Component Cost Details - In Current Year $		
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	

Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$13,671,715.02
Component cost (in-service year)	$14,642,407.00

Transmission Line Upgrade Component

Component title	Line 2135 Reconductoring - Hollymead to Hollymead Junction (993431 Alt 1)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	Line 2135
Point A	Hollymead
Point B	Hollymead Junction
Point C	
Terrain description	The project is in the Piedmont region, specifically Albemarle. The western mostly suburban, but as it moves east the more rural. There are numerous stream and wetlands crossing as well as minor arterial roads. There is one railroad crossing as well. There are elevation changes along the route with the highest being approximately 1178 feet and the lowest being approximately 340 feet.
Existing Line Physical Characteristics	
Operating voltage	230
Conductor size and type	2-636.0 ACSR (24/7) 150°C MOT
Hardware plan description	Existing hardware will be reused and is assumed to be in good condition.
Tower line characteristics	Existing structures will be reused. Most of the existing structures from Hollymead Substation to Hollymead Junction were built in 2014, and are a mix of H-frames, monopoles, and 2-pole double circuit engineered steel structures on foundations.
Proposed Line Characteristics	

	Designed	Operating
Voltage (kV)	230.000000	230.000000

	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Shield wire size and type	Existing Shield wire will remain	
Rebuild line length	8.39 Miles	
Rebuild portion description	Refer to "993431 ALT 1 - Conceptual Scope & one lines" for complete description.	
Right of way	A right of way width of 120’ is assumed based on existing plan and profiles, map viewer, or right of way extents provided by Dominion. It is assumed no additional ROW will be required. A land rights review will be required for detailed engineering.	
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Component Cost Details - In Current Year $		
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Total component cost	$13,671,715.02	
Component cost (in-service year)	$14,642,406.77	

Substation Upgrade Component

Component title	Hollymeade Substation Terminal Equipment Upgrade (993431 Alt 1)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Hollymeade
Substation zone	363
Substation upgrade scope	Purchase & Install Substation Material: 1. One (1), 230kV, 80kA, 4000A SF6 Circuit Breaker 2. Two (2), 230kV, 4000A Wave Trap 3. Two (2), 230kV, 4000A Center Break Switches 4. Two (2) 230kV, 4000A, Vertical Break Line Switch with Interrupter 5. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Remove Substation Material: 1. One (1), 230kV, 50kA, 3000A SF6 Circuit Breaker 2. Two (2), 230kV, 3000A Wave Trap 3. Two (2), 230kV, 3000A Center Break Switches 4. Two (2) 230kV, 3000A, Vertical Break Line Switch with Interrupter 5. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Purchase & Install Relay Material: 1. One (1), 4526_A – Transformer Fiber Optic Makeup Box 2. One (1), 4510 - SEL-2411 Equipment Annunciator 3. One (1), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 4. One (1), Relay Reset

Transformer Information

None

New equipment description	1. One (1), 230kV, 80kA, 4000A SF6 Circuit Breaker 2. Two (2), 230kV, 4000A Wave Trap 3. Two (2), 230kV, 4000A Center Break Switches 4. Two (2) 230kV, 4000A, Vertical Break Line Switch with Interrupter
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. 4-hole pad connections must be replaced with 6-hole pad connections to maintain 4000A ratings. 3. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 4. It was determined that the GA would not need any additional equipment or equipment relocation, thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$1,725,650.33
Component cost (in-service year)	$1,848,172.00

Greenfield Transmission Line Component

Component title	New 230 kV Line Terminals - Gordonsville to Charlottesville (99-3431 Alt 2)	
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Point A	Gordonsville	
Point B	Charlottesville	
Point C		
	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	

Nominal voltage	AC
Nominal voltage	230
Line construction type	Overhead
General route description	Installing terminal ends at Gordonsville Substation and Charlottesville Substation.
Terrain description	The project is in the Piedmont region, specifically Albemarle. The western mostly suburban, but as it moves east the more rural. There are numerous stream and wetlands crossing as well as minor arterial roads. There is one railroad crossing as well. There are elevation changes along the route with the highest being approximately 1178 feet and the lowest being approximately 340 feet.
Right-of-way width by segment	Installing terminal ends at Gordonsville Substation and Charlottesville Substation.
Electrical transmission infrastructure crossings	NA
Civil infrastructure/major waterway facility crossing plan	Refer to section A.5 of "99-3431 Real Estate Communications and Permitting Summary".
Environmental impacts	Refer to section A.4 of "99-3431 Real Estate Communications and Permitting Summary".
Tower characteristics	Refer to "993431 ALT 2 Gordonsville-Charlottesville - Conceptual Scope & One Line" for complete description.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$6,225,903.47
Component cost (in-service year)	$6,667,942.60

Substation Upgrade Component

Component title	Gordonsville Substation Terminal Equipment Upgrade (993431 Alt 2)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Gordonsville
Substation zone	363
Substation upgrade scope	Purchase & Install Substation Material: 1. Two (2), 230kV, 80kA, 4000A SF6 Circuit Breaker 2. Four (4), 230kV, 4000A Double End Break Switches 3. Three (3), 230kV Coupling Capacitor Voltage Transformers. 4. Three (3), 180kV MO(s), 144kV MCOV Surge Arresters. 5. Foundation and steel structures as required. 6. Bus, conductors, connectors, conduit, control cables, and grounding material as necessary per engineering standards. Purchase & Install Relay Material: 1. Two (2), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 2. One (1), 1340 – 24” Dual SEL-411L CD/Fiber Line Panel 3. One (1), 4506 – 3Ø CCVT Potential Makeup Box 4. Two (2), 4510 - SEL-2411 Equipment Annunciator 5. Two (2), 4526_A – Circuit Breaker Fiber Optic Makeup Box

Transformer Information

None

New equipment description	1. Two (2), 230kV, 80kA, 4000A SF6 Circuit Breaker 2. Four (4), 230kV, 4000A Double End Break Switches 3. Three (3), 230kV Coupling Capacitor Voltage Transformers. 4. Three (3), 180kV MO(s), 144kV MCOV Surge Arresters.
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. 4-hole pad connections must be replaced with 6-hole pad connections to maintain 4000A ratings. 3. Relay Settings and P&C design will be revised as part of the SPE Scope of Work.
Real-estate description	Substation will not be expanded for this project.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$5,460,867.70
Component cost (in-service year)	$5,848,589.00

Substation Upgrade Component

Component title	Charlottesville Substation Terminal Equipment Upgrade (993431 Alt 2)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Charlottesville
Substation zone	363
Substation upgrade scope	Purchase & Install Substation Material: 1. Two (2), 230kV, 80kA, 4000A SF6 Circuit Breaker 2. Four (4), 230kV, 4000A Double End Break Switches 3. Three (3), 230kV Coupling Capacitor Voltage Transformers. 4. Three (3), 180kV MO(s), 144kV MCOV Surge Arresters. 5. Foundation and steel structures as required. 6. Bus, conductors, connectors, conduit, control cables, and grounding material as necessary per engineering standards. Purchase & Install Relay Material: 1. Two (2), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 2. One (1), 1340 – 24” Dual SEL-411L CD/Fiber Line Panel 3. One (1), 4506 – 3Ø CCVT Potential Makeup Box 4. Two (2), 4510 - SEL-2411 Equipment Annunciator 5. Two (2), 4526_A – Circuit Breaker Fiber Optic Makeup Box

Transformer Information

None

New equipment description	1. Two (2), 230kV, 80kA, 4000A SF6 Circuit Breaker 2. Four (4), 230kV, 4000A Double End Break Switches 3. Three (3), 230kV Coupling Capacitor Voltage Transformers. 4. Three (3), 180kV MO(s), 144kV MCOV Surge Arresters.
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. 4-hole pad connections must be replaced with 6-hole pad connections to maintain 4000A ratings. 3. Relay Settings and P&C design will be revised as part of the SPE Scope of Work.
Real-estate description	Substation will not be expanded for this project.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$2,407,350.00
Component cost (in-service year)	$2,578,272.00

Transmission Line Upgrade Component

Component title	Line 2083 Rebuild - Fredericksburg to Birchwood (99-3458)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	Line 2083
Point A	Fredericksburg
Point B	Birchwood
Point C	
Terrain description	The project area is in the Virginia Piedmont and Virginia Coastal Plain/Tidewater regions with elevations ranging from approximately 20 to 225 feet. The terrain is predominately vegetated existing right-of-way with several areas of residential development consisting of minimal to moderate slopes. The line will include two new crossings of CSX railroad, and new crossings of Routes 1, 206 and 207, the Rappahannock River, Claiborne Run, Little Falls Run, White Oak Run, and Muddy Creek within existing right-of-way.
Existing Line Physical Characteristics	
Operating voltage	230
Conductor size and type	2-721 ACAR (18/19) 90°C MOT [0.87 miles], 2-636 ACSR (24/7) 150°C MOT [0.05 miles], 2-545.6 ACAR (15/7) 90°C MOT [11.33 miles], 1534 ACAR (42/19) 90°C MOT [3.05 miles]
Hardware plan description	Existing hardware will be reused for the reconductoring portion. Hardware assumed to be in good condition. New hardware will be used for the rebuild.
Tower line characteristics	Existing structures will be reused for the reconductoring portion. Structures assumed to be in good condition. New structures will be used for the rebuild.
Proposed Line Characteristics	

	Designed	Operating
Voltage (kV)	230.000000	230.000000
	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000

Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Shield wire size and type	(2) DNO-10410 shield wire	
Rebuild line length	15.3 Miles	
Rebuild portion description	EXISTING FACILITIES TO BE REMOVED: 1. Remove (77) existing single circuit wood 2-pole H-Frame suspension structures. 2. Remove (1) existing single circuit wood 2-pole suspension structure. 3. Remove (9) existing single circuit wood 3 pole double deadend structures. 4. Remove 10) existing single circuit steel monopole double deadend structures. 5. Remove (3) existing single circuit steel monopole suspension structures. 6. Remove approx. 0.87 miles of 3-phase bundled (2) 721 (18/19) ACAR conductor from structure 2083/1A to structure 2083/8 (2157/5405). 7. Remove approx. 0.05 miles of 3-phase bundled (2) 636 (24/7) ACSR conductor from structure 2083/8 (2157/5405) to structure 2083/9 (2157/5406). 8. Remove approx. 11.33 miles of 3-phase bundled (2) 545.6 (15/7) ACAR conductor from structure 2083/9 (2157/5406) to structure 2083/110. 9. Remove approx. 3.05 miles of 3-phase single (1) 1534 (42/19) ACAR conductor from structure 2083/110 to structure 2083/132. 10. Remove 3#6 Alumoweld shield wire. MODIFICATIONS TO EXISTING FACILITIES: 1. Remove and replace (12) existing 230kV conductor strain insulator assemblies with new 230kV bundled 250 MOT conductor crossing strain assemblies. 2. Remove and replace (30) 230kV conductor strain insulator assemblies with new 230kV bundled 250 MOT conductor strain insulator assemblies. 3. Remove and replace (32) 230kV conductor suspension V-string insulator assemblies with new 230kV bundled 250 MOT conductor suspension V-string insulator assemblies. 4. Remove and replace (28) 230kV conductor suspension I-string insulator assemblies with new 230kV bundled 250 MOT conductor suspension I-string insulator assemblies. 5. Remove and replace (22) static strain insulator assemblies with new OPGW strain insulator assemblies. 6. Remove and replace (20) static suspension insulator assemblies with new OPGW suspension insulator assemblies. PERMANENT FACILITIES TO BE INSTALLED: 1. Install (79) 230 kV steel double circuit tangent monopole structure. 2. Install (15) 230 kV steel double circuit double dead end monopole structure. 3. Install (7) 230 kV steel double circuit double dead end 2 pole structure. 4. Install appropriately 15.30 of 3-phase bundled (2) 768.2 ACSS/TW/HS (20/7) 250 MOT “Maumee” conductor from Structure 2083/1A (Fredericksburg Substation) to Structure 2083/132 (Birchwood Substation). 5. Install DNO-11410 OPGW Refer to "993458 Conceptual Scope & one lines" for complete description.	
Right of way	Existing Right-of-Way shall be used.	
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Component Cost Details - In Current Year $		

Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$75,554,390.01
Component cost (in-service year)	$80,918,751.69

Substation Upgrade Component

Component title	Birchwood Substation Terminal Equipment Upgrade (993458)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Birchwood
Substation zone	354
Substation upgrade scope	Relay Reset Only

Transformer Information

None

New equipment description	NA
Substation assumptions	1. Relay Settings and protection & control design will be revised as part of the SPE scope of work. 2. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary.
Real-estate description	Substation is not being expanded.

Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$19,210.00
Component cost (in-service year)	$20,573.91

Substation Upgrade Component

Component title	Fredericksburg Substation Terminal Equipment Upgrade (993458)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Fredericksburg
Substation zone	353

Substation upgrade scope	Purchase & Install Substation Material: 1. Two (2), 230kV, 4000A, 80kA, SF6 Circuit Breakers. 2. Three (3), 230kV, 4000A Center Break Switches. 3. One (1), 230kV, 4000A Wave Trap. 4. Bus, conductors, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Removal Material: 1. Two (2), 230kV, 3000A, 63kA, SF6 Circuit Breakers. 2. Three (3), 230kV, 3000A Center Break Switches. 3. One (1), 3000A Wave Trap. 4. Bus, conductors, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Purchase & Install Relay Material: 1. Two (2), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel. 2. One (1), 1340 – 24” Dual SEL-411L DCB/PLC Line Panel. 3. Two (2), 4526_D – C.B. w/ BCM Fiber Optic Makeup Box. 4. Two (2), 4510 – SEL-2411 Equipment Annunciator. 5. Three (3), Retired Panels (Panel 38, Panel 41, and Panel 42).

Transformer Information

None

New equipment description	1. Two (2), 230kV, 4000A, 80kA, SF6 Circuit Breakers. 2. Three (3), 230kV, 4000A Center Break Switches. 3. One (1), 230kV, 4000A Wave Trap.
Substation assumptions	1. The scope of work depicted on the drawings assumes no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 3. It was determined that the GA would not need any additional equipment or equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$2,188,500.00
Component cost (in-service year)	$2,343,883.50

Transmission Line Upgrade Component

Component title	Line 2076 Rebuild - Northern to Dahlgren (99-3427)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	Line 2076
Point A	Northern
Point B	Dahlgren
Point C	
Terrain description	The project area is in the Virginia Coastal Plain/Tidewater region with elevations ranging from approximately 20 to 195 feet. The terrain is predominately vegetated existing right-of-way with several areas of residential development consisting of minimal to moderate slopes. The line will include new crossings of CSX railroad, Routes 205 and 301, Upper Machodoc Creek, Deep Creek, Williams Creek, Pine Hill Creek, Kings Mill Creek, Mattox Creek, Bundys Swamp, The Big Swamp, Cat Point Creek, Ruin Branch, Pantico Run, Muddy Run, and Branham Mill Swamp, within existing right-of-way.
Existing Line Physical Characteristics	
Operating voltage	230
Conductor size and type	2-636.0 ACSR (27/7) "Rook"
Hardware plan description	Existing hardware to be reused is assumed to be in good condition.
Tower line characteristics	Existing structures to be reused is assumed to be in good condition.
Proposed Line Characteristics	

	Designed	Operating

Voltage (kV)	230.000000	230.000000
	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Shield wire size and type	(2) DNO-10410 shield wire	
Rebuild line length	34 Miles	
Rebuild portion description	PERMANENT FACILITIES TO BE INSTALLED: A. Reconductoring 1. Install approximately 9.5 miles of 2-set 3-phase 2-768.2 ACSS/TW/HS 250°C MOT conductor as follows: a. From structure #2145/171(#2076/170) to Dahlgren Substation (#2145/238 & #2076/103). B. Rebuild 1. Install two hundred ninety-one (291) 230 kV steel single pole structure double circuit I-string structures [Reference Drawing 12.610] on foundations as follows: a. Structures #2076/171-180,182-189,191-195,197-231,233-256,260-261,263-303,305362,364-397,399-414, 419-429,431-437,439-450, and 452-457. 2. Install ten (10) 230 kV steel pole double circuit double dead-end structures [Reference Drawing 12.614] on foundations as follows: a. Structures #2076/181,190,196,232,304,363,398,438,451, and 458. 3. Install four (4) 230 kV double circuit steel H-frame double-dead-end (0-15°) crossing structures [Reference Drawing 12.216] a. Structure #2076/415, 418, and 258-259. 4. Install one (1) 230 kV double circuit steel H-frame tangent structures [Reference Drawing 12.200] a. Structure #2076/417 5. Install three (3) 230 kV 2 steel pole dead-end heavy angle double circuit structures – no arms [Reference Drawing 12.235] on foundations as follows: a. Structures #2076/257,262, and 430. 6. Install one (1) 230 kV double circuit steel backbone 40’-0” pole spacing with switch attachments [Reference Drawing 12.903] on foundations as follows: a. Structures 2076/416 7. Install two (2) 230kV self-supporting switch structure [Reference Drawing 12.830] a. Structures 2076/258s-259s 8. Install approximately 34 miles of 2-set 3-phase 2-768.2 ACSS/TW/HS 250° C MOT conductor as follows: a. From structure #2076/170 to Northern Neck (#2076/459) 9. Install approximately 34 miles of two (2) DNO-11410 OPGW wire as follows: a. From structure #2076/170 to Northern Neck (#2076/459). 10. Install fifteen (15) splice boxes as follows: a. Structures #2076/170, 191, 212, 232, 251, 274, 295,314, 335, 356, 379, 401, 423, 444, and 459 Refer to "993427 Conceptual Scope & One Lines" for complete description.	
Right of way	Existing Right-of-Way shall be used.	
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.	

Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$176,277,952.49
Component cost (in-service year)	$188,793,687.00

Transmission Line Upgrade Component

Component title	Line 2145 Rebuild - Birchwood to Dahlgren (99-3427)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	Line 2145
Point A	Birchwood
Point B	Dahlgren
Point C	
Terrain description	The project area is in the Virginia Coastal Plain/Tidewater region with elevations ranging from approximately 20 to 195 feet. The terrain is predominately vegetated existing right-of-way with several areas of residential development consisting of minimal to moderate slopes. The line will include new crossings of CSX railroad, Routes 205 and 301, Upper Machodoc Creek, Deep Creek, Williams Creek, Pine Hill Creek, Kings Mill Creek, Mattox Creek, Bundys Swamp, The Big Swamp, Cat Point Creek, Ruin Branch, Pantico Run, Muddy Run, and Branham Mill Swamp, within existing right-of-way.

Existing Line Physical Characteristics

Operating voltage	230
Conductor size and type	2-636.0 ACSR (27/7) "Rook"
Hardware plan description	Existing hardware to be reused is assumed to be in good condition.
Tower line characteristics	Existing structures to be reused is assumed to be in good condition.

Proposed Line Characteristics

	Designed	Operating
Voltage (kV)	230.000000	230.000000
	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Shield wire size and type	(2) DNO-10410 shield wire	
Rebuild line length	7.2 Miles	

Rebuild portion description	PERMANENT FACILITIES TO BE INSTALLED: A. Reconductoring 1. Install approximately 3.0 miles of 2-set 3-phase 2-768.2 ACSS/TW/HS (20/7) "Maumee" 250°C MOT conductor as follows: a. From Birchwood Substation (#2145/88) to Structure #2145/110. B. Rebuild 1. Install fifty-two (52) 230 kV steel single pole structure double circuit I-string structures [Reference Drawing 12.610] on foundations as follows: a. Structures #2145/111-126,128-135,138-147,152-164,166-170. 2. Install six (6) 230 kV steel pole double circuit double dead-end structures [Reference Drawing 12.614] on foundations as follows: a. Structures #2145/127, 136-137, 148, 151 and 165. 3. Install one (1) 230 kV 2 steel pole no arms double circuit – double-end heavy angle structures [Reference Drawing 12.235] on foundations as follows: a. Structures #2145/110 4. Install four (2) 230 kV 2 steel pole no arms double circuit – double-end heavy angle [Reference Drawing 12.235 using these as single pole] on foundations as follows: a. Structures #2145/149, 149.5 and 150. b. Install new structure right next to the existing #2145/171 5. Install two (2) 230kV self-supporting switch structure [Reference Drawing 12.830] on foundation as follows: a. Structures #2145/136s-137s. 6. Install approximately 7.2 miles of 2-set 3-phase 2-768.2 ACSS/TW/HS 250°C MOT conductor as follows: a. From structure #2145/110 to #2145/171 7. Install approximately 7.2 miles of two (2) DNO-11410 OPGW wire as follows: a. From Structure #2145/110 to #2145/171 8. Install four (4) splice boxes as follows: a. Structures #2145/110, 131,153, and 171. Refer to "993427 Conceptual Scope & One Lines" for complete description.
Right of way	Existing Right-of-Way shall be used.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Total component cost	$58,759,317.50
Component cost (in-service year)	$62,931,229.04

Substation Upgrade Component

Component title	Dahlgren Substation Terminal Equipment Upgrade (99-3427)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Dahlgren
Substation zone	354
Substation upgrade scope	Purchase & Install Substation Material: 1. Eight (8), 230kV, 4000A Center Break Switches 2. Four (4), 230kV, 4000A, 80kA Circuit Breakers 3. Two (2), 230kV, 4000A, Vertical Break Line Switch with Interrupter 4. One (1), 230kV, 4000A, Wave Trap 5. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Remove Substation Material: 1. Eight (8), 230kV, 3000A Center Break Switches 2. Four (4), 230kV, 3000A, 30kA Circuit Breakers 3. Two (2), 230kV, 3000A, Vertical Break Line Switch with Interrupter 4. One (1), 230kV, 3000A, Wave Trap 5. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Purchase & Install Relay Material: 1. Four (4), 4510 - SEL-2411 Equipment Annunciator 2. Four (4), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 3. Four (4), 4526_A – Circuit Breaker Fiber Optic Makeup Box

Transformer Information

None

New equipment description	1. Eight (8), 230kV, 4000A Center Break Switches 2. Four (4), 230kV, 4000A, 80kA Circuit Breakers 3. Two (2), 230kV, 4000A, Vertical Break Line Switch with Interrupter 4. One (1), 230kV, 4000A, Wave Trap
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. 4-hole pad connections must be replaced with 6-hole pad connections to maintain 4000A ratings. 3. Relay Settings and P&C design will be revised as part of the SPE Scope of Work.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Component Cost Details - In Current Year $

Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$4,009,098.20
Component cost (in-service year)	$4,293,744.17

Substation Upgrade Component

Component title	Locomotive Substation Terminal Equipment Upgrade (99-3427)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Locomotive
Substation zone	354
Substation upgrade scope	(1) Relay Reset

Transformer Information

None

New equipment description	NA

Substation assumptions	1. The scope of work depicted on the drawings assumes no overlap with other designs and construction activities, except as mentioned in this Project Summary. 2. It was determined that the GA would not need any additional equipment or equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$37,137.30
Component cost (in-service year)	$39,773.73

Substation Upgrade Component

Component title	Northern Neck Substation Terminal Equipment Upgrade (99-3427)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Northern Neck
Substation zone	354

Substation upgrade scope	Purchase & Install Substation Material: 1. Four (4), 230kV, 4000A Center Break Switches 2. Two (2), 230kV, 80kAIC, 4000A, SF6 Circuit Breakers 3. One (1), 230kV, 4000A Wave Trap 4. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Remove Substation Material: 1. Four (4), 230kV, 3000A Center Break Switches 2. One (1), 230kV, 63kAIC, 3000A, SF6 Circuit Breaker 3. One (1), 230kV, 40kAIC, 3000A, SF6 Circuit Breaker 4. One (1), 230kV, 2000A Wave Trap 5. Conductor, connectors, conduit, control cable, foundations, structures, and grounding material as per engineering standards. Purchase & Install Relay Material: 1. Two (2), 1510 – 24” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 2. Two (2), 4510 – SEL-2411 Equipment Annunciator 3. Two (2), 4526_A – Circuit Breaker Fiber Optic Makeup Box 4. One (1), Relay Reset

Transformer Information

None

New equipment description	1. Four (4), 230kV, 4000A Center Break Switches 2. Two (2), 230kV, 80kAIC, 4000A, SF6 Circuit Breakers 3. One (1), 230kV, 4000A Wave Trap
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 3. It was determined that the GA would not need any additional equipment or equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$2,188,500.00
Component cost (in-service year)	$2,343,883.50

Substation Upgrade Component

Component title	Bremo Substation Terminal Equipment Upgrade (99-3450)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Bremo
Substation zone	363
Substation upgrade scope	Purchase & Install Substation Material: 1. One (1), 230kV, 4000A, 80kAIC, Circuit Breaker. 2. Two (2) 230kV, 4000A, Center Break Switch, 3. Three (3), 180kV MO (S), 144kV MCOV Surge Arrester. 4. Conductor, connectors, control cable, conduit, steel, foundation, and grounding as required per engineering standards. Remove Substation Material: 1. One (1), 230kV, 2000A Circuit Breaker. 2. Two (2), 230kV, 2000A Center Break Switch. 3. Three (3), 180kV MO (S), 144kV Surge Arrester 4. Conductors, connectors, control cable, conduit, steel, foundation, and grounding as required per engineering standards. Purchase & Install Relay Material: 1. One (1), 1340 – 24” Dual SEL-411L CD/Fiber Line Panel 2. One (1), 1511 – 24” Single SEL-351 Transmission Breaker w/o Reclosing Panel 3. One (1), 4526_A – Circuit Breaker Fiber Optic Makeup Box 4. One (1), 4510 - SEL-2411 Equipment Annunciator 5. Two (2), Panel Retirements

Transformer Information

None

New equipment description	1. One (1), 230kV, 4000A, 80kAIC, Circuit Breaker. 2. Two (2) 230kV, 4000A, Center Break Switch, 3. Three (3), 180kV MO (S), 144kV MCOV Surge Arrester.
Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work. 3. It was determined that the GA would not need any additional equipment or equipment relocation thus it has been omitted from the submittal.
Real-estate description	Substation is not being expanded.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Component Cost Details - In Current Year $

Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$1,779,500.00
Component cost (in-service year)	$1,905,845.00

Substation Upgrade Component

Component title	New 230/115kV Substation - Prince George Substation (99-3206)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Substation name	Prince George
Substation zone	352
Substation upgrade scope	Refer to Scope of Work document for completed description.

Transformer Information

None

New equipment description	Refer to Scope of Work document for completed description.

Substation assumptions	1. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 2. Relay Settings and P&C design will be revised as part of the SPE Scope of Work.
Real-estate description	Real Estate acquisition is required.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Total component cost	$34,053,652.50
Component cost (in-service year)	$36,471,462.13

Transmission Line Upgrade Component

Component title	Line 2089 Reconductoring - Ladysmith CT to Ladysmith (99-3315)
Project description	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Impacted transmission line	Line 2089
Point A	Ladysmith CT
Point B	Ladysmith

Point C

Terrain description	The project area is in the Virginia Piedmont region with elevations ranging from approximately 112 to 300 feet. The terrain is predominately vegetated existing right-of-way consisting of minimal to moderate slopes. The line will include new crossings of Interstate 95, US 1, US 1 BUS, US 3, numerous secondary roads, Motto River, Matta River, Po River, Ni River, and Massaponax Creek.

Existing Line Physical Characteristics

Operating voltage	230
Conductor size and type	2-636 ACSR (24/7) 150°C MOT
Hardware plan description	Existing hardware to be reused. hardware assumed to be in good condition.
Tower line characteristics	Existing structures are assumed to be in good condition.

Proposed Line Characteristics

	Designed	Operating
Voltage (kV)	230.000000	230.000000
	Normal ratings	Emergency ratings
Summer (MVA)	1573.000000	1573.000000
Winter (MVA)	1648.000000	1648.000000
Conductor size and type	2-768.2 ACSS/TW/HS (20/7) 250°C MOT	
Shield wire size and type	DNO-11410 shield wire	
Rebuild line length	3.94 Miles	

Rebuild portion description	Removal • Remove approximately 3.95 miles of existing conductor and OPGW for line 2089 from Structure 2089/27 (Ladysmith CT) to 2089/1 (Ladysmith Sub). o Conductor: 2-636 ACSR, Total Conductor Length: 250,065 ft o OPGW: 45/45mm2/614, Total OPGW Length: 41,678 ft o See Plan and Profile drawing 1-2089-1-5 for line 2089 existing condition details. Reuse • All lattice structures from Structure 2089/27 (Ladysmith CT) to 2089/1 (Ladysmith Sub) will be reused. • Existing substation backbones 2089/1 (Ladysmith Sub) and 2089/27 (Ladysmith CT) will be reused. • Existing double circuit steel monopole structure 2089/2 will be reused. See drawing 1-2089-1-34 (10152-D1). • Existing spun concrete 3-pole deadend structures 2089/19 and 2089/18 will be reused. The lower set of conductors from structure 2089/17 to 2089/18 will be removed. • Existing spun concrete H-Frame deadend structure 2089/20 will be reused. • Steel H-Frame deadend structure 2089/20A will be reused. Install • Install new conductor and OPGW for line 2089 along a 3.95-mile section from Structure 2089/27 (Ladysmith CT) to 2089/1 (Ladysmith Sub). Note: South facing portion of 2089 from 2089/27 (Ladysmith CT) to 2089/18 will not be replaced and will be left idle. o Total conductor length to be ordered for this section of the project: 287,000 ft o Total OPGW length to be ordered for this section of the project: 50,000 ft • The east facing side of the line coming out of Ladysmith CT will be designated as 2089 while the west side will be idle up to structure 2089/18. • Replace OPGW Splice boxes at the following structure locations: o (2) at backbone structure 2089/27 o (2) at backbone structure 2089/1 o (2) at 2089-9
Right of way	Existing Right-of-Way shall be used.
Construction responsibility	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Benefits/Comments	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Component Cost Details - In Current Year $	
Engineering & design	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Permitting / routing / siting	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
ROW / land acquisition	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Materials & equipment	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction & commissioning	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Construction management	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Overheads & miscellaneous costs	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.
Contingency	The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Total component cost	$6,262,759.97
Component cost (in-service year)	$6,707,415.91

Congestion Drivers

None

Existing Flowgates

None

New Flowgates

The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Financial Information

Capital spend start date	02/2025
Construction start date	06/2025
Project Duration (In Months)	52

Additional Comments

None