PJM Facilities Study Report

For

Network Upgrade N9259

Transition Cycle #1

July 2025

Introduction

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff and PJM Manuals. The Transmission Owner (TO) is Virginia Electric and Power Company (VEPCO or Dominion).

A. Project Description

The System Impact Study for PJM Interconnection Transition Cycle #1 has identified the need for PJM Network Upgrade N9259. The scope of this Network Upgrade includes the following:

- Two 230 kV GIS Bus ties at Fentress

B. Transmission Owner Facilities Study Results

1. Detailed Scope of work for Network Upgrade N9259:

The following is a detailed description of Transmission Owner Upgrades for Network Upgrade N9259. These facilities shall be designed according to the Transmission Owner's Applicable Technical Requirements and Standards. Once built the Transmission Owner will own, operate, and maintain these facilities.

See Preliminary Scoping Summaries located in the Appendices, Attachment #1 and #2.

2. MILESTONE SCHEDULE FOR COMPLETION OF DOMINION WORK

Facilities outlined in this report are estimated to take 38 months to construct, from the time of full execution of the Generation Interconnection Agreement and completion of a construction kickoff call. This schedule may be impacted by the timeline for procurement and installation of long lead items and the ability to obtain outages to construct and test the proposed facilities.

Description	Start month	Finish month
Engineering	1	9
Permitting/Procurement	3	35
Construction	36	38

Due to outage congestion, Network Upgrades and/or internal Dominion projects have been identified as having possible outage conflicts with this network upgrade that may affect the estimated milestones listed above. Additional outage sequencing may be required that includes, but not limited to the following projects:

- Coordinate with other projects at Fentress Substation

3. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

- The preliminary construction schedule is dependent on outage availability.
- See Attachment 1 and 2- Preliminary Scoping Summary for additional assumptions

4. LAND REQUIREMENTS

Dominion will be responsible for the following expectations in the area of Real Estate:

- Any additional land needed for Storm Water Management, Landscaping, and Wetlands/Wetlands Mitigation.
- Any other Land/Permitting requirements required by the Network Upgrade

5. ENVIRONMENTAL AND PERMITING

The Dominion will be responsible for the following expectations in the area of Environmental and Permitting:

- Assessment of environmental impacts related to the Network Upgrade including:
    - Environmental Impact Study requirements
    - Environmental Permitting
- A stormwater easement and/or specific stormwater design BMP's to allow access to and use of the facilities, including a maintenance agreement for said stormwater facilities.
- Conditional Use Permit for Substation
- Any additional land needed for Storm Water Management, Landscaping, and Wetlands/Wetlands Mitigation
- Any other Permitting requirements required by the Network Upgrade

C. APPENDICES

Attachment #1: Preliminary Scoping Summary – Substation

Attachment #2: Preliminary Scoping Summary – Transmission

Attachment #1

Project Number: N9259 – Fentress Substation

Project Description: Add Two 230kV GIS Bus Ties

SUBSTATION SCOPE OF WORK

Date: 7/1/2025

Revision Number: 0

Project Summary

Project number N9259 provides for the construction of two new GIS bus ties into the existing 230kV GIS ring bus at Fentress Substation, as part of the Coastal Virginia Offshore Wind project, in Chesapeake, Virginia.

Assumption:

Currently, the scope and estimate assume Dominion standard spread footer foundations. Once the soil information is available and it is prudent to change the design to “helical pile foundations” the Dominion team should be informed to adjust the project estimate at the earliest possible opportunity.

Purchase and install substation material – Network Upgrade:

1. Two (2), 230kV, 4000A, 63kAIC, SF-6 circuit breaker
2. Two (2), 230kV, 4000A, 3-phase double end break switch
3. Six (6), 230kV, relay accuracy CCVT
4. One (1) 230 GIS equipment addition
    a. Four (4), 230kV, 4000A, 80kAIC circuit breaker
    b. Eight (8), 230kV, 4000A, 3-phase breaker disconnect switch
    c. Four (4), 230kV, 4000A, 3-phase line switch
    d. Six (6), 230kV, 2000:5, relay accuracy CT
    e. Six (6), 180kV, 144kV MCOV arrester
5. Six (6), 230kV GIS to air transition structure
6. Approximately 650 linear feet of GIL
7. Two (2), 230kV, heavy duty steel backbone (by Transmission)
8. Station stone as required

9. Station lighting as required
10. Steel structures as required including switch stands, bus supports, station service transformers, CCVT and wave trap supports
11. Foundations as required including control house, equipment, and bus support stands
12. Conductors, connectors, conduits, control cables, cable trough, and grounding materials as per engineering standards

Relocate substation material – Network Upgrade:

1. One (1), 230kV, 167kVA power PT
2. One (1), 230kV, 3000A, 2-phase center break gang operated switch (for PVT)
3. Steel structures as required including switch stands, bus supports, station service transformers, CCVT and wave trap supports
4. Foundations as required including control house, equipment, and bus support stands
5. Conductors, connectors, conduits, control cables, cable trough, and grounding materials as per engineering standards

Purchase and install relay material – Network Upgrade:

1. Two (2), 1110 – 24” SEL-587Z/351A transmission bus panel
2. One (1), 1510 – 24” dual SEL-351-7 transmission breaker with reclosing panel
3. One (1), 1511 – 24” dual SEL-351-7 transmission breaker without reclosing panel
4. Two (2), 4510 – SEL-2411 breaker annunciator
5. Two (2), 4526_A – circuit breaker fiber optic make-up box
6. Two (2), 4200 – bus differential C.T. make-up box
7. Two (2) 4506 – 3-phase CCVT potential make-up box

Attachment #2

230kV Fentress Substation

PROJECT N9259

PRELIMINARY SCOPING SUMMARY

This project serves to install two (2) new GIL lines within Fentress Substation. This work will include the installation of two (2) strain bus spans and two (2) strain bus structures, which will be two (2) 230 kV steel backbone structures. The proposed conductor to be installed between the strain bus structures will be twin bundled (2) 2500 ACAR conductor. This work will occur entirely within Fentress Substation, which is located in Chesapeake County, VA. See **Figure 1** for the project location. The proposed work requires no additional land and will all be completed within the existing right of way. The project will install a total of two (2) new structures.

The strain bus conductor and structures referred to in this scope are not transmission structures and as such do not have a circuit number assigned to them. Structure numbers will be referred to as labeled in **Figure 2**.

Design Considerations:

EXISTING FACILITIES TO BE MODIFIED:

1. Cut and transfer the existing single (1) 2500 ACAR for Line I279 from the back side of existing structure I279/1B (2428/1B) to the ahead side of proposed structure SB2.

2. Cut and transfer the existing OPGW for Line I279 from back side of existing structure I279/1B (2428/1B) to the ahead side of proposed structure SB2.

3. Replace three (3) conductor strain crossing assemblies with three (3) conductor strain crossing assemblies [Reference Drawing 32.338] on the ahead side of the following one (1) existing structure:
    a. Structure I279/1C (2087/1A)

4. Install three (3) conductor strain crossing assemblies [Reference Drawing 32.338] on the ahead side of the following one (1) existing structure:
    a. Structure 2240/1

5. Install two (2) shield wire deadend assemblies [Reference Drawing 42.011] and two (2) shield wire safety catch assemblies [Reference Drawing 42.222] on the following two (2) existing structures:
    a. Structures I279/1C (2087/1A) and 2240/1.

PERMANENT FACILITIES TO BE INSTALLED:

1. Install two (2) 230kV single circuit steel backbone structures [Reference Drawing 12.905] on foundations as follows:
    a. Structures SB1 and SB2.

2. Install approximately 0.06 miles of 3-phase twin bundled (2) 2500 ACAR conductor as follows:
    a. 0.03 miles between existing backbone structure 2240/1 and proposed backbone structure SB1.
    b. 0.03 miles between existing backbone structure I279/1C (2087/1A) and proposed backbone structure SB2.

3. Install approximately 0.12 miles of two (2) 7#7 Alumoweld shield wire as follows:
    a. 0.06 miles between existing backbone structure 2240/1 and proposed backbone structure SB1.
    b. 0.06 miles between existing backbone structure I279/1C (2087/1A) and proposed backbone structure SB2.

4. Install one (1) fiber splice [Reference Drawing 96.530] on the west pole on the proposed backbone structure SB2.

CONCEPTUAL SCOPE NOTES:

1. No PLS-CADD modeling was done for this project.

2. It is assumed for detailed engineering that a LiDAR survey will be required.

3. Any potential height restrictions were not accounted for in this design.

4. All project work will be completed within Fentress Substation and no additional land will be required.

5. A wetland delineation has not been completed as part of this conceptual package.

6. It is assumed that the existing span between existing backbone structure I279/1C (2087/1A) and existing structure I279/1B (2128/1B) can be transferred to the proposed SB2 structure. This will need to analyzed in further detail during detailed engineering.

7. This scope is based on the working copy of the N9259 General Arrangement drawing for Fentress Substation. As this is a working copy of the general arrangement, the copy provided with this scope should be considered for reference only. Please refer to the substation conceptual package for the most up to date document.

CONCEPTUAL ESTIMATE NOTES:

1. Steel pole foundation costs were based off the projects' location and structure type in the regional soil profile map. The regional soil profile map used for this project is Coastal Plains East.

2. Due to the time allotted to create an estimate, stakeholders were not consulted for their respective costs. Stakeholder costs were derived as follows:
    a. DEES permitting costs were based on a cost per mile based off comparable projects in the TC#1 Phase 3 Cycle. Project N9211, which is reconductoring line 123 from Rocky mount Sub to Battleboro Sub, was used to develop the DEES cost per mile due to similar project scope and location.
    b. Siting and Permitting costs were derived using the permitting spreadsheet but not verified by the permitting team.
    c. Real estate acquisition costs were assumed to be $0 due to no additional land needed to be acquired.
    d. Right of Way Management (Encroachment) costs were based on a cost per mile based off comparable projects in the TC#1 Phase 3 Cycle. Project N9143, which is rebuilding line 35 from AltaVista Sub to Gladys Tap, was used to develop the Encroachment cost per mile due to similar project location.
    e. Forestry, Rehab and Access costs were based on a cost per mile based off comparable projects in the TC#1 Phase 3 Cycle. Project N9211, which is reconductoring line 123 from Rocky mount Sub to Battleboro Sub, was used to develop the Forestry and Access cost per mile due to similar project scope and location.
    f. Surveying costs were based on the typical cost to acquire approximately two (2) miles of survey. These costs were provided by the surveying team as part of TC#1 Phase 3 process.
    g. Communications (Marketing Manager) costs are assumed to be Tier 1 - $25K based off similar linear lengths and locations to projects N9211.
    h. Telecommunications costs are assumed to be $0 due to no fiber being installed for this project.

Figure 1 – Project Location

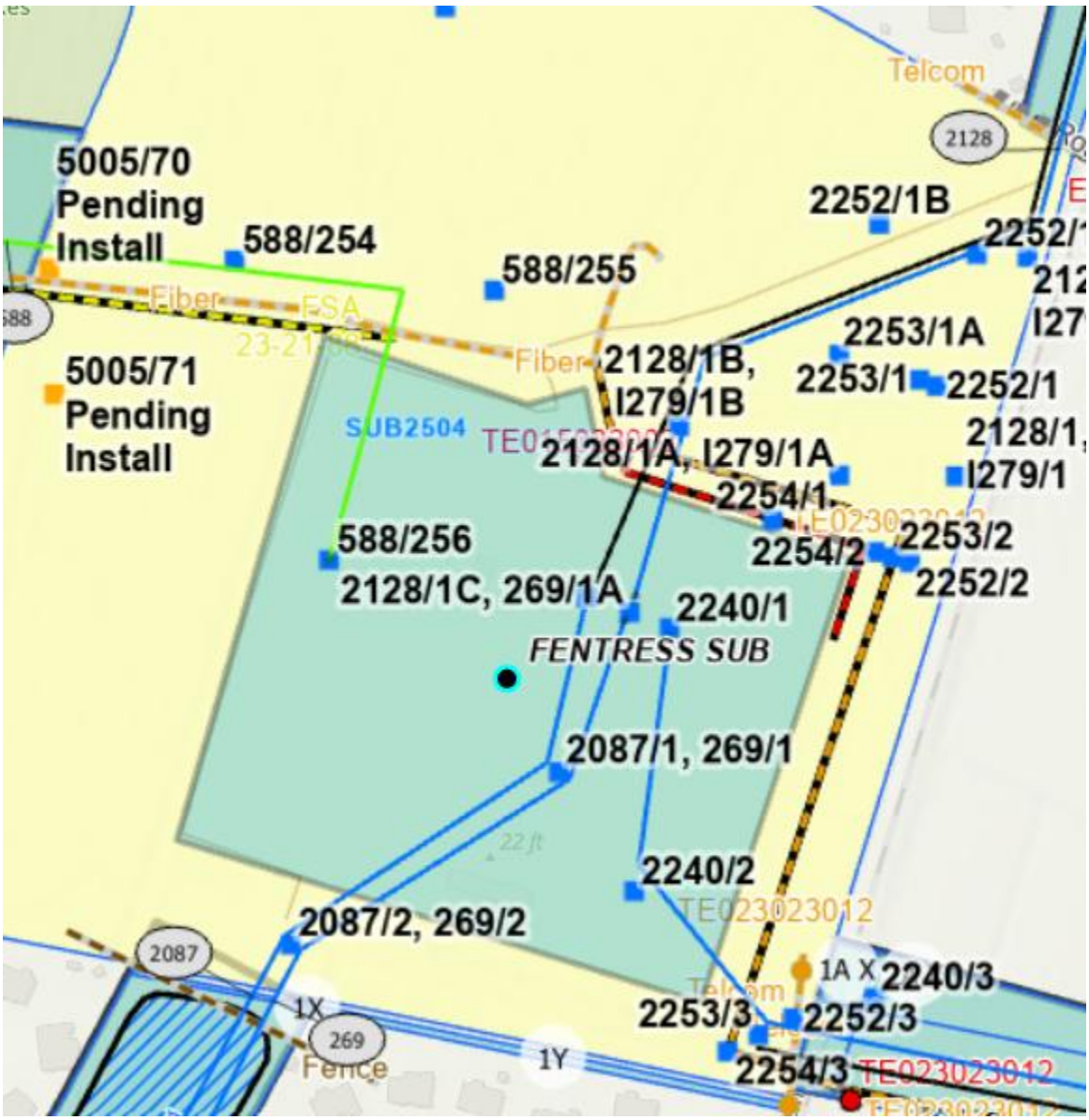
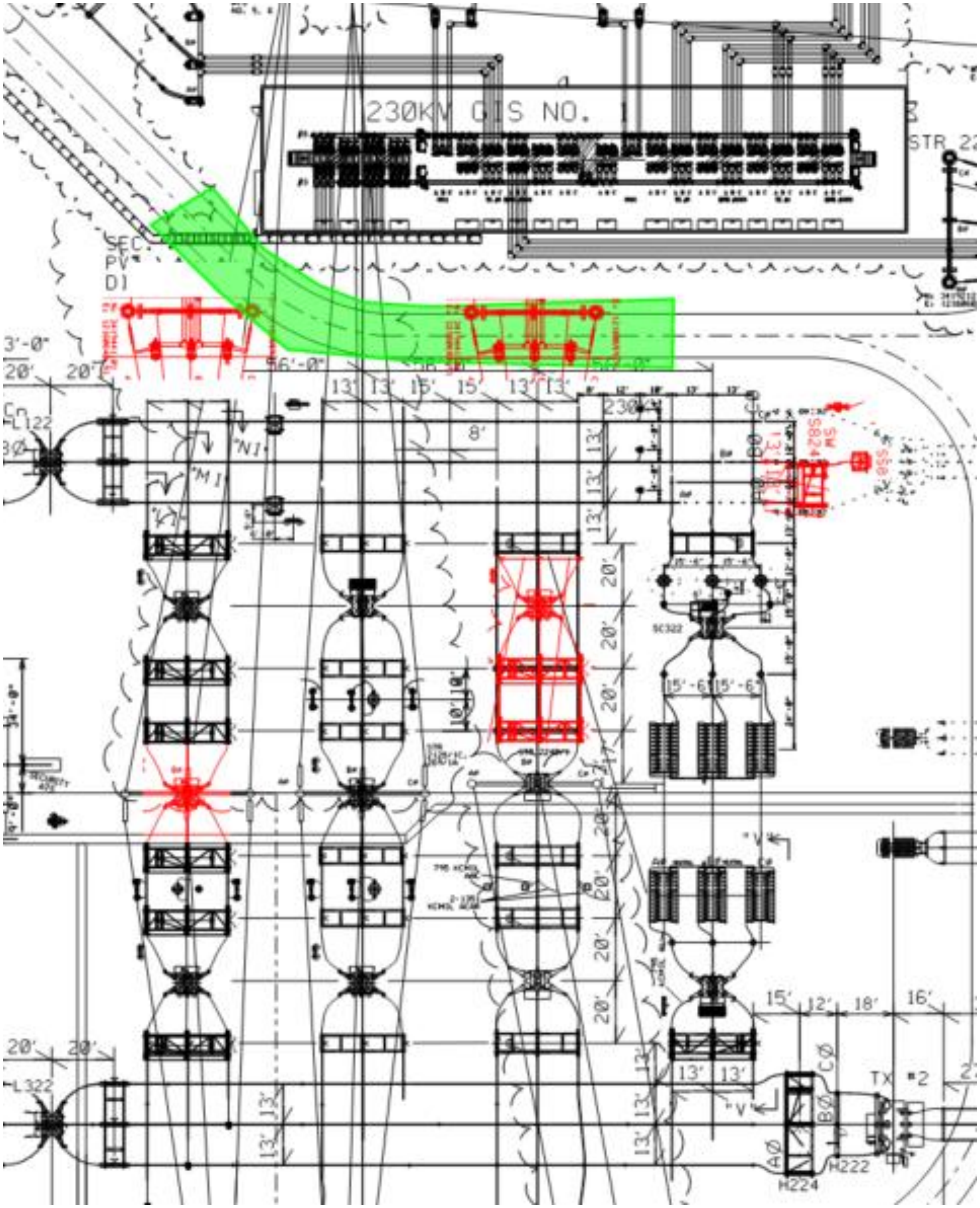


Figure 2 – PreliminaryGeneral Arrangement - Proposed Structure Configuration



Required Material Summary

Item	Qty
230 kV Single Circuit Steel Backbones	2
7,100-Ft Static Reels	1
12,000-Ft Conductor Reels	2