PJM Facilities Study Report

For

Network Upgrade N9204

Transition Cycle #1

June 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 N9204. The scope of this Network Upgrade includes the following:

- Upgrade 1.57 Miles of 230kV transmission line 238 from Sapony to AE2-033 Tap

B. Transmission Owner Facilities Study Results

1. Detailed Scope of work for Network Upgrade N9204:

The following is a detailed description of Transmission Owner Upgrades for Network Upgrade N9204. 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, #2 and #3.

2. MILESTONE SCHEDULE FOR COMPLETION OF DOMINION WORK

Facilities outlined in this report are estimated to take 42 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	30
Permitting/Procurement	3	38
Construction	36	42

3. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

- The preliminary construction schedule is dependent on outage availability.
- See Attachment 1 and 2– Preliminary Scoping Summary – Substation for additional assumptions
- See Attachment 3 – Preliminary Scoping Summary – Transmission line 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 AE2-033

Attachment #2: Preliminary Scoping Summary – Substation Sapony

Attachment #3: Preliminary Scoping Summary – Transmission

Attachment #1

Project Number: N9204 – AE2-033 Station

Project Description: Replace Line Lead for Line 238

SUBSTATION SCOPE OF WORK

Date: 06/20/2025

Revision Number: 0

Project Summary

Network upgrade N9204 provides for the uprate of Line 238 at AE2-033 station in Sussex County, Virginia.

Purchase and install substation material – Network Upgrade:

1. Conductors, connectors, and grounding materials as per engineering standards

Attachment #2

Project Number: N9204 – Sapony Substation

Project Description: Replace Line Lead for Line 238

SUBSTATION SCOPE OF WORK

Date: 06/20/2025

Revision Number: 0

Project Summary

Network upgrade N9204 provides for the uprate of Line 238 at Sapony Substation in Sussex County, Virginia.

Purchase and install substation material – Network Upgrade:

1. Conductors, connectors, and grounding materials as per engineering standards

Attachment #3

230kV LINE 238

AE2-033 - SAPONY

PROJECT N9204

PRELIMINARY SCOPING SUMMARY

This project serves to wreck and rebuild 230kV Line 238 between structure 238/110A at Sapony Substation and structure 238/125, outside of the AE2-033 Tap for approximately 1.57 miles, which is located in Sussex County, VA. See **Figure 1** for the project location. The proposed work will require approximately 7.14 acres of additional land along the existing right of way between structure 238/110A and structure 238/125. The project will install a total of twelve (12) new structures. A Certificate of Public Convenience and Necessity (CPCN) filing is expected due to the quantity of structures that will need to be replaced as part of this project.

The existing line primarily consists of single circuit wood h-frame structures built in 1982. The proposed structure to be installed are direct embed single circuit 230kV steel suspension h-frame structures. The existing twin bundled (2) 721 ACAR (18/19) conductor will be replaced with twin bundled (2) 768.2 ACSS/TW/HS (20/7) “Maumee” conductor. The existing single (1) 26/39 MM2 Optical Ground Wire (OPGW) and single (1) 3#6 Alumoweld shield wire will be replaced with dual (2) DNO-11410 OPGW.

This scope has an overlap with project AE2-033 which plans to interconnect Line 238 to a new substation by cutting in one (1) single circuit 230kV steel backbone structure mid-span between existing single circuit 230kV wood suspension structure 238/125 and 238/126. Additionally, as part of AE2-033, structure 238/125 and structure 238/126 will be replaced with two (2) engineered single circuit steel double deadend h-frame structures. New 3-phase twin bundled (2) 768.2 ACSS (20/7) “Maumee” conductor and dual (2) DNO-11410 OPGW will be installed between structure 238/125 and structure 238/126. It is assumed that project AE2-033 will be constructed prior to the start of this project.

It is also assumed that an outage for Line 238 will be acquired for the work specified in this scope. No temporary conditions have been accounted for in this scope.

Design Considerations:

EXISTING FACILITIES TO BE REMOVED:

1. Remove twelve (12) existing 230kV single circuit suspension wood h-frame structures as follows:
    a. Structures 238/111, and 238/114 to 238/124

2. Remove approximately 1.57 miles of 3-phase twin bundled (2) 721 ACAR (18/19) conductor from the **ahead side** of existing single circuit concrete backbone structure 238/110A inside Sapony Substation to the **back side** of existing single circuit steel double deadend h-frame structure 238/125.

3. Remove approximately 1.57 miles of single (1) 26/39 MM2 OPGW from the **ahead side** of the **east pole** of existing single circuit concrete backbone structure 238/110A inside Sapony Substation to the **back side** of the **east pole** of existing single circuit steel double deadend h-frame structure 238/125.

4. Remove approximately 1.57 miles of single (1) 3#6 Alumoweld shield wire from the **ahead side** of the **west pole** of existing single circuit concrete backbone structure 238/110A inside Sapony Substation to the **back side** of the **west pole** of existing single circuit steel double deadend h-frame structure 238/125.

EXISTING FACILITIES TO BE MODIFIED:

1. Replace three (3) 230kV bundled conductor strain assemblies with three (3) 230kV bundled conductor strain assemblies [32.630] as follows:
    a. Three (3) strain assemblies on the **back side** of structure 238/125
    b. Three (3) strain assemblies on the **ahead side** of backbone structure 238/110A

2. Replace two (2) 230kV bundled conductor I-String suspension assemblies with two (2) 230kV bundled conductor I-String suspension assemblies [32.610] on the following two (2) structures:
    a. Structures 238/112 and 238/113

3. Replace one (1) 230kV bundled conductor V-String suspension assembly with one (1) 230kV bundled conductor V-String suspension assembly [32.850] on the following two (2) structures:
    a. Structure 238/112 and 238/113

4. Replace one (1) insulated OPGW strain assembly and one (1) insulated shield wire strain assembly with two (2) insulated OPGW strain assemblies [96.060] as follows:
    a. Two (2) strain assemblies on the **back side** of structure 238/125
    b. Two (2) strain assemblies on the **ahead side** of backbone structure 238/110A

5. Replace one (1) insulated OPGW suspension assembly and one (1) insulated shield wire suspension assembly with two (2) insulated OPGW suspension assemblies [96.020] on the following two (2) structures:
    a. Structure 238/112 and 238/113

6. Replace three (3) 230kV bundled conductor jumper loop assemblies with three (3) 230kV bundled conductor jumper loop assemblies [39.227] on the following structure:
    a. Structure 238/125

PERMANENT FACILITIES TO BE INSTALLED:

1. Install twelve (12) 230kV direct embed steel single circuit suspension h-frame structures [12.555] as follows:
    a. Structures 238/111, and 238/114 to 238/124

2. Install approximately 1.57 miles of 3-phase twin bundled (2) 768.2 ACSS/TW/HS (20/7) “Maumee” conductor from the **ahead side** of backbone structure 238/110A inside Sapony Substation to the **back side** of structure 238/125.

3. Install approximately 1.57 miles of dual (2) DNO-11410 OPGW from the **ahead side** of backbone structure 238/110A inside Sapony Substation to the **back side** of structure 238/125.
    a. This includes the installation of two (2) fiber splices as follows:
        i. Two (2) fiber splices on structure 238/110A.

CONCEPTUAL SCOPE NOTES:

1. The existing line consists primarily of wood suspension h-frame structures installed in 1982. These structures are considered insufficient for the proposed conductor, resulting in the need for the line to be rebuilt. No PLS-CADD modeling was done for this project. Structures were replaced like for like and estimated using typical transmission right of way characteristics.

2. Structures are designed based off the following NESC code parameters: NESC Heavy, 90 mph wind, ¾” Ice & 30 mph wind regardless of project location.

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

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

5. An existing right of way width of 150 feet is assumed based on existing plan and profiles and map viewer information. An additional 37.5 feet of ROW will be required between structure 238/110A and structure 238/125 for approximately 1.57 miles. The necessary ROW extents will be verified during detailed design.
    a. If additional ROW is unable to be acquired, alternative solutions could be to rebuild the line as monopoles or acquire project specific approval to not meet typical minimum right of way requirements.
    b. The additional right of way may shift the proposed centerline from the existing centerline. This project was scoped assuming that the shift would not be substantial enough to require replacing existing structure 238/112 and existing structure 238/113 which were replaced in 2022.
    c. Typical ROW width for two (2) 230kV lines on h-frame structures adjacent to each other is 200 feet. This scope is only increasing the width to 187.5 feet to account for the existing centerline of adjacent line being offset 47.5 feet from the ROW edge, rather than the typical 60 feet.

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

7. No critical crossings were observed between AE2-033 Tap and Sapony Substation. This will need to analyzed further during detailed engineering.

8. This project scope assumes that project N904 occurs prior to other network upgrades included in Transition Cycle 1, Phase 3. The following projects may impact the project scope if this assumption is incorrect:
    a. N9202 – Replace line switch at Sapony
    b. N9200 – Uprate Line 238 from Sapony – Carson
    c. N8487 – Uprate Line 69 from Frog Lick – Sapony
    d. N9205 – Replace line switch at Sapony.

CONCEPTUAL ESTIMATE NOTES:

1. Engineered steel pole costs were determined based off typical wind and weight spans, line angles, and average structure heights in the typical right of way associated with the structure type.

2. 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 Piedmont.

3. The conceptual estimate assumes that a laydown yard is required for this project.

4. According to the existing plan and profiles, there is a Columbia Gas line running parallel along the east side of Line 238. The gas line is approximately 35 feet from the center of the Line 238 structures. The project estimate includes a $50,000 cost for an AC mitigation study for cathodic protection to cross this and any other existing utility.

5. Prior to detailed engineering, a full land rights review would be required. A desktop review was completed to estimate the project cost.

6. Access estimate cost inputs include the following assumptions:

    a. Work pad totals based on provided SOW and assumptions from kmz file. Assume 15 mats for tangents and 30 mats for angles at each work pad for reconductor work and 50 mats per pull pad.
    b. DDE structures assumed based off of wire reel lengths - based off of pull pad locations.
    c. Pull pad locations based on location of major road/water crossings and line mileage.
    d. Assuming that existing stone in Substations will be used for access per SOW and that access is existing or will be built by others before the start of construction. Assumes that the substations will be constructed with access roads built to and from Substations and work from inside the substations for Backbone installation.
    e. Assumes no delays due to permitting or real estate issues after work begins. Assume no schedule compressions from SOC/PJM.
    f. Assumes all clearing and forestry costs have been captured by others. No access costs for forestry activities included in this pricing.
    g. Stream crossing based on estimates from aerial imagery.
    h. Assumes that all existing roads may be dressed with stone that can remain at the end of the project. Assumes existing two track roads in many locations will be impermeable. No costs for stone road removal are included.

Figure 1 – Project Location

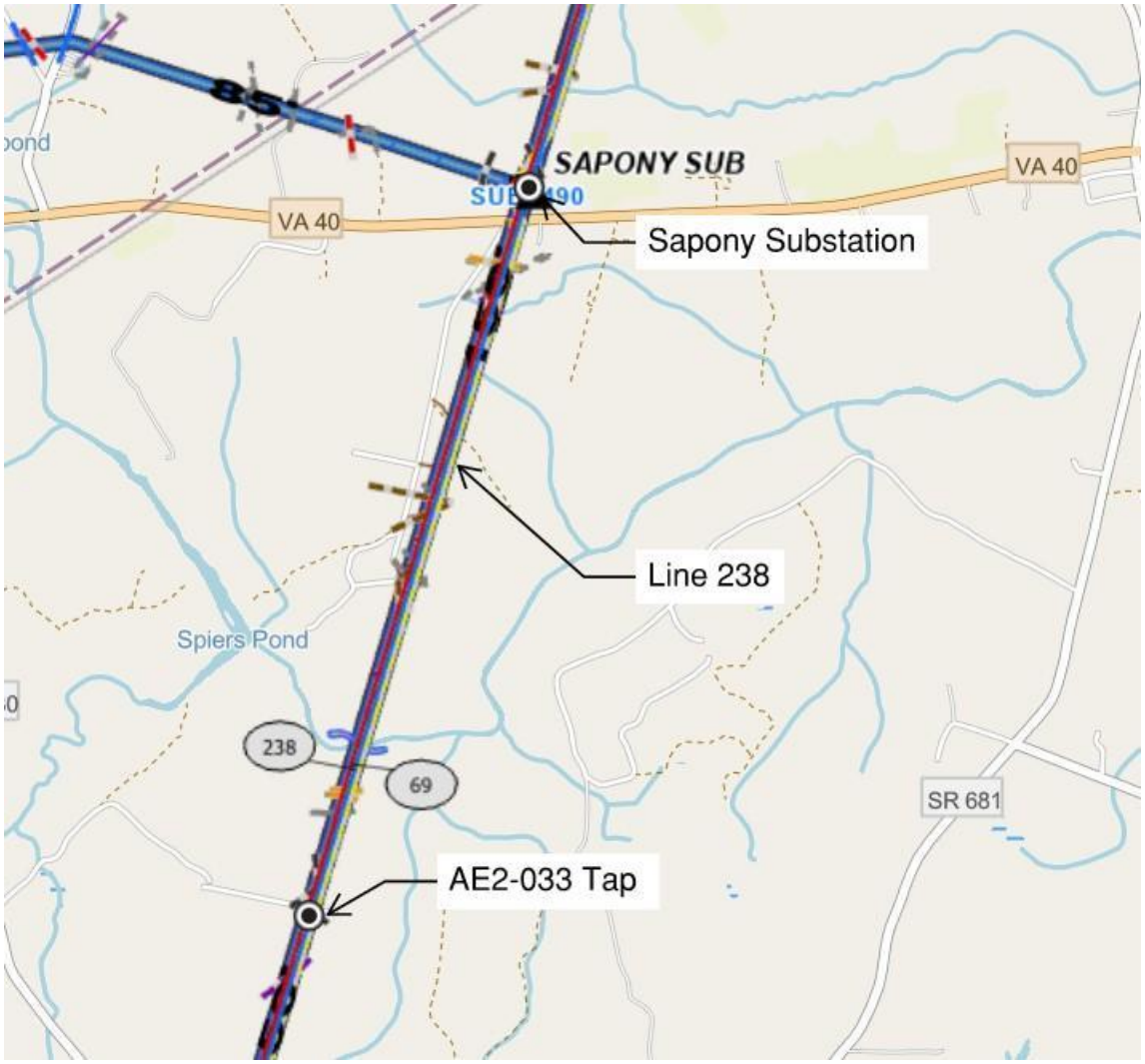
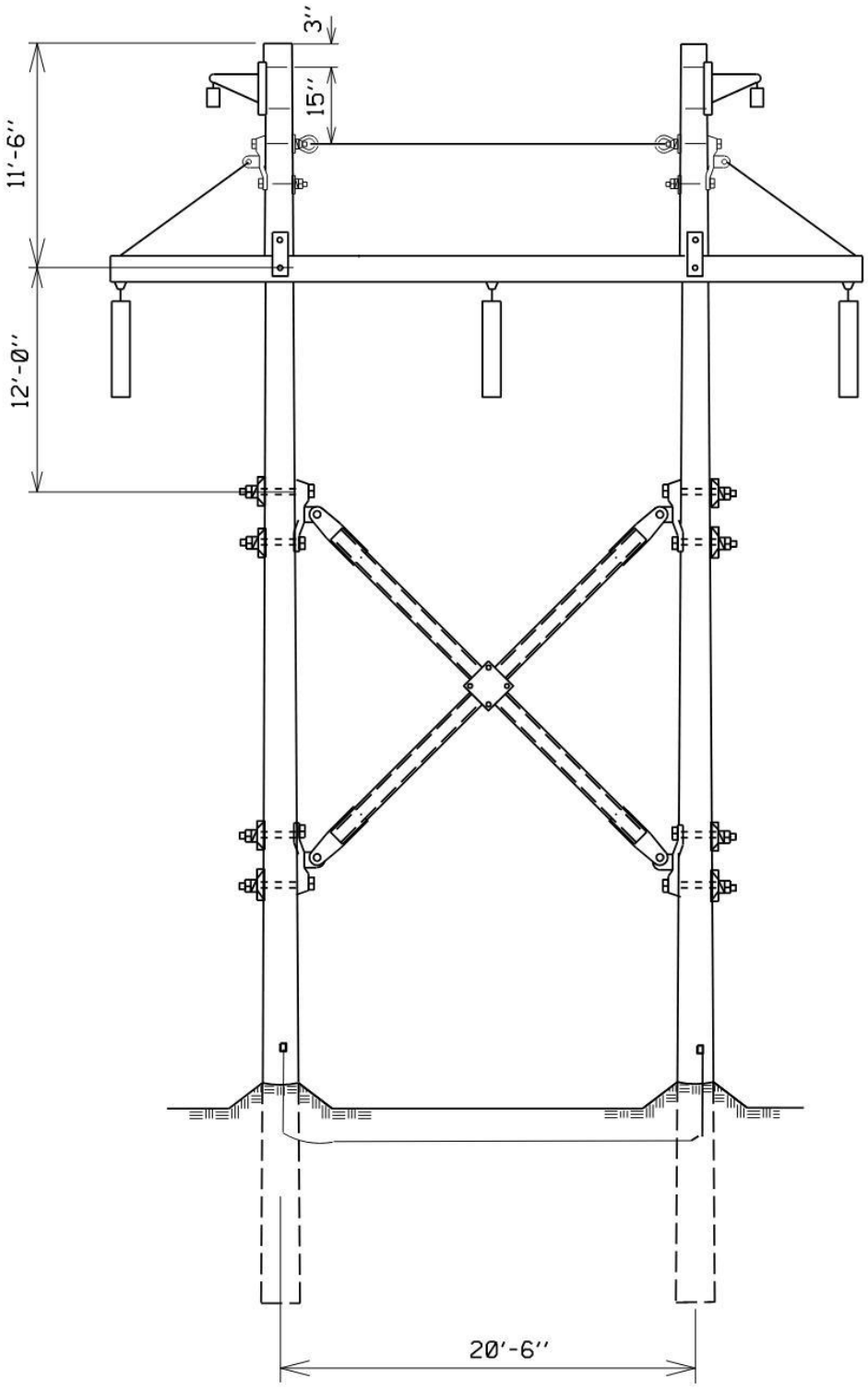


Figure 2 – Proposed Structure Configuration



Required Material Summary

Item	Qty
230kV SC Suspension Steel H-Frame [12.160]	12
12,000-Ft DNO-11410 OPGW Reels	2
12,000-Ft 768.2 ACSS/TW/HS “Maumee” Conductor Reels	6