PJM Facilities Study Report

For

Network Upgrade N9651

Transition Cycle #1

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 N9651. The scope of this Network Upgrade includes the following:

- Upgrade 10.05 Miles of 115kV transmission line 1059 from Northern Neck Substation to Moon Corner Substation

The Preliminary Scoping Document located in the Appendices, Attachment #1, #2, and #3.

B. Transmission Owner Facilities Study Results

1. Detailed Scope of work for Network Upgrade N9651:

The following is a detailed description of Transmission Owner Upgrades for Network Upgrade N9651. 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.

The Preliminary Scoping Document 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 45 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	45

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 Moon Corner

Attachment #2: Preliminary Scoping Summary – Substation Northern Neck

Attachment #3: Preliminary Scoping Summary – Transmission

Attachment #1

Project Number: N9651.0 – Moon Corner Substation

Project Description: Replace Line Lead for Line 1059 **SUBSTATION SCOPE OF WORK**

Date: 8/13/2025

Revision Number: 0

Project Summary

Network Upgrade N9651.0 provides for the uprate of line 1059 at Moon Corner Substation in Richmond County, Virginia.

Assumptions & Clarifications:

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.*

Purchase and install substation material – Network Upgrade:

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

Attachment #2

Project Number: N9651.0 – Northern Neck Substation

Project Description: Replace Line Lead for Line 1059 **SUBSTATION SCOPE OF WORK**

Date: 08/13/2025

Revision Number: 0

Prepared By: Courtney Buser, Kyle Lundeen, Duane Miller

Project Summary

Network Upgrade N9651.0 provides for the uprate of line 1059 at Northern Neck Substation in Richmond County, Virginia.

Assumptions & Clarifications:

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.*

Purchase and install substation material – Network Upgrade:

2. One (1), 115kV, heavy duty steel backbone (by Transmission)
3. Conductors, connectors, control cables, steel, and grounding materials as per engineering standards

Purchase and install relay material – Network Upgrade:

1. One (1), 1340 – 24” dual SEL-411L DCB/PLC line panel

Remove relay material – Network Upgrade:

1. Remove Panel No. 32

Attachment #3

115 kV LINE #1059

Northern Neck Sub – Moon Corner Sub

PROJECT N9651

PRELIMINARY SCOPING SUMMARY

This project serves to rebuild 115 kV line 1059 from Northern Neck Sub to Moon Corner Sub for approximately 10.05 miles, which is located in Richmond County, VA. See **Figure 1** for the project location. The proposed work requires no additional land and will all be completed within existing right of way. The project will install a total of eighty-four (84) new structures. A Certificate of Public Convenience and Necessity (CPCN) filing will be required for this project.

The existing line consists mainly of 115 kV wood and weathering steel single circuit h-frames built in 1962 and 2005. The proposed structures to be installed are 115 kV single circuit direct embed "DOM" suspension H-frame structures, and 115 kV single circuit engineered steel double deadend H-frame and 3-pole structures. The existing single (1) 477 ACSR 24/7 “Flicker” conductor will be replaced with single (1) 768.2 ACSS/TW/HS “Maumee” conductor. The existing two (2) 3#6 Alumoweld shield wires will be replaced with two (2) DNO-11410 OPGW wires.

Design Considerations:

EXISTING FACILITIES TO BE REMOVED:

1. Remove one (1) existing 115 kV single circuit wood double deadend 3-pole structure as follows:
    a. Structure 1059/414.

2. Remove one (1) existing 115 kV single circuit wood double deadend h-frame as follows:
    a. Structure 1059/428.

3. Remove sixty-two (62) existing 115 kV single circuit wood suspension h-frames as follows:
    a. Structures 1059/416-419, 421-424, 426, 429, 431-432, 434-438, 442, 444-445, 447, 449-452, 454-457, 459-471, 473-482, 485, 487, 489-490, and 492-497.

4. Remove seventeen (17) existing 115 kV single circuit weathering steel suspension h-frames as follows:
    a. Structures 1059/420, 425, 427, 430, 433, 439, 441, 443, 446, 448, 453, 458, 472, 483-484, 488, and 491.

5. Remove two (2) existing 115 kV single circuit wood running angle 3-pole structure as follows:
    a. Structures 1059/415 and 1059/486.

6. Remove one (1) existing 115 kV single circuit galvanized steel deadend A-frame backbone structure as follows:
    a. 1059/413

7. Remove approximately 10.05 miles of single (1) 477 ACSR (24/7) “Flicker” conductor from existing backbone structure 1059/413 to existing backbone structure 1059/499.

8. Remove approximately 10.01 miles of two (2) 3#6 Alumoweld shield wire from existing backbone structure 1059/413 to existing structure 1059/498

9. Remove approximately 0.04 miles of two (2) 7#7 Alumoweld shield wire from existing structure 1059/498 to existing backbone structure 1059/499.

EXISTING FACILITIES TO BE MODIFIED:

1. Install three (3) conductor crossing strain assemblies [Reference Drawing 31.340], and two (2) OPGW strain assemblies [Reference Drawing 96.061] on the back side of the following one (1) backbone structure:
    a. Structure 1059/499

2. Install three (3) conductor suspension assemblies [Reference Drawing 31.500] and two (2) OPGW suspension assemblies [Reference Drawing 96.020] on the following two (2) structures:
    a. Structures 1059/440 and 1059/498

PERMANENT FACILITIES TO BE INSTALLED:

1. Install seventy-six (76) 115 kV single circuit direct embed "DOM" suspension H-frame structures [Reference Drawing 11.655] on foundations as follows:
    a. Structures 1059/416-427, 429-439, 441-445, 447-462, 464-480, 482-485, and 487-497.

2. Install five (5) 115 kV single circuit engineered steel double deadend H-frame structures [Reference Drawing 12.165 - 115 kV configuration] on foundations as follows:
    a. Structures 1059/414, 428, 446, 463 and 481.
    b. See **Figure 3** for a visual of the proposed structure design.

3. Install two (2) 115 kV single circuit engineered steel double deadend 3-pole structures [Reference Drawing 12.158 - 115 kV configuration] on foundations as follows:
    a. Structures 1059/415 and 486.
    b. See **Figure 4** for a visual of the proposed structure design.

4. Install one (1) 115 kV single circuit steel backbone structure [Reference Drawing 11.955] on foundations as follows:
    a. Structure 1059/413

5. Install approximately 10.05 miles of 3-phase single (1) 768.2 ACSS/TW/HS “Maumee” conductor from proposed backbone structure 1059/413 to existing backbone structure 1059/499.

6. Install approximately 10.05 miles of two (2) DNO-11410 from proposed structure proposed backbone structure 1059/413 to existing backbone structure 1059/499.
    a. This includes the installation of twelve (12) total splices as follows:
        i. Two (2) on structures 1059/413, 428, 446, 463, 481, and 499.

CONCEPTUAL SCOPE NOTES:

1. The existing line consists primarily of wood and weathering steel h-frame and 3-pole structures. The wood structures are considered insufficient for the proposed conductor, resulting in the need for a portion of the line to be rebuilt. Structures were replaced like for like and estimated using typical transmission right of way characteristics.

   For the weathering steel structures, no PLS-CADD modeling was done for this project. Instead, a design span was used to determine the difference in sags between the existing and proposed conductors at max sag conditions. The resulting change in max sags is approximately 4.92 ft. This change in sags is substantial enough to assume that the line must be rebuilt. Structures were replaced like for like and estimated using typical transmission right of way characteristics.

    a. Design Span Length = 850 feet
    b. Existing Design Tension = 7000 lbs NESC Heavy
    c. Proposed Design Tension = 7000 lbs NESC Heavy
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. An existing right of way width of 100 ft and 175 ft are assumed based on MapViewer. No additional ROW will need to be acquired for this project.
5. An existing right of way width of 100’ is assumed based on existing plan and profiles OR map viewer.
6. A wetland delineation has not been completed as part of this conceptual package.
7. Wire reel lengths were not accounted for this line design. The assumed pull pad locations to avoid tension splices will be determined during detailed design.
8. Existing structures 1059/440 and 1059/498 were installed in 2023 and 2024. These structures were not replaced as part of project N9651. It is assumed that these structures would be sufficient for this design. In detailed engineering, these structures will need to be analyzed further.

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 Coastal Plains East.

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

4. Prior to detailed engineering, a full land rights review would be required.

5. 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 N9213, which is rebuilding line 136 from Tunis Sub to Ahoskie 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 are assumed to be $0 due to no additional right of way being acquired for this project.
    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 N9213, which is rebuilding line 136 from Tunis Sub to Ahoskie Sub, was used to develop the Right of Way Management cost per mile due to similar project scope and 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 N9213, which is rebuilding line 136 from Tunis Sub to Ahoskie Sub, was used to develop the Forestry, Rehab, and Access cost per mile due to similar project scope and location.
    f. Surveying costs were based on the typical cost to acquire approximately ten miles of survey. These costs were provided by the surveying team as part of the TC#1 Phase 3 process.
    g. Communications (Marketing Manager) costs are assumed to be Tier III- $200K due to similar scope of work for project N9213.
    h. Telecommunications costs were based on a cost per mile based off comparable projects in the TC#1 Phase 3 Cycle. Project N9213, which is rebuilding line 136 from Tunis Sub to Ahoskie Sub, was used to develop the Telecommunication cost per mile due to similar project scope and location.

Figure 1 – Project Location

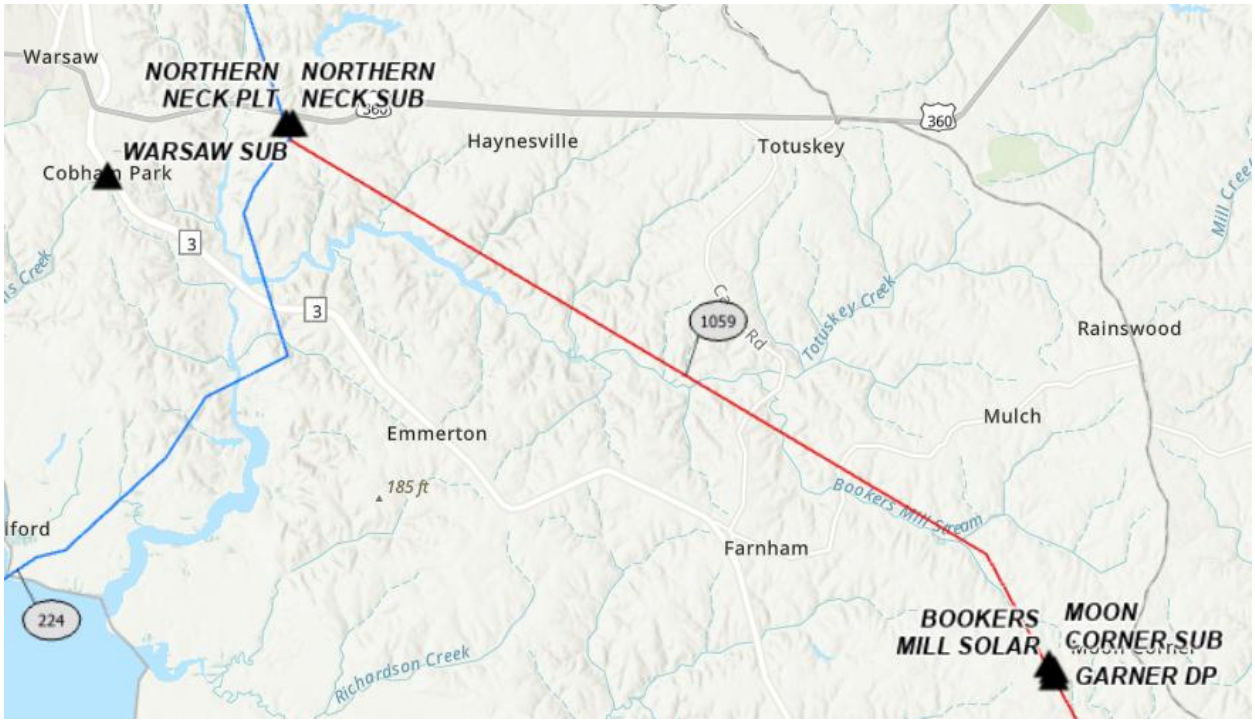


Figure 2 –115kV Single Circuit Direct Embed "DOM" Suspension H-frame Structure Configuration

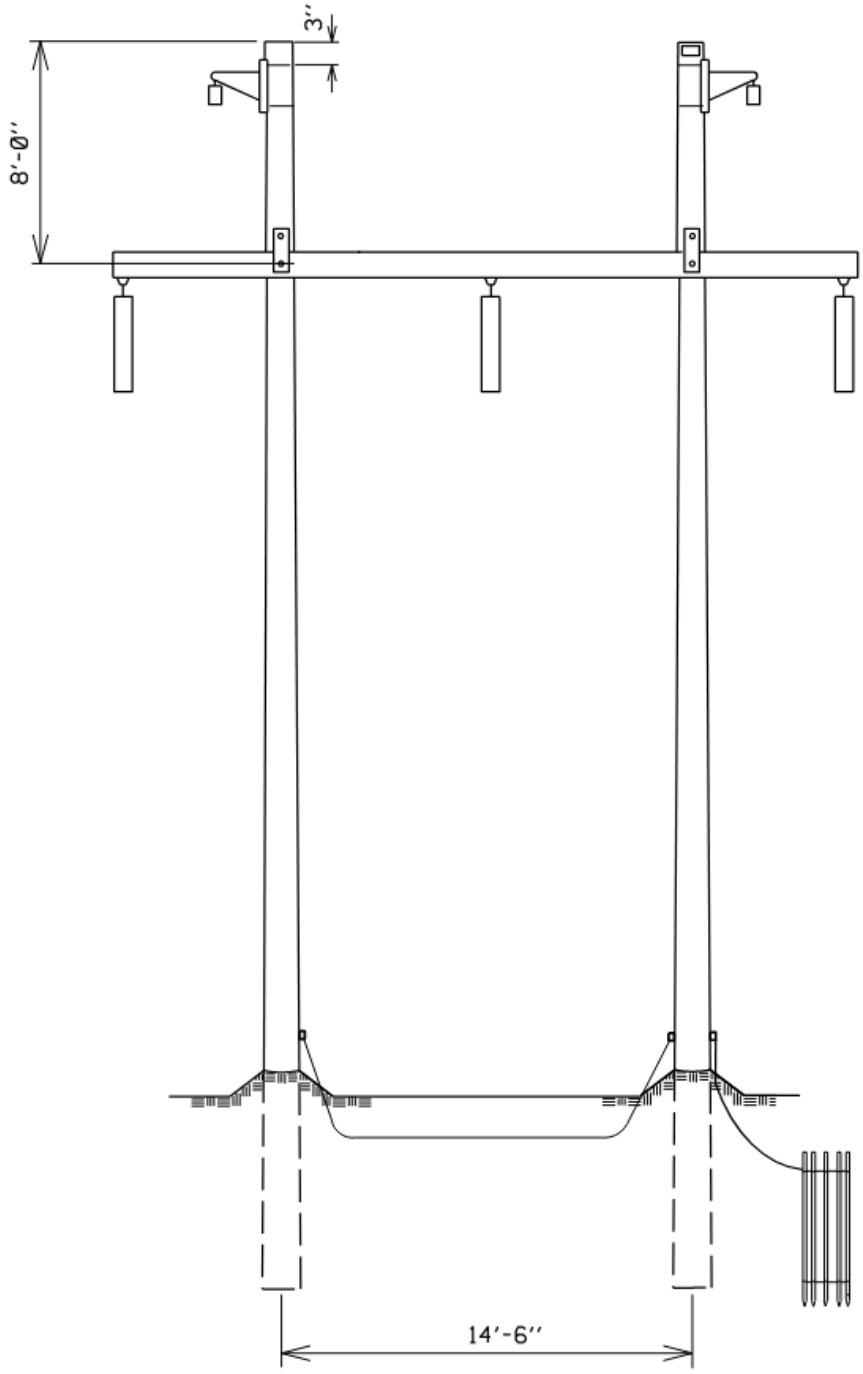


Figure 3 –115 kV Single Circuit Engineered Steel Double Deadend H-frame Structure Configuration

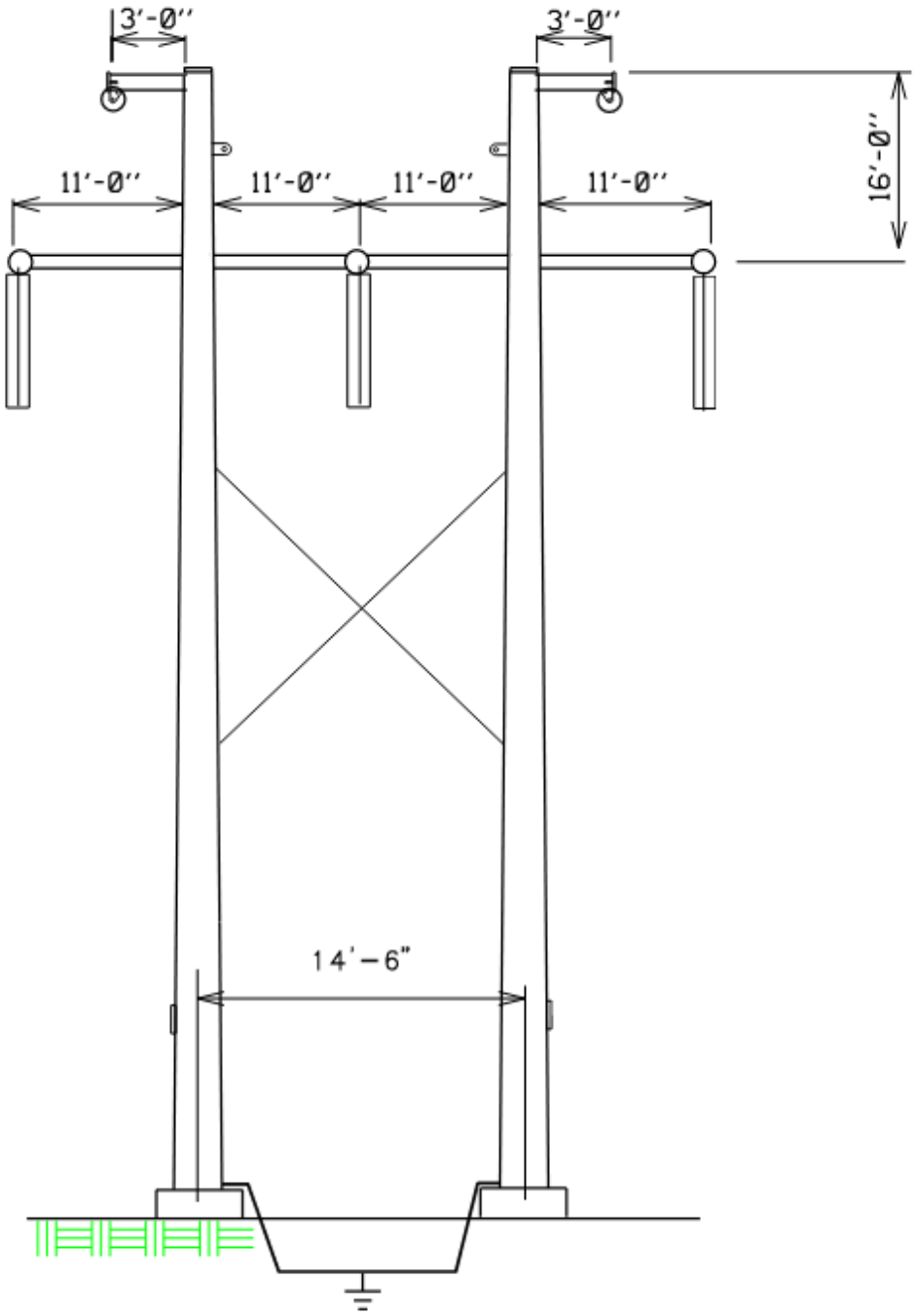
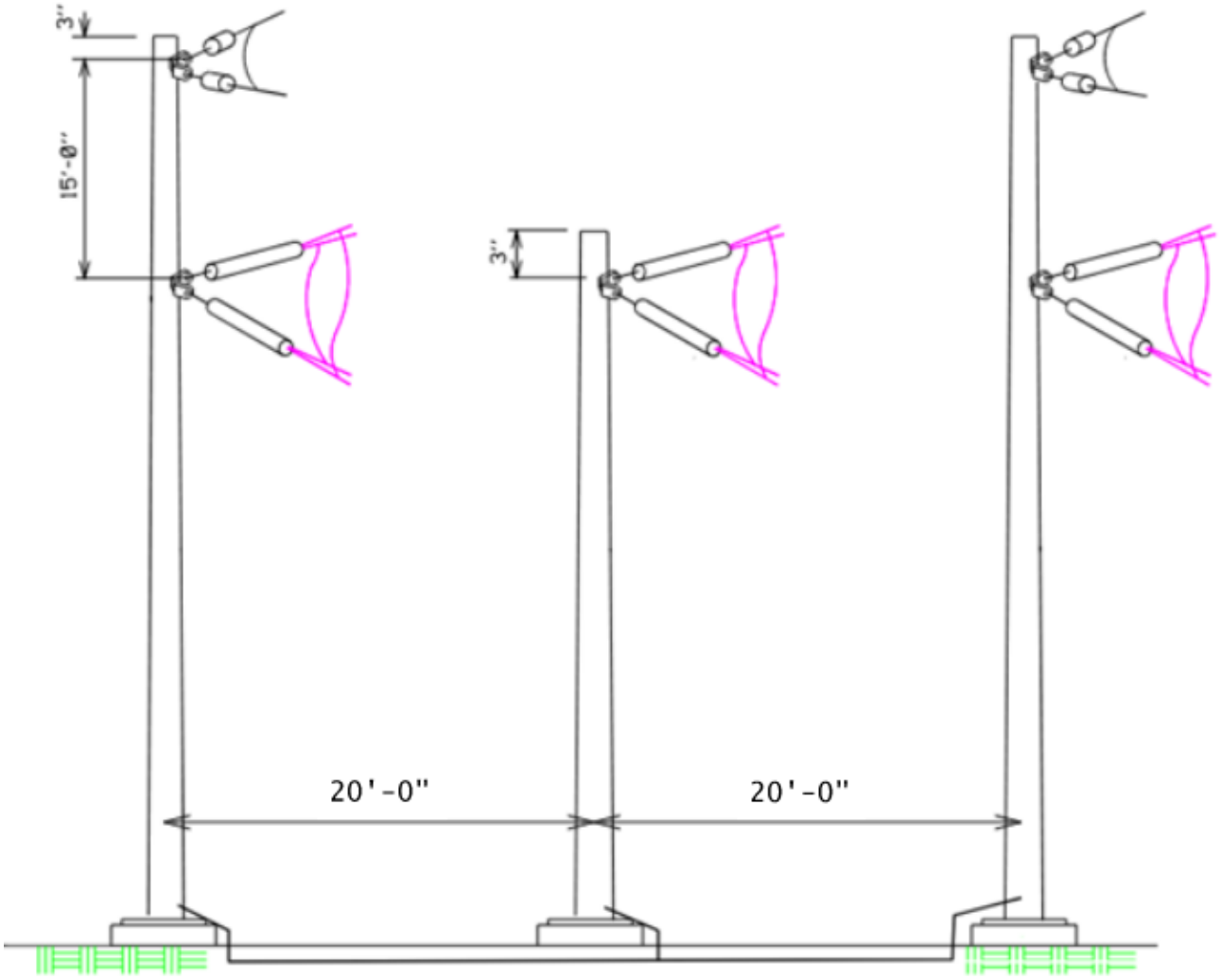


Figure 4 – 115 kV Single Circuit Engineered Steel Double Deadend 3-Pole Structure Configuration



Required Material Summary

Item	Qty
115 kV SC "DOM" Suspension H-Frame Structure [11.655]	76
115 kV SC Engineered Steel DDE H-frame Structure [12.165 - 115 kV Configuration]	5
115 kV SC Engineered Steel DDE 3-Pole Structure [12.158 - 115 kV Configuration]	2
115 kV SC Steel Backbone Structure [11.955]	1
12,000-Ft OPGW Reels	10
12,000-Ft Conductor Reels	15