PJM Facilities Study Report

For

Network Upgrade N7698

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 N7698. The scope of this Network Upgrade includes the following:

- Upgrade 4.29 Miles of 115kV transmission line 65 from Chilton (AD2-074) to Robley (AG1-135)

B. Transmission Owner Facilities Study Results

1. Detailed Scope of work for Network Upgrade N7698:

The following is a detailed description of Transmission Owner Upgrades for Network Upgrade N7698. 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 43 months to construct, from the time of full execution of the Generation Interconnection Agreement and completion of a construction kickoff call. This schedule is 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	43

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:

- Project 992965 – Rebuild Line 65
- Coordinate with other projects on line 65

3. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

- The proposed work requires no additional land and will all be completed within the existing 100' right of way.
- It is assumed that project N7698 would move forward independently of projects N7556 and N9136
- It is assumed for detailed engineering that a LiDAR survey will be required.
- The conceptual estimate assumes that a laydown yard is required for this project.
- The preliminary construction schedule is dependent on outage availability.

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

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 Robley (AG1-135)

Attachment #2: Preliminary Scoping Summary – Substation Chilton (AD2-074)

Attachment #3: Preliminary Scoping Summary – Transmission

Attachment #1

Project Number: N7698 – AG1-135 Station

Project Description: Replace Line Lead for Line 65

SUBSTATION SCOPE OF WORK

Date: 06/20/2025

Revision Number: 0

Project Summary

Network upgrade N7698 provides for the uprate of Line 65 at AG1-135 Station in Richmond County, Virginia.

Purchase and install substation material – Network Upgrade:

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

Attachment #2

Project Number: N7698 – AD2-074 Station

Project Description: Replace Line Lead for Line 65

SUBSTATION SCOPE OF WORK

Date: 06/20/2025

Revision Number: 0

Project Summary

Network upgrade N7698 provides for the uprate of line 65 at AD2-074 Station in Lancaster County, Virginia.

Purchase and install substation material – Network Upgrade:

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

Attachment #3

115 kV LINE #1XX1

Chilton Substation – Robley Substation

PROJECT N7698

PRELIMINARY SCOPING SUMMARY

This project serves to rebuild 115 kV line 65 from Chilton Substation (also referred to as AD2-074 Tap) to Robley Substation (also referred to as AG1-135 Tap) for approximately 4.29 miles, which is located in Richmond and Lancaster Counties, VA. See **Figure 1** for the project location. The proposed work requires 10.4 acres of additional right of way but will primarily occur within the existing right of way. The project will install a total of thirty-three (33) new structures. A Certificate of Public Convenience and Necessity (CPCN) filing will be required due to the structure placements.

The existing line consists mainly of single circuit direct embed weathering steel H-frame structures built in 2013. The proposed structures to be installed are single circuit direct embed "DOM" steel suspension H-frame and single circuit engineered steel 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 (20/7) "Maumee" conductor. The existing one (1) 3#6 Alumoweld shield wire and one (1) DNO-11410 OPGW will be replaced with dual (2) DNO-11410 Optical Ground Wire (OPGW).

Projects AD2-074 and AG1-135 have scope overlap with project N7698. This scope assumes that projects AD2-074 and AG1-135 will occur prior to project N7698. It is assumed that project AD2-074 would renumber line 65 to new line 1XX1 from Robley Sub to Chilton Sub.

Projects N7556 and N9136 have work impacting Chilton Substation and Robley Substation that could impact this project. It is assumed that project N7698 would move forward independently from other projects in Transition Cycle 1 – Phase 3.

Design Considerations:

EXISTING FACILITIES TO BE REMOVED:

1. Remove thirty-two (32) existing 115 kV single circuit weathering steel H-frame suspension structures as follows:
    a. Structures 1XX1/511-532 and 1XX1/534-543

2. Remove one (1) existing 115 kV single circuit weathering steel running angle 3-pole structure as follows:
    a. Structure 1XX1/533

3. Remove approximately 4.29 miles of single (1) 477 ACSR (24/7) “Flicker” conductor from existing structure 1XX1/510 to existing structure 1XX1/543A.

4. Remove approximately 4.29 miles of one (1) 3#6 Alumoweld shield wire from existing structure 1XX1/510 to existing structure 1XX1/543A.

5. Remove approximately 4.29 miles of one (1) DNO-11410 OPGW from existing structure 1XX1/510 to existing structure 1XX1/543A.

EXISTING FACILITIES TO BE MODIFIED:

1. Replace three (3) conductor strain assemblies with three (3) conductor crossing strain assemblies [Reference Drawing 31.340] and one (1) shield wire strain assembly and one (1) OPGW strain assembly with two (2) OPGW strain assemblies [Reference Drawing 96.061] on the following one (1) structure:
    a. Structure 1XX1/543A.

2. Replace three (3) conductor strain assemblies with three (3) conductor strain assemblies [Reference Drawing 31.540], three (3) conductor jumper assemblies with three (3) conductor jumper loops [Reference Drawing 39.225], three (3) training insulators with three (3) training insulators [Reference Drawing 31.640] and one (1) shield wire strain assembly and one (1) OPGW strain assembly with two (2) OPGW strain assemblies [Reference Drawing 96.060] on the following one (1) structure:
    a. Structure 1XX1/510

PERMANENT FACILITIES TO BE INSTALLED:

1. Install thirty-one (31) 115 kV single circuit direct embed “DOM” suspension H-frame structures [Reference Drawing 11.655] on foundations as follows:
    a. Structures 1XX1/511-526, 1XX1/528-532 and 1XX1/534-543
    b. See **Figure 2** for a visual of the proposed structure design.

2. Install one (1) 115 kV engineered steel single circuit double deadend H-frame structure [Reference Drawing 12.165 – 115 kV spacing] on a foundation as follows:
    a. Structure 1XX1/527
    b. See **Figure 3** for a visual of the proposed structure design.

3. Install one (1) 115 kV engineered steel single circuit double deadend 3-pole structure [Reference Drawing 12.158 – 115 kV spacing] on a foundation as follows:
    a. Structure 1XX1/533
    b. See **Figure 4** for a visual of the proposed structure design.

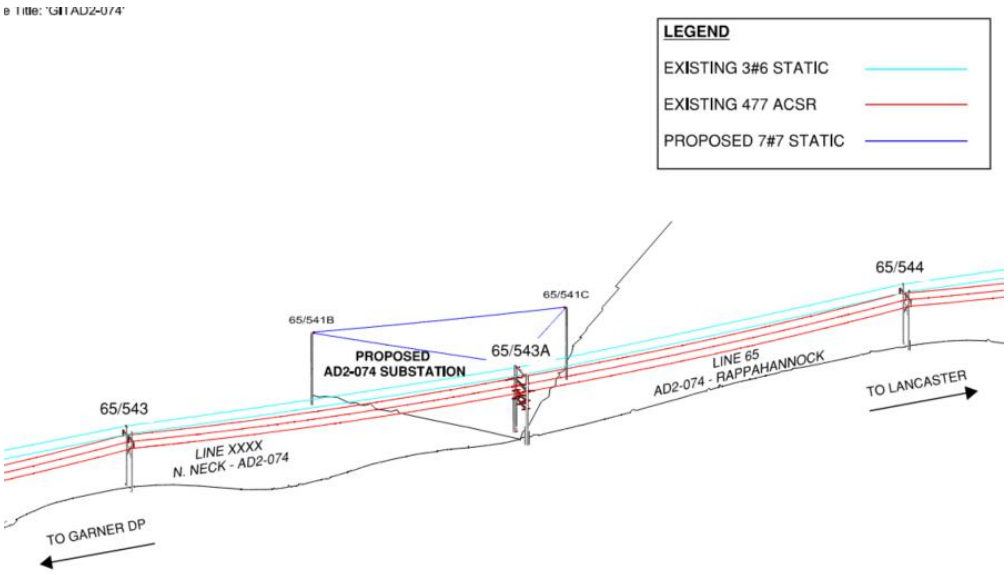
4. Install approximately 4.29 miles of 3-phase single (1) 768.2 ACSS/TW/HS (20/7) “Maumee” conductor from existing structure 1XX1/510 to existing structure 1XX1/543A.

5. Install approximately 4.29 miles of dual (2) DNO-11410 OPGW from existing structure 1XX1/510 to existing structure 1XX1/543A.
    a. This includes the installation of four (4) total splices as follows:
        i. Two (2) fiber splices on structure 1XX1/527
        ii. One (1) fiber splice on existing structures 1XX1/510 and 1XX1/543A.
            - Project N7698 will utilize the existing one (1) splice on structure 1XXX/543A from project AD2-074 and on structure 1XX1/510 from project AG1-135.

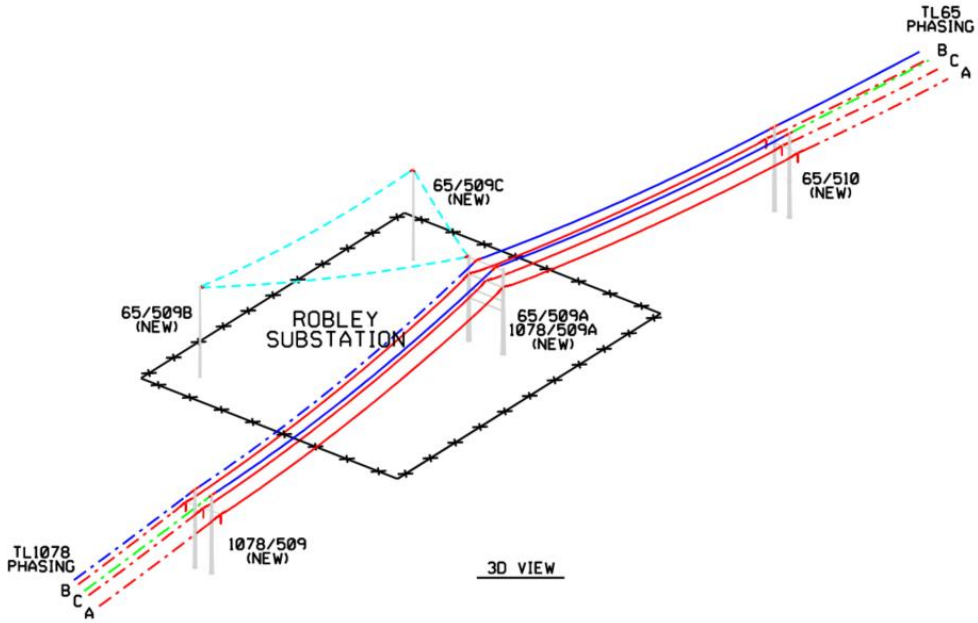
CONCEPTUAL SCOPE NOTES:

1. 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 5.0 feet. 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 = 900 feet
    b. Existing Design Tension = 7,500 lbs NESC Heavy
    c. Proposed Design Tension = 7,500 lbs NESC Heavy
2. This project scope assumes that it is independent from other network upgrades included in Transition Cycle 1 – Phase 3. The following projects may impact the project scope if this assumption is incorrect.
    a. N7556 – Rebuild 115 kV Line 65 from Chilton Sub (AD2-074 Tap) to AG1-146 Tap
    b. N8305 – Rebuild 115 kV Line 65 from Ocran Sub to Whitestone Sub
    c. N9136 – Rebuild 115 kV Line 1078 from Gardner DP to Robley Sub (AG1-135 Tap)
    d. N9145 – Reconductor 115 kV Line 1078 from Garner DP to Moon Corner Sub
    e. N9212 – Rebuild 115 kV Line 65 from Lancaster Sub to Ocran Sub
    f. N9218 – Rebuild 115 kV Line 65 from AG1-146 Tap to Lancaster Sub

3. It is assumed that Chilton Sub (AD2-074 Tap) and Robley Sub (AG1-135) will be constructed prior to project N7698. Project AD2-074 will renumber Line 65 to Line 1XX1 between Robley Sub and Chilton Sub. See the figures below for more information on Chilton Sub (AD2-074 Tap) and Robley Sub (AG1-135 Tap).
    a. Chilton Sub (AD2-074 Tap)



    b. Robley Sub (AG1-135 Tap)



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

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

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

7. An existing right of way width of 100' is assumed based on the map viewer provided by Dominion. Approximately 10.4 acres (20 ft for 4.29 miles) will be required of additional right of way.

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

9. 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.

10. Line 1XX1 crosses a river between structures 1XX1/515 to 1XX1/516 and a road between structures 1XX1/522 to 1XX1/523. No other significant crossings are anticipated. These crossings should be further analyzed during detailed engineering.

11. The proposed structures will be designed based on 115kV spacing while utilizing 230kV engineered structure as reference.

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. A desktop review was completed to estimate the project cost.

5. 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.

6. Due to the time allotted to create an estimate, stakeholders were not consulted for their respective costs. Stakeholder costs were derived as follows:
    a. Telecommunications costs were based on a cost per mile based off comparable projects in the TC#1 Phase 3 Cycle. Project N9212, which is rebuilding Line 65 from Lancaster Sub to Ocran Sub, was used to develop the Telecommunications cost per mile due to similar project scope and location.
    b. Forestry costs were based on a cost per mile based off comparable projects in the TC#1 Phase 3 Cycle. Project N9222, which is rebuilding Line 89 from White Marsh Substation to Hayes, was used to develop the Forestry cost per mile due to similar project scope and location.

Figure 1 – Project Location

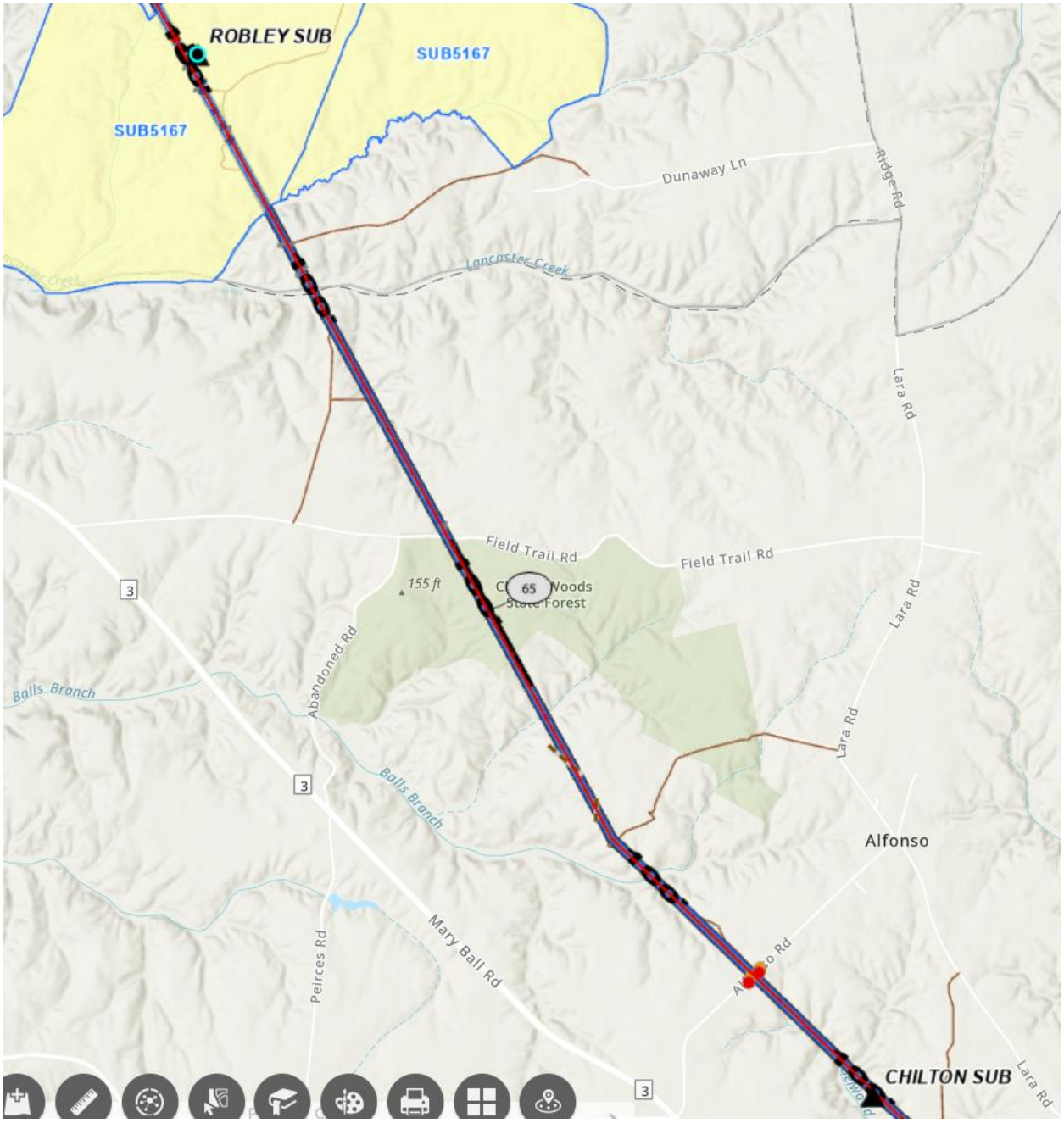


Figure 2 – Proposed Suspension H-Frame Structure Configuration

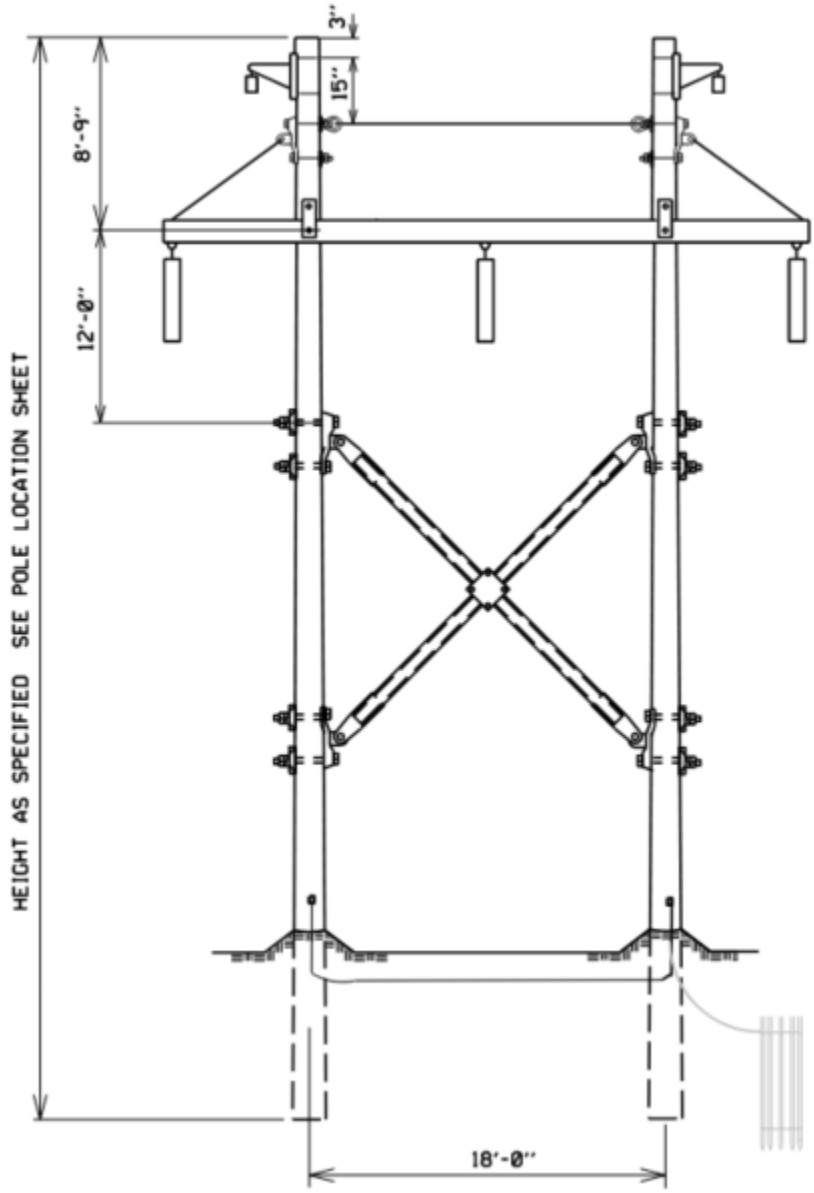


Figure 3 – Proposed Double Deadend H-Frame Structure Configuration

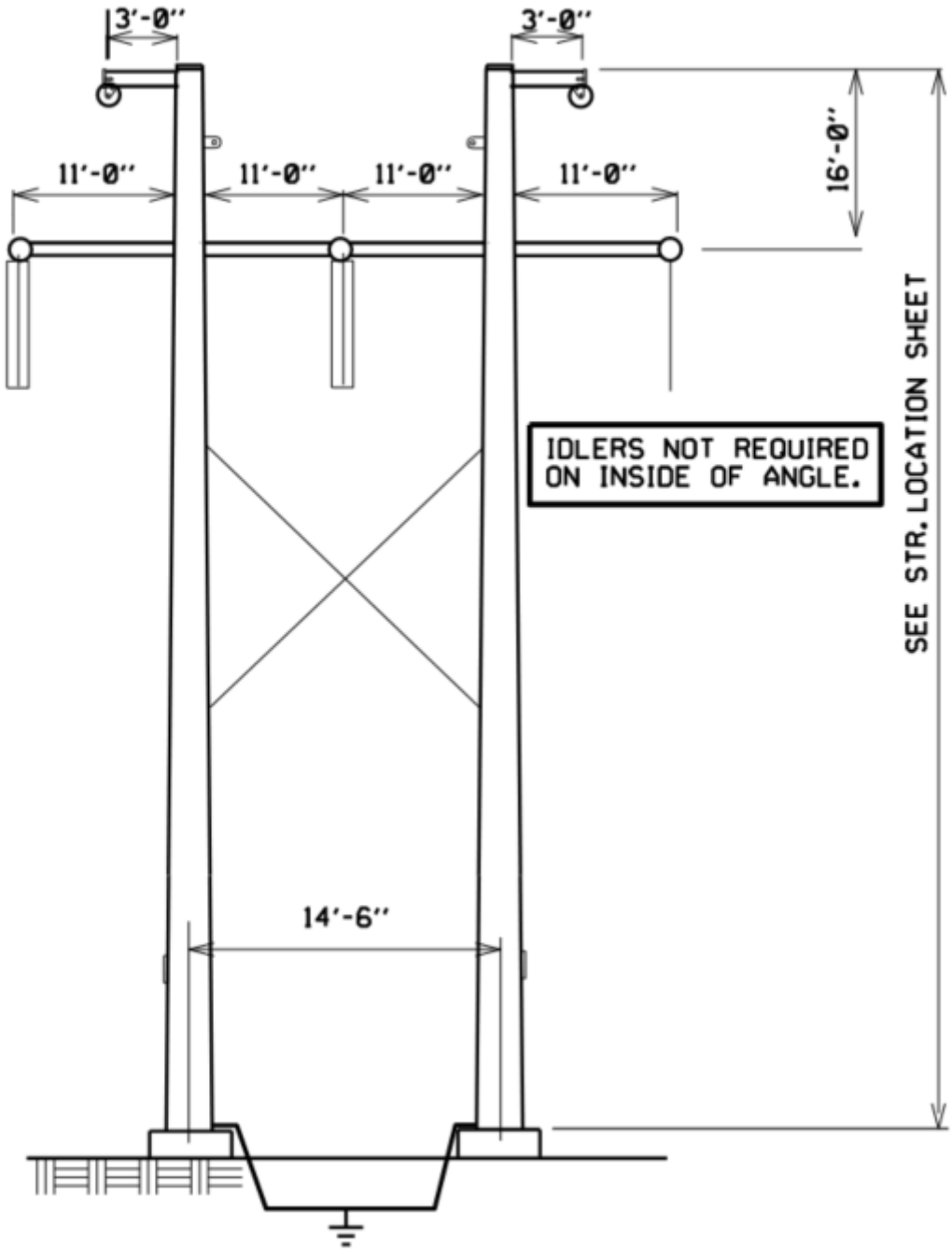
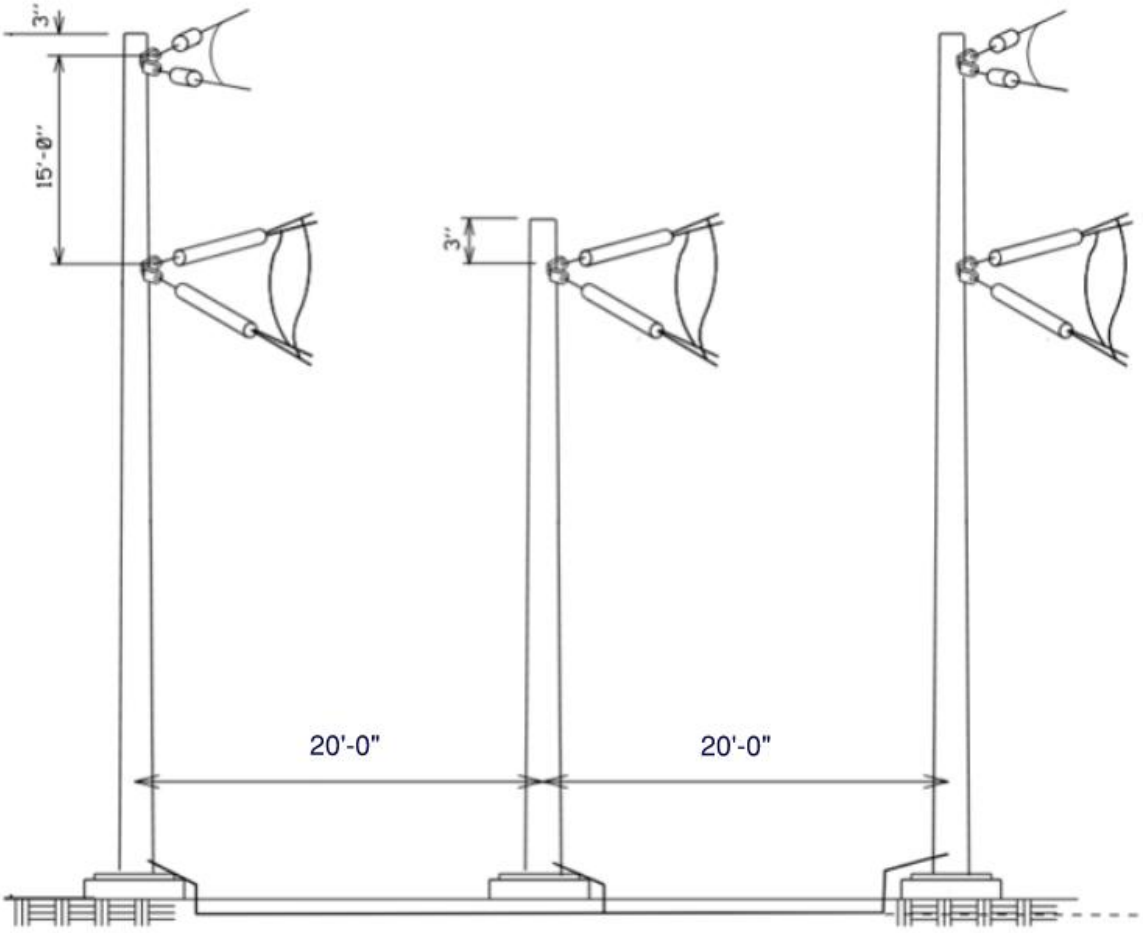


Figure 4 – Proposed Double Deadend 3-Pole Structure Configuration



Required Material Summary

Item	Qty
115kV Single Circuit Direct Embed "DOM" Suspension H-Frame Structure [11.655]	31
115 kV Engineered Steel Double Deadend H-Frame Structure [12.165 – 115 kV spacing]	1
115 kV Engineered Steel Double Deadend 3-pole Structure [12.158 – 115 kV spacing]	1
12,000-Ft 768.2 ACSS/TW/HS (20/7) "Maumee" conductor	7
12,000-Ft DNO-11410 OPGW Reels	6