

PJM Facilities Study Report
for
Network Upgrade N9119

“Keystone - Shelocta 230 kV
Line Upgrade”

Revision 1: August 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 Mid-Atlantic Interstate Transmission, LLC (MAIT).

A. Project Description

The System Impact Study for PJM Interconnection Cycle TC-1 has identified the need for PJM Network Upgrade N9119. The scope of this Network Upgrade includes the following:

- Reconductor/Rebuild the Shelocta – Keystone 230 kV Line, approximately 2.5 miles, with 1272 kcmil 45/7 ACSR 2-conductor.
- Terminate new conductor at Keystone substation.
- Terminate new conductor at Shelocta substation.

Upon completion of the Network Upgrade above, the expected final ratings will be:

Unit	Normal	LTE	STE	LD
MVA	820	1044	1044	1158

B. Transmission Owner Facilities Study Results

1. Detailed Scope of work for Network Upgrade [N9119]:

The following is a detailed description of Transmission Owner Upgrades for Network Upgrade N9119. 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.

1.1 Shelocta – Keystone 230 kV Substation

Reconductor the Shelocta - Keystone 230 kV line (approximately 2.5 miles) with 1272 kcmil 45/7 ACSR 2-conductor. Replace all wood structures with steel structures on foundations.

- Existing Conditions
 - The existing line is constructed mostly on single circuit wood multi-pole structures, along with (3) 3-pole steel deadends and (2) lattice towers.
 - The steel pole deadends and lattice towers are to remain.
 - Per TAMI, the existing conductor 636 kcmil 24/7 ACSR shielded by (1) 3/8" - 7 strand EHS Steel and (1) OPGW.
 - Per GIS View there are no distribution crossings or under-build along this line.
- Installations
 - (3) engineered steel, monopole, dead-end structures on concrete foundations
 - (1) engineered steel, mono-pole, angle structures on concrete foundations
 - (11) light duty steel (WPE Wood Pole Equivalent), monopole, direct embedded, tangent structures
 - 2.5 miles of double bundled 1272 kcmil 45/7 ACSR, shielded by (1) OPGW

- Removals
 - (15) wood, multi-pole, tangent structures
 - 2.5 miles of (3) 636 kcmil 24/7 ACSR and (1) 3/8" - 7 strand EHS Steel and (1) OPGW shield wire
- Siting/Licensing
 - It is assumed a Full Application will be required.
- Scope of Work Assumptions
 - It is assumed the outage requirements for construction on the line can be met.
 - It is assumed that a Ground Survey will be required.
 - It is assumed that only a Ground Survey (instead of LiDAR) is required for the As Built Survey.
 - It is assumed an Aerial LiDAR survey will be required.
 - It is assumed that the existing right-of-way can be used.
 - FAA: Restricted flight zone identified northwest of Keystone Station.
 - The proposed rebuild crosses (1) major roads and (2) other roadways.
 - The proposed rebuild crosses (4) registered wetland areas per TAMI and the FWS Wetland Directory on Google Earth.
 - It is assumed the Keystone and Shelocta Substations will need to remain energized during construction. Temporary construction may be required.
 - Exact structure locations are not yet determined. This rebuild is assumed to be a structure for structure rebuild. An engineering analysis will be required.
 - Assumed an additional 20 foot to all existing structure heights due to the transition from H-frames to monopoles where the phase distances are significantly different. This was to ensure adequate ground clearance per NESC standards.
 - Assumed steel construction for this 230kV rebuild. All structures assumed to be engineered steel on concrete foundations.
 - Existing steel and lattice structures are to remain. Only existing wood structures are to be replaced.
 - It is assumed that the existing structures (to remain) are in adequate condition and can handle the new loading. An engineering analysis during project development will be required.
 - Assumed new insulators are required on the existing (to remain) steel and lattice structures due to a change in conductor size.
 - Assumed line route will need groundline inspection prior to project to ensure justification.
- Ancillary Scope of Work
 - Project Management
 - Provide project management, coordination, administration, scheduling, material management and project development if required.
 - Forestry

- Tree and grub clearing will be required. Priority tree rights are to be expanded.
- Real Estate
 - It is assumed that all work will take place within the existing ROW.
 - A “rights and restrictions” review by Real Estate will be required.
 - Georeferenced ROW extents will be required to be provided to engineering.
 - Real estate estimate has been included for:
 - Internal support including document review, project planning meetings, subcontractor oversight and assistance with transfer of assets if required.
 - External support for rights & restrictions reviews, easement digitization and other GIS support, general project support, acquisition, construction support and damage settlements/releases.
 - Cost of purchasing new land rights and associated fees such as recording costs or permits (estimated--actual cost will depend on current market values, land type, location and negotiations and can vary greatly along the route).
 - We have not included acquisition labor or cost of potential priority tree rights unless specified as needed in the scope and assumptions.
 - Direct damage payments not included in estimate.
 - Any assumed ROW width used in this estimate for the calculation of easement area is based on the widest ROW needed for the voltage and does not account for structure configuration or span lengths. Widths needed can vary upon final design.
 - Access roads (direct cost); assumption of 2 off-ROW road.
 - Laydown yard; assumption of 1 yard (per SMIF) for duration of construction (per interview).
 - Modified easements; assuming 2.
 - Agent per diem.
 - Assuming 10% of New ROW will be accounted for centerline modifications which may arise due to the rebuild. 3.79 acres will need to be acquired.
 - Recording fees=10% of total easement/acquisition cost; fees do not include taxes that may be required by specific counties via a "Real Estate Transfer Tax Statement of Value.
- Environmental
 - Several wetland areas along the rebuild line route have been identified and all applicable permits are required.
 - An environmental review will be required to identify any additional construction constraints or additional permitting requirements.
- Information Technology
 - Estimated cost associated with new OPGW build on Keystone - Shelocta 230 kV line.

- Access Road
 - Access roads will be required along the entire line route and the terrain is hilly.
- Distribution Scope
 - None

1.2 Keystone Substation

Terminate new line conductor on the Shelocta terminal.

- Below Grade Scope of Work
 - None
- Above Grade Scope of Work
 - Terminate new conductor on the Shelocta terminal.
- Relay & Controls
 - Review and revise relay settings as required by line reconductoring.
- Scope of Work Assumptions
 - It is assumed that the existing takeoff structures can accommodate the new loading from the new line conductor.
 - It is assumed that the existing fiber conduit within the substation can be reused.
- Ancillary Scope of Work
 - Project Management
 - Project management will be required for this asset.
 - Information Technology
 - Estimated (1) in-sub fiber run to represent ADSS tail extension from Keystone Substation control house to last T-Line structure for OPGW build.
 - Testing & Commissioning
 - Testing and commissioning services as required for new equipment.

1.3 Shelocta Substation

Terminate new conductor on the Keystone terminal.

- Below Grade Scope of Work
 - None
- Above Grade Scope of Work
 - Terminate new conductor on the Keystone terminal.
- Relay & Controls

- Review and revise relay settings as required by line reconductoring.
- Scope of Work Assumptions
 - It is assumed that the existing takeoff structures can accommodate the new loading from the new line conductor.
 - It is assumed that the existing fiber conduit within the substation can be reused.
- Ancillary Scope of Work
 - Project Management
 - Project management will be required for this asset.
 - Information Technology
 - Estimated (1) in-sub fiber run to represent ADSS tail extension from Shelocta Substation control house to last T-Line structure for OPGW build.
 - Testing & Commissioning
 - Testing and commissioning services as required for new equipment.

2. MILESTONE SCHEDULE FOR COMPLETION OF MAIT WORK

Facilities outlined in this report are estimated to take 23 months to construct, from the time the Generation Interconnection Agreement is fully executed. This schedule is based on the ability to obtain outages to construct and test the proposed facilities.

Description	Start Month	Finish Month
Preliminary Engineering	1	2
Siting, Permits & Real Estate	5	14
Detailed Engineering	3	14
Equipment Delivery	16	16
Construction	17	21
Testing & Commissioning	19	23

3. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

3.1 Scope Assumptions:

- N/A

3.2 Cost Estimate Assumptions:

- The cost estimates provided in this report were developed as of February 25, 2025, based upon current market conditions. Hence, they are subject to significant changes in the event that project implementation is delayed. Notwithstanding the cost estimates from this report being used in the applicable Interconnection Agreement for the related project, FirstEnergy reserves the right to re-evaluate and provide a more accurate cost estimate during the implementation phase of the project.

3.3 Schedule Assumptions:

- FirstEnergy's ability to support this schedule also depends on the feasibility of taking the required outages to support construction. Outages that are determined to negatively impact system reliability or cause congestion may be delayed or denied, at any time, even if they are submitted on time based on the Outage Submittal Rules in section 4.2.1 of PJM Manual 03. This includes, but is not limited to, outages requested between the months of June and September, as well as January and March, which typically get denied due to summer and winter peak conditions. Therefore, the construction schedule will be adjusted as needed to accommodate any outage restrictions that have been identified by FirstEnergy or the Transmission Provider.

4. LAND REQUIREMENTS

4.1 Real Estate Assumption:

- Real Estate estimate includes:
 - Internal support including document review, project planning meetings, subcontractor oversight and assistance with transfer of assets if required.
 - External support for rights & restrictions reviews, easement digitization and other GIS support, general project support, acquisition, construction support and damage settlements/releases.
 - Purchasing new land rights and associated fees such as recording costs or permits (estimated--actual cost will depend on current market values, land type, location and negotiations and can vary greatly along the route).
 - We have not included acquisition labor or cost of potential priority tree rights unless specified as needed in the scope and assumptions.
 - Direct damage payments are not included in the estimate.
 - Any assumed ROW width used in this estimate for the calculation of easement area is based on the widest ROW needed for the voltage and does not account for structure configuration or span lengths. Widths needed can vary upon final design.
 - Access roads (direct cost); assumption of 2 off-ROW road.
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 - Agent per diem.
 - Assuming 10% of New ROW will be accounted for centerline modifications which may arise due to the rebuild. 3.79 acres will need to be acquired.
 - Recording fees=10% of total easement/acquisition cost; fees do not include taxes that may be

required by specific counties via a "Real Estate Transfer Tax Statement of Value.

5. ENVIRONMENTAL AND PERMITTING

The following are environmental and permitting assumptions for the project:

5.1 Environmental:

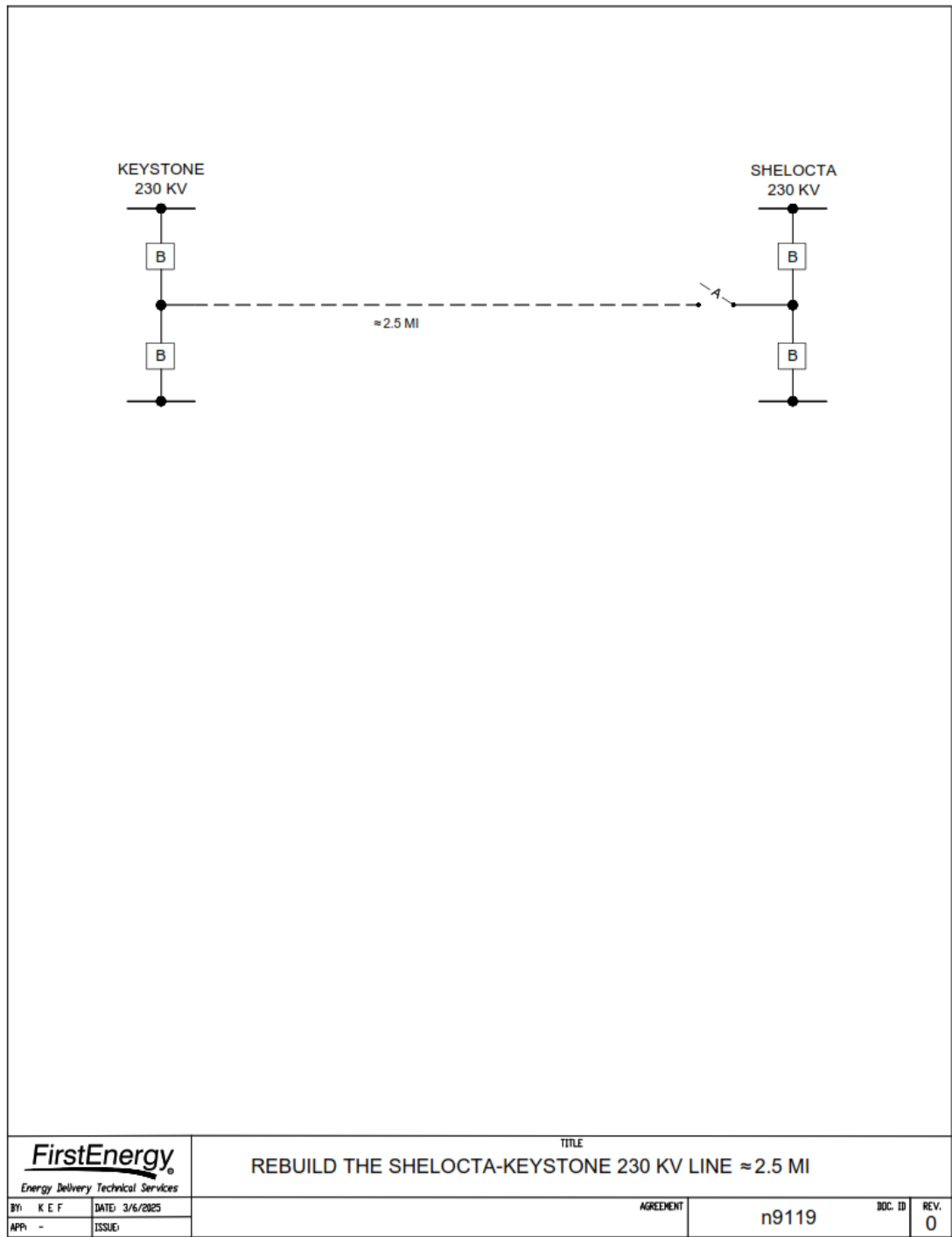
- Road Bonds are required.
- Environmental Filming Documentation of Existing roads are required
- Environmental Access and Road Crossing Permit Fees are required.
- Environmental Development of Permit Binder is required.
- Environmental Cultural Resource Consultation is required.
- Environmental Wetland Permits are required.
- Environmental Construction Walk-down is required.

5.2 Permitting:

- A Full Application will be required.
- FAA: Restricted flight zone identified northwest of Keystone Station.
- The proposed rebuild crosses (1) major roads and (2) other roadways.
- The proposed rebuild crosses (4) registered wetland areas per TAMI and the FWS Wetland Directory in Google Earth.

C. APPENDICES

ATTACHMENT #1: SINGLE LINE DIAGRAM



ATTACHMENT #2: PROTECTION REQUIREMENTS

Not Applicable.