Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request
Project ID AG2-119

"Galion-Roberts South 138 kV II"

Introduction

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff, as well as the Application and Studies Agreement between the Project Developer and PJM Interconnection, LLC (PJM or Transmission Provider (TP)). The Transmission Owner (TO) is American Transmission Systems, Inc. (ATSI), a FirstEnergy company.

This Facility Study was performed to satisfy the Phase 2 Facility Study requirement of the PJM Tariff. The Facility Study is intended to provide scope, cost and schedule estimates for the project as currently defined and approved for Phase 2 study. In the event project changes are made during DP2 that impact this report, updates will be provided as part of the Phase 3 report. Following execution of the project's final agreement, this report will not be updated to account for other changes made as part of the agreements modification clause and instead the scope change process will be followed.

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer has proposed a Solar Generating Facility located in Marion County, Ohio. The installed facilities for AG2-119 will have a total Maximum Facility Output (MFO) of 80 MW with 53.6 MW of this output being recognized by PJM as Capacity.

2. POINT OF INTERCONNECTION (POI)

The Generating Facility will interconnect with the ATSI as a direct connect at the existing Selma (AC2-195) 138 kV Substation.

The proposed generation interconnection is shown on the single line diagram in Attachment #1.

3. POINT OF CHANGE IN OWNERSHIP (PCO)

The Point of Change in Ownership (PCO) will be located at the first dead-end structure, owned by the Project Developer, outside the existing Selma (AC2-195) substation fence line.

4. SCOPE OF PROJECT DEVELOPER FACILITIES

Project Developer will design, build, own, operate and maintain the Project Developer Interconnection Facilities on Project Developer's side of the Point of Change in Ownership (PCO). This includes, but is not limited to:

- Circuit breakers and associated equipment located between the high side of the GSU and the Point of Change in Ownership.
- Generator lead line from the Generating Facility to the Point of Change in Ownership.
- Relay and protective equipment, and Supervisory Control and Data Acquisition (SCADA) and telecommunications equipment to comply with the TO's Applicable Technical Requirements and Standards.

B. Transmission Owner Facilities Study Results

The following is a description of Transmission Owner facilities for physical interconnection of the proposed AG2-119 project to ATSI transmission system. These facilities shall be designed according to FirstEnergy Applicable Technical Requirements and Standards. Once built, ATSI will own, operate, and maintain these Facilities.

1. TRANSMISSION OWNER INTERCONNECTION FACILITIES (TOIF)

1.1 New Interconnection Substation Line Terminal

Install one disconnect switch and one span of 138 kV conductor from the existing Selma substation to the Project Developer-owned dead-end structure at the Point of Change in Ownership (PCO).

- Installations
    - 0.1 miles of conductor 795 kcmil 26/7 ACSR shielded by (1) 7#8 alumoweld
    - Disconnect switch and line exit facilities described in the Selma substation scope.
- Siting & Licensing
    - Full Application will be required.
- Scope of Work Assumptions:
    - Assume minimal social and ecological impacts.
    - Assume no local opposition to the project.
    - Location of PCO assumed
    - Location of generator substation assumed
    - A ground survey will be required for design and as-built.
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.

1.2 AG2-119 Generator Substation

Energize and integrate generator Interconnection Facilities to the Tansmission System.

- Relay and Controls Scope of Work
    - Integrate interconnection facilities protection and controls to the transmission system.
- Ancillary Scope of Work
    - Project Management

        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Testing and Commissioning
        - Testing and commissioning services as required.

2. STAND ALONE NETWORK UPGRADES

None

3. NETWORK UPGRADES

3.1 Selma Substation Expansion

Install new substation equipment to interconnect AG2-119 Interconnection Generation Facility to existing ATSI Selma Substation.

- Below Grade Scope of Work:
    - Install conduit, and control cables to new equipment (assume 200' from equipment to control house).
    - Install foundations for new equipment.
    - Removal of existing foundations noted below.
- Above Grade Scope of Work:
    - Add (1) new H-frame line exit structure in southeast unused bay position.
    - Add (1) new 3-phase 138 kV MOAB Line Disconnect Switch on new H-frame structure (assumer 2000A).
    - Add (1) new 138kV Circuit Breaker (CB) on new foundations (assume 3000A).
    - Add (2) new bus disconnect switches on new foundations (assume 2000A, low stands and no motors).
    - Install new rigid bus, bus supports, strain bus, and conductor drops to support the new AG2-119 line terminal.
        - 15' conductor drops (795 ACSR) and equipment connections (1033.5 ACC)
        - 60' of 4" AL pipe rigid bus
    - Add (1) new 3-phase Surge Arrestors (assume mounted on H-Frame).
    - Add (1) new 3-phase CCVT mounted on new stands and foundations.
    - Allowance of $50k to perform an updated lightning protection and grounding survey that includes updated calculations and drawings.
- Relay & Control Scope of Work

  - Primary relay: (1) SEL-411L relay with line current differential protection over fiber
  - Backup relay: (1) SEL-411L relay with line current differential protection over fiber
  - 138kV Breaker Failure to Trip Relaying – (1) SEL451 relay per breaker
- Additional Equipment to be Removed
  - Remove (2) existing bus supports and foundations for installation of the bus disconnects.
  - Existing lightning mast/foundation will be removed and assume existing shield wire will be reattached to the new H-frame.
- Scope of Work Assumptions:
  - Assume no new bus supports or shield wire needed as they are already installed.
  - Assume will need one light near the CB.
  - Assume will need (2) relay panels.
  - There is enough space in the existing Control house for the new panels.
  - The DC Battery system can support the added relays and equipment.
  - There is enough space inside substation for the added substation equipment and no expansion is needed.
  - Layout/measurements will be similar to the existing 138kv lines at the substation.
- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Environmental
    - Support as required for substation reconfiguration.
  - Information Technology
    - Estimate SCADA work at Selma Substation to support breaker, relays, meters, MOAB, GOAB, and disconnect switch installation.
  - Testing and Commissioning
    - Testing and Commissioning services are required for new equipment and relays.

3.2 Galion Substation

Review and update relay settings.

- Below Grade Scope of Work:
  - N/A
- Above Grade Scope of Work:
  - N/A

- Relay & Control Scope of Work
    - Review and update relay settings.
- Scope of Work Assumptions:
    - Existing relays will be used.
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Information Technology
        - N/A
    - Testing and Commissioning
        - Testing and commissioning services as required for revised relay settings.

3.3 Roberts Substation

Review and update relay settings.

- Below Grade Scope of Work:
    - N/A
- Above Grade Scope of Work:
    - N/A
- Relay & Control Scope of Work
    - Review and update relay settings.
- Scope of Work Assumptions:
    - Existing relays will be used.
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Information Technology
        - N/A
    - Testing and Commissioning
        - Testing and commissioning services as required for revised relay settings.

3.4 Galion – Selma 138 kV Line Relocation

Relocate line exit of the Galion - Selma 138kV Line in Selma Substation to be between AC2-195 and AG2-119 line exits.

- Existing Conditions:
    - Per TAMI the existing line is primarily constructed on double circuit, lattice tower structures. Existing conductor is 477 kcmil 26/7 ACSR shielded by (1) OPGW or (1) 3#6 Alumoweld.
    - The Galion - Selma 138kV Line shares structures with the Galion - Roberts North 138kV Line.
    - Per GIS View, there does not appear to be distribution under-build along the length of the project area on the Galion-Selma 138kV Line
- Installations:
    - (2) single circuit, steel, monopole, dead-end structures on concrete foundations.
    - (1) single circuit, light duty steel, monopole, direct embedded, tangent structure.
    - 0.2 miles of conductor 795 kcmil 26/7 ACSR and (1) 7#8 Alumoweld shield wire and (1) OPGW
    - Transfer existing conductor and shield wire to new dead-end structure
- Removal
    - (1) single circuit, wood, monopole, direct embedded, deadend structure.
    - 0.1 miles of conductor 477 kcmil 26/7 ACSR and (1) 3#6 Alumoweld shield wire
- Siting & Licensing
    - Full Application is required.
- Scope of Work Assumptions:
    - Assume minimal social and ecological impacts.
    - Assume no local opposition to the project.
    - Outage can be obtained to perform line construction.
    - A ground survey will be required for design and as-built.
    - It is assumed the existing conductor and shield wire are in adequate condition and can be transferred. An engineering analysis during project development will be required.
    - New dead-end structure to be located on the Galion - Selma 138kV Line.
    - It is assumed the adjacent structures are in adequate condition and can handle the new loading. An engineering analysis during project development will be required.
    - The exact location of the line entrances to the new Salma Station are unknown.
    - Length of wire install is assumed. Length of wire removal is approximate.
    - Included a tangent structure to ensure crossing clearance and because we don’t have the exact location of the line entrances on the new Salma Station.
    - It is assumed that any guying on existing Str. 3824C, on the Roberts - Selma 138kV Line, are

going to ground and do not require a stub pole install.

- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Access Roads
    - Access roads will be required, terrain is flat, approximately 0.1 miles.
  - Environmental
    - No wetlands
    - 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 Construction walk down is required
    - RTE conultation letters are required
    - Wetland Delineations and WDR are required
    - Stormwater permits and local approvals are assumed
    - Internal environmental engineering and external project management costs are included
  - Forestry
    - Some grub clearing may be required.
  - Real Estate and Right of Way
    - Rights & restrictions review on existing line
    - New ROW will be required.
    - Testing and commissioning services as required for revised relay settings.
    - Real Estate costs have been included for:
      - Internal support including document review, project planning meetings, subcontractor oversight and assistance with transfer of assets if required.
      - External support for general project support, and minimal construction support and damage settlements/releases.
      - Direct damage payments not included in estimate.
      - Kept GIS / R&R for installation of structures.

4. Other Scope of Work

4.1 Revenue metering.

Provide revenue metering equipment at existing Selma substation for AG2-119 generation interconnection.

- Below Grade Scope of Work:
    - (1) Lot of excavation, conduit, backfill, grounding, and wiring, between free standing CT/VT combo and revenue metering.
    - (1) Lot of foundations for free-standing 138kV CT/VT Combo Unit.
- Above Grade Scope of Work:
    - (1) set of 3-phase Free Standing 138kV CT/VT Combo Unit.
- Relay & Control Scope of Work
    - (1) New Revenue Metering Panel with test switches. The material for the revenue meter to be included in revenue metering support estimate.
- Scope of Work Assumptions:
    - It is assumed current and voltage signals will be pulled from new 3-phase free standing CT/VT Combo Units.
    - Assumes enough room in AG2-119 Control house to support a new revenue metering panel.
    - Assumes enough room in AG2-119 substation to add in free standing CT/VT Combo Units. Final location to be determined during detailed engineering.
    - Assumes the same crew that is constructing the Selma substation expansion scope will be adding the revenue metering panel and freestanding CT/VT combo units.
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Revenue Metering
        - Provide high end meter and engineering support for metering at existing Selma substation.
    - Testing and Commissioning
        - Testing and commissioning services as required.

5. MILESTONE SCHEDULE FOR COMPLETION OF ATSI WORK

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

Description	Start Month	Finish Month
Preliminary Engineering	1	2
Siting, Permitting & Real Estate	5	31
Detailed Engineering	3	31
Equipment Delivery	33	33
Construction	34	36
Testing and Commissioning	36	38

- **ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE**

6.1 Scope Assumptions:

- Project Developer will coordinate design and alignment of proposed 138 kV generator lead line with the Transmission Owner for review of any clearance, right-of-way or right-of-way encroachment issues with TO owned facilities.
- Project Developer will coordinate design and construction of proposed 138 kV lead line. For these areas, the Project Developer shall provide TO with proposed drawings prior to construction and as-built drawings, confirmed by as-built survey data post-construction.
- Transmission Owner's preference would be to limit interference and avoid transmission line crossings with new 138 kV terminal positions. As a minimum, Project Developer facilities should not encroach within 100 feet of TO centerline at blowout conditions. If Project Developer's line design does not comply with this requirement TO would need to review this area as a special exception.
- Additional costs will be incurred by the Project Developer, if final alignment of the 138 kV generator lead line causes encroachments, changes, or modifications to any existing or relocated TO facilities.
- Project Developer is responsible for making all arrangements for electric distribution service (if required) for its generation station. No costs or schedule are included herein.
- All new generator only and new generator plus load facilities must be isolated from the ATSI Transmission System by a Power Transformer with a winding configuration meeting the requirements in FirstEnergy's "Requirements for Transmission Connected Facilities" document.
- Revenue metering equipment. Current and voltage transformers shall be installed on the high voltage side of the GSU, on the generation side of the fault-interrupting device, and within the local zone of fault protection for the facility.

6.2 Cost Estimate Assumptions:

- The cost estimates provided in this report were developed as of April 2, 2026, 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

Generator Interconnection Agreement for the related project, ATSI reserves the right to re-evaluate and provide a more accurate cost estimate during the implementation phase of the project. In accordance with section 217 of the Open Access Transmission Tariff, the Project Developer will be responsible for 100 percent of the actual costs of the facilities required to accommodate its Interconnection Request.

- ATSI reserves the right to charge the Project Developer operation and maintenance expenses to maintain the Project Developer attachment facilities, including metering facilities, owned by ATSI. These costs will be specified in the Generator Interconnection Agreement.

6.3 Schedule Assumptions:

- This schedule assumes that all issues covered by the "Environmental, Real Estate and Permitting Issues" section of this document are resolved. Construction cannot begin until after all applicable permits and/or easements have been obtained.
- ATSI'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 ATSI or the Transmission Provider.

- **REVENUE METERING REQUIREMENTS**

All revenue metering needed for this interconnection project must meet the metering requirements stated in Appendix 2, section 8 of the AG2-119 GIA, and in PJM Manuals M01 and M14D. The details of applicable revenue metering requirements are given in the "Requirements for Transmission Connected Facilities" posted on PJM website.

The revenue metering will be installed on the Transmission Owner side of the Point of Change in Ownership, and will be installed, owned, and maintained by Transmission Owner.

The revenue metering system (particularly the revenue metering current transformers) shall be designed to accurately meter the light loads that will occur when the facility is not generating power and only back-feeding station service from the Transmission Owner. This may require the use of high accuracy extended range current transformers.

Transmission Owner will obtain real-time, site-specific, generation data from PJM, via the required communication link from Project Developer to PJM. Transmission Owner will work with PJM and Project Developer to ensure the generation data provided to PJM meets Transmission Owner's requirements.

These requirements are in addition to any metering required by PJM.

- **LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION**
  - No additional land is required for the substation expansion.

- **APPLICABLE TECHNICAL REQUIREMENTS AND STANDARDS**

The Requirements for Transmission Connected Facilities, Revision 7, dated January 27, 2026, shall apply.

The TPP-REF-003 Transmission Planning Criteria, Revision 10, dated December 19, 2023, shall apply.

- **ENVIRONMENTAL AND PERMITING**

The following are possible environmental, real estate and permitting issues:

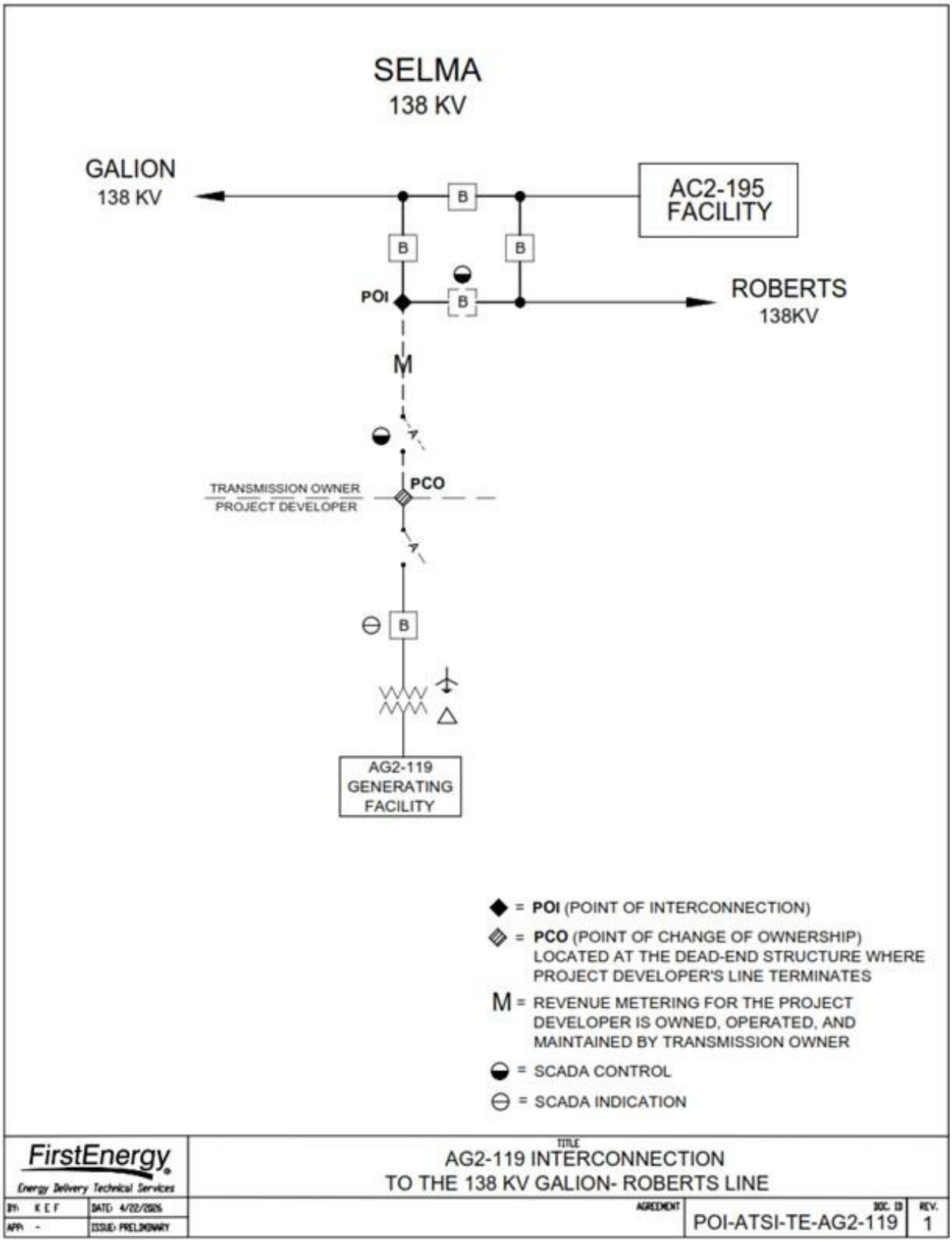
- Environmental permitting, Real Estate acquisition, and notifications to the state's Public Utilities Commission (PUC) vary, some up to twelve (12) months after preliminary engineering is completed to secure the required approvals.
- Prior to agreement by Project Developer to purchase the property, a Phase 1 Environmental Assessment should be conducted for the entire site to avoid assumption of environmental liabilities by Project Developer or Transmission Owner.
- The Transmission Owner interconnection substation may involve environmental surveys, permits, approvals and plans with federal, state, and/or local agencies.
- Assumed Project Developer is to provide all access rights, easements, ROW and permits necessary to complete the Project to the satisfaction of Transmission Owner. Environmental permitting shall encompass all federal, state, and local requirements, consultations, and agency coordination. Confirmation of meeting all permitting requirements shall be provided to Transmission Owner, prior to start of construction. Following construction and energization, confirmation of permit closeout shall be provided to the satisfaction of Transmission Owner, prior to transfer of ownership. If any of these elements are not included in the final agreement between Transmission Owner and Project Developer, twelve (12)-to-eighteen (18) months should be added to the Project Schedule to secure necessary permits, and additional costs would apply.
- Project Developer will provide copies of all the relative environmental permits and other necessary approvals to Transmission Owner before Transmission Owner accepts the interconnection facilities.
- Project Developer is required to install an access road from the new interconnection substation to the nearest public road (must be approved by Transmission Owner) and obtain access rights for Transmission Owner. Project Developer is responsible to maintain access road and ensure unimpeded access for Transmission Owner at all times.
- Project Developer is responsible for all property acquisition (including easements/rights-of-way (ROW)) for transmission, distribution and communication facilities needed for the generator interconnection.
- If Project Developer owns the project property, in fee title, Transmission Owner will require a fee property transfer for the interconnection substation site which may require subdivision approval, together with permanent access rights to and from the substation, as well as a perpetual easement for any transmission lines to the substation. Project Developer is responsible for all costs, including but not limited to subdivision, associated with the property transfer.
- If Project Developer leases the project property, the Project Developer will be required to obtain fee property from the underlying fee property owner, on behalf of Transmission Owner, for the interconnection substation site, together with permanent access rights to and from the substation, as well as a perpetual easement for any transmission lines to the substation.
- All property rights must be surveyed and metes and bounds descriptions prepared for incorporation into Transmission Owner's document forms, for transfer of title.

- The Transmission Owner interconnection substation and transmission line loop will involve PUC notification/approval.
- All work occurs within an existing transmission line right-of-way or on Project Developer's property with access to all existing structures possible via that property and the right-of- way following established access routes that do not cross wetlands or streams.
- Project Developer will develop, and secure regulatory approval for, all necessary Erosion and Sediment Control (E&SC) plans and National Pollutant Discharge Elimination System (NPDES) permits.
- Project Developer will obtain all necessary permits.
- Project Developer will conduct all necessary wetlands and waterways studies and permits.
- Project Developer will conduct all necessary historical and archaeological studies.
- If the Project Developer plans to cross the transmission line right of way with facilities or access roads, please refer to the Transmission Rights-of-Way Restrictions information located at:

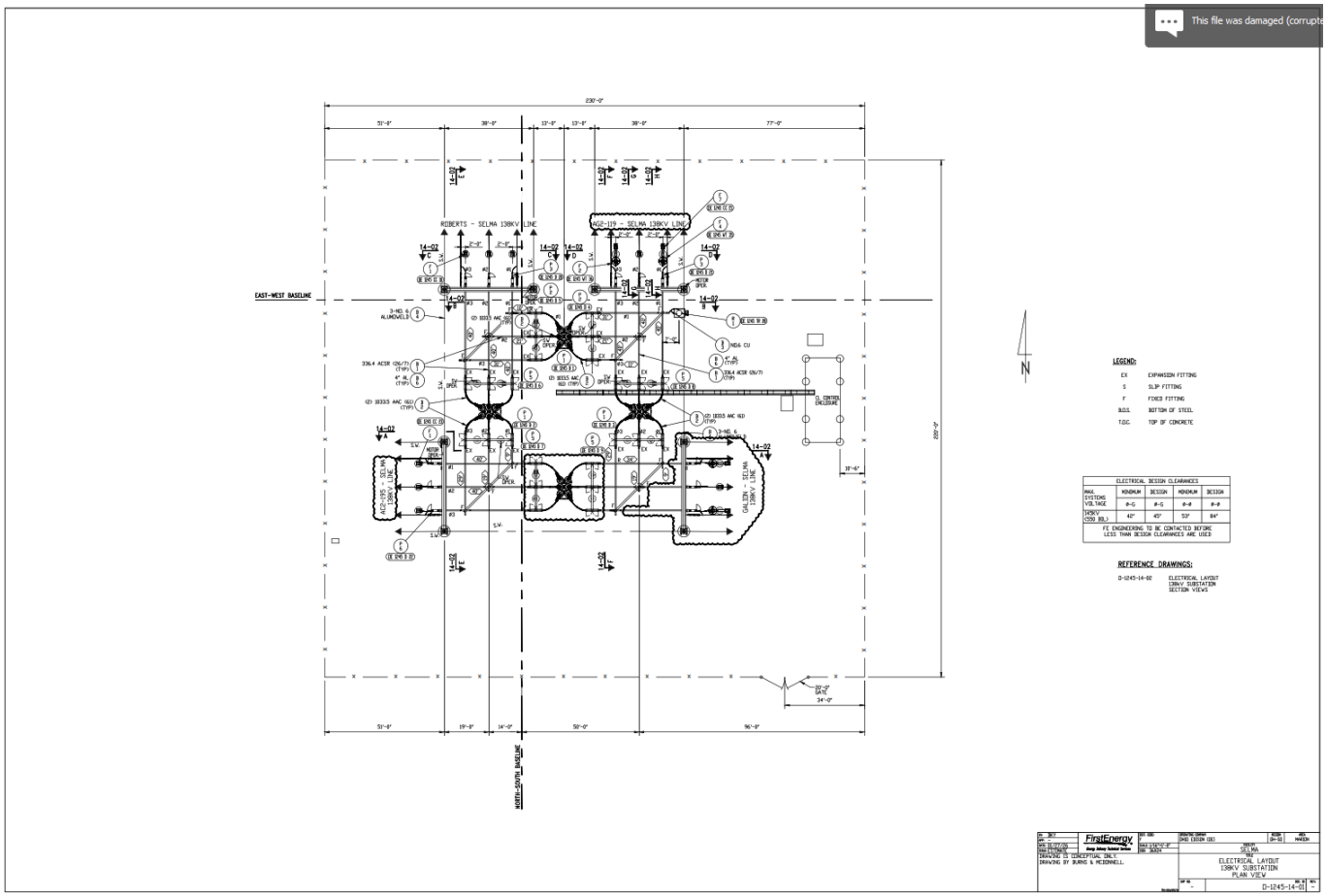
  https://www.firstenergycorp.com/help/safety/real-estate-power-lines/transmission-right-of-way.html#ROWform

C. APPENDICES

ATTACHMENT #1: SINGLE LINE DIAGRAM FOR THE PHYSICAL INTERCONNECTION



ATTACHMENT #2: SUBSTATION GENERAL ARRANGEMENT



ATTACHMENT #3: MATERIAL LIST AND EQUIPMENT RATINGS

Material/Equipment	Quantity
Insulator - Line - Braced Post (ea)	3
Insulator - Line - Polymer (ea)	6
Insulator - Line - Porcelain/Glass (ea)	216
Engineered Steel Poles (ea)	2
Light Duty Steel Pole - Class H2 (ea)	1
Steel Support Structure (ea)	14
Hard Bus - 4 inch (ft)	80
Relay - Individual (ea)	3
Relay Panel (ea)	3
Circuit Breaker - 145 kV 40 kA (ea)	1
Anchor Bolt - Substation (ea)	96
Insulator - Substation - 138 kV (ea)	11
Surge Arrester - 138 kV (ea)	3
Capacitor Coupled Voltage Transformer (CCVT) - 138 kV (ea)	3
Current Transformer - Freestanding (CT) - 138 kV (ea)	3
Potential Transformer (PT) - 138 kV (ea)	3
Disconnect Switch - Substation - 138 kV (ea)	3
Switch - Motor Operator - Substation (ea)	1
Cable - Control/Communication (lf)	8470
Conductor - AAC (ft)	645
Conductor - ACSR (ft)	5272.2
Conduit - Rigid (lf)	511
Wire - Fiber - ADSS (ft)	1868.004
Wire - Fiber - Underground (ft)	3318
Wire - Shield - OHGW (lf)	2904

ATTACHMENT #4: PROTECTION SCOPE

Short Circuit Analysis:

Short Circuit Values:

The 138kV fault values for the AG2-119 interconnection location with all new generation out of service are:

Three phase = 10.5kA

Single line to ground = 8.7kA

Z1= (0.888 + j 3.867)%

Z0= (1.512 + j 6.340)%

Impedances are given on 100 MVA and 138kV bases. The faults provided are bolted, symmetrical values for normal system conditions. Future increases in fault currents are possible, and it is the Project Developer's responsibility to upgrade their equipment and/or protective equipment coordination when necessary.

General Connection Requirements:

The AG2-119 delivery point substation (DPS) is a direct connection to the existing Selma substation.

New 138kV breaker at Selma shall have failure-to-trip protection. SEL-451 relay is acceptable for this application.

Protection of the 138kV Generator Lead Line of approximately 0.1 miles shall consist of two SEL-411L line current differential schemes with pilot communication over fiber optic cable, at each terminal.

The AG2-119 generator protection system shall include a Transfer Trip Receiver for Anti- Islanding via AG2-119 138kV breaker.

Protection Requirements

Selma substation

- AG2-119 generating facility
    - Primary relay: SEL-411L relay with line current differential protection over fiber
    - Backup relay: SEL-411L relay with line current differential protection over fiber

138kV Breaker Failure to Trip Protection

- 138kV Breaker Failure to Trip Relaying – SEL451 relay per breaker

AG2-119 Generating Station 138kV

138kV Transmission Line Protection @ AG2-119 generating station

- AG2-119 Interconnecting Station line exit

- Primary relay: SEL-411L relay with line current differential protection over fiber
- Backup relay: SEL-411L relay with line current differential protection over fiber
- Dual, independent fiber-optic cable paths with dedicated fibers for use with the SEL- 411L primary and backup relaying
    - Minimum of 12 fibers, separate primary and backup fiber cables
- Synch check for manual/SCADA close on the interconnecting line to be done at AG2- 119 Generating Station

138kV Breaker Failure to Trip Protection

- 138kV Breaker Failure to Trip Relaying
    - SEL-352-2 breaker failure to trip relaying on AG2-119 138kV Generating Station breaker. The breaker failure to trip relaying on the AG2-119 Interconnecting Station line exit breaker shall initiate direct transfer trip via the SEL-411L primary and backup line relays (fiber).

Connecting party AG2-119 Generator & Substation Protection Requirements

The requirements listed below are the minimum requirements to protect Transmission Owner's transmission system.

The proposed generating interconnection substation will have one GSUs and a dedicated 138 kV high side breaker associated with GSU. Also required for GSU is a low-side breaker.

The transformer windings for each GSU shall be wye ground–delta (HV-LV).

For each GSU, the minimum protective relaying requirements for this installation include primary and backup transformer differential (87T) relays, a transformer neutral time overcurrent relay (51G), and a breaker failure relay for the dedicated high side breaker. Acceptable relay models for each of the schemes are identified below, the use of any other relays will require prior approval from Transmission Owner.

SEL-587, SEL-387 and/or SEL-487E relays are acceptable for both applications of the required 87T functions. The 87T schemes shall trip the high side GSU transformer breaker and the transformer low side breakers to remove the transformer from service. A separate tripping path energizing separate breaker trip coils is required for primary and backup relaying.

The AC current source for the 87T relays shall be CTs on the bus or line side of the high side GSU circuit breakers and CTs from the low side GSU breakers. The low side CTs can be from either the GSU transformer or transformer breaker(s), depending on Connecting party's protection philosophy (see bus protection requirements below).

An SEL351 or SEL451 relay is acceptable for the 51G function(s). The 51G scheme shall trip the transformer breaker and the transformer low side breakers to remove the transformer from service with a dedicated tripping path.

A breaker failure relay (SEL-451) shall be utilized on the high side 138 circuit breaker. Any protective trip of these breakers shall initiate the failure to trip scheme. The re-trip feature for the BFT scheme shall be utilized and trip the high side breaker it protects. The high side breaker failure scheme shall initiate trip & block close of all adjacent breakers. The line breaker at each station will also initiate direct transfer trip via line relaying to the corresponding remote ring bus substation. Local tripping shall be accomplished via hand-reset lockout relays.

For the 138 kV line exit to the new 138 kV ring bus, primary and backup line protection relays are required. The primary and backup relays shall be SEL-411Ls (two (2) relays) (usage of this particular model is required). Specific style numbers shall be provided by Transmission Owner at a later date. AC sources for these schemes shall be CTs on the 138kV breaker, located on the bus side of the breaker, and CCVTs or PTs on the line side of the 138 kV line breaker. A separate tripping path energizing separate breaker trip coils is required for primary and backup relaying. The line relays shall communicate via dedicated multi-fiber, fiber optic communication channels with the new ring bus terminal line relays. The line relays will send/receive DTT and receive an anti-islanding trip from the new ring bus station. The primary & backup schemes must utilize independent (diverse) fiber routes. Transmission Owner shall provide relay settings for these line relays at the cost of Connecting party.

The relaying systems shall have a reliable source of DC power independent from the AC system or immune to AC system disturbance or loss (for example - DC battery and charger) to assure proper operation of the protection scheme.

The Connecting Party shall provide utility-grade relays for protection of the FE Transmission System, including time delay and auxiliary relays. Relay operation for any of the listed functions that are required shall initiate immediate separation of the parallel generation from the FE Transmission System:

Relay	Function
Frequency	To detect underfrequency and overfrequency operation.
Overvoltage	To detect overvoltage operation.
Undervoltage	To detect undervoltage operation.
Ground Fault Detector	To detect a circuit ground on the FE Transmission System.
Phase Fault Detector	To detect phase to phase faults on the FE Transmission System.
Transfer Trip Receiver	To provide tripping logic to the generation owner for isolation of the generation upon opening of the FE supply circuits.
Directional Power	To detect, under all system conditions, a loss of FE primary source. The relay shall be sensitive enough to detect transformer magnetizing current supplied by the generation
Breaker Failure	To detect a stuck breaker condition at the generation substation and 1-send a trip signal to the remote ends of the connected line via transfer trip or 2-to trip a high speed ground switch.

www.firstenergycorp.com/feconnect

www.pjm.com/planning/design-engineering/to-tech-standards.aspx

FE System Modifications

Selma

- Settings changes are possible at Selma substation.
- Wiring changes are required at Selma Substation for both Galion and Roberts exits.
- one set (3) of three 138 kV line side CCVTs (one on each phase) are to be installed on the new line exits at Selma Substation.
- Convert the DCB scheme on the Selma- Galion 138kV line to a DCUB scheme

Galion:

- Settings changes are possible at Galion substation.
- Convert the DCB scheme on the Selma- Galion 138kV line to a DCUB scheme
- Settings changes are possible at Roberts and remote substations.

Revenue Metering and SCADA Requirements

The Project Developer will be required to comply with all FE Revenue Metering Requirements for Generation Interconnections. The Revenue Metering Requirements may be found within the "FirstEnergy Requirements for Transmission Connected Facilities" document located at the following links:

www.firstenergycorp.com/feconnect

www.pjm.com/planning/design-engineering/to-tech-standards.aspx

ATTACHMENT #5: PRELIMINARY GEOTECHNICAL SUMMARY

Observation & Concern Table:

Category	Source	Risk	Comment
Surficial Soil Survey	USDA Soil Survey/Geophysical Report	Moderate	Fine grained soil
Geologic Formation/Group	USGS Geologic Survey/Geophysical Report	Low	Bedrock at moderate depths
Karst	USGS/ TAMI 2/karst report	Low	Bedrock mapped as limestone, TAMI indicates karst features, Karst Report indicates low potential
Landslide Susceptibility	GIS/Google Earth/FEMA Risk Map/FE Files	low	Low risk inside and beyond substation limits
Coal Mining and Oil and Gas Wells	OH Geologic Survey/TAMI 2	Low	No coal mining. No gas wells present in the area
Environmental Hazard	US Wetland Maps/FEMA	Low	Low risk to flooding
Past Development	TAMI/GIS MAP/Historic Aerials	Low	Undeveloped except for substation and transmission line

Site Background / Geologic Hazards Potential

This review was conducted to determine potential geologic hazards and risks at the existing generator developer (Galion-South Roberts 138kV II Substation) location (AG2-119). The reviewed location is in the City of Marion, Marion County, Ohio. This includes proposed improvements to the existing Selma Substation. The proposed improvements would consist of the installation of one new breaker with SCADA control inside of the existing substation fence. The Selma Substation is operated by Ohio Edison. FE reviewed the available Geotechnical Recommendation Report by Mott Macdonald (dated January 15, 2021), and other related documents available as part of this review. The substation expansion was reviewed for surficial soils survey, geologic formation/group, karst, landslide susceptibility, coal mining and oil and gas wells resource mapping, environmental hazards, and past development. The review was performed to identify any geologic risks that could affect the project's budget, constructability, and/or schedule.

Surficial Soil Survey

The United States Department of Agriculture Web Soil Survey indicates that the site is currently mapped to be underlain by the Pewamo silty clay loam. Pewamo silty clay loam are generally clayey soils (CL or CH) that are very poorly drained soils with a depth to water table listed at one foot below the ground surface. However, the geotechnical borings performed at the site indicate the groundwater table at the time of the borings was at approximately 3.5 to 18 feet below the ground surface. The site has a current C/D Hydrologic

Soil Group (HSG) rating, indicating slow to very slow infiltration rates. Higher plastic soils (CH) are very sensitive to moisture and can present foundation related construction difficulties.

Geologic Formation/Group

The site is located in the Central Ohio Clayey Till Plain section of the Central Lowland physiographic province which is described as a flat to rolling terrain formed by retreating glaciers. The Ohio Department of Natural Resources Division of Geological Survey maps the site to be underlain by the Devonian aged (48 million years) Columbus Limestone. The Columbus Limestone generally consists primarily of fossiliferous limestone and dolomite.

Mott Macdonald performed a geotechnical study on behalf of Savion Energy for the development of the generator developer in which geotechnical borings were performed. The geotechnical borings were reviewed and indicate that the site is underlain by clays and occasional clayey sands ranging from approximately 6 feet to 20 feet and underlain by highly weathered gravel or limestone bedrock. Grading was also performed at the site to achieve a level substation but based on available grading information, the cuts and fills were relatively minor (less than 5 feet).

Karst

The site is underlain by the Columbus Limestone which is mapped to contain limestone and dolomite. The Transmission Asset Mapping Interface (TAMI 2) was reviewed, and the site is located in a potential karst risk area. A Technical Memorandum by Black & Veatch (dated June 30, 2023) was also provided to FE in which a sinkhole and Karst risk evaluation was performed. The karst report identified that the site is a low karst risk

Landslide Susceptibility

The existing Overall Site plan contains both preexisting and post construction grades for the Selma Substation. Prior to development the site had a very gentle slope downward from east to west, approximately 2 feet over the span of the substation limits. Construction of the substation created a level pad near Elevation (El.) +948 feet, between 3 to 5 feet above surrounding grades. As there are no steep slopes observed in the original site grading plan, the likely occurrence of a landslide is low.

Resource mapping

The Ohio Department of Natural Resources was reviewed for any coal mining (past or present) that has occurred in the site vicinity. No coal mining has occurred at the site or the site vicinity. In addition, no natural gas wells are located in the surrounding area of the site. A quarry is located approximately 2,000 feet to the east of the site, East of Marion-Bucyrus Road (Route 4).

Environmental Hazards

Based on FEMA and U.S. Fish and Wildlife Service maps there are no wetlands or mapped flood plains within the site vicinity that would present a risk for the development. An environmental study should still be conducted to confirm this prior to construction. There appears to be a low risk that the site is prone to flooding. The FE region overseeing the substation should be consulted on the history of any flooding that has occurred at or near the site.

Past Development

The past development assessment of the site was based on aerial photography dating back to 1957. The substation was constructed in 2024 to 2025. The Galion-Roberts North 138kV line that runs along the north side of the substation was constructed in 1948. Prior to the substation, the site appears to have been a farm field. Other than the recently constructed substation, there appears to be low risk of any prior development at the site.

Recommendations & Geotechnical Opinion

List of Observations/Concerns Interconnection Facilities – AG2-119:

1. This site is part of the Columbus Limestone formation. Existing borings are available from the site
2. Low potential for karst
3. Low risk for landslides
4. Low environmental impact risk
5. No mining activity in the area. No gas wells are present in the site area.
6. Site was only developed for the construction of the substation

Preliminary Geotechnical Opinion

The geotechnical conditions of this site seem to conclude that it is relatively low risk location for the improvements to the existing substation. Additional due diligence will be required to determine if the new equipment would be at risk of karst. Borings should be performed at the locations of any new equipment. The above estimate was based on available online resources and an available geotechnical report performed for the station. The use of the geotechnical report should only be used as reference and should not be used for the design of any new equipment.