Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AH1-673

State Line - River Energy Center 138 kV

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 ComEd.

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 (PD) has proposed a solar Generating Facility located in, Cook County, IL with a designated PJM Project ID of AH1-673. The installed facilities will have a total Maximum Facility Output (MFO) of 85 MW with 85 MW of this output being recognized by PJM as Capacity.

2. POINT OF INTERCONNECTION (POI)

The Generating Facility will interconnect with the ComEd transmission system via a newly constructed 138kV substation, TSS 916 Ewing Ave, tapping the ESSZ100 Tower Auto – STA7 State Line 138kV line, L.0704, approximately 0.1 miles from TSS 955 River Energy Center and 2.9 miles from STA 7 State Line.

The construction of the new interconnection substation will result in the splitting of the existing ESSZ100 Tower Auto – STA7 State Line 138kV line, L.0704 into two lines on the transmission system. The new L.91602 will connect TSS 916 Ewing Ave to TSS 955 River Energy Center and L.0704 will connect TSS 916 Ewing Ave to STA7 State Line.

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

3. POINT OF CHANGE IN OWNERSHIP

The Point in Change of Ownership will be located at the first dead-end structure inside the TSS 916 Ewing Ave substation fence line.

4. SCOPE OF PROJECT DEVELOPER INTERCONNECTION 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:

4.1. The PD is responsible for construction of the additional 85MW of storage. The PD is

also responsible for one (1) 138kV circuit breakers, one (1) generator step-up transformers (GSU), and a 138kV generation lead line with associated structures terminating at TSS 916 Ewing Ave.

4.2. At AH1-673, in general, IPP relaying, etc. to follow section 6.2 (Design E) of latest version of EED interconnection guidelines (for Generator at Transmission Level) Rev. 2 Effective 12/16/2021, with the following project specific notes (where applicable):

- New gas circuit breakers to auto trip and isolate for critical gas level
- New Tie Line terminal relay types to be the same as ComEd terminal relays. This includes relay firmware versions
- ComEd Protection and Control Engineering must review all developer relay protection design drawings and relay settings.
- Developer equipment impedance and/or test data must be provided to ComEd Protection and Control Engineering to model in a short circuit program.
- Developer to include over/under frequency and voltage protection at battery storage collector bus. Suggested settings will be provided by ComEd. Under-frequency settings are to comply with MAIN Guide 1B.
- Dual bus protection for secondary buses.
- Dual TRFM protection and site protection must be compliant with NERC & PJM requirements.
- Metering is required to be installed per ComEd & PJM standards.
- SCADA interface to ComEd will be required.
- Witness testing by ComEd or a DA will be required and must be pre-scheduled at least 90 days in advance.

4.3. IPP developer to provide transformer test reports for 138kV - 34.5kV step up transformers, for ComEd short circuit modeling. Test reports must include %Z impedance and load loss, including type of Inverter/s used for ComEd short circuit modeling.

4.4. For any new equipment connected to the BES (Bulk Electric System rated at 100kV or above) the associated primary/System 1 and secondary/System 2 protective schemes to have a minimum redundant:

- Connected CTs (where available)
- PT secondary (where available)
- DC control circuits
- Auxiliary trip relays
- Circuit breaker trip coils (where available)
- Communication circuitry
- Foundations and structures to support all/new equipment

4.5 The PD will be responsible to purchase real estate or obtain the necessary right-of-way easement to install the 138kV transmission line to TSS 916 Ewing Ave substation.

a. New Gas Circuit breaker control for loss of SF6 gas condition should be as follows (see Engineering practice EP-5206E and relay specifications):

i. For a normally-open bus-tie SF6 gas bus-tie circuit breaker, when SF6 gas drops to the critical level, the close circuit of Breaker shall be opened, and motor operated disconnects on both sides of CB shall be opened.
ii. For a normally-closed bus-tie SF6 gas circuit breaker, when SF6 gas drops to the critical level, the circuit breaker shall be opened, and motor operated disconnects on both sides of CB shall be opened and the close circuit of the circuit breaker shall be opened.
iii. For a transformer circuit breaker, when SF6 gas drops to the critical level, the circuit breaker shall be opened, the close circuit of the breaker shall be opened, and motor operator disconnects on the bus side of CB shall be opened.

b. All changes to topology, including generation, must be modeled during the Phase 1 study for PRC-027 compliance. A protection system coordination study is required for new BES buses or when there is a 15% (or greater) change in the fault current for an existing BES bus. Settings changes may be required per the outcome of this coordination study.

c. The PD is to provide two, physically diverse, Single Mode Fiber paths between TSS 916 Ewing Ave and AH1-673 Collector Substation that are physically diverse from each other. One path will be for Primary Relays, and the other path will be for Secondary Relays, and there should be a minimum of 48 fibers in each cable. IPP fiber demarcation will be FDP within the Substation control building.

d. For 138kV L91601 (GIC LINE): GIC developer to install and own standard ComEd 138kV GIC interface relaying for the remote end station consisting of a dual SEL-411L-1 current differential scheme per GDD1940. A ComEd settings template will be provided to the developer for the scheme to work with the relays at TSS916:

    i. GIC developer to send a Transfer Trip to TSS916 Ewing Ave for TR 138kV CB Breaker Failure. Ability to isolate 87L and DTT functions is required. Example scheme/settings can be provided by ComEd.

    ii. The GIC interface relaying will be the only point of interface with ComEd relaying. Current contributions from all developer breakers to be combined and wired to the SEL-411L relays for 87L scheme.

e. Two physically diverse paths of Single Mode Fiber with a minimum 48-count, will need to be run between TSS916 Ewing Ave and Big Shoulder I BESS for L91601. Both of these Fibers and cables will be owned and maintained by the developer, and terminated at the ComEd FDP in TSS916. There will be a System 1 Fiber cable for the System 1 Relays, and a System 2 Fiber cable for the System 2 Relays. The demarcation of ownership for these Fiber cables will be in the Fiber Distribution Panel (FDP) in ComEd TSS916. The developer will own and maintain both Fiber cables from ComEd's TSS916 FDP all of the way to their Big Shoulder I BESS facility. Additional circuits for SCADA, Metering, telephony, etc. may be placed on the unused Fiber strands in either cable

Comm Summary:

System 138kV L91601	Function	TSS916 Ewing Ave		Big Shoulder I BESS	
1 – Direct Fiber	SEL 411L (87L-1, LTT, BFTT)	T	R	T	R
2 – Direct Fiber	SEL 411L (87L-2, LTT, BFTT)	T	R	T	R

f. Load rejection transfer trip if at TSS916, any of the below conditions occur (logic via 52b breaker aux contacts): BT1-2 and BT2-3 are open.

g. The PD will be responsible to request and bear the cost of any outages required on existing transmission or distribution lines that may be required for the transport of any large equipment, i.e. turbines, rotors, turbine structures, etc.

h. ComEd will complete pre-design and post construction survey for the transmission and substation upgrades, as required. This includes, but is not limited to, the LIDAR survey and video imaging for transmission lines. Costs associated with this are at the expense of the PD.

i. ComEd will complete geotechnical soil borings, resistivity study, and analysis for substation and transmission upgrades. Costs associated with this are at the expense of the PD.

j. This document assumes that the PD has completed, tested, and conveyed to ComEd the new TSS 934 substation (per ComEd guidelines) and transmission line tie-in up to existing ComEd right of way to allow for the 345kV line energization and back feed.

k. Option to Build

- If the PD selects the Option to Build, the PD shall construct TSS 916 Ewing Ave.
- The PD shall construct TSS 916 Ewing Ave and transfer ownership to ComEd prior to commercial operation of AH1-673. The PD shall transfer ownership of the real estate in fee to ComEd.
- Substation requirements are described below in section B.

B. Transmission Owner Facilities Study Results

The following is a description of the planned Transmission Owner facilities for the physical interconnection of the proposed AH1-673 project to Commonwealth Edison transmission system. These facilities shall be designed according to Commonwealth Edison Applicable Technical Requirements and Standards. Once built, Commonwealth Edison will own, operate, and maintain these Facilities.

1. TRANSMISSION OWNER INTERCONNECTION FACILITIES:

The TO Interconnection Facilities will include, but not be limited to, the following.

INTERCONNECT SUBSTATION (NEW) (DIRECT CONNECTION)

TSS 916 Ewing Ave

A new breaker-and-a-half substation, TSS 916 Ewing Ave, will be constructed along the L.0704 138kV transmission line to interconnect the AH1-673 project with the ComEd transmission system.

The greenfield new substation will include

- A 138 KV dead end structure and foundation within the fence of the interconnect substation to terminate the project developers generator lead line
- Line conductor from the dead end structure to the bus position in the switchyard of the interconnect substation
- One (1) line disconnect switches, rated for 3000A, ACCC D06, to be installed at PD line

- Nine (9) new 138kV 1200:1 CCVTs to be installed at Busses 1, 2, and 3
- Three (3) metering CT/PTs
- Nine (9) Surge Arrestors
- Foundations and structures to support all/new equipment

2. STAND ALONE NETWORK UPGRADES

TSS 916 Ewing Ave Interconnection Substation

A new breaker and a half substation, TSS 916 Ewing Ave 138kV, will be constructed along the L.0704 138kV transmission line to interconnect the project with the Commonwealth Edison transmission system.

INTERCONNECT SUBSTATION (NEW) (DIRECT CONNECTION)

TSS 916 Ewing Ave

A new breaker-and-a-half substation, TSS 916 Ewing Ave, will be constructed along the L.0704 138kV transmission line to interconnect the AH1-673 project with the ComEd transmission system.

The greenfield new substation will include

- Three (3) 3-phase new gas SF6 138kV circuit breakers BT 1-2, BT 2-3, and BT 1-3, with accommodation for future breakers BT 4-5, BT 5-6, and BT 1-6 rated for 3000A, equipped with 3000:5A, MR CT, with RF 2.0.
- Two (2) new 3-phase 138kV motor-operated disconnect switches, rated for 3000A, ACCC D06 to be installed at each new breaker (total of six (6)).
- Two (2) 3-phase motor operated line disconnect switches, rated for 3000A, ACCC D06, to be installed at each line
- One (1) line disconnect switches, rated for 3000A, ACCC D06, to be installed at PD line
- Nine (9) new 138kV 1200:1 CCVTs to be installed at Busses 1, 2, and 3
- Three (3) metering CT/PTs
- Nine (9) Surge Arrestors
- Foundations and structures to support all/new equipment

One (1) new 12kV-208/120V AC auxiliary transformer to be installed. This will be fed via a nearby 12kV distribution line to be determined during detailed design; new 12kV UG cable will be run to allow access to TSS 916 Ewing Ave. The distribution line connection will require construction of new 12kV overhead lines and poles from an existing distribution line to TSS 916 Ewing Ave. Connection details and length will be determined during detailed engineering and may exceed the assumptions in this study. If a lower cost option is found during engineering, the cost estimate would be reduced. It is assumed that no new ROW for the new distribution line will be required, but this will be determined during detailed engineering. One (1) propane 120/208V back-up generator to be installed as the emergency station service AC source.

New masonry control building to be installed to accommodate new relaying and relaying for future breaker-and-a-half bus expansion. Control enclosure shall meet latest ComEd standards. If NERC Low Impact, install BSC/IT UCOMM router and firewall. If Medium Impact, use serial communication. The new control building will contain:

- One (1) 125VDC battery system
- DC distribution panels
- Relay panels
- Auxiliary AC power panels
- Building HVAC system
- Fire/security system
- SCADA
- Metering equipment.
- One (1) SCADA Cabinet:
  - One (1) SEL-2731 SCADA WAN Switch (2731#KR58)
  - One (1) SEL-3355 RTU RTAC (3555#QP5W)
    - Install one pair of serial fiber connections for each developer RTU data exchange to be coordinated with ComEd SCADA Engineering:
      - Breaker statuses
      - Line analog values
  - One (1) SEL-3355 ENG RTAC (3555#QP5W)
    - with mouse, keyboard, and monitor on the engineering desk
  - One (1) SEL-3355 PDC RTAC (3555#QP5W)
  - Two (2) SEL-3355 HMI RTAC (3555#QP5W)
    - with mouse, keyboard, and monitor on the operator desk
  - One (1) Omicron Station Scout RBX1
  - One (1) Local/Remote Switch, wired to I/O DPAC 1 IN101
  - One (1) SEL-3350 Blueframe with DMA
  - If a new ComEd-owned revenue meter is required by Metering Group, connect to IP switch architecture.

Two (2) Station Bus Cabinets, each with:
- One (1) SEL-2488 GPS Clock
- One (1) SEL-3350 Blueframe with Flow Controller
- SEL-2741 Station Bus Switches
  - Relay Engineering to determine the topology and number of switches
- One (1) SEL-2440 I/O DPAC, 48 Digital Inputs
- One (1) RSG-910C Access Switch

One (1) Desk Hoffman Box with:
- DC to AC Inverter
- One (1) 2x2 Ethernet RJ45 Patch Box with connections to:
  - Station Bus A via RSG-910C
  - Station Bus B via RSG-910C
  - SCADA WAN via SEL-2731
  - Cooperate Access via UCOMM patch panel

One (1) Operator Desk with:
- Two (2) 27” Monitors (HMI 1 and HMI 2 RTACs)
- Two (2) Keyboard and Mouse
- One (1) Ergotron LX Dual Mount Stacking Arm

One (1) Engineer Desk with:

- Two (2) 27” Monitors (ENG RTAC and Spare)
- Two (2) Keyboard and Mouse
- One (1) Ergotron LX Dual Mount Stacking Arm

One (1) UCOMM Rack (If station is designated Low Impact by Transmission Planning)

- One (1) Nokia 7705 SAR-H MPLS Router
- One (2) Check Point 1570R Firewall
- One (1) SEL-2730U Corporate Access Switch

- Connect metering group-provided revenue meter to station IP architecture.
- Confirm latest device model numbers and GDD with the assigned SCADA engineer.

2 quatro modules

1 Nx64 card for L.0704 system 2

1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 1) System 1

1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 2) System 1

1 Nx64 card for L.91602 DCB LTT/BFTT (411L Mirror bits Ch. 1) System 1

1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 1) System 2

1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 2) System 2

1 Nx64 card for L.91602 DCB LTT/BFTT (411L Mirror bits Ch. 1) System 2

2 SEL-2814 DB9 to Fiber converters

Multimode Fiber

Relay Installs at TSS 916 Ewing Road

a. Design station per DSS G2 whitepaper.
    i. For 138kV L91602
        1. 11-1 and 11-2 SEL-411L relays will utilize DCB/DTT for system 1 and system 2 protection. 87 COMM Channels on 411L relays will BOTH be 850nm to connect to MUX Nx64 cards and will be used for DCB/DTT between TSS916, TSS955 and ESSZ100. An additional Mirrored Bits connection via MUX Nx64 will be used for DTT between TSS916 and ESSZ715.
        2. Install fiber multiplexing node.

System 138kV L0704	Function	STA7 State Line	TSS916 Ewing Ave

1 – Direct Fiber	SEL 411L (87L-1, LTT, BFTT)	T R	T R
2 – Direct Fiber or MUX	SEL 411L (87L-2, LTT, BFTT)	T R	T R

System 138kV L91602	Function	TSS916 Ewing Ave	TSS955 River Energy	ESSZ100 Tower Automotive	ESSZ715 South Chicago Properties
System 1 –MUX	DCB - Via 87 COMM Channel	T R	T R	T R	
System 1 –MUX	LTT, BFTT - Via 87 COMM Channel	 T(Echo) R	T R	T(Echo) R	
System 1 –MUX	BFTT – Via MB	R			T
System 1 –MUX	BFTT – Via MB			R	T
System 1 –MUX	LTT, BFTT – Via MB	T			R
System 1 –MUX	LTT, BFTT – Via MB			T	R
System 2 –MUX	DCB - Via 87 COMM Channel	T R	T R	T R	
System 2 –MUX	LTT, BFTT - Via 87 COMM Channel	 T(Echo) R	T R	T(Echo) R	
System 2 –MUX	BFTT – Via MB	R			T
System 2 –MUX	BFTT – Via MB			R	T
System 2 –MUX	LTT, BFTT – Via MB	T			R
System 2 –MUX	LTT, BFTT – Via MB			T	R

New SB-91601 and CD-91601 will be created for the new line.

New SB-91602 and CD-91602 will be created for the new line.

Yard cable trench to be installed from control building to breakers and line terminal structures. Cable Trough to have a drainage system, be road rated, and installed below the trough per ComEd standards. A lift station may be needed.

New substation to require installation of new fence and (2) sliding vehicular gates that are positioned no less than one half of the yard diagonal apart, as well as site development and grading. Preliminary security classification for the proposed substation indicates that fencing will be 7' with 1' barbed wire; fencing must adhere to all ComEd specifications and requirements. Security requirements including fencing may change. New station grounding, lightning protection, and lighting to be evaluated by studies, designed, and installed.

The developer ground grid shall not be tied to the TSS 916 Ewing Ave ground grid. New property will need to be purchased.

The access road to the main public road should be a minimum of 28 feet and have an asphalt or concrete approach. The radius transition to the main road to be in accordance with the requirements of the government having jurisdiction of the public road.

- Minimum width of road is 20'-0"
- Minimum turning radius (horizontal curve) of road to be 40'-0" to the center of the road.
- Maximum slope of road is to be 4.5%

Stormwater detention and any other required stormwater management features to be constructed outside of the substation fence. These must satisfy all local, county, state, and federal requirements for stormwater management.

Security system will need to be installed to meet ComEd standards.

If any utilities are routed under the substation these will need to be re-routed outside of the substation.

3. NETWORK UPGRADES

The Network Upgrades will include, but not be limited to, the following.

<u>Transmission Line Tie-in for new interconnection substation:</u>

Cut existing L.0704 138kV transmission line between existing structures 30 and 31 to loop into the new TSS 916 Ewing Ave Substation. L0704 will be cut into two new lines, L.0704 and L.91602

a. ComEd will be performing the design, procurement, and construction of the new structures required to cut over to the new TSS 916 Ewing Ave.
b. Install two (2) new horizontal single circuit 138kV deadend structures 30D and 30F on drilled shaft foundations.
    i. Both structures will be approximately 40ft in height. They will be similar to LS1864 in geometry but will require a larger 60-90 degree line angle loading.
c. Install one (1) new double circuit vertical 345kV deadend structure 30E on a drilled shaft foundation.
    i. Structure will be approximately 135ft in height. It will be similar to LS1361.
d. Approximately 0.1 new circuit miles of conductor and shield wire will be installed.

i. New conductor for the 138kV lines going into TSS 916 will be 1113 kcmil (45/7) Bluejay ACSR. A shielding study will be required during Phase 1 to determine if shieldwire is necessary coming into the substation.

ii. Existing conductor on 138kV L.0704 and L.91602 (previously L.0704) is 1113 kcmil (45/7) Bluejay ACSR, and will be transferred to new cut-in structures 30D and 30F.

iii. Existing conductor on 345kV L.17723 and L.17724 is 2156 kcmil (84/19) Bluebird ACSR, and will be transferred to the new deadend structure 30E.

iv. Existing conductor is 13#11 DNO-4826, and will be transferred to the new deadend structure 30E.

e. Overhead distribution near structures 30D and 30F will be required to transition to underground.

f. Existing structures 30 and 31 will remain.

Structure Number	Existing Structure Type	Proposed Modifications
30D	N/A	Install new structure similar to LS1864
30F	N/A	Install new structure similar to LS1864
30E	N/A	Install new structure similar to LS1361

Upgrades to neighboring facilities:

1. At ESSZ100 Tower Automotive
    a. For 138kV L91602
        i. Replace existing 11-1 SEL-321 and 11-2 SEL-421 relays with dual SEL-411L relays per GDD1940. Relays will utilize DCB/DTT for system 1 and system 2 protection. 87 COMM Channels on 411L relays will BOTH be 850nm to connect to MUX Nx64 cards and will be used for DCB/DTT between TSS916, TSS955 and ESSZ100. An additional Mirrored Bits connection via MUX Nx64 will be used for DTT between ESSZ100 and ESSZ715. Include external stop block to relay from Line breaker LOR.
        ii. Remove all Power Line Carrier Equipment. Install new fiber multiplexing node. Install 2 physically diverse minimum 48 count single mode fiber paths. Engage UCOMM for fiber splicing for new path installations from existing Burham Taylor Ring to ESSZ100.
        iii. Install SEL-3350 RTAC.
        iv. Install RST-2228 Master Switch and dual RST-2228 Aux Switches.
        v. Replace existing GPS Clock SEL-2488.
        vi. Add new SEL-ICON fiber multiplexing node.
        vii. 2 quatro modules
        viii. 1 Nx64 card for L.0704 system 2
        ix. 1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 1) System 1
        x. 1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 2) System 1
        xi. 1 Nx64 card for L.91602 DCB LTT/BFTT (411L Mirror bits Ch. 1) System 1
        xii. 1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 1) System 2
        xiii. 1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 2) System 2
        xiv. 1 Nx64 card for L.91602 DCB LTT/BFTT (411L Mirror bits Ch. 1) System 2
        xv. Multimode fiber

2. At ESSZ715 South Chicago Properties
    a. For 138kV L91602
        i. Install dual SEL-2411 relays to act as System 1 and System 2 DTT transmitters/receivers via Mirrored Bits with both TSS916 and ESSZ100.
        ii. Remove all Power Line Carrier Equipment. Use existing fiber multiplexing node.
        iii. Add new relays to existing dual IP switch architecture.
        iv. 1 quatro module
        v. 1 Nx64 card for L.91602 DCB LTT/BFTT (2411 mirror bits ch. 1) System 1
        vi. 1 Nx64 card for L.91602 DCB LTT/BFTT (2411 mirror bits ch. 2) System 1
        vii. 1 Nx64 card for L.91602 DCB LTT/BFTT (2411 mirror bits ch. 1) System 2
        viii. 1 Nx64 card for L.91602 DCB LTT/BFTT (2411 mirror bits ch. 2) System 2
        ix. 4 SEL-2814 DB9 to Fiber converters
        x. Multimode fiber

3. At STA7 State Line
    a. For 138kV L0704
        i. Replace existing 11-1 SEL-421 and 11-2 SEL-311C with dual SEL-411Ls per GDD1940 to perform current differential via direct fiber and MUX. DTT will be internal to the relays.
        ii. Remove all Power Line Carrier Equipment. Use existing fiber multiplexing node. Install 1 physically diverse from existing minimum 48 count single mode fiber path. Engage UCOMM for new path installation from STA 7 to TSS 916 Ewing.
        iii. Add new relays to existing dual IP switch architecture.
        iv. Install quatro module, 1 Nx64 card, and multimode fiber
4. At TSS955 River Energy Center
    a. For 138kV L91602
        i. Replace existing 11-1 SEL-321 and 11-2 SEL-421 relays with dual SEL-411L relays per GDD1940. Relays will utilize DCB/DTT for system 1 and system 2 protection. 87 COMM Channels on 411L relays will BOTH be 850nm to connect to MUX Nx64 cards and will be used for DCB/DTT between TSS916, TSS955 and ESSZ100. Include external stop block to relay from Line breaker LOR.
        ii. Remove all Power Line Carrier Equipment. Use existing fiber multiplexing node.
        iii. Add new relays to existing dual IP switch architecture.
        iv. 1 quatro module
        v. 1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 1) System 1
        vi. 1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 2) System 1
        vii. 1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 1) System 2
        viii. 1 Nx64 card for L.91602 DCB LTT/BFTT (411L 87 Ch. 2) System 2
        ix. Multimode Fiber

<u>Fiber cable circuits</u>

Developer to provide two, physically diverse, Single Mode Fiber paths between TSS 916 Ewing Ave Interconnection Substation and AH1-673.

System 1 Relays will use the “System 1” Fiber cable for a Current Differential Relay Scheme, which will also provide Direct Transfer Trip (DTT). This Fiber cable will be owned and maintained by the developer and should have minimum of 48 Fibers. The demarcation for the Fibers in this cable will be in a Fiber Distribution Panel (FDP) inside of the TSS 916 Substation. ComEd will own and maintain the FDP.

System 2 Relays will use the “System 2” Fiber cable for a Current Differential Relay Scheme, which will also provide Direct Transfer Trip (DTT). This Fiber cable will be owned and maintained by the developer and should have a minimum of 48 Fibers. The demarcation for the Fibers in this cable will be in a Fiber Distribution Panel (FDP) inside of the TSS 916 Substation. ComEd will own and maintain the FDP.

The developer will own and maintain both Fiber cables from ComEd’s TSS 916 FDP all of the way to their AH1-673.

Spare Fibers may be used for telephony, SCADA, Metering, Fire Protection, or other data purposes.

PM to engage UCOMM Fiber Engineering early in the process.

Run fiber for multiplexing network upgrade to existing location. Fiber installation required from TSS 916 Ewing to ESSZ15 Tower Automotive use existing ComEd fiber locations or install new paths between substations. Existing fiber path information and coordination to be confirmed by UCOMM. Run two physically diverse paths of Single Mode Fiber with a minimum 48-count, coordinate with UCOMM to confirm slice points or fiber installation locations.

Modify all mimic boards as required.

SB-0704 and CD-0704 will be updated to reflect the new line configuration and any setpoint changes.

4. OTHER SCOPE OF WORK

ComEd to provide oversight to the developer at the developer’s cost or the engineering and construction of the interconnect substation.

Metering will be required to be installed at the interconnection substation. Metering to be provided for revenue and AMI purposes.

5. MILESTONE SCHEDULE FOR COMPLETION OF [TO] WORK

Facilities outlined in this report are estimated to take 48 months to construct, from the time the Generation Interconnection Agreement is fully executed. This schedule is 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
Detailed Design	1	16
Permitting	16	36

Construction	36	48

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

6.1 This study is based on the Phase 2 System Impact Report for PJM Generation Interconnection New Service Request Project AH1-673. The steady-state voltage study for stability analysis will be performed by PJM during the Facility Phase. The PJM study could identify upgrades to the ComEd system that would become part of this project's scope of work. It is assumed that all associated network upgrades, as listed in the above Phase 2 System Impact, are complete prior to this Queue Position being placed in service.

6.2 This study assumes that pursuant to PJM's site control requirements, the Project Developer is responsible for the acquisition of any land rights required for construction of a new substation.

6.3 The schedule is based on GIA/CSA contract being executed by all parties and the deposit received.

6.4 This cost estimates assume that work will be performed during normal weekdays and with no overtime. Transmission line outages for construction have not been identified, but generally are available from September to May. These outages are controlled by PJM.

6.5 Costs are based on 2026 rates and do not reflect a potential increase in Labor or Material costs after 2026.

6.6 ComEd cost estimate is valid for six (6) months after Facilities Study release by PJM.

6.7 The Project Developer will be responsible to request and bear the cost for relocation of existing transmission or distribution lines (including structures and other facilities) that may be required for transmission line crossings, the transport of any large equipment, such as turbines, rotors, turbine structures, cranes, etc. Formal submittal of this request to ComEd's TSO for ultimate review by PJM can be made 7 months prior to back feed request date.

6.8 Foundation design assumes typical soil conditions at locations and will be subject to change after soil boring tests.

6.9 All upgrades to facilities included in this document will be required to meet latest ComEd standards.

6.10 Upgrades are subject to change based on detailed design development.

6.11 ComEd will complete pre-design and post construction survey for the transmission and substation upgrades, as required. This includes, but is not limited to, the LIDAR survey and video imaging for transmission lines. Costs associated with this are at the expense of the Project Developer. Pre-design survey must be completed prior to detailed engineering.

6.12 This Facilities Study is time dependent. If the project is not into construction within one year of the issuance, the study will be void and the project re-studied, requiring the completion of a new Facilities Study.

6.13 It is assumed that all associated network upgrades, as listed in the Phase 1 study, are complete prior to this New Service Request Project being placed in service.

6.14 Both (1) all real property conveyed in fee to ComEd must be remediated to and (2) all real property to which real property rights are transferred to ComEd (as determined in ComEd's discretion) must be remediated to IEPA's Tiered Approach to Corrective Action.

6.15 This Phase 3 System Impact report (FSR) assumes that generator output and plant auxiliary power consumption can both be metered with revenue accuracy as described. The final revenue metering configuration and equipment will be confirmed, and may be revised, during detailed engineering following execution of the Interconnection Construction Services Agreement (ICSA).

6.16 PD owned line L.91601 is assumed to be exiting the station to the North. Final determination of line exit will be determine during detailed design.

6.17 Final station location and transmission plan and profiles will be determined during detailed design due to any changes in final site location.

6.18 This document assumes that the PD has completed, tested, and conveyed to ComEd the new TSS 916 substation (per ComEd guidelines) and transmission line tie-in up to the existing ComEd right of way to allow for the 345kV line energization and back feed.

6.19 ComEd will complete pre-design and post construction survey for the transmission and substation upgrades, as required. This includes, but is not limited to, the LIDAR survey and video imaging for transmission lines. Costs associated with this are at the expense of the PD.

6.20 ComEd will complete geotechnical soil borings, resistivity study, and analysis for substation and transmission upgrades. Costs associated with this are at the expense of the PD.

6.21 It is assumed that final parcel provided will meet land requirements provided in facility study. Current parcel does not meet provided requirements.

6.22 Prior to the start of engineering it is assumed ICON nodes will be installed at STA7 Stateline, TSS955 River Energy, and ESSZ715. If these nodes do not exist at this time they will be required to be installed as part of AH1-673.

6.23 Transmission scope assumes that existing structures, wires, and hardware are in good working condition.

7. REVENUE METERING REQUIREMENTS

All revenue metering needed for this interconnection project must meet the metering requirements stated in Appendix 2, section 8 of the AH1-673 GIA, and in PJM Manuals M01 and M14D. The details of applicable revenue metering requirements are given in the 'ComEd Interconnection Guidelines" posted on PJM website.

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

- REVENUE METERING FOR PJM AND COMED
  - The revenue meter measures the wholesale energy output (Hourly compensated net MWH and Hourly compensated net MVARH) of the Generating Facility.
  - The metering equipment, including revenue meter and CT/PT shall be installed, at Project Developer's expense, at the interconnection substation on ComEd side of the Point of Change in Ownership.
  - ComEd shall own, operate, maintain, inspect, and test all the metering equipment as set forth in 'Testing of Metering Equipment' section of the PJM Tariff, at the Project Developer's expense.
- REAL-TIME METERING FOR PJM
  - The Project Developer shall install, own, operate, maintain, inspect, and test real-time metering equipment to measure and transmit directly to PJM the real time MW, MVAR, voltage and status of electrical equipment such as circuit breakers and Motor Operated Disconnect switches, in conformance with the requirements listed in PJM Manuals M-01 and M-14D, at the Project Developer's expense.
- RETAIL METERING FOR COMED
  - The AMI Meter measures the energy consumption by the Project Developer at transmission level and hence shall be designed to measure low MW flow.

- The metering equipment including AMI Meter and CT/PT shall be installed at the interconnection substation on ComEd side of the POI, at the Project Developer's expense.
- ComEd shall own, operate, maintain, inspect, and test all the metering equipment as set forth in the 'ComEd Interconnection Guidelines'.

- BATTERY CHARGE METER FOR COMED
  - FERC Order 841 designates inflow to charge battery storage facility as wholesale power. To separately measure the power inflow to charge the battery and bill it at wholesale rate, the Project Developer needs to install the following equipment.
    - Battery Charge Meter including Current Transformer/Potential Transformer (CT/PT) at the output terminal of the battery storage facility to measure power inflow from transmission system to charge the battery storage facility.
    - Fiber cable to provide communication link to transmit Battery Charge Meter data to the ComEd SCADA system.

8. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

Land requirements for the Interconnection Substation needed for this interconnection project must meet the requirements in the 'ComEd Interconnection Guidelines' and 'Guidelines to Land Requirement for Interconnection Substation' posted on PJM website.

Upon completion of the construction and installation of the interconnection substation, the tie-line, access road, stormwater detention facility and related improvements and facilities, and the satisfactory completion of testing of the interconnection substation acceptable to ComEd, the Project Developer shall transfer all the Property Rights and Permits to ComEd, at no cost or expense to ComEd, pursuant to documentation that is acceptable to ComEd, including (without limitation) the Property Transfer Documents in fee simple.

All real property conveyed in fee to ComEd must be remediated to and all real property to which real property rights are transferred to ComEd (as determined in ComEd's discretion) must be remediated to IEPA's Tiered Approach to Corrective Action Objectives (TACO) Tier 1 residential remediation standards.

Pursuant to PJM's site control requirements, the Project Developer is responsible for the acquisition of any land rights required for construction of a new substation. As such, the estimated total cost and schedule contemplated by this Facilities Study Report does not include the estimated cost and time necessary for the acquisition of any such land rights.

The total assumed fiber route is approximately 15 miles and traverses approximately. The estimated total cost for acquiring required easements is 60,000 dollars. The fiber route identified in this study is preliminary and may change. The acquisition of easements necessary for the assumed fiber route is contingent upon landowner consent, and easement rights for fiber installation cannot be assured. Easement acquisition costs may vary by landowner.

10. ENVIRONMENTAL AND PERMITING

- ComEd will be responsible to obtain all environmental approvals and permitting required. This includes any endangered species studies and monitoring, as required. Costs associated with this permitting are at the expense of the Project Developer.

- The Project Developer will be responsible for site restoration required for substation and transmission upgrades. This includes, but is not limited to road restoration/improvements, wetland restoration, and farm field restoration/crop damage. Costs associated with this are at the expense of the Project Developer.
- The Project Developer will be responsible for the cost to purchase real estate or obtain the necessary right-of-way easement for all upgrades associated with this project. These associated upgrades are not included in the costs listed in this study.
- The Project Developer will be responsible for remediation costs for locations found to have environmental contaminations and remediation. This may require contaminated soil disposal as well as lead paint removal for existing structure work.
- It is assumed that all necessary permits will be obtained in a timely manner to allow engineering and construction to proceed according to the Milestone Schedule.
- It is assumed that conveyance of property and rights will be obtained to support the PJM Transmission Outage Schedule.
- It is assumed that the required Environmental Study will yield no impediments to the development of the site.
- ComEd will complete geotechnical soil borings, resistivity study, and analysis for substation and transmission upgrades. Costs associated with this are at the expense of the Project Developer.

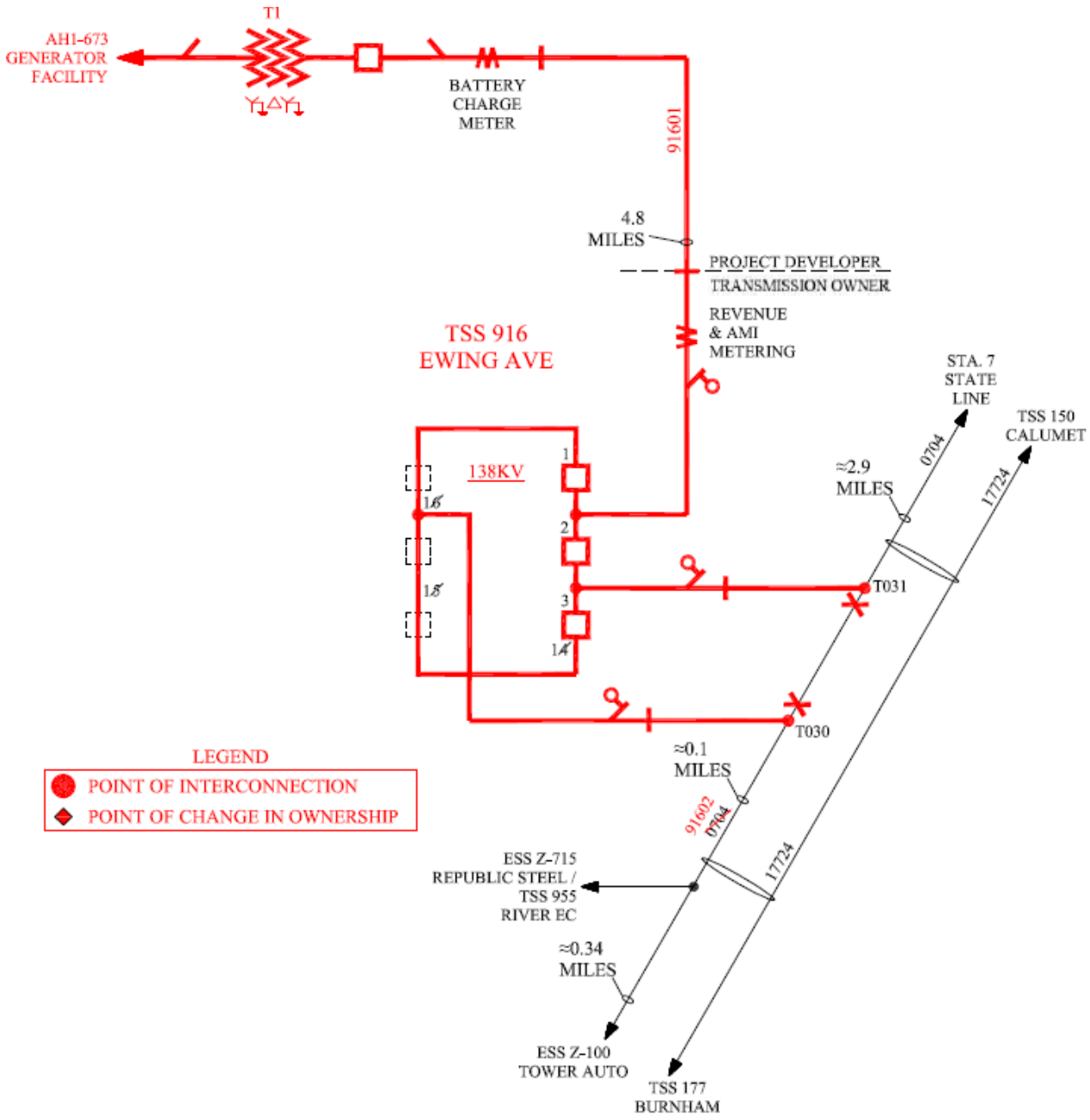
Both (1) all real property conveyed in fee to ComEd must be remediated to and (2) all real property to which real property rights are transferred to ComEd (as determined in ComEd's discretion) must be remediated to IEPA's Tiered Approach to Corrective Action Objectives (TACO) Tier 1 residential remediation standards

C. APPENDICES

1) Attachment #1: High Level Project Diagram Depicting Interconnection Facilities for Physical Interconnection and Points of Ownership/Demarcation

Attachment #1:

High Level Planning Diagram Depicting Interconnection Facilities and Points of Ownership/Demarcation


T1
AH1-673
GENERATOR
FACILITY
BATTERY
CHARGE
METER
91601
4.8
MILES
PROJECT DEVELOPER
TRANSMISSION OWNER
REVENUE
& AMI
METERING
TSS 916
EWING AVE
138KV
1
2
3
1A
1B
1C
STA. 7
STATE
LINE
TSS 150
CALUMET
≈2.9
MILES
0704
17124
T031
T030
≈0.1
MILES
91602
0704
17124
ESS Z-715
REPUBLIC STEEL /
TSS 955
RIVER EC
≈0.34
MILES
ESS Z-100
TOWER AUTO
TSS 177
BURNHAM
LEGEND
POINT OF INTERCONNECTION
POINT OF CHANGE IN OWNERSHIP