

# **FirstEnergy Allen 230/115 kV Substation**

Existing Facility Upgrade/Greenfield Project Company  
Evaluation and Constructability Information

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FirstEnergy Corporation hereby submits the following information as required by the PJM Template for Greenfield Project-Company Evaluation and Constructability Information.

## **A. Executive Summary**

FirstEnergy Corporation (FirstEnergy)  
76 S Main Street  
Akron, OH 44308

FirstEnergy is a regional energy provider headquartered in Akron, Ohio. Its subsidiaries and affiliates are involved in the generation, transmission, distribution and sale of electricity, as well as energy management and other energy-related services. FirstEnergy is a publicly traded corporation. JCP&L, Met-Ed and Penelec are wholly-owned direct subsidiaries of FirstEnergy. Mon Power, Potomac Edison and West Penn Power are wholly-owned direct subsidiaries of Allegheny Energy, Inc., which is a wholly-owned direct subsidiary of FirstEnergy. ATSI and TrAILCo are wholly-owned direct subsidiaries of FirstEnergy Transmission, LLC, which is a wholly-owned subsidiary of Allegheny Energy, Inc.

This proposal submitted by FirstEnergy, in response to the 2014 PJM RTEP Reliability Open Window 2 (“Window 2”), proposes to build a new 230 kV “greenfield” loop and upgrade an existing 115 kV substation to resolve the reliability violations identified below. The greenfield elements include:

- Looping the PPL Cumberland – West Shore 230 kV transmission line approximately 2 miles into the existing Allen 115 kV substation.

Upgrades to existing Allen, PPGI and Roundtop 115 kV substations includes the following:

- Install additional bus work and breakers at Allen substation to upgrade the existing substation to a three breaker 115 kV ring-bus configuration.
- Construct a 230 kV three (3) breaker ring-bus at Allen substation.
- Install a 224 MVA 230/115 kV transformer at Allen substation.
- Upgrade relays at Roundtop substation
- Upgrade relays at PPGI substation

Collectively, the 230 kV loop, expansion of existing Allen substation, relay upgrades at Roundtop, and relay upgrades at PPGE is referred to as the “Allen Project”.

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The Allen Project mitigates violations reported in the Window 2 results. Specifically, the Allen Project addresses the N-1-1 loss of the Middletown Junction-Roundtop (B\_ME115-SX-#28) and Gardners-Hunterstown (B\_ME115-SX-#6) 115 kV lines, which result in the following Window 2 violations:

FG #	Bus	Contingency Voltage (p.u.)	Voltage Drop (%)
N2-VD2	204520 27ALLEN 115 kV	0.87	14.83
N2-VD3	204526 27DILLSBRG 115 kV	0.87	14.82
N2-VD4	204528 27GARDNERS 115 kV	0.87	14.43
N2-VD5	204546 27MOUNTAIN 115 kV	0.87	14.69
N2-VD6	204552 27P.P.G.I. 115 kV	0.87	14.71
N2-VD7	204556 27ROUND TP 115 kV	0.87	14.92
N2-VD9	204520 27ALLEN 115 kV	0.87	12.55
N2-VD10	204526 27DILLSBRG 115 kV	0.87	12.47
N2-VD11	204528 27GARDNERS 115 kV	0.87	11.98
N2-VD12	204546 27MOUNTAIN 115 kV	0.87	12.42
N2-VD13	204552 27P.P.G.I. 115 kV	0.87	12.44
N2-VD14	204556 27ROUND TP 115 kV	0.87	12.63

Installing a 28.8 MVAR capacitor bank at the Mountain 115 kV substation (FE-W2-4a) mitigates all of the flowgate violations summarized above and reported in Window 2. [REDACTED]

[REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]

[REDACTED]

The total cost of the proposed Allen Project is approximately \$19.3 million. The expected Allen Project duration is 18 months from receipt of approval from PJM.

As required by PJM Operating Agreement Subsection 1.5.8 (a), 'Prequalification for Designated Entity Status', FirstEnergy hereby submits the following:

FirstEnergy submitted its prequalification documentation on June 27, 2013 and was subsequently granted pre-qualified status by PJM and given ID number 13-10. Further, in compliance with the PJM Operating Agreement Schedule 6, Subsection 1.5.8(a)(3), on September 29, 2014, FirstEnergy submitted the appropriate updates to Section F of its initial prequalification information. As such, FirstEnergy hereby states that the pre-qualification information provided to PJM, as updated, reflects FirstEnergy's current qualifications for eligibility as a Designated Entity as defined in the Operating Agreement Subsection 1.5.8(a).

FirstEnergy hereby indicates its intent to be designated to construct, own, operate, maintain and finance the proposed Allen Project and thus makes clear its intent to be considered to be the Designated Entity for the proposed project.

## **B. Company Evaluation Information**

FirstEnergy hereby submits by reference as to the specific section in its original pre-qualification documentation (dated June 27, 2013 and subsequently accepted by PJM) as evidence of the following:

- FirstEnergy's technical and engineering qualifications (Section B)
- FirstEnergy's experience in:
  - developing, operating and maintaining transmission facilities (Section C);
  - adherence to standardized construction, maintenance and operating practices (Section E), and including the ability for emergency response and system restoration (Section H);
  - working in the geographic region in which the proposed project is located (Section D);
  - ability to acquire rights of way within the proposed projects geographic region (Section I)

- FirstEnergy has adequate financial resources available to construct, operate and maintain the proposed project.
- FirstEnergy has demonstrated its managerial ability to contain costs and adhere to construction schedules for numerous transmission projects that have been constructed by its 10 utilities and 2 transmission companies.

[REDACTED]

- FirstEnergy is amply qualified to construct, operate, and maintain the proposed project (Section C).

## C. Proposed Project Constructability Information

### C.1. *Component Scope*

#### C.1.a Greenfield Transmission Line Element Detail

##### Terminal points

The greenfield portion of the Allen Project loops the PPL Cumberland – West Shore 230 kV line approximately 2 miles into Allen substation. Remote terminal points for the 230 kV portion of the Allen Project are PPL’s Cumberland and West Shore substations. Remote terminal points for the 115 kV portion of the Allen Project are relay upgrades at Met-Ed’s Roundtop and PPGI substations.

##### General description of alternative routes or routing study area

A line route evaluation has not been performed to determine the final line route for the Allen Project.

[REDACTED]

##### Line Route and Geographic description of any terrain traversed by the proposed new line or study area

The final line route has not been determined;

[REDACTED]

A detailed Line Route Evaluation (LRE) will be performed to determine the final route. In general, construction of the line will utilize double circuit wood-pole construction with braced post insulators

Electrical & Physical characteristics

The proposed transmission line has the following specifications:

Parameter	Value
Nominal Voltage Rating	230 kV
AC or DC?	AC
Line MVA Normal and Emergency Rating	
Line and Shield Conductor Type and Size	
Overhead or Underground/Submarine	Overhead Construction
Single or Double Circuit Towers	Double circuit wood pole with braced post insulators

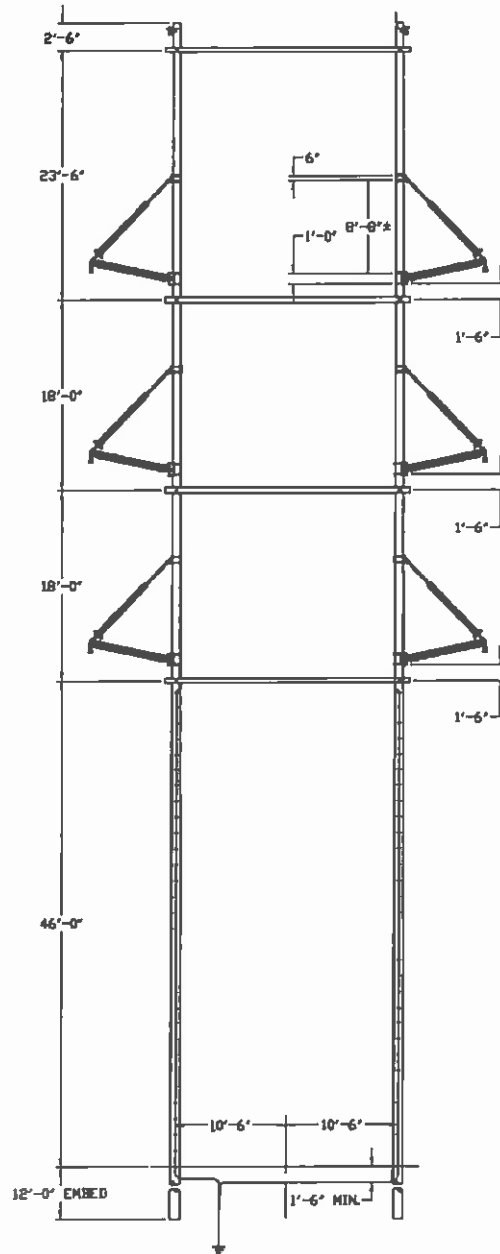
Geographic map with proposed transmission line study area superimposed

Attached below is an aerial image of the proposed Allen Project 230 kV line route. The existing PPL Cumberland-West Shore 230 kV line is shown in green.



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Shown below is a drawing of the double circuit wood pole structure with post insulators.





### C.1.b Greenfield Substation/ Switchyard Facility Element Detail

#### General description of the proposed locations(s)

The Allen Project includes expanding the existing 115 kV Allen substation in the Met-Ed service territory and installing a 230/115 kV transformer. Allen substation is located in the vicinity of:



As previously defined, the Allen Project will consist of:

#### **Allen Substation - Upgrade Existing Facilities:**

1. Install a 3 breaker 230kV Ring Bus
2. Expand existing Allen 115 kV bus to a 3 breaker ring bus
3. Install a 224 MVA 230/115 kV Transformer




#### **PPGI Substation - Upgrade Existing Facilities:**

1. Upgrade relays at PPGI 115 kV (Allen Terminal)
  - a. Install new primary, backup, DCB, TT and breaker failure protection.

#### **Roundtop Substation - Upgrade Existing Facilities:**

1. Upgrade relays at Roundtop 115 kV (Allen Terminal)
  - a. Install new primary, backup, DCB, TT and breaker failure protection.

#### **230 kV Line Loop - Greenfield Scope of work:**

1. Loop the PPL Cumberland-West Shore 230 kV line into Allen substation (~2 miles) using 

One-line diagram and general arrangement drawings

Shown below is a single line of the Allen Project. Facilities shown in Blue are new facilities (230 kV line) or upgrades to existing facilities (Allen Substation). Facilities shown in pink are future facilities. Allen substation will be designed to accommodate a second 230/115 kV transformer (future).

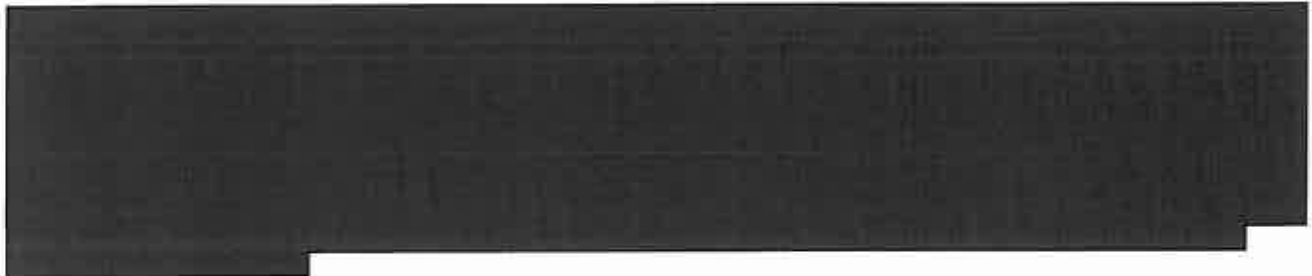


Illustrated below is a Plan View of Allen substation showing the 115 kV and 230 kV layout (future facilities not shown).



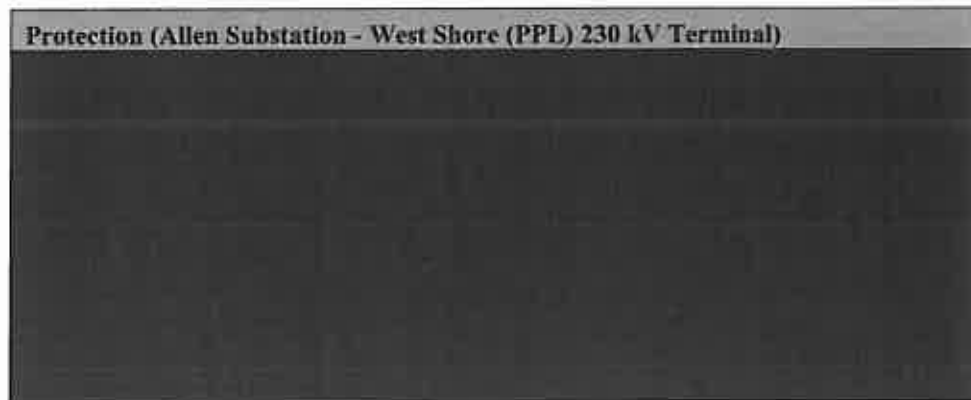
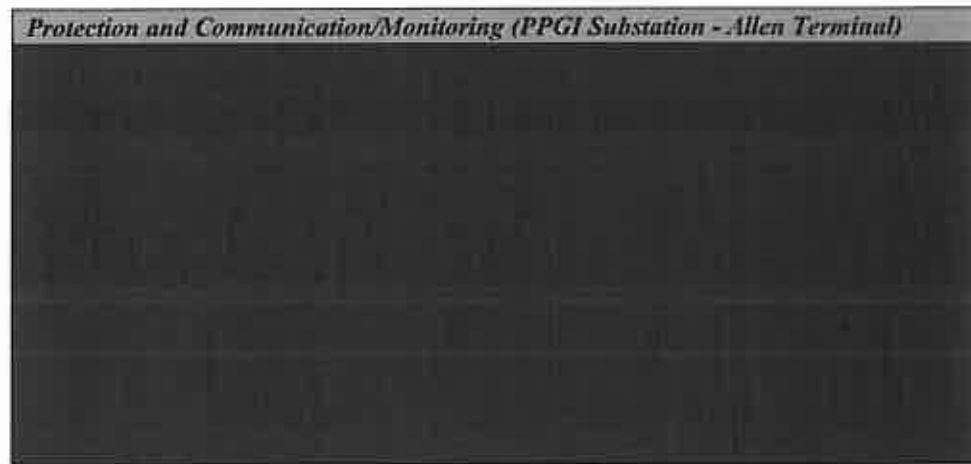
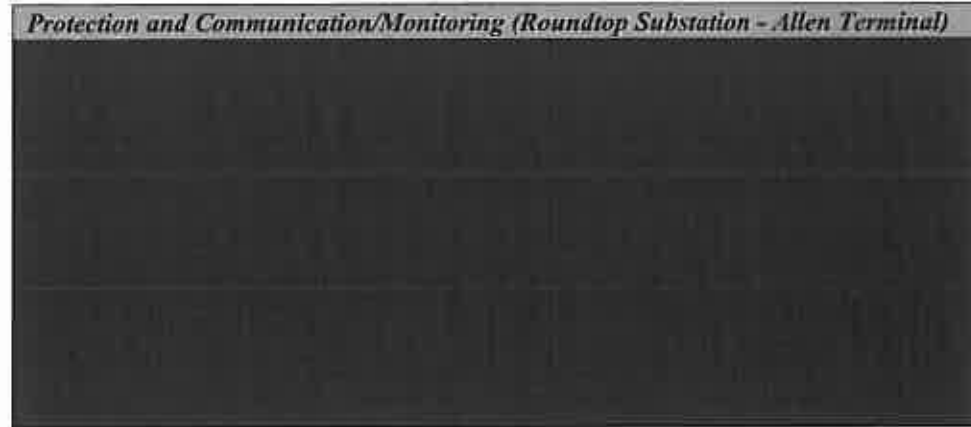
Electrical design

The Allen Project consists of an approximately 2 mile 230 kV loop, installation of a 230/115 kV transformer at Allen substation and expansion of the existing Allen substation (i.e. 230 kV and 115 kV ring bus). The text below provides the necessary information to add the Allen Project to the Window 2 models.




Relay communications plan

New relays will be installed at Allen substation as part of the 230 kV and 115 kV ring bus conversion/construction. The following relay/communication upgrades will be required:

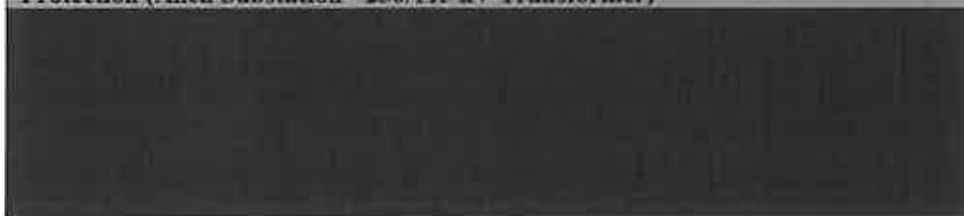


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**Protection (Allen Substation - Cumberland (PPL) 230 kV Terminal)**

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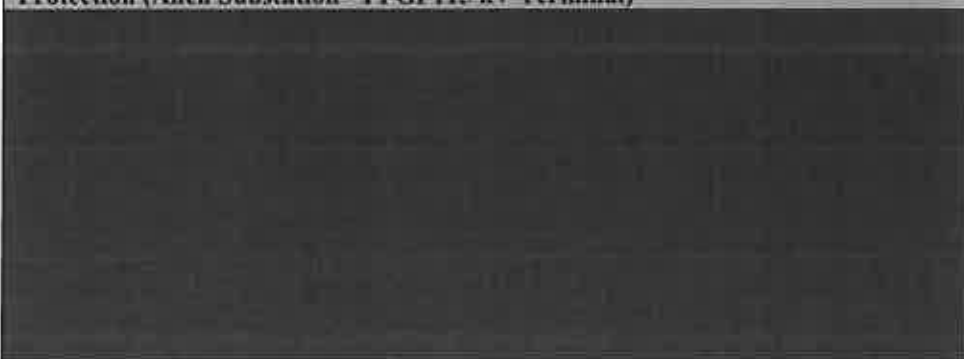
**Protection (Allen Substation - 230/115 kV Transformer)**

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**Protection (Allen Substation - Roundtop 115 kV Terminal)**

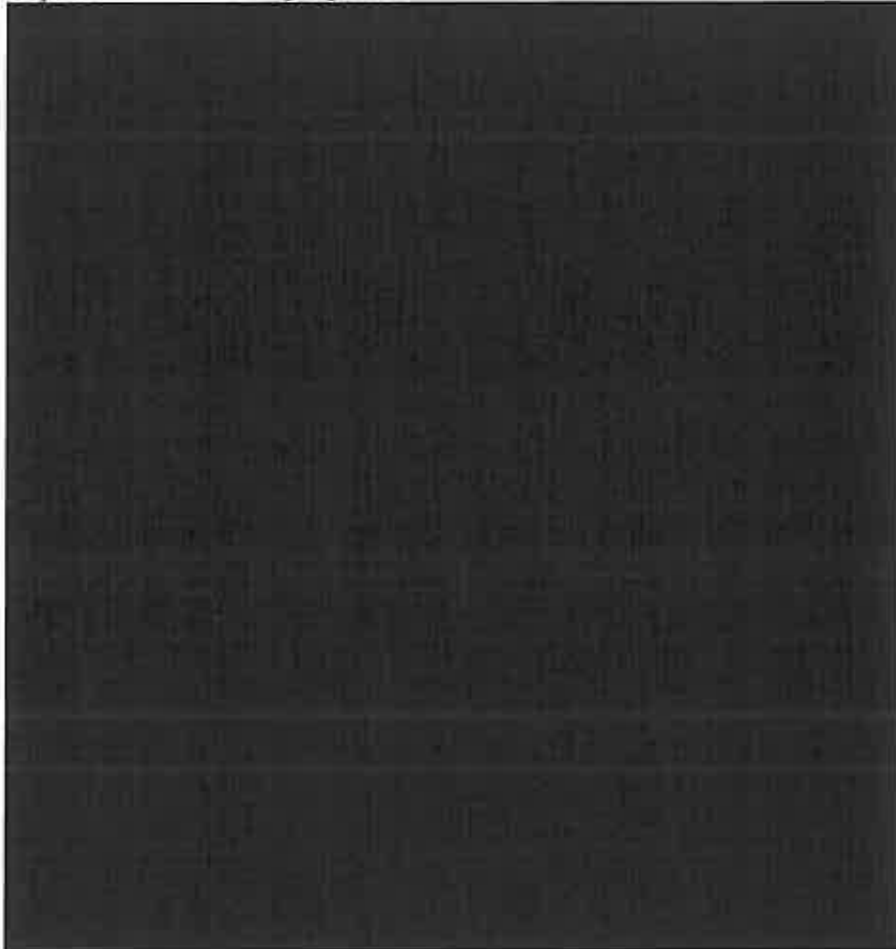
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**Protection (Allen Substation - PPGI 115 kV Terminal)**

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Geographic map

Shown below is an aerial photo of the existing Allen Substation with the region in yellow depicting the proposed substation expansion. Final grading plans have not been complete. The purpose of this drawing is to give an approximate representation of the proposed modification.



**C.1.c Transmission facilities to be constructed by others**

Transmission line relocation



Substation expansion or modification

PPL may need to upgrade the relays at Cumberland and West Shore substations.

**C.1.d Environmental, permitting and land acquisition**

Assessment of environmental impacts

FirstEnergy will evaluate all potential environmental impacts and will submit for the necessary permits. It is anticipated that the environmental permits will be readily obtained with no unusual conditions.

Right of way and land acquisition plan and approach

FirstEnergy will negotiate with affected property owners for additional rights to operate at 115kV. Rights for access routes will also be negotiated as needed.

Permitting plan and approach

FirstEnergy will obtain all required permits and local approvals.

Discussion of potential public opposition

[REDACTED]  
[REDACTED] an LRE will be performed. The study will provide support for final route selected. [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

**C.2. Project Component Cost Estimates**

**C.2.a Cost Estimate Table – Rebuild and Expansion of Allen 115 kV Substation**

Description	Total Cost

**Total Cost \$19,329,200**

**C.3. Schedule**

Listed below is the timeline for construction of the Allen Project. The estimated project timeline is 18 months.

Substation	Activity	Start	Finish
█			
█			
█			
█			
	In Service	6/1/2019	



**C.4. *On-going Transmission Facility Items***

Operational Plan

[REDACTED]

Maintenance Plan

The Allen Project facilities will be maintained consistent with FirstEnergy's existing maintenance practices.

**C.5. *Assumptions***

The following assumptions were made for the proposed Allen Project:

[REDACTED]

3. The 2 mile loop will consist generally of 2-pole, double-circuit wood pole structures with braced post insulators.

[REDACTED]