



Reliability Analysis Update

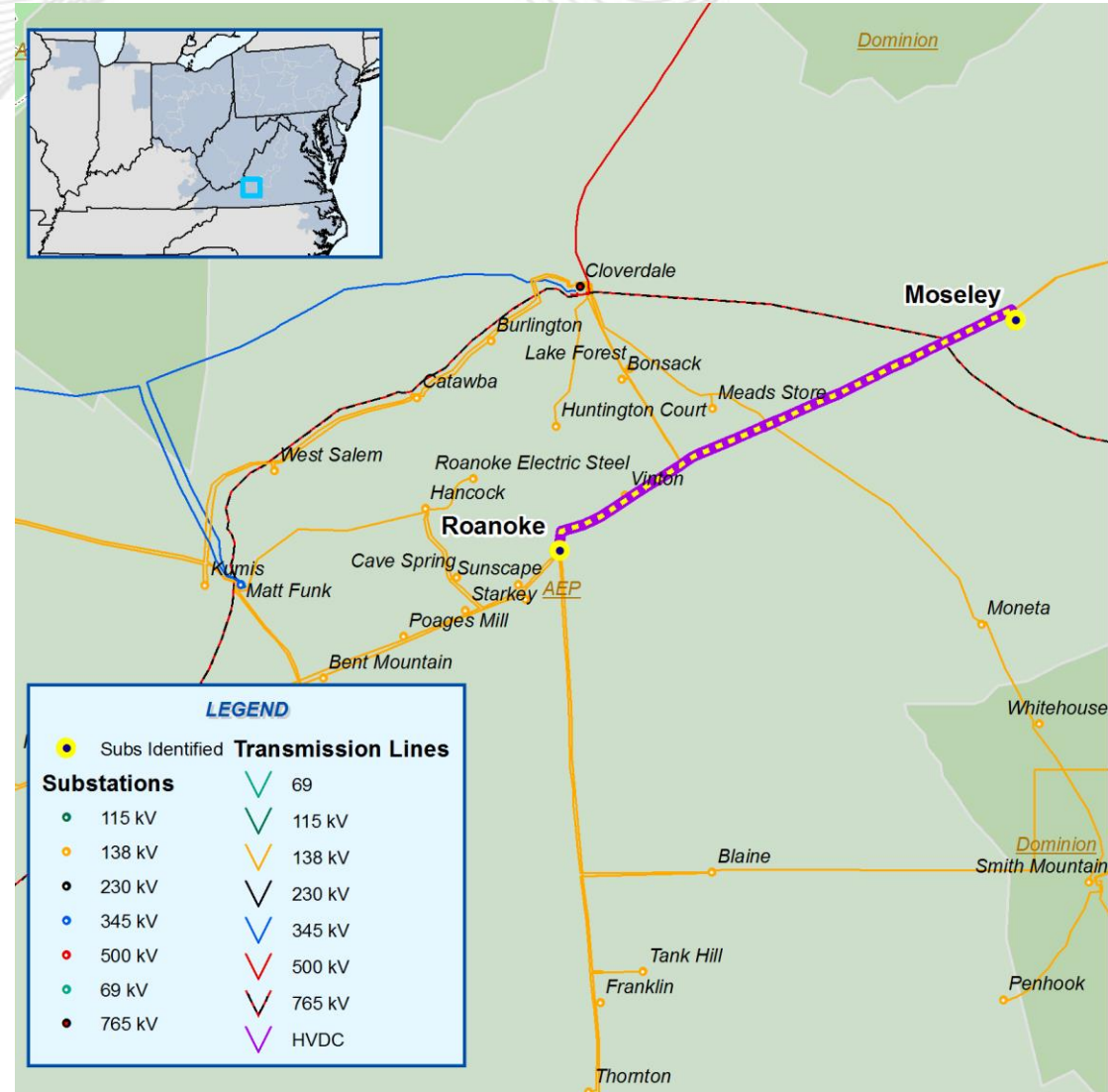
Sub Regional RTEP Committee - PJM West

March 19, 2021

Existing Project Updates

Baseline Reliability Projects

- **B1880 Cancellation**
- B1880: Presented in 3/19/2012 SRRTEP
- Scope: Rebuild the 15 miles of the Moseley – Roanoke 138kV line. This project would consist of rebuilding both circuits on the double circuit line
- Driver: The Moseley – Roanoke 138kV line is overloaded for various N-1-1 contingency pairs
- Estimated Project Cost: \$30M
- Required IS date: 06/01/2016
- **Reasons for the cancellation:** Due to the rating increase of the line (related to a rating methodology update back in 2014), there is no current baseline need to address this line. The project was put on hold back in 2014. It hasn't been modeled in the RTEP cases for the past several years and no reliability violations have been identified in any RTEP cycle since then.



First Review

Baseline Reliability Projects

Process Stage: Needs Review

Criteria: AMPT FERC 715 Radial load criteria S3.2.7

Additional Benefits: Member Service and AMPT Interconnection Requirements

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

Problem Statement:

Huron 69kV Substation (AMP Transmission):

The existing interconnection is a simple 0.15 mile radial tap from the supplying 69kV line to a three, breaker station. Current load is 26MW, projected to increase to 38MW by 10/1/21 and 40MW by 10/1/22. Population served is 7,149.

AMPT's FERC 715 Radial Load Criteria (Section 3.2.7) requires a second independent source for facilities in excess of 30 MW-miles of exposure. Additionally, AMPT Interconnection Requirements specify a second source for loads 5MVA and above.



Dayton Transmission Zone: Baseline Greene 138kV Breaker "GJ-138C" Replacement

Process Stage: Need Review

Criteria: Over Duty Breaker

Assumption Reference: 2025 RTEP assumption

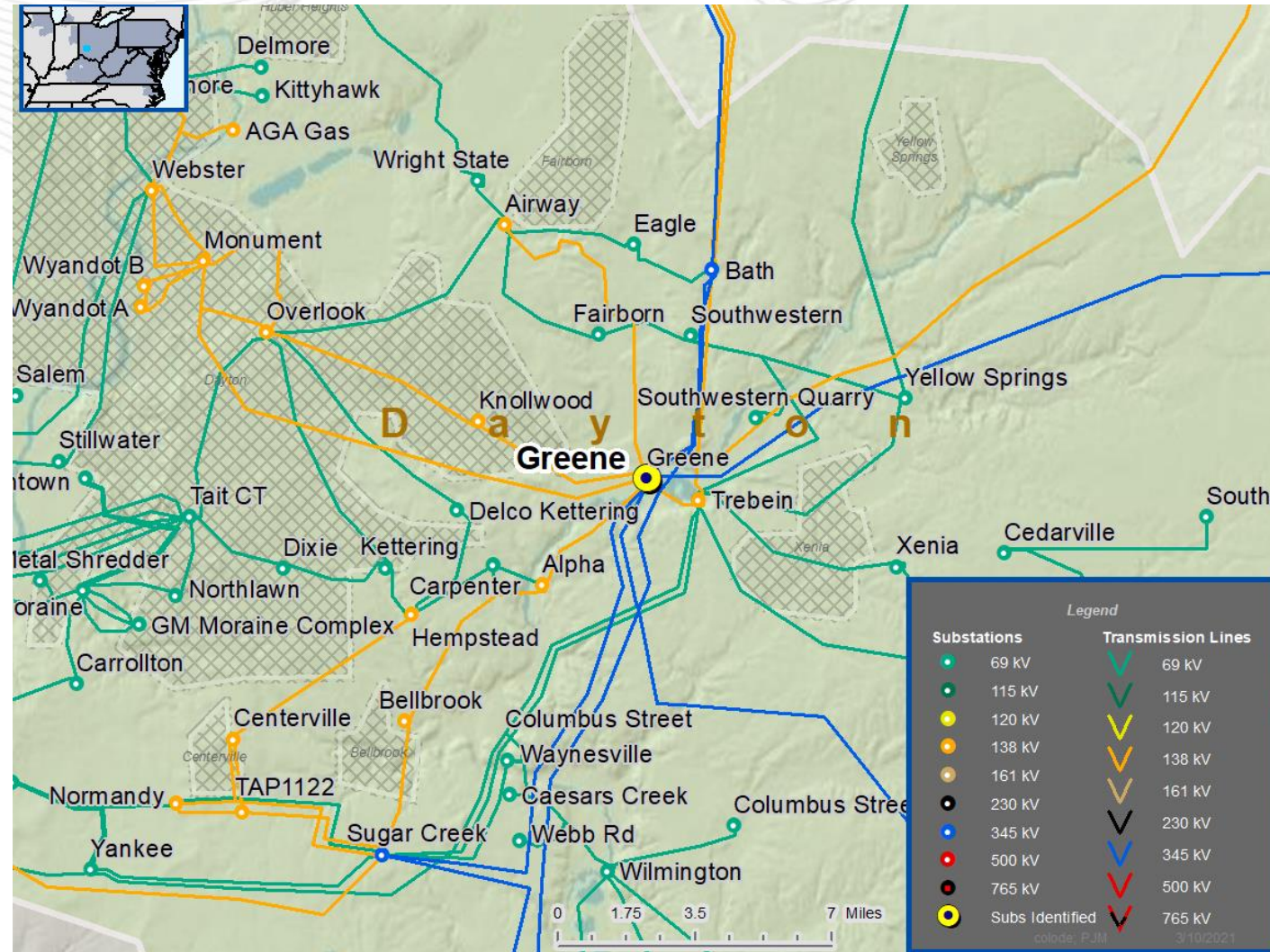
Model Used for Analysis: 2025 short circuit model

Proposal Window Exclusion: Below 200kV

Problem Statement:

In 2025 RTEP short circuit model, One (1) Greene 138kV breaker is over duty: "GJ-138C"

Existing Facility Rating: 40kA interrupting rating





ComEd Transmission Zone: Baseline Waukegan 138kV Substation

Process Stage: Needs Review

Criteria: ComEd FERC 715 Stability Criteria 4.3.2

Additional Benefits: N/A

Assumption Reference: 2023 RTEP assumption

Model Used for Analysis: 2023 RTEP cases

Proposal Window Exclusion: Below 200 kV

Problem Statement:

Waukegan 138kV Substation:

Mitigate existing instabilities at 138kV STA16 Waukegan for close-in three-phase faults with breaker failure. ComEd has been using out-step-relay as a temporary solution. A permanent solution is needed.



Recommended Solution

Baseline Reliability Projects

AEP Transmission Zone: Baseline Arlington Voltages

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

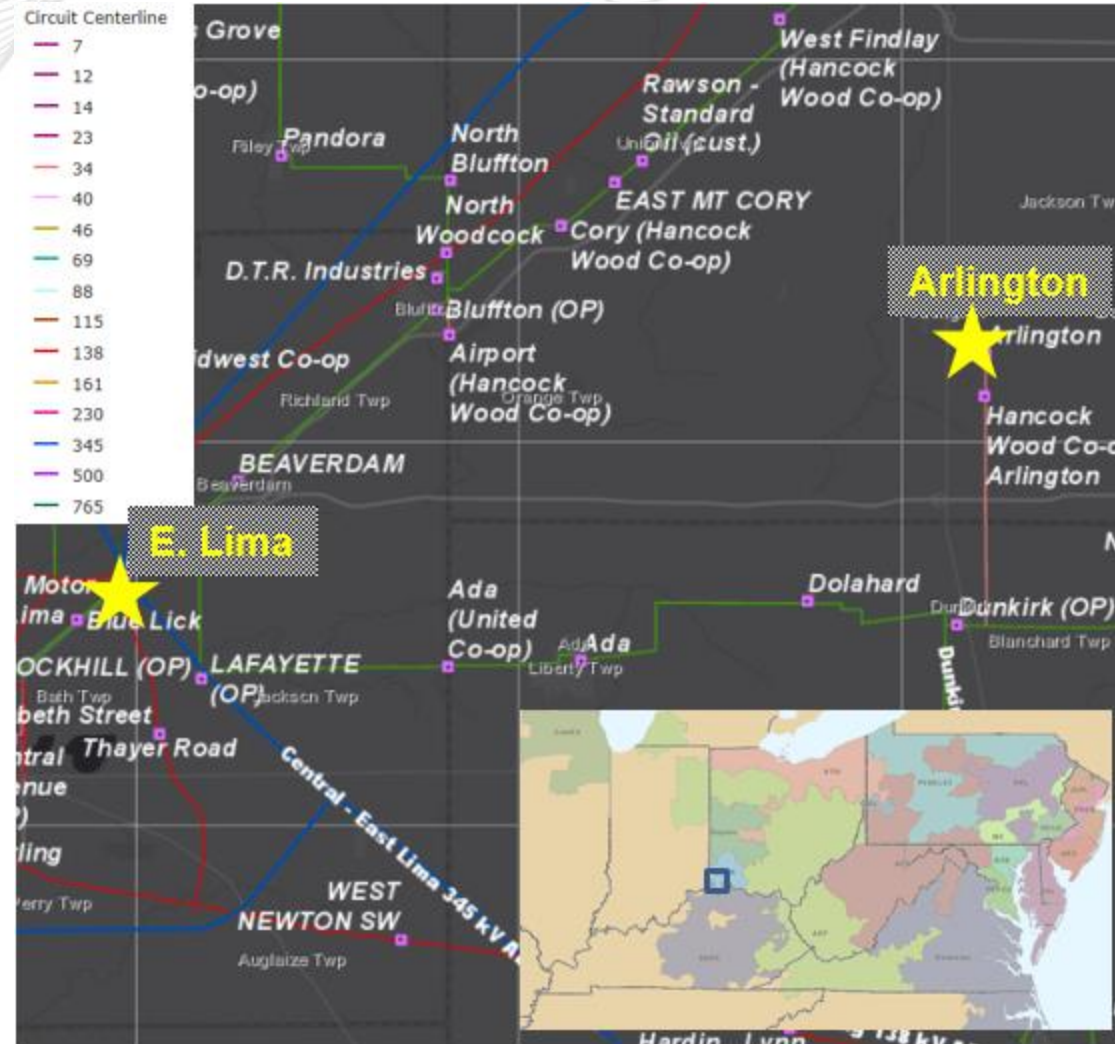
Problem Statement:

FG: EP-VM808, AEP-VM809

In the 2025 Summer RTEP case, low voltage violations at the Arlington 34.5 buses for an N-1-1 contingency.

Proposed Solution: Add circuit breakers on the low and high side of East Lima 138/69 kV Transformer (B3313)

Estimated Cost: \$1.2M





AEP Transmission Zone: Baseline Arlington Voltages

Alternatives:

1. Install a 138 kV circuit breaker on the high side of South Kenton transformers 2&3 (parallel) and rebuild 2.9 miles 69 kV line from S. Kenton to Kenton. Estimated Cost: ~\$7.0M
2. Convert S2395.1 .2, .3, .4, .5, .6, .12, .14, .15, .16, .17, .18, .19, .20, and .21.

S2395.1: Rebuild existing double circuit portion of the Dunkirk – Forest line asset from existing Str 194 to the greenfield Rangeline station (1.35 miles). Rebuild existing ~6.5 mi Arlington – Dunkirk 34.5 kV as Rangeline – East Arlington single 69 circuit from Str 194 to the greenfield East Arlington (formerly Arlington) .

S2395.2: Reconfigure ~0.05mi Dunkirk – Kenton 69kV line to terminate into Rangeline station.

S2395.3: Reconfigure ~0.05mi Dunkirk – Ada 69kV line to terminate into Rangeline station. S2395.4: Estimated Cost \$0.1M – Build ~10.1 mi 69kV line section between greenfield Buckrun Sw and East Arlington as single circuit 69kV.

S2395.5: Rebuild ~5.75 mi 69kV line section between greenfield West Crawford Station and Buckrun Switch (outside of Blanchard Station) as single circuit 69kV.

S2395.6: Rebuild ~0.22 mi South Vanlue Extension to tie into East Arlington – West Crawford 69kV ckt.)

West Crawford 69kV (Rebuild): Install a new 69kV ring bus with three 3000A, 40kA circuit breakers to replace

S2395.12: West Crawford Sw. Replace Cap switcher “AA” and relocate Cap bank from Carey Sw to West Crawford 69 kV bus.

S2395.14: Remove North Wharton Sw 69kV.

S2395.15: South Vanlue 69kV: Replace 69kV bus and existing switches with 2000A, 40kA line MOABs with sectionalizing capability.

S2395.16: Buckrun Sw 69kV: Install a new 69 kV, 2000A, 40kA, 3-way Phase-over-Phase Switch with sectionalizing capability

S2395.17: East Arlington 69kV: Install a new 69kV ring bus with three 3000A, 40kA circuit breakers to replace existing Arlington station.

S2395.18: Flat Branch Sw 69kV: Install 69 kV, 2000A, 40kA, 3-way Phase-over-Phase Switch with sectionalizing capability.

S2395.19: South Berwick 69kV: Remote end work.

S2395.20: Rangeline 69kV: Install a 5-breaker(3000A, 40kA) 69 kV ring bus to replace Dunkirk station.

S2395.21: Forest 69kV: Remove 69kV CB-H towards South Berwick.

Total Estimate cost: \$84.5M,

Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 2/17/2021



AEP Transmission Zone: Baseline Elliot Transformer Addition

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

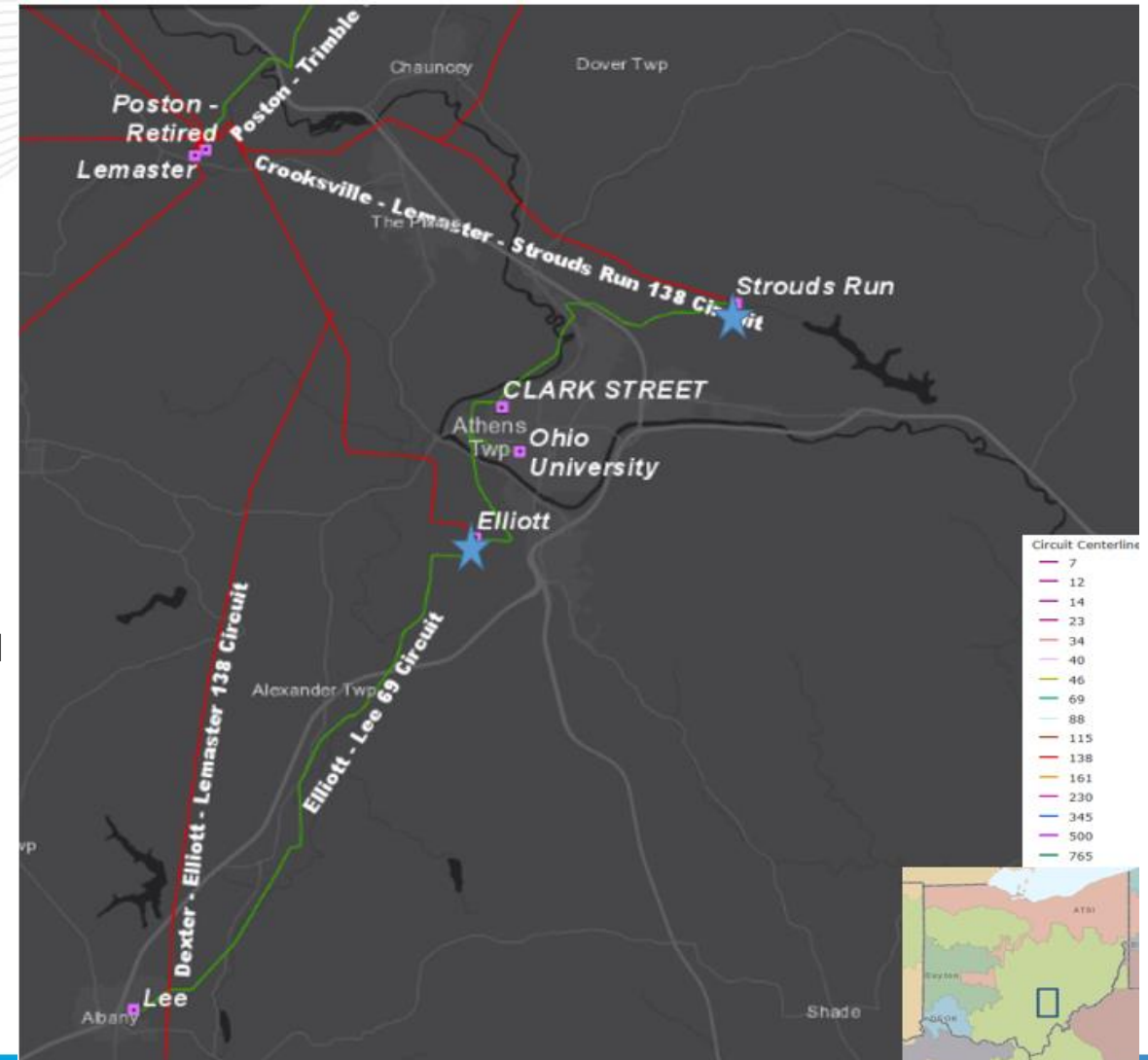
Problem Statement:

FG: AEP-T164 through AEP-T167

In the 2025 Summer and Winter RTEP cases, the Strouds Run 138/69/13 KV transformer #1 is overloaded for an N-1-1 contingency.

Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
05STRDREQ1– 05STROUDS 69KV winding	37/42/37/45





AEP Transmission Zone: Baseline Elliot Transformer Addition

Proposed Solution: Convert portions of s2224.5 and s2224.7 to baseline.

Covert S2224.5: Install a new 130 MVA transformer and associated protection at Elliot station (**B3314.1**).

Covert S2224.7: Perform work at Strouds Run station to retire transformer #1 and install a dedicated 138/13 KV distribution transformer (**B3314.2**).

Estimated Transmission Cost: \$3.0M

Estimated Distribution Cost: \$0.96M

Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
05ELLIOT new 138/69KV transformer	130/130/130/130

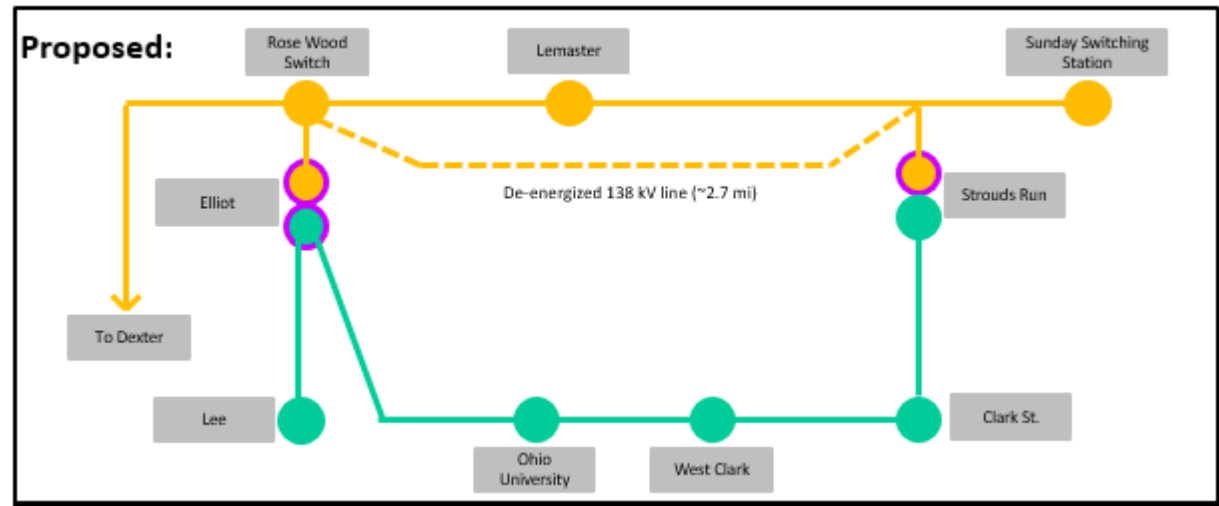
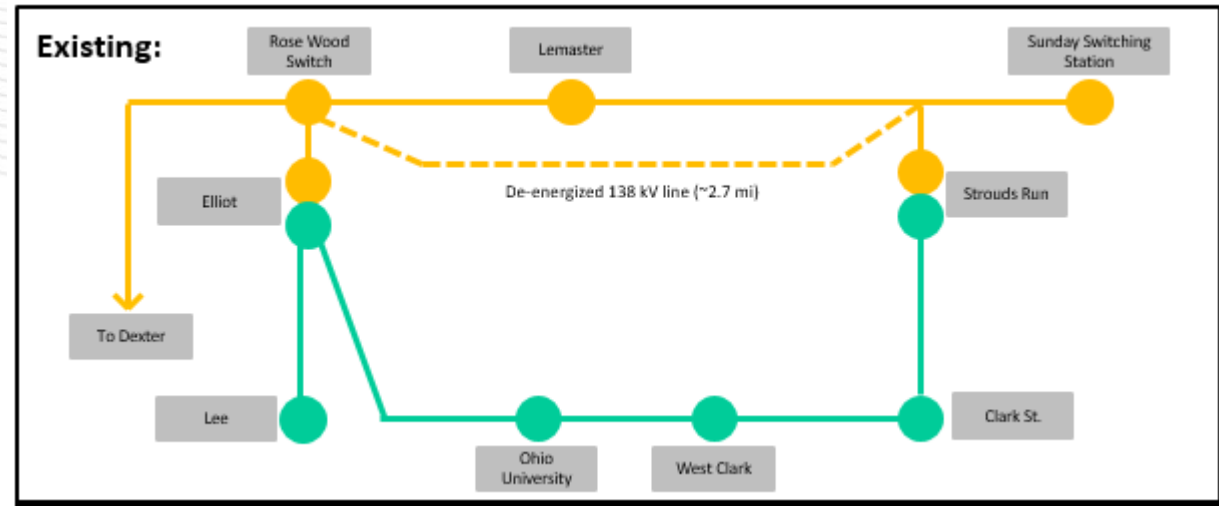
Ancillary Benefit:

No additional work required to address baseline issues. Cost and scope already identified in supplemental project.

Required In-Service: 6/1/2025

Projected In-Service: 10/25/2024

Previously Presented: 2/17/2021



AEP Transmission Zone: Baseline Mark Center - S.Hicksville Relay Upgrade

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

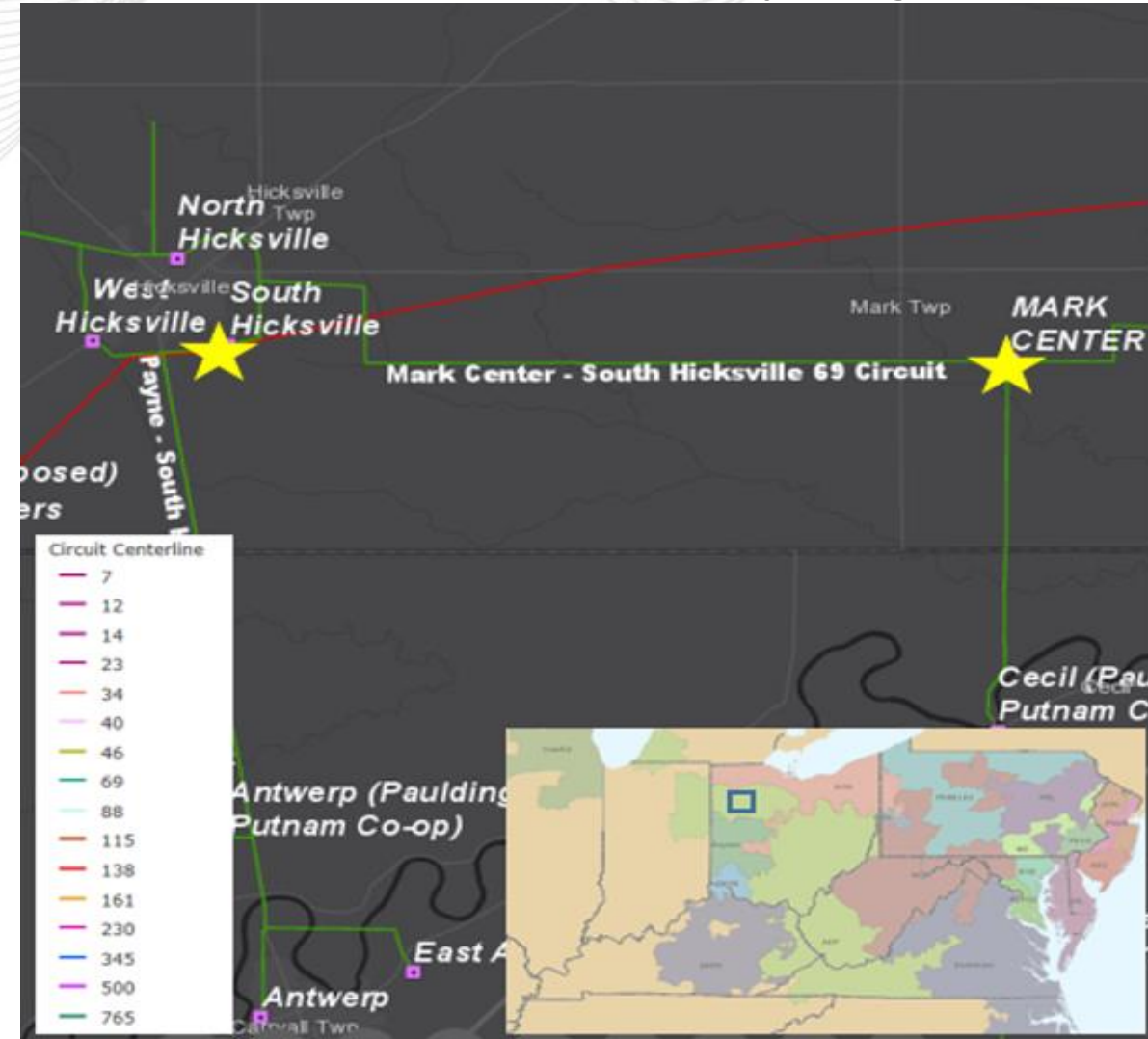
Problem Statement:

FG: AEP-T3 through AEP-T6, and AEP-T432, AEP-VD916, AEP-VD920, AEP-VD921, AEPVD923, AEP-VD948

In the 2025 Summer RTEP case, the Mark Center – South Hicksville 69 KV is overloaded for the multiple N-1-1 contingency pairs and a tower contingency; and voltage drop violations are observed at Paulding, Gen Port, Cecil, Mark Center and Sherwood 69kV buses for an N-1-1 contingency pair. In the 2025 Winter RTEP case, the Mark Center – South Hicksville 69 KV is overloaded as the result of a tower contingency.

Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
05S HICKSV – 05MARK CEN 69KV	49/53/53/53





AEP Transmission Zone: Baseline Mark Center - S.Hicksville Relay Upgrade

Proposed Solution: : Upgrade Relaying on Mark Center - South Hicksville 69 kV line and replace Mark Center cap bank with a 7.7 MVAR unit.
(B3315)

Estimated Transmission Cost: \$1.25M

Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
05S HICKSV – 05MARK CEN 69KV	68/76/90/98

Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 2/17/2021

Existing:



Legend	
500 kV	
345 kV	
138 kV	
69 kV	
34.5 kV	
23 kV	
New	

Proposed:



Questions?



- V1 – 3/11/2021 – Original slides posted
- V2 – 3/16/2021 – Added Slide #7, Waukegan stability problem statement
- V3 – 3/31/2021 – Added Slide #13, #14 correction on FGs, scope and cost for B3315 to be consistent with 1st read in Feb. SRRTEP