

Western Sub Regional RTEP: AEP Supplemental Projects

July 21, 2023

Needs

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

AEP Transmission Zone M-3 Process Greenbrier County, WV

Need Number: AEP-2023-AP017

Process Stage: Need Meeting 7/21/2023

Project Driver:

Equipment Material/Condition/Performance/Risk

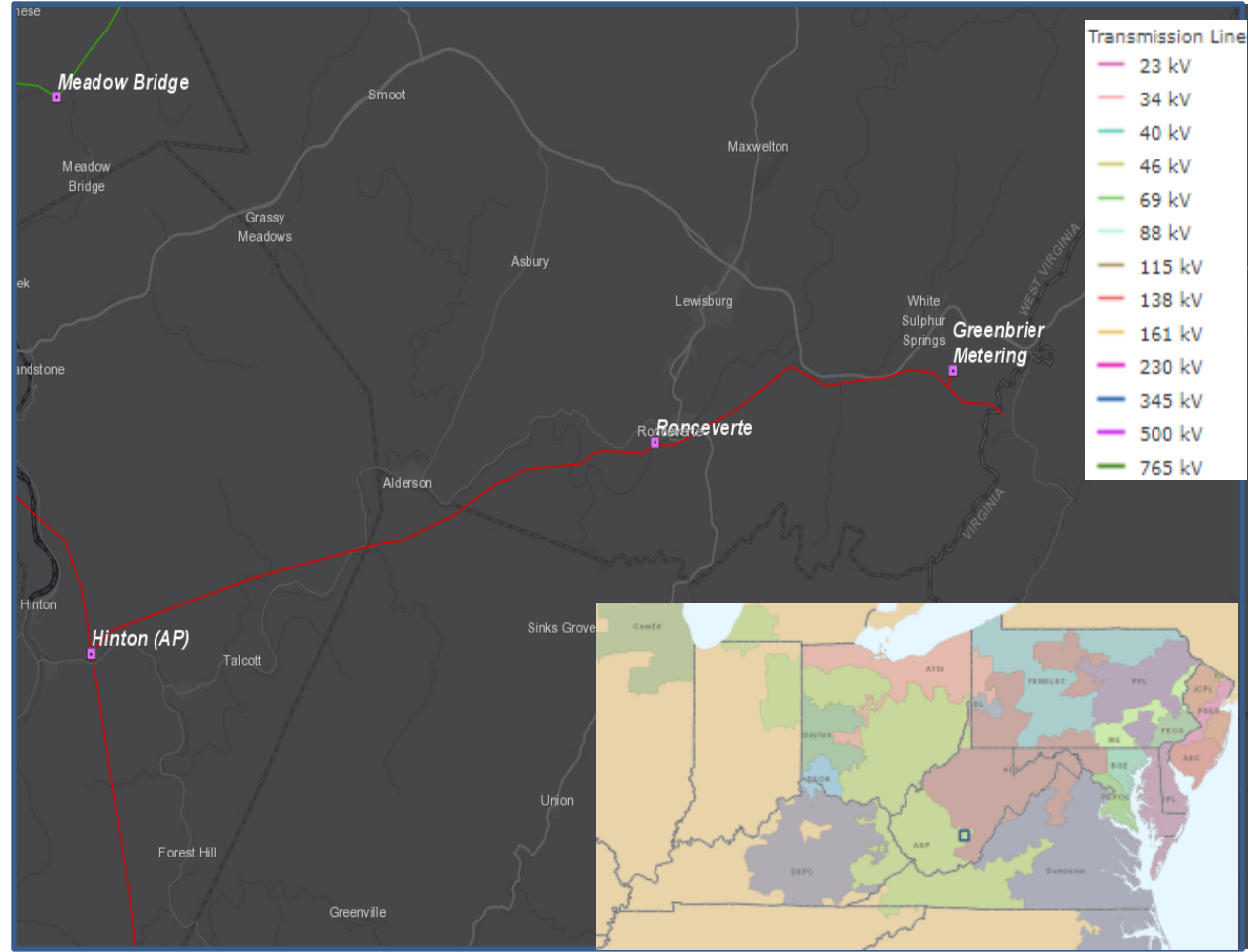
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

Hinton Station

- 138 kV circuit breakers A, B, C
 - HVB145-4000 type, SF6 filled breakers
 - The HVB145 model family has the propensity to mechanically pump closed instead of locking open as it awaits an electrical close command from the relaying. This presents a high mis-operation risk on the system. The HVB breakers have had some failures due to slow tripping with the breakers not reclosing faster than 20 cycles. Also, this model family has a high occurrence of SF6 gas leaks with 215 recorded malfunction records. This is an environmental concern since SF6 is a potent greenhouse gas with a high global warming potential, and its concentration in the earth's atmosphere is rapidly increasing. In addition, low SF6 causes operational issues with the breaker which can lead to excessive maintenance of closing contacts or failure. CBs A and C have active SF6 leaks.
- 37 of the 40 relays (93% of all station relays) at the station are in need of rehabilitation
 - 28 relays are electromechanical type which have significant limitations with regards to fault data collection and retention.
 - 4 static relays which have significant limitations with regards to spare part availability and fault data collection and retention.
 - 5 legacy MP relays with significant limitations regarding spare part availability and no vendor support and obsolete firmware.
- Hinton Station ties with Allegheny Power Services (APS), which is connected to the 138kV Bus at Hinton with no circuit breaker. This lack of sectionalizing creates a scenario where a fault on this tie outages the entire bus at Hinton and contains more than two zones of overlapping protection.



AEP Transmission Zone M-3 Process Greenbrier County, WV

Need Number: AEP-2023-AP018

Process Stage: Need Meeting 7/21/2023

Project Driver:

Equipment Material/Condition/Performance/Risk

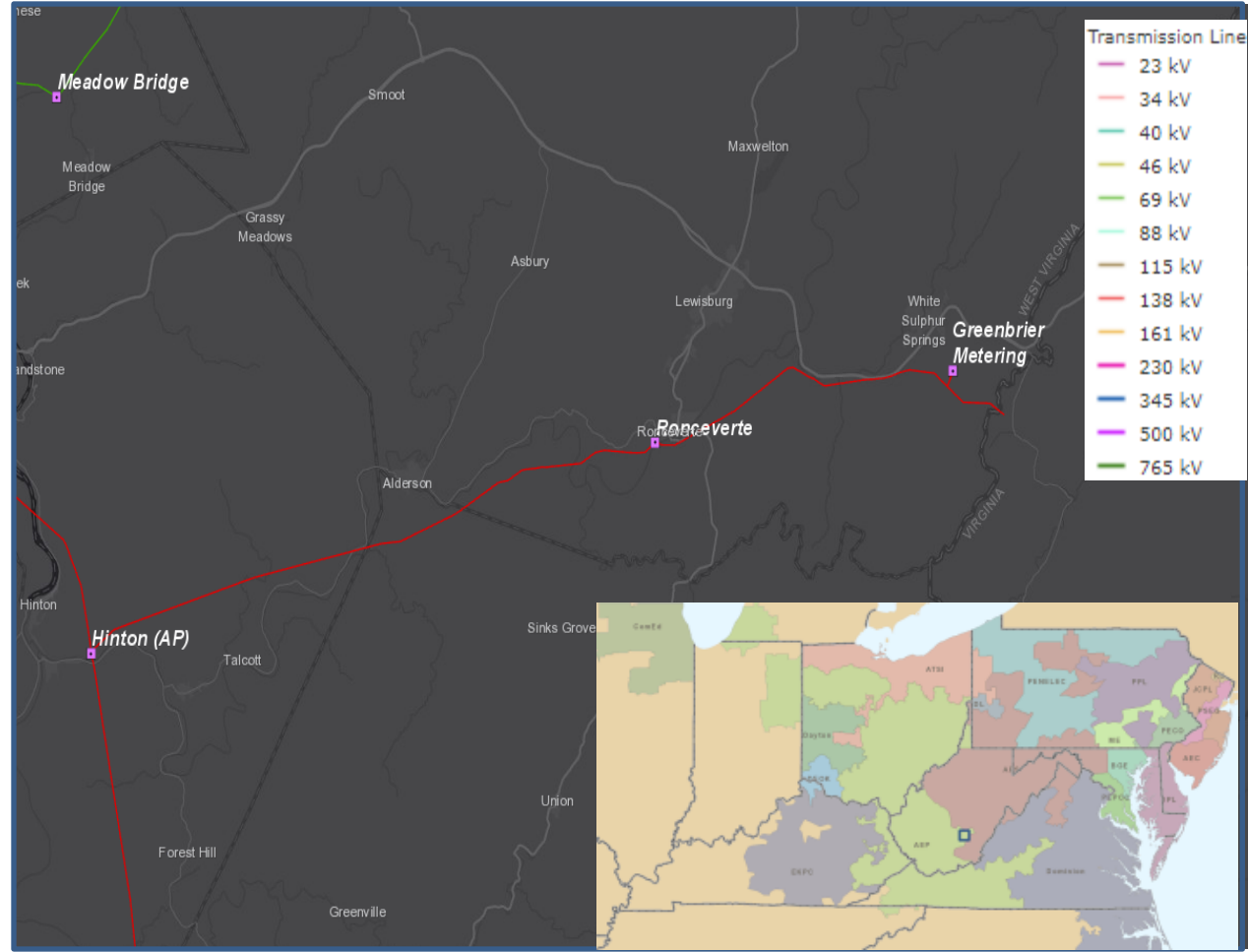
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

Greenbrier Metering Station

- 138 kV circuit switcher CS-AA
 - 1978 vintage, MARK V-138 type, SF6 filled switcher
 - The Mark V family of circuit switchers have no gas monitor and currently in-service units on the AEP system have experienced 110 malfunctions from May 2000 to August 2019. Two malfunctions of note were catastrophic equipment failures involving failures to trip. The first was an explosive failure of an interrupter of the capacitor switcher. The second was a catastrophic failure of the capacitor bank caused by a failure of the in-service MARK V to operate; in addition, this caused significant oil loss and a grass fire. Parts are expensive, especially because interrupters can only be replaced, not repaired, as they are hermetically sealed.
- 15 of the 17 relays (88% of all station relays) at the station are in need of replacement
 - 13 relays are electromechanical type which have significant limitations with regards to fault data collection and retention.
 - 2 static relays which have significant limitations with regards to spare part availability and fault data collection and retention.
- Greenbriar Metering Station is currently a shared station with APS where AEP owns the two line MOABs and the cap bank. The station, control house, batteries, transformers and circuit breakers are APS owned.
- The existing Hinton-Fudge Hollow line has tapped stations at Kanawha Trail, Ronceverte, and Greenbriar. This configuration creates a 5 terminal line from a protection and control standpoint due to the connections of the wye-grounded transformers at the tap points.



Need Number: AEP-2023-AP019

Process Stage: Need Meeting 07/21/2023

Supplemental Project Driver: Equipment Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

Line Name: Becco – Huff Creek 46kV Line

Original Install Date (Age): 1966

Length of Line: ~6.25 mi

Total structure count: 44

Original Line Construction Type: Wood structures

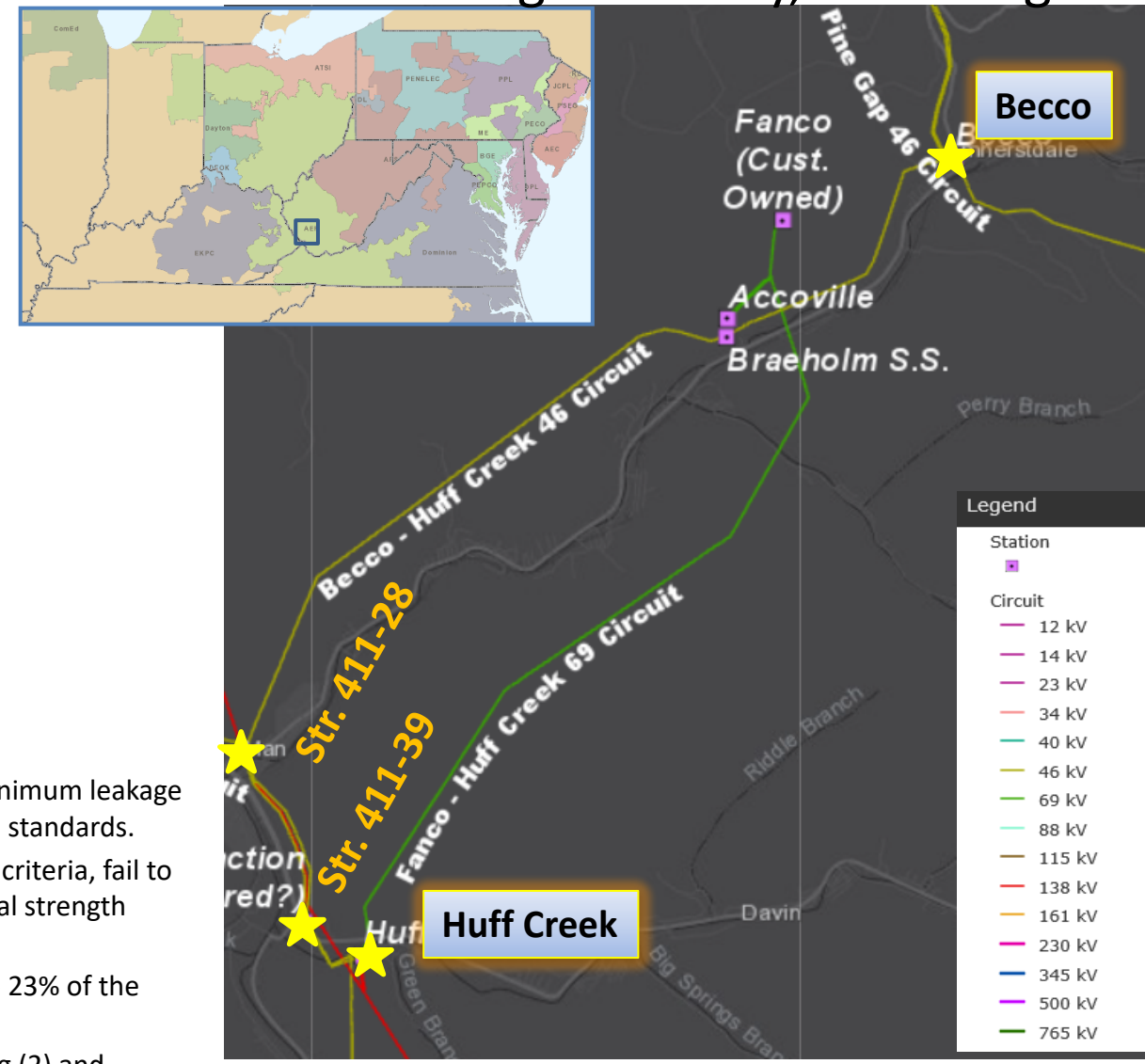
Conductor Type: 336,400 ACSR, 556,500 ACSR

Momentary/Permanent Outages: 2 momentary and 3 permanent outages

The 1-mile segment between and including Str. 411-28 to 411-39 was rebuilt in 1999.

Line conditions:

- 32 of 44 structures are 1966 vintage (73%)
- The 4-bell porcelain insulators on the line do not meet current AEP standards for CIFO and minimum leakage distance requirements. The legacy butt wrap grounding method is inadequate for current AEP standards.
- The 1966 structures on the Becco – Huff Creek circuit fail to meet 2017 NESC Grade B loading criteria, fail to meet current AEP structural strength requirements and fail to meet the current ASCE structural strength requirements.
- Currently, there are 10 structures with at least one open structural condition, which relates to 23% of the structures on this line.
- The 2 momentary outages were due to lighting. The 3 permanent outages were due to lighting (2) and distribution (1) causes. The Becco – Huff Creek circuit had a total outage duration of 286 hours due to these three permanent outages. The inadequate shielding angle and stolen or broken ground wire leads are a contributing factor to the poor lightning performance of this circuit.



AEP Transmission Zone M-3 Process Mason County, WV

Need Number: AEP-2023-AP020

Process Stage: Need Meeting 07/21/2023

Project Driver: Equipment Condition/Performance/Risk

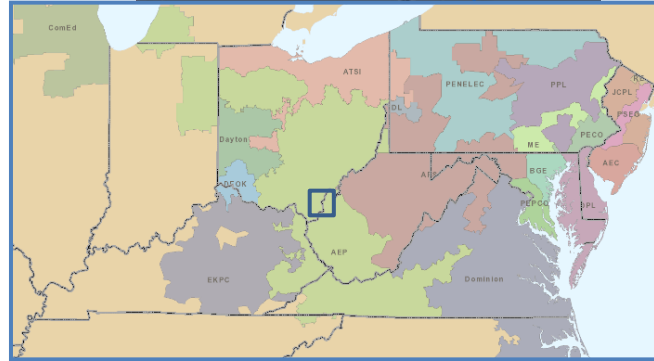
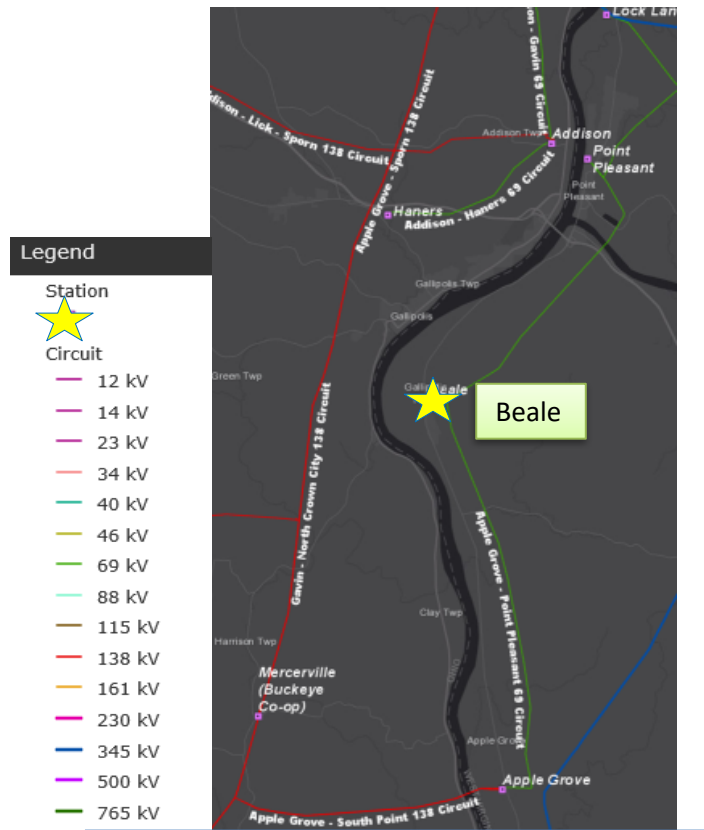
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumption Slide 13)

Problem Statement:

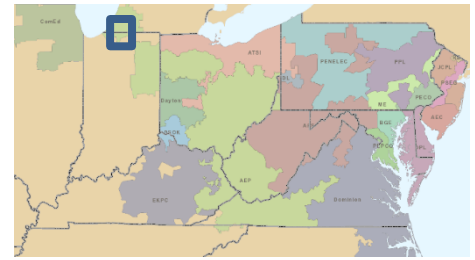
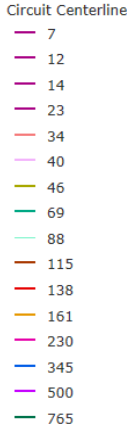
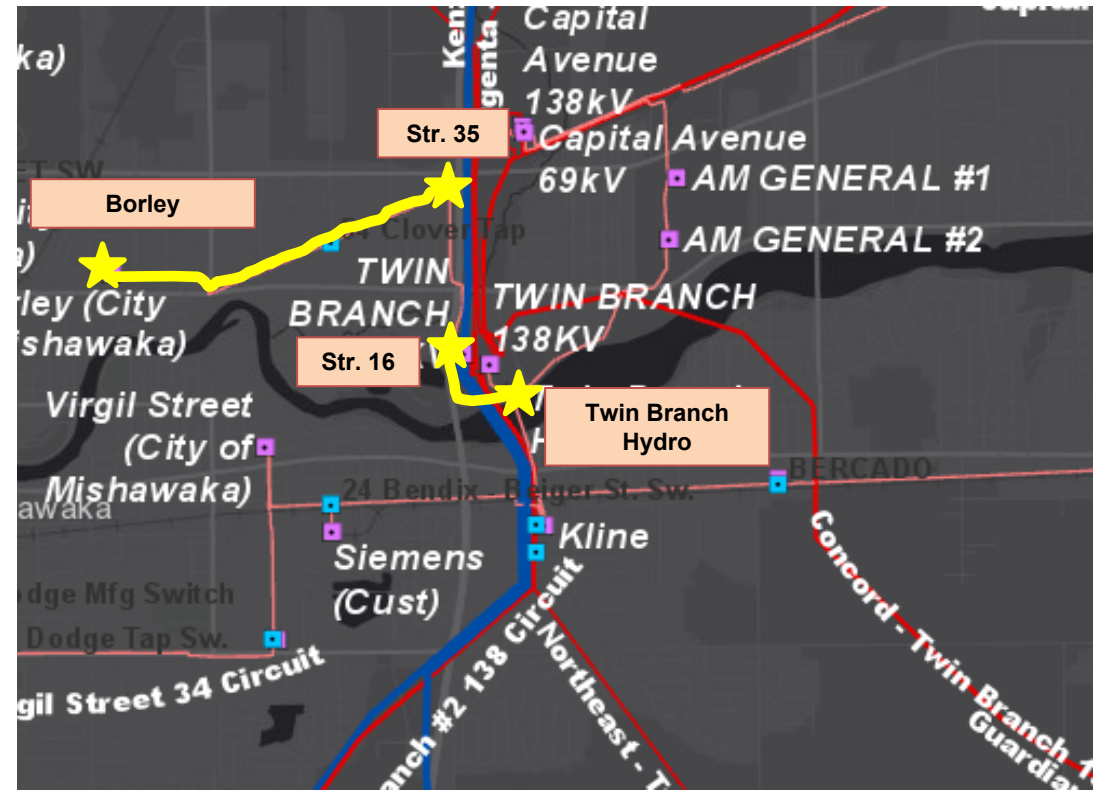
Beale Station

- 69 kV MOAB W has a broken arc horn on the middle phase.
- 69 kV MOAB/Ground switch that is an outdated design.
- 69/12 kV TR-1 067 is 1978 vintage and has experienced excessive decomposition of the paper insulation materials, overheating, high moisture content, low and declining dielectric strength indicative of increasing particle concentrations in the oil and decreasing ability of the oil to withstand future fault events.
- 12 kV Circuit Breaker A is oil filled and a Westinghouse PR Type.
- There are also 4 transmission and 10 electromechanical relays that need to be replaced.
- The distribution DOS RTU is currently not in service.



Need Number: AEP-2023-IM004
Process Stage: Needs Meeting: 07/21/2023
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Problem Statement:

- Twin Branch – Borley 34.5kV Line:**
- Line is 2.74 miles long installed in 1969 with a mix of wood poles with cross arms or horizontal post construction
 - 4/0 copper conductor exists on structure ranges 1 – 16 and 35 – 75
 - Structures fail 2017 NESC Grade B, AEP structural strength, and ASCE structural strength requirements
 - Mostly insulated with a mixture of 34.5kV and 69kV insulators, which do not meet AEP standards for CIFO and minimum leakage distance requirements
 - There are 10 structures with open conditions (13% of line). These conditions are structure related including bowed crossarm, rot heart, rot top, and split conditions
 - Approximately 30% of the wood poles have some level of decay or woodpecker damage
 - Approximately 20% of all crossarms are cracked and/or have visible decay



Need Number: AEP-2023-IM018

Process Stage: Needs Meeting: 7/21/2023

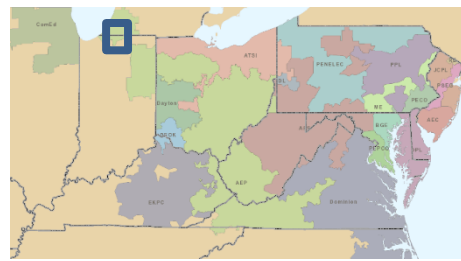
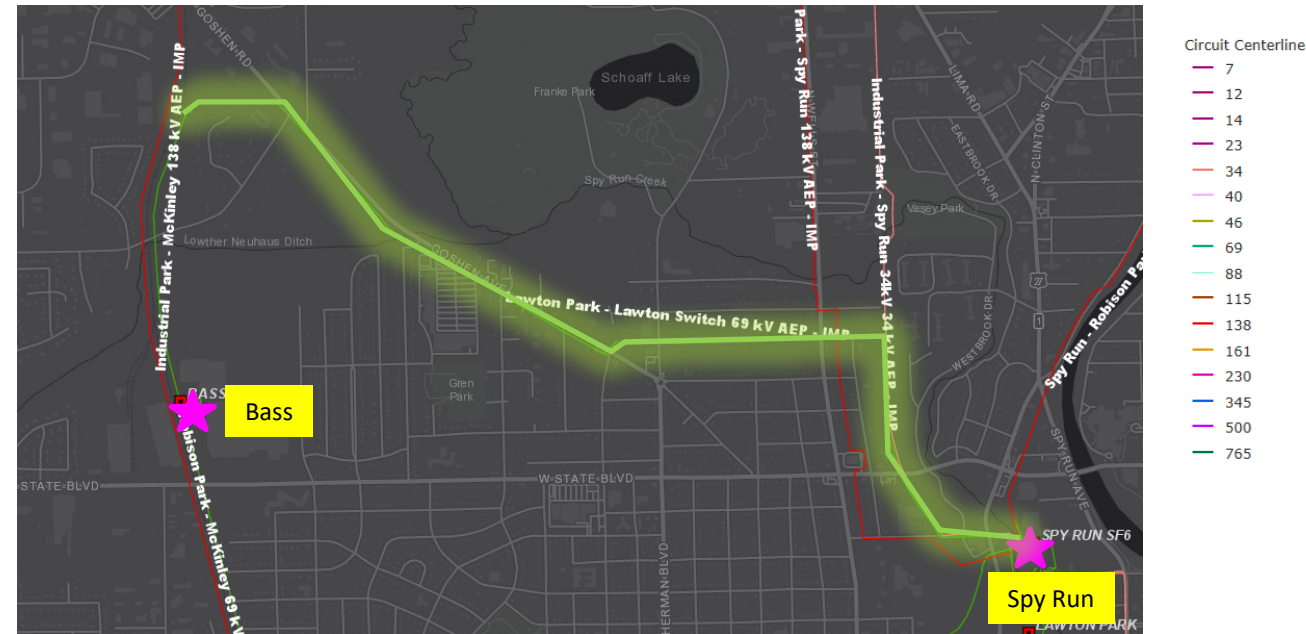
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

Lawton Park-Lawton Switch:

- Lawton Park- Lawton Switch 34.5kV line is 2.59 miles long that was originally installed in 1956 and mostly consists of single wood poles
- Structures fail to meet NESC Grade B and AEP structural strength requirements
- The grounding method utilizes butt wraps on every other structure, which is inadequate for current AEP Standards.
- The shield angle on a typical tangent structure is measured at 45 degrees, which is inadequate for current AEP shield angle requirements and can lead to poor lightning performance
- There are 63 structures with that have at least one (1) open condition (82% of line). These conditions specifically affecting the pole include woodpecker damage, insect damage, split, cracked, damaged, rot heart, broken, leaning transverse and rot shell conditions
- Out of 32 structures assessed (22 by aerial drone and 10 by ground crew), the following conditions were found:
 - Greater than 50% of wood poles assessed have moderate to advanced decay of the shell or ground line heart
 - Most poles have decayed tops, crossarms have light to moderate decay, crossarm braces have advanced decay and insect damage



AEP Transmission Zone M-3 Process Stark County, OH

Need Number: AEP-2023-OH002

Process Stage: Need Meeting 07/21/2023

Project Driver: Equipment Material/Condition/Performance/Risk; Operational Flexibility and Efficiency

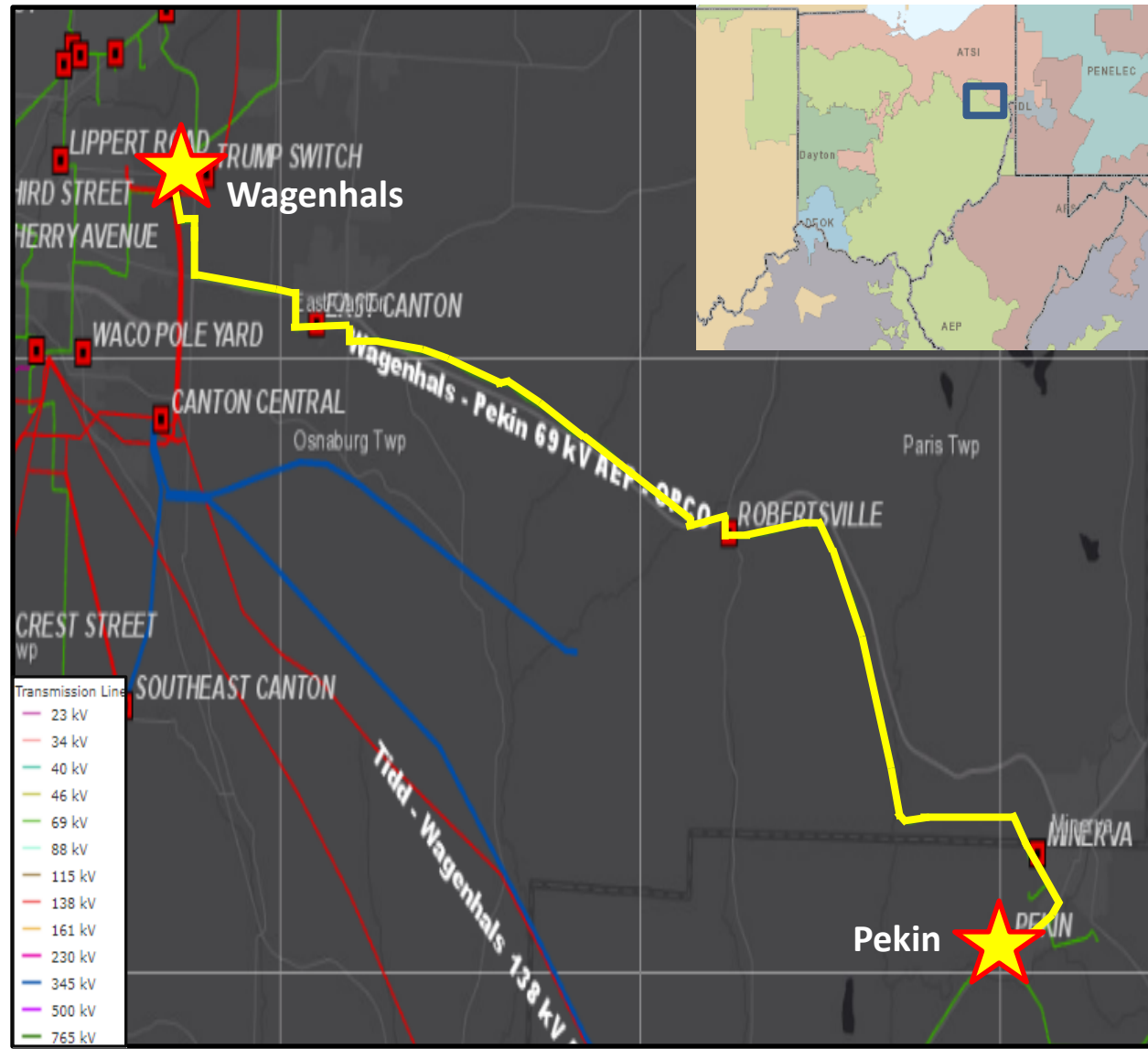
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slides 13 & 14)

Problem Statement:

Equipment Material/Condition/Performance/Risk:

Wagenhals – Pekin 69kV transmission line:

- Length of Line: 15.56 miles long
- Consists of Wagenhals-Minerva and Minerva-Pekin 69kV circuits
- Total Structure Count: 358
 - Wood: 2 from 1959, 1 from 1960, 350 from 1965, 1 from 1979, 2 from 1986, & 1 from 1991.
 - Steel: 1 from 2010
- Conductor Types: 15.52-miles of 4/0 COPPER from 1965 & 0.04-miles of 4/0 COPPER from 2010.
- Outage History: 18 outages with a total CMI of 534,443 over a 5-year sample period
 - Momentary Outage: 14
 - Permanent Outage: 4
- Open Conditions: There are 56 structures with at least one open condition, which relates to 15.6% of the structures on this line. There are currently 22 structure based open conditions consisting of rot top, insect damage, rot top on a filler block, broken and split knee/vee brace, cracked pole, rot heart and woodpecker holes. There are currently 7 conductor based open conditions consisting of improper installation of the PLP splice/dead end and a worn PLP splice/dead end. There are currently 17 grounding based open conditions consisting of broken/missing/stolen ground lead wires. There are currently 30 hardware based open conditions consisting of damaged armor rod, damaged guy grip, cracked guy strain insulator, broken/burnt insulators and broken/damaged/missing moldings.



Need Number: AEP-2023-OH002

Process Stage: Need Meeting 07/21/2023

Project Driver: Equipment Material/Condition/Performance/Risk; Operational Flexibility and Efficiency

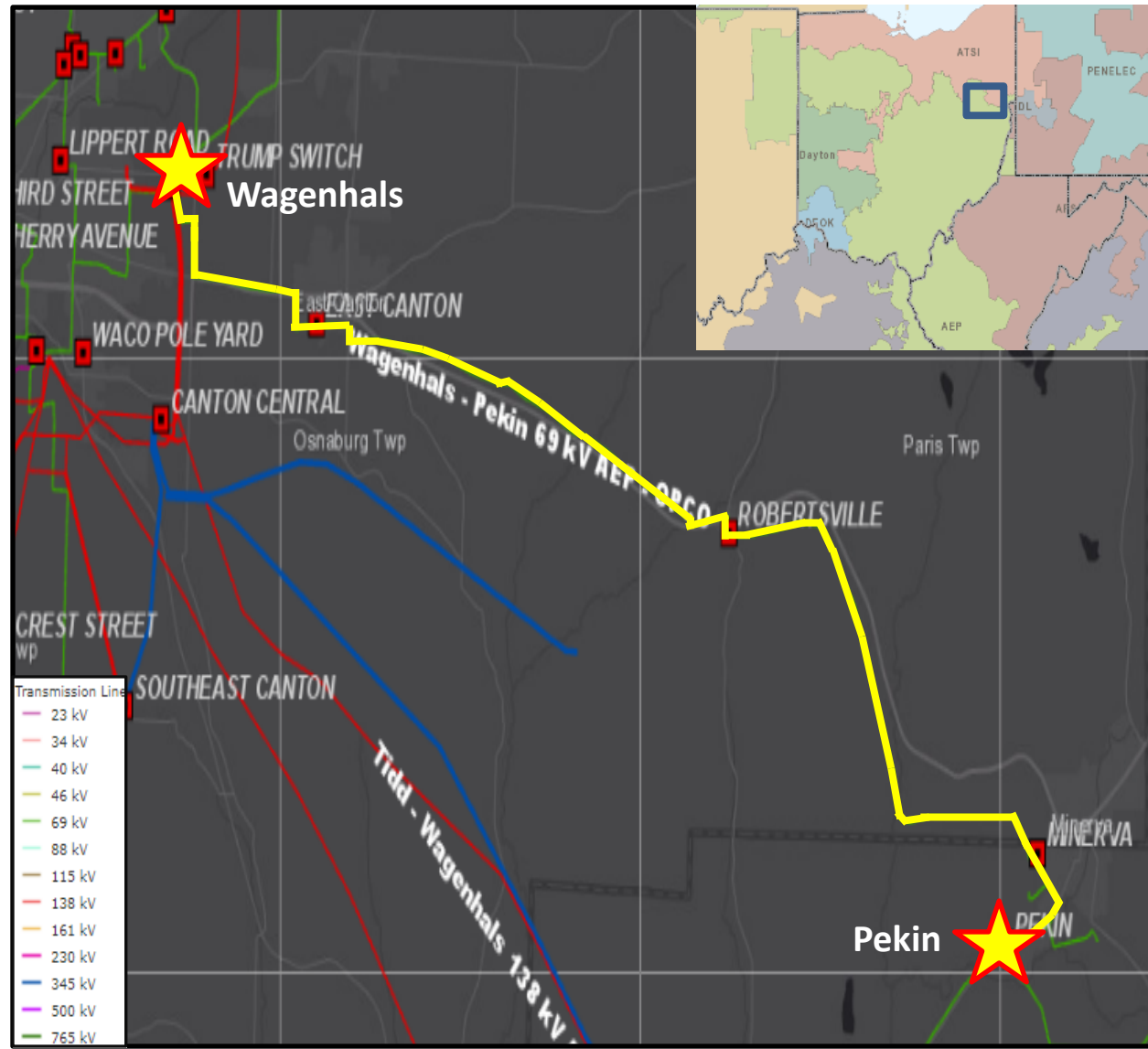
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slides 13 & 14)

Problem Statement Continued:

- Additional Information:
 - 69kV line fails to meet 2017 NESC Grade B loading criteria. The line was originally constructed in 1924 but replaced in 1965 with wooden poles. The structures are direct embedded. The line is insulated with porcelain HP which do not meet current AEP standards for CIFO and minimum leakage distance requirements. The line is grounded with butt wraps which does not meet current AEP standards and can lead to poor lightening performance.
 - 18 structures were recently assessed by a ground crew. 39% of those structures had reported conditions which included the following: one structure had woodpecker holes, one structure had insect damage, one structure had rusted hardware, six structures had splices observed on the shield wire, one structure had the top of a pole split, one structure had bolt hole ovalization, one structure had significant deterioration and one structure had both the pole and grounding broken due to a vehicle collision.

Operational Flexibility and Efficiency:

- The circuit has one 69kV hard tap serving a customer (at Masco Tech), which limits the capabilities of Operations and Field personnel to properly sectionalize and maintain the circuit.
- Due to a lack of 69kV line breakers at Minerva and Pekin, there are 3 overlapping zones of protection (Minerva 69kV bus, Minerva-Pekin 69kV line, and Pekin 69kV bus), causing an increased risk of misoperation and outaging more facilities than necessary.



Need Number: AEP-2023-OH053

Process Stage: Need Meeting 07/21/2023

Project Driver: Equipment Material/Condition/Performance/Risk, Operational Flexibility and Efficiency

Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slides 13-14)

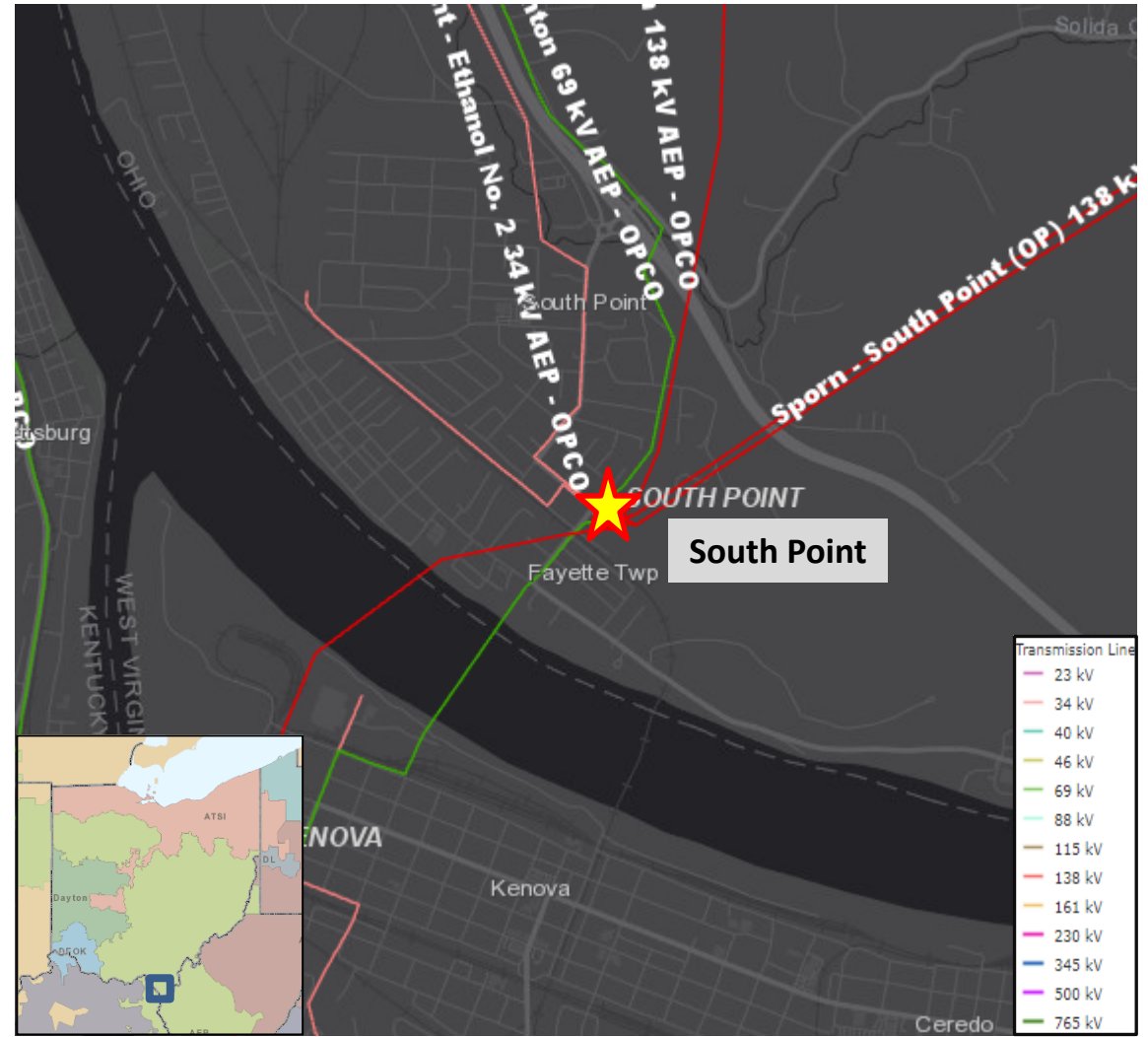
Problem Statement:

South Point 69 kV Circuit Breakers D, E:

- Breaker Manufacture Date: 1966
- Interrupting Medium: (Oil)
- Number of Fault Operations: D 39, E 71
- Additional Information: These breakers are CF type breakers. These breakers are oil filled without oil containment; oil filled breakers have much more maintenance required due to oil handling that their modern, SF6 counterparts do not require. The manufacturer provides no support for the CF/CG/CGH/CH family of circuit breakers and spare parts are not available. This model family has experienced major malfunctions associated with their OA-3 hydraulic mechanism, which includes low-pressure readings, hydraulic leaks, pump lockouts, and failure to shut off. These mechanism malfunctions have led to several failures to close and other types of mis-operations across the AEP fleet. Circuit breakers D and E have exceeded the manufacturer’s designed number of full fault operations. Each of these fault operations is likely not at the full fault current rating of the circuit breakers, but with each fault operation of any magnitude comes accelerated aging.

South Point 34.5 kV Circuit Breakers N, K, L:

- Breaker Manufacture Date: 1950
- Interrupting Medium: (Oil)
- Number of Fault Operations: N 65, K 26
- Additional Information: These breakers are FK type breakers. These breakers are oil filled without oil containment; oil filled breakers have much more maintenance required due to oil handling that their modern, vacuum counterparts do not require. The manufacturer provides no support for this fleet of circuit breakers and spare parts are not available. A common failure mode are compressor failures and valve defects, which cause low pressure and oil leaks. Another failure mode includes trip or reclose failures, caused primarily by spring latching and charging motor component failures. Circuit breakers N and K have exceeded the manufacturer’s designed number of full fault operations. Each of these fault operations is likely not at the full fault current rating of the circuit breakers, but with each fault operation of any magnitude comes accelerated aging.



Problem Statement (continued):

South Point 138 kV Capacitor Bank AA (67.2 Mvar):

- This capacitor bank has experienced continuous malfunctions.
 - Bad interrupter was found on one phase of CS AA (2004)
 - Arcing drain coil, melted terminal block, interrupter failure (2013)
 - Leaking capacitors and blown fuse (2016)
 - Bad cap and blown fuse (2016)
 - Blown fuse (2018)
 - Two blown fuses (2019)
 - Two blown fuses (2019)
 - Two blown fuses (2019)
 - Two blown fuses and one capacitor with bushing blown out (2019)

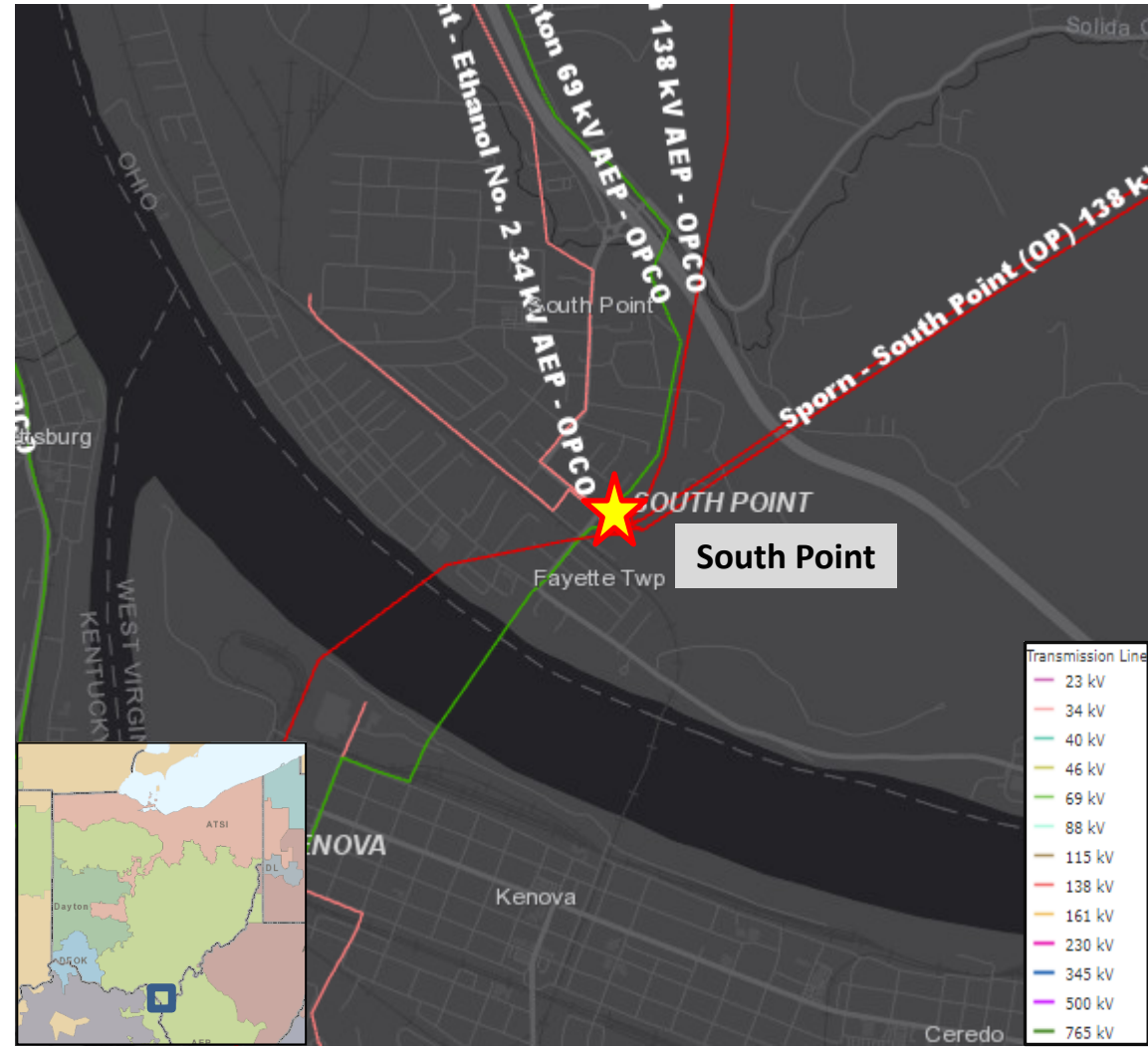
Operational Issues:

- Due to lack of sectionalizing at the station, the 69 kV bus, 138/69/34.5 kV transformer #4, and 138 kV bus #2 are three dissimilar relay zones combined into a single relay zone, which can create protection issues and potentially lead to mis-operations.

Ancillary Issues:

- 66 of the 97 relays are electromechanical relays. These relays have significant limitations with regards to spare part availability and fault data collection and retention.
- Station grounding is not up to current standards.

AEP Ohio has indicated concerns with the 34/12 kV and 138/34.5 kV distribution equipment at the station.



AEP Transmission Zone M-3 Process Jackson County, Ohio

Need Number: AEP-2023-OH057

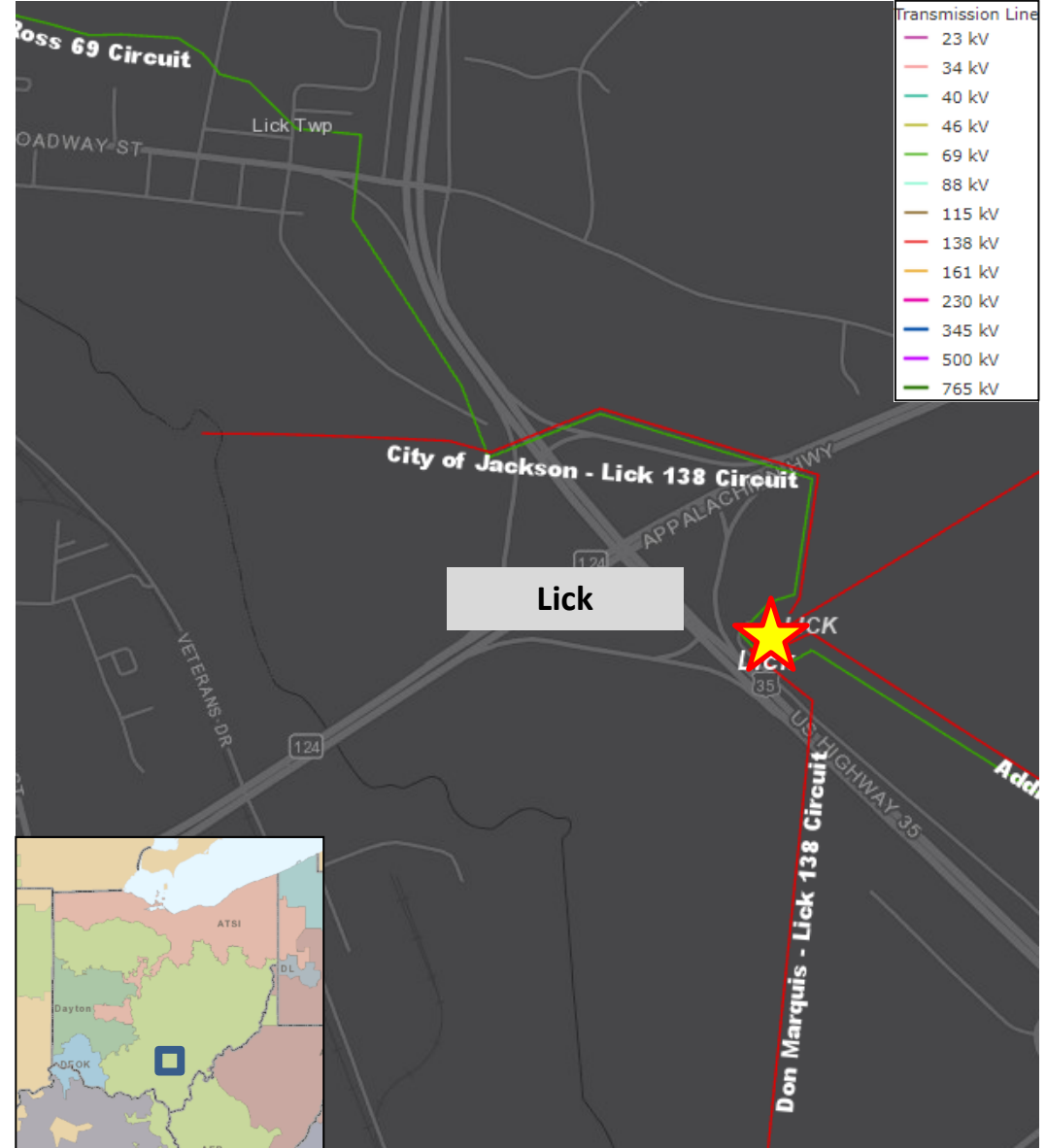
Process Stage: Need Meeting 07/21/2023

Project Driver: Customer Service

Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 12)

Problem Statement:

The City of Jackson has requested a new transmission feed for their Veterans station separate from their existing 138 kV feed from AEP’s Lick station. The city of Jackson currently serves approximately 25 MW of load via Lick station.



AEP Transmission Zone M-3 Process Canton, Ohio

Need Number: AEP-2023-OH061

Process Stage: Need Meeting 07/21/2023

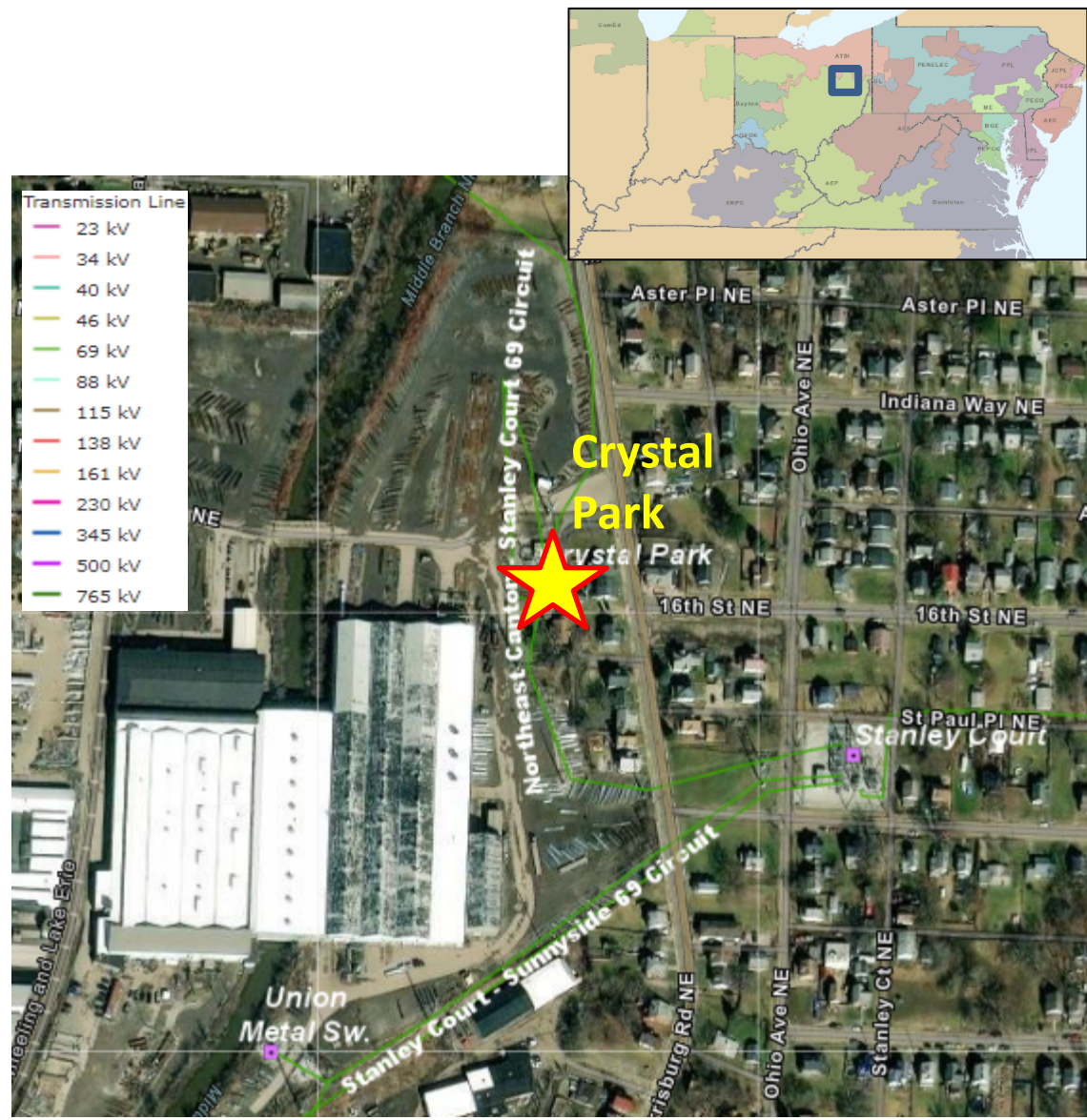
Project Driver: Customer Service; Equipment Material/Condition/
Performance/Risk

Specific Assumption Reference: AEP Connection Requirements for
the AEP Transmission System (AEP Assumptions Slide 12); AEP
Guidelines for Transmission Owner Identified Needs (AEP
Assumptions Slide 13)

Problem Statement:

AEP Ohio Distribution has identified various concerns at the Crystal Park distribution station in Canton, Ohio. The station was constructed in 1949 and the majority of the equipment is beyond its useful life. In addition, there are a number of environmental concerns at the site, and it serves an island of 4 kV distribution load (the surrounding area is 12 kV).

AEP Ohio has indicated their desire to address the concerns at the station and in the area by retiring the station and converting the distribution circuits to 12 kV.



Need Number: AEP-2023-OH068

Process Stage: Need Meeting 07/21/2023

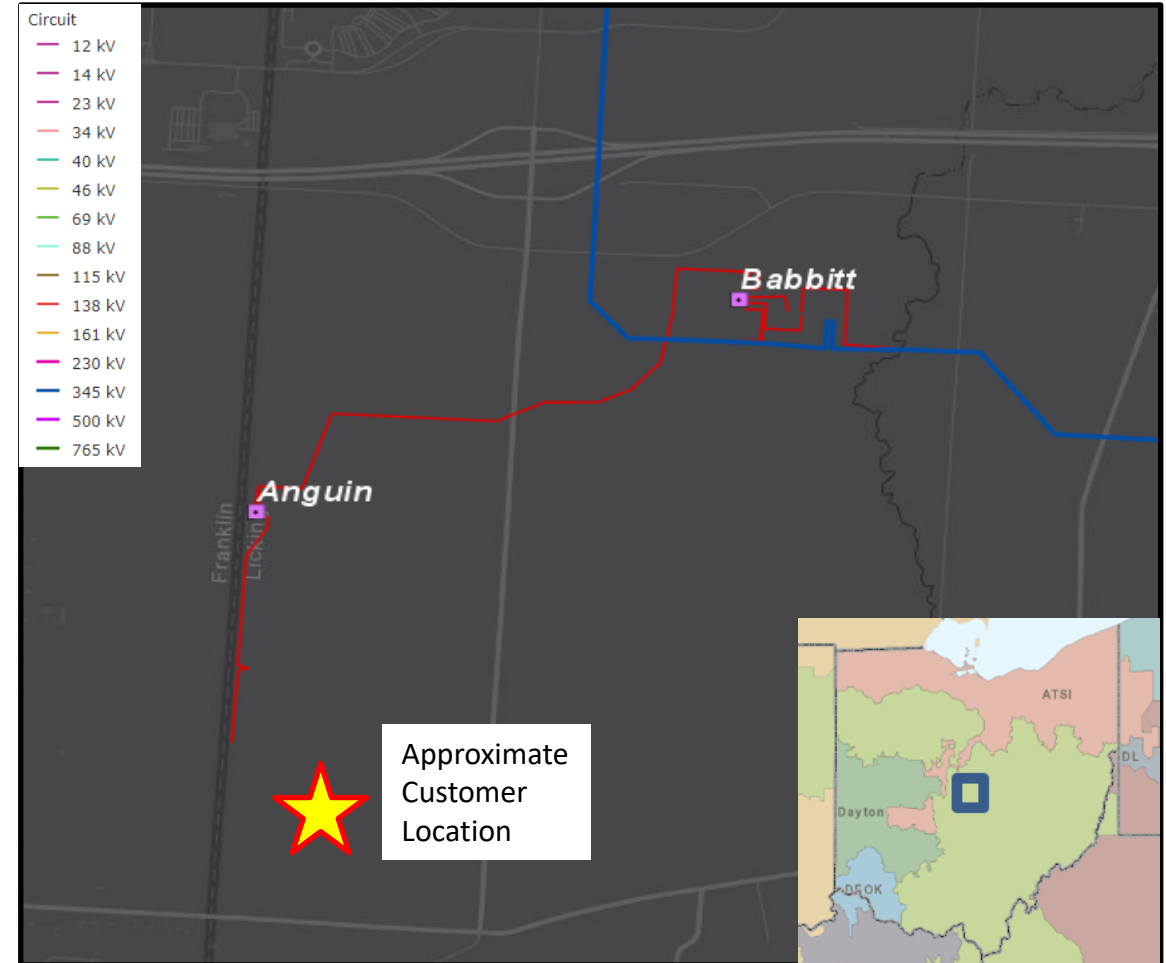
Project Driver: Customer Service

Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System
(AEP Assumptions Slide 12)

Problem Statement:

- An existing customer served out of AEP’s Anguin Station in New Albany, OH, has requested an additional service for a new bulk load addition of 96 MW. This will bring the total load for the customer’s site to 646 MW. The customer has indicated the possibility to ultimately go to 720 MW at the site.
- Customer requested in-service date of 01/31/2025.



Need Number: AEP-2023-OH079

Process Stage: Need Meeting 07/21/2023

Project Driver:

Customer Service

Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

In Wheeling, WV a property-owner has requested the relocation of structures 56 – 59A (8 total structures & ~0.96-miles of line) on the Wheeling – Windsor 69 kV AEP - WPCO double circuit line, due to an increase in mining activity around these structures.



Need Number: AEP-2023-OH083

Process Stage: Need Meeting 7/21/2023

Project Driver:

Customer Service

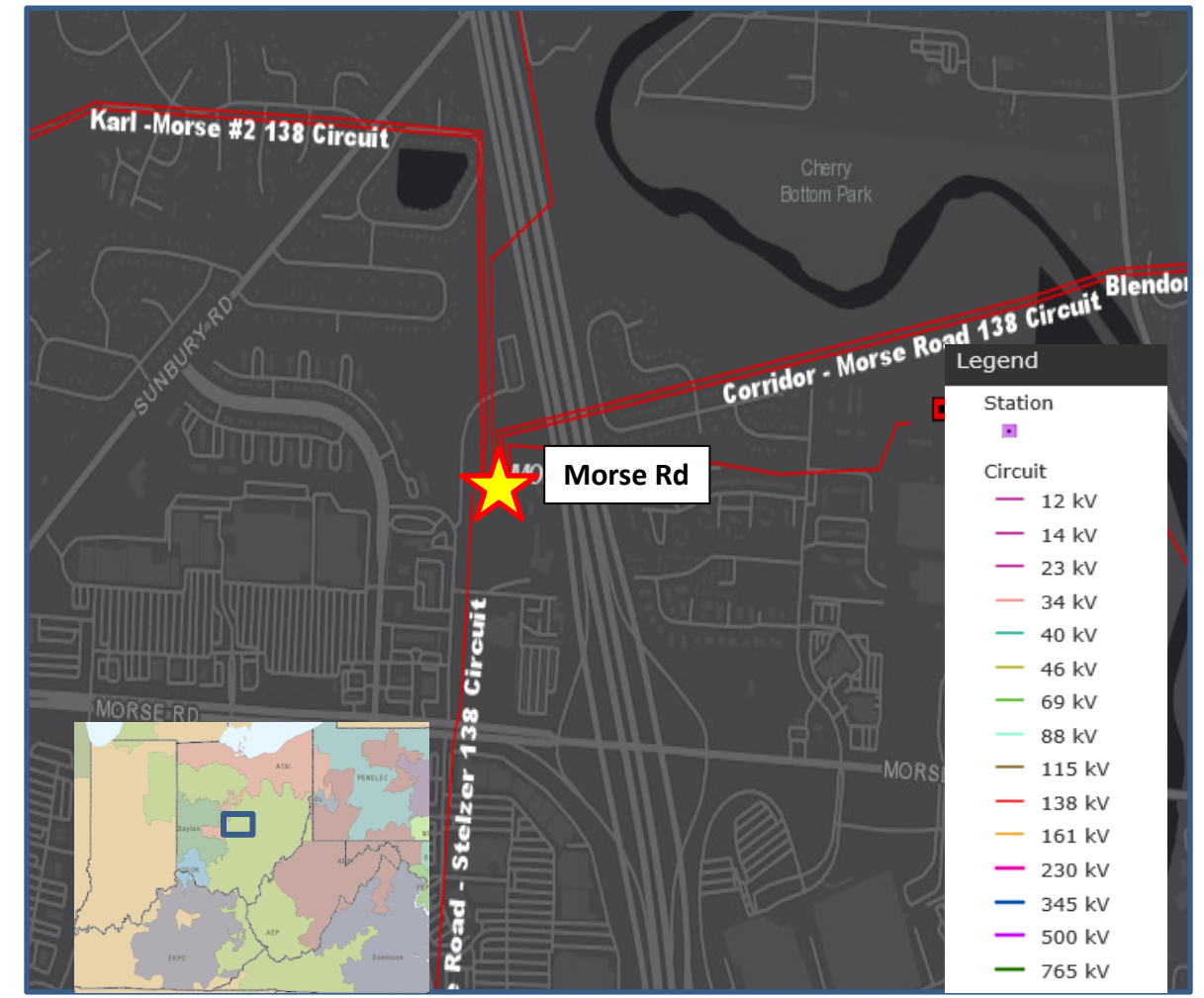
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

Customer Service:

- AEP Ohio has identified multiple Distribution assets at Morse Rd station needing rehab. AEP Ohio has also requested additional distribution transformers to meet growing customer demand in the area.



Solutions

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

Need Number: AEP-2021-AP019

Process Stage: Solutions Meeting 7/21/2023

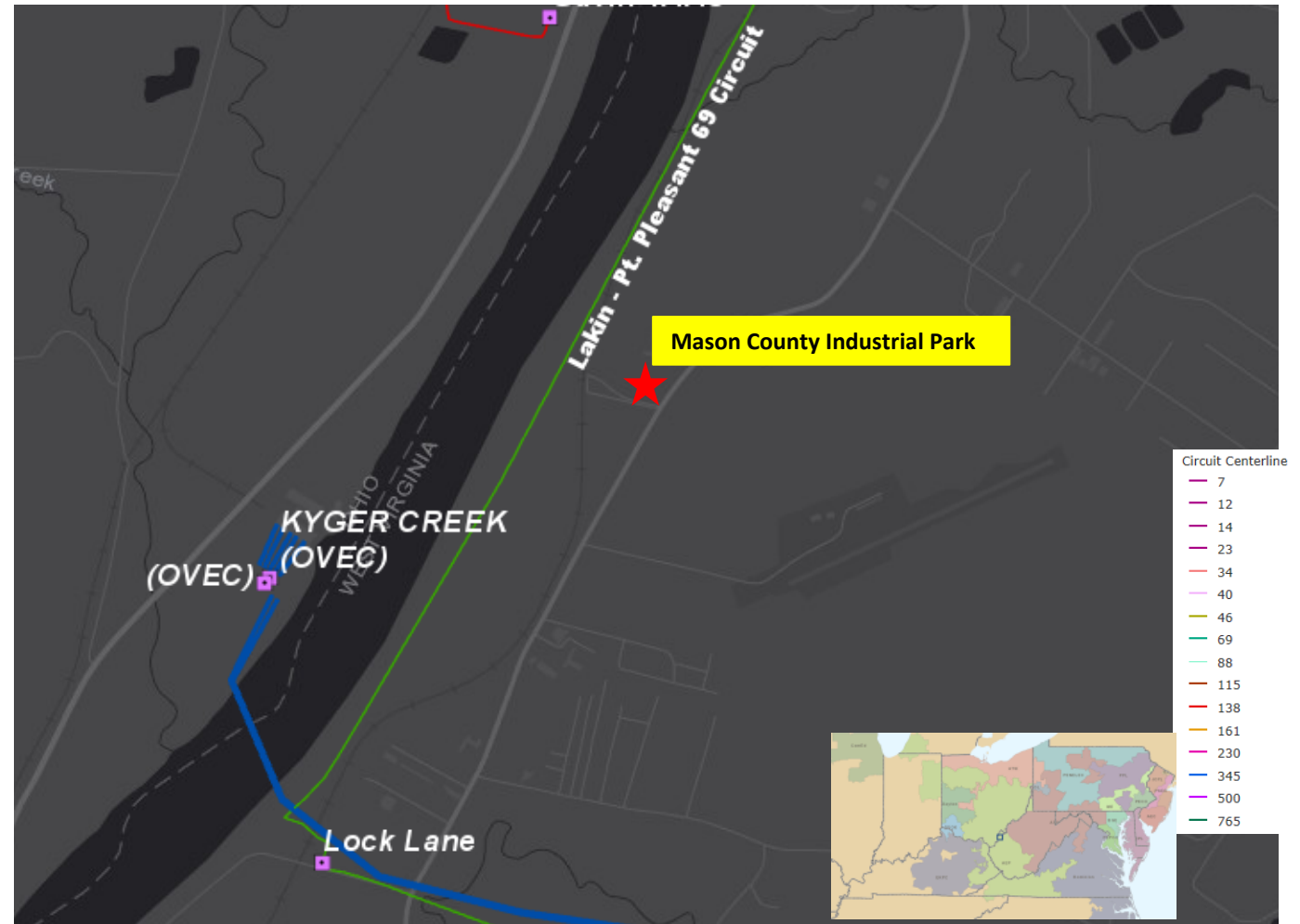
Previously Presented: Needs Meeting 5/21/2021

Supplemental Project Driver: Customer Service

Specific Assumption References: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

APCO Distribution has requested a new distribution station located in Raleigh County, West Virginia. **Approximately 2 MVA of load will be transferred to this site from existing distribution sources. Multiple inquiries continue to be evaluated for additional new load at this location.** This site has been approved by the state as a development location supporting West Virginia Business Ready Sites Program (House Bill 144).



Need Number: AEP-2021-AP019

Process Stage: Solutions Meeting 7/21/2023

Proposed Solution:

Cut in/out of the existing Lakin – Lock Lane 69 kV line and construct a new double circuit 69 kV line in/out to the new Mason County Industrial Park Station (approx. 0.25 mi) **Est. Trans Cost: \$2.1M**

Install two 69 kV circuit breakers and a 69/12 kV 25 MVA transformer at the new Mason County Industrial Park Station (York Station) **Est. Trans. Cost: \$0.0M**

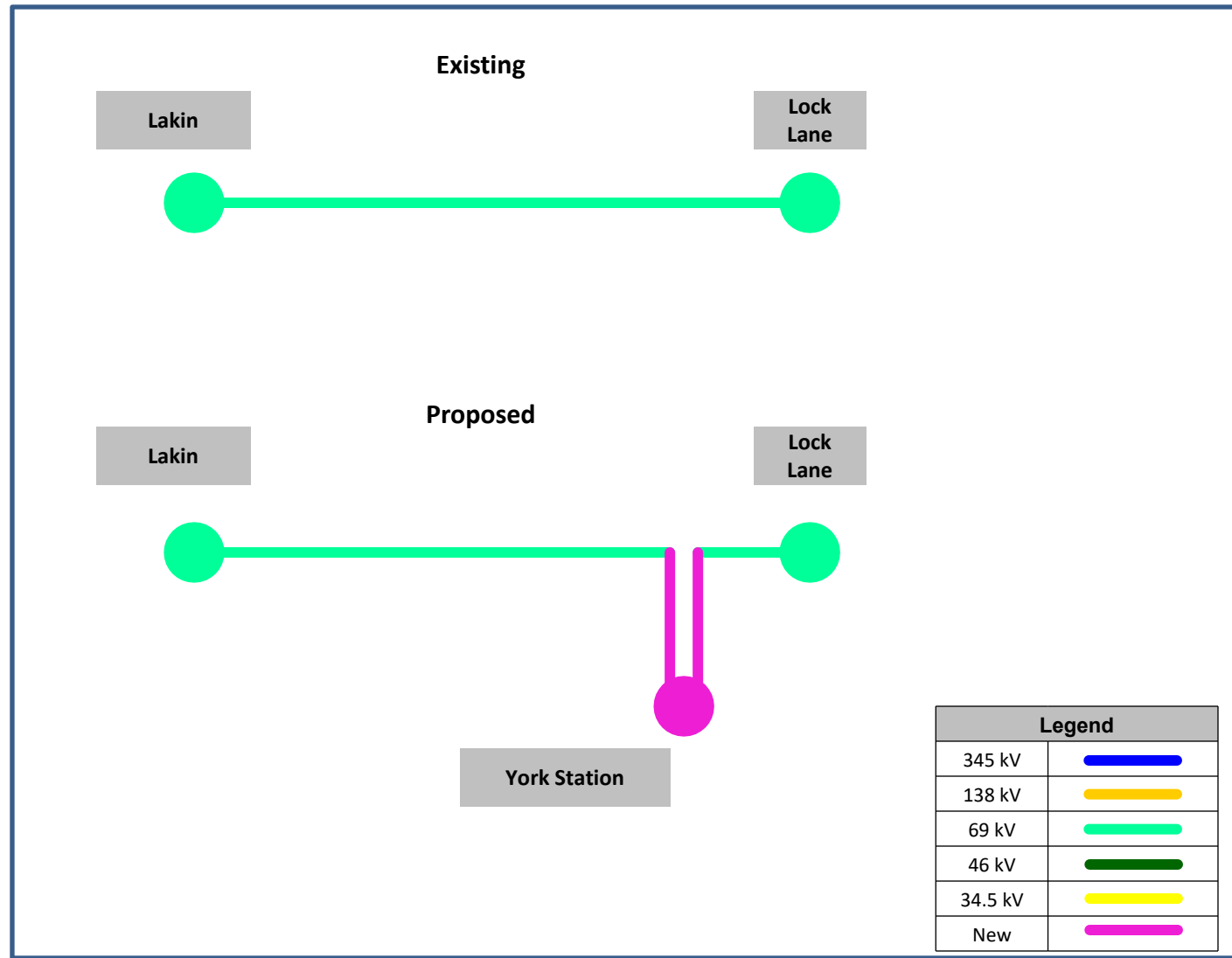
Estimated Total Trans. Cost: \$2.1M

Alternatives Considered: No viable transmission alternatives due to the site’s proximity to the existing infrastructure

Projected In-Service: 5/1/2024

Project Status: Engineering

Model: 2027 RTEP



Need Number: AEP-2022-OH007

Process Stage: Solutions Meeting 7/21/2023

Previously Presented: Need Meeting 1/21/2022

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

South Kenton 138/69kV

Circuit Breakers :

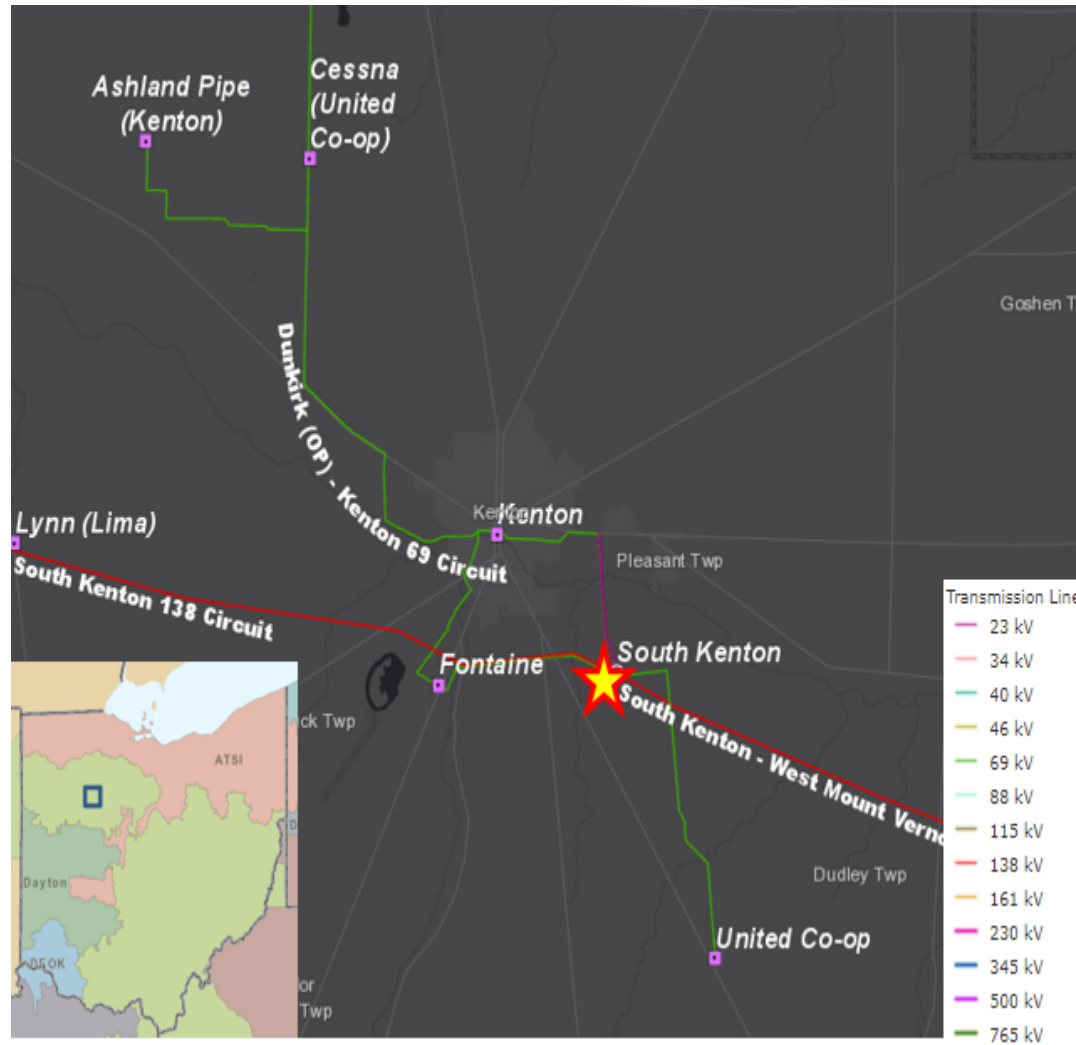
- Breaker Age: A 1953 (138 kV), B 1952 (138 kV), E 1954 (69 kV)
- Interrupting Medium: (Oil)
- Fault Operations:
 - Number of Fault Operations: A 42, B 49, E 26
 - Manufacturer recommended Number of Operations: 10
- Additional Breaker Information: These breakers are FK-439. These breakers are oil filled without oil containment; oil filled breakers have much more maintenance required due to oil handling. Manufacture support and spare parts are not available.

Relays: Currently, 56 of the 61 relays (92% of all station relays) are in need of replacement. These relays are the electromechanical type which have significant limitations with regards to spare part availability, fault data collection, and data retention. Station also utilized legacy pilot wire schemes.

Transformers: The 138/69kV 15MVA transformer #3 & #2 (both 1962 vintage) are recommended for replacement due to short circuit strength breakdown and dielectric strength breakdown of the oil, reducing the ability of the units to withstand through fault current. These transformers have horizontal bushings which increase the difficulty of routine station maintenance. The transformers are currently operated in parallel with one another.

Operational Flexibility and Efficiency:

Transformers #2, #3, and the 138 kV bus are all in the same zone of protection due to lack of sectionalizing on the transformers.



AEP Transmission Zone M-3 Process South Kenton Upgrades Project

Need Number: AEP-2022-OH007
Process Stage: Solutions Meeting 07/21/2023

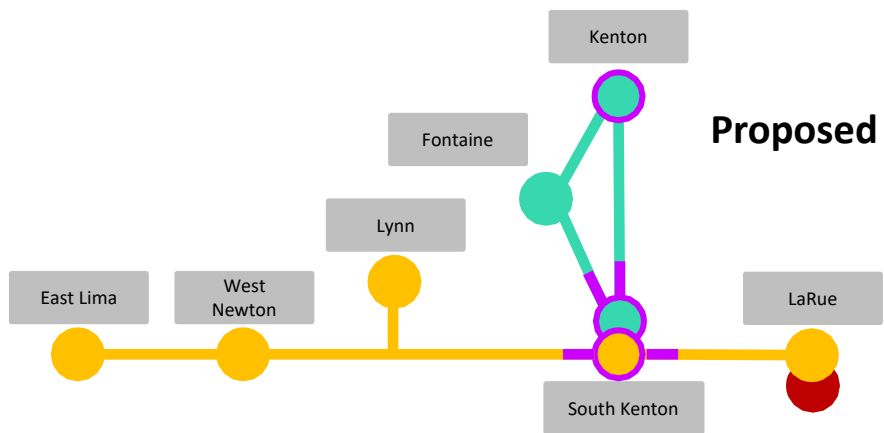
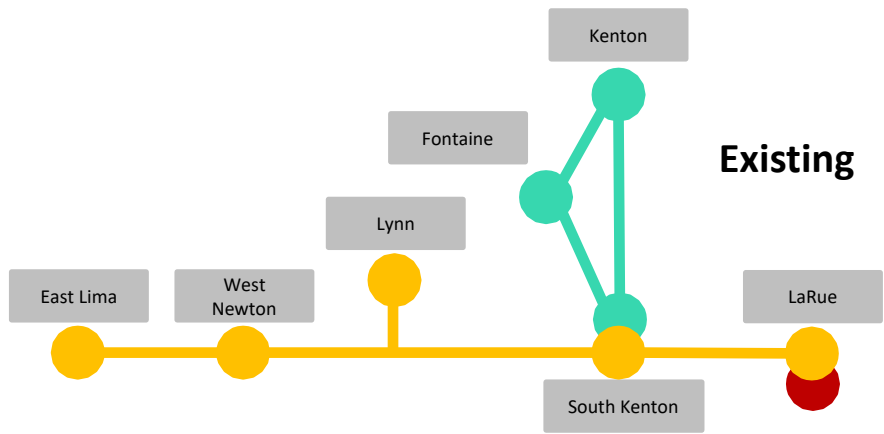
Proposed Solution:

- **South Kenton.** Rebuild the 138kV bay as a four breaker ring bus using 3000A 40kA breakers. Replace transformers two and three with a single 90MVA unit. Install a DICM and replace the EM relays. Replace the 69kV bus and breakers C and E.
Estimated Cost \$12.7M
 - Re-terminate the East Lima - South Kenton 138 kV and South Kenton - Larue 138kV circuits into the new South Kenton ring bus. **Estimated Cost \$3.64M**
 - Re-terminate the South Kenton - Kenton #1 69kV and South Kenton - Kenton #2 69kV circuits into the station. Install fiber between South Kenton and Kenton, retire the pilot wire scheme **Estimated Cost \$1.45 M**
 - At Kenton station, replace MOABS X,Z with 69kV 3000A 40kA breakers. Install a DICM **Estimated Cost \$3.80M**
 - Upgrade telecom equipment at Rangeline and Gunn Road stations **Estimated cost \$94.4K**
- Total Estimated Transmission Cost: \$21.70M**

Alternatives considered

- Consideration was given to keeping the existing MOAB line sectionalizing scheme at Kenton. In order to replace the pilot wire scheme between the stations, a custom protection scheme would be required. Installing line breakers allows a much simpler protection and control scheme while also providing ancillary benefits that MOABs do not.
- South Kenton is an important source for the NW Ohio 69kV network. Retiring transformers two and three without replacement is not a viable option. Installing only one transformer to replace the parallel does not reduce the area's reliability because the banks could not be sectionalized.

Projected In-Service: 06/01/2025
Project Status: Scoping



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

Need Number: AEP-2022-OH019

Process Stage: Solutions Meeting 7/21/2023

Previously Presented:

Need Meeting 4/22/2022

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

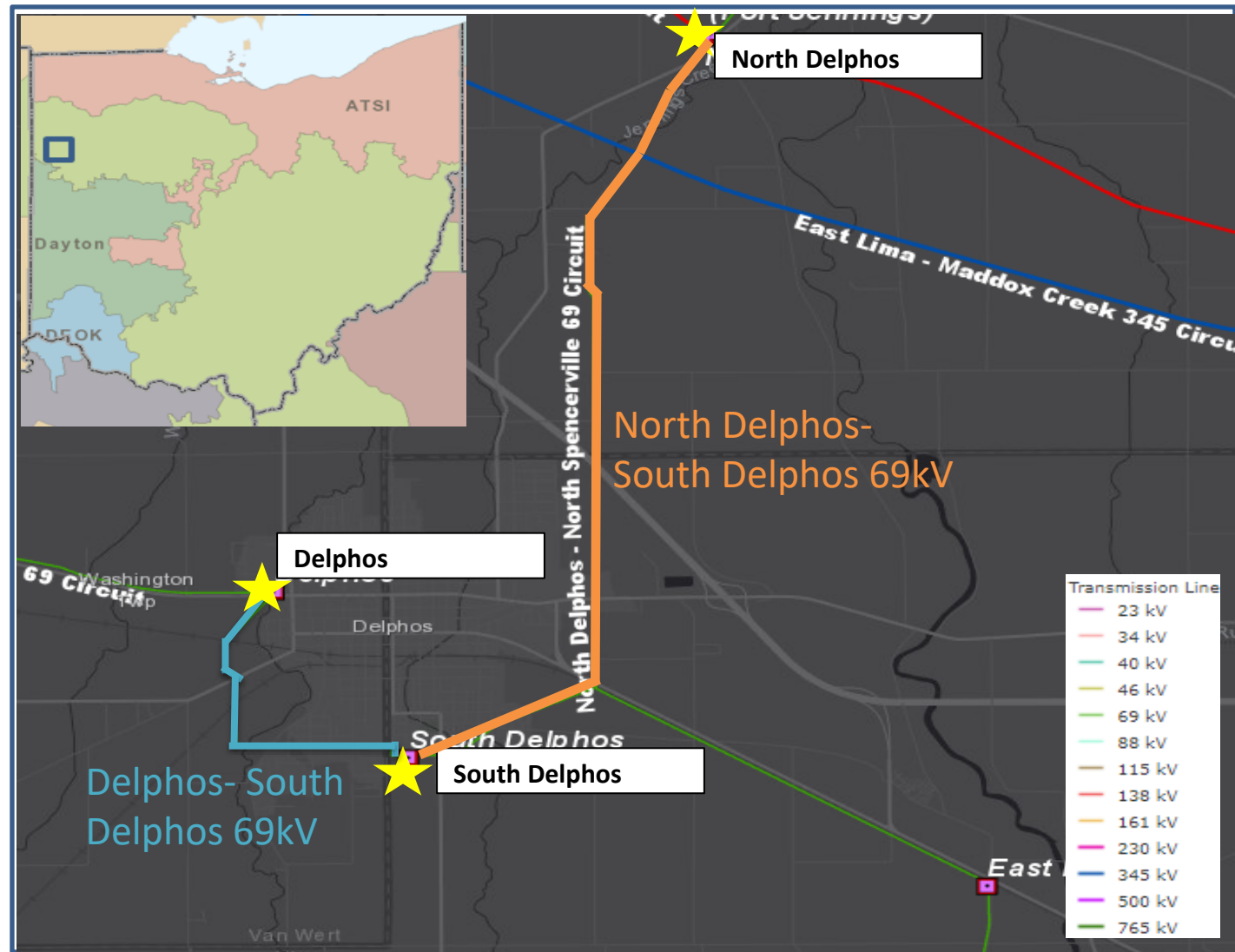
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

Delphos – South Delphos 69kV Line (1961 vintage):

- Length of Line: 2.0 Miles
- Total Structure Count: 39
 - Wooden Monopole Structures
- Conductor Types: 336.4 ACSR 18/1 (Merlin), 4/0 ACSR 6/1 (Penguin)
- Outage History: 7 Momentary and 2 Permanent outages – average duration of 24.6 hours, 1.177M CMI between 2017 and 2022.
- Open Conditions: 10 open conditions on 6 unique structures, including burnt insulators, conductor splice issues, and pole rot and insect damage

The South Delphos – Delphos line does not meet 2017 NESC Grade B loading criteria or current AEP structural strength requirements. The line is insulated with horizontal post insulators which do not meet current AEP standards for CIFO and minimum leakage distance requirements.



Problem Statement (continued):

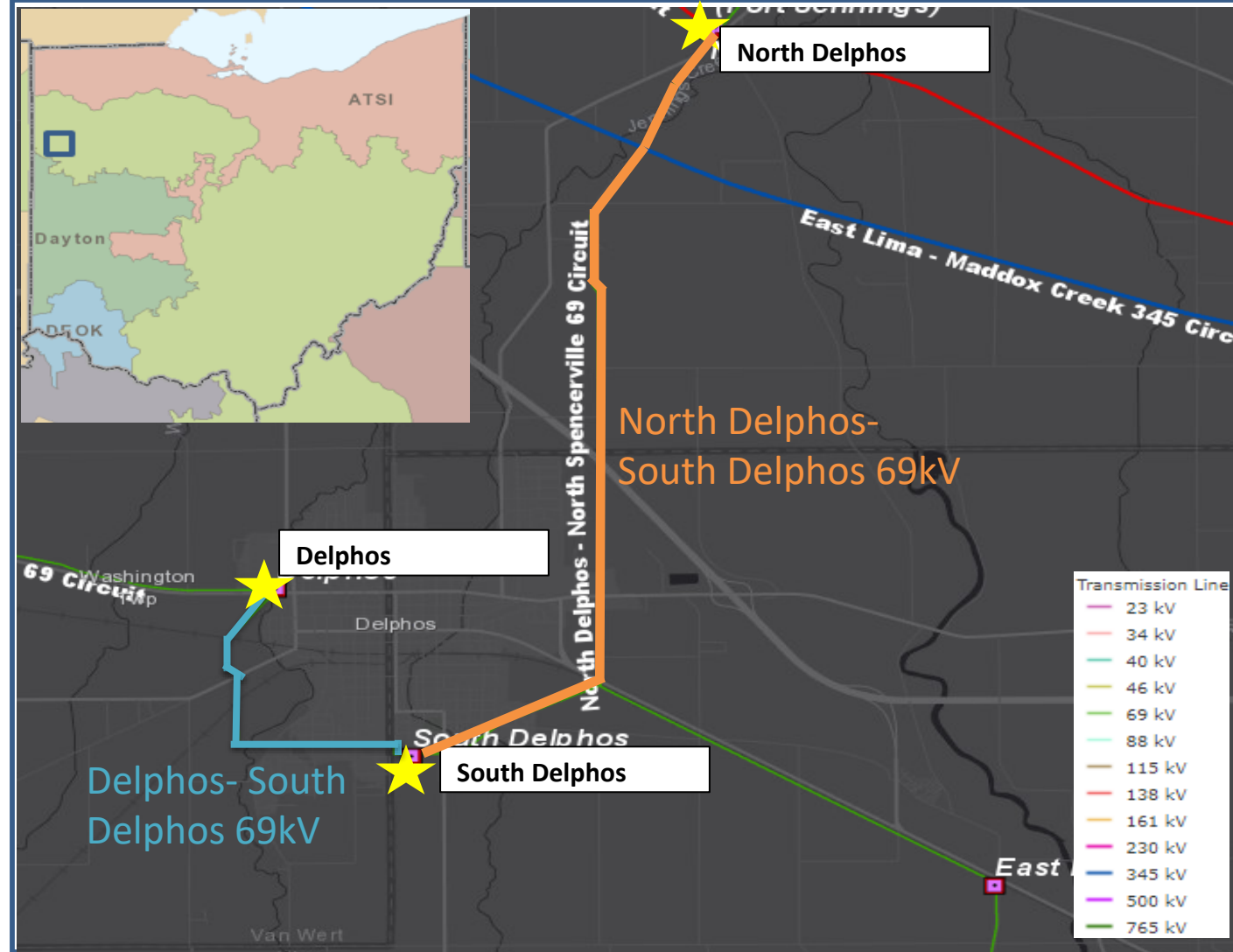
North Delphos – South Delphos 69kV Line(1943) :

- Length of Line: 5.22 Miles
- Total Structure Count: 226
 - Wooden Monopoles
 - Vertical post insulators
- Conductor Types: 336.4 ACSR 18/1 (Merlin), 4/0 COOPER, 4/0 ACSR 6/1 (Penguin) 2/0 COOPER
- Outage History: North Delphos- Van Wert: 7 Momentary and 2 Permanent outages – average duration of 24.64 hours. North Delphos – North Spencerville: 3 Momentary and 1 Permanent outages- average duration of 40 hours. Combined CMI: 2,982,794 for the 2017-2022 timeframe
- Open Conditions: 36, including broken ground lead wire and rot, split, woodpecker, and bowed poles and crossarms

The North Delphos – South Delphos fails to meet 2017 NESC Grade B loading criteria, current AEP structural strength requirements and fails to meet the current ASCE structural strength requirements. The line is insulated with vertical post insulators that do not meet current AEP standards for CIFO and minimum leakage distance requirements.

North Delphos 69kV Circuit Breakers A & C:

- Breaker Age: A 1962, C 1965
- Interrupting Medium: (oil)
- Fault Operations:
 - Number of Fault Operations: A 93, C 166
 - Manufacturer recommended Number of Operations: 10
- Additional Breaker Information: These breakers are FK-69 type oil breaker. Manufacture support and spare parts are no longer available. This type of breaker experiences common failures of the compressor, valves, and trip/reclose mechanism. These breakers are oil filled without oil containment; oil filled breakers have much more maintenance required due to oil handling that their modern, SF6 counterparts do not require.



Need Number: AEP-2022-OH019

Process Stage: Solutions Meeting 7/21/2022

Proposed Solution:

North Delphos: Replace 69kV circuit breakers A & C and Install DICM. **Cost: \$3.3M**

Van Wert: Upgrade line relays. **Cost: \$0.7M**

South Delphos – Delphos: Rebuild 2.7 miles of 69kV with 556 ACSR conductor. **Cost: \$7.8M**

North Delphos - South Delphos: Rebuild 4.33 miles of 69kV with dove 556 ACSR. 1.1 miles will be double circuit (part of the in and out to North Delphos not covered under b3346) and 3.2 miles will be single circuit. **Cost: \$ 11.7M**

Total Estimated Cost: \$23.5M

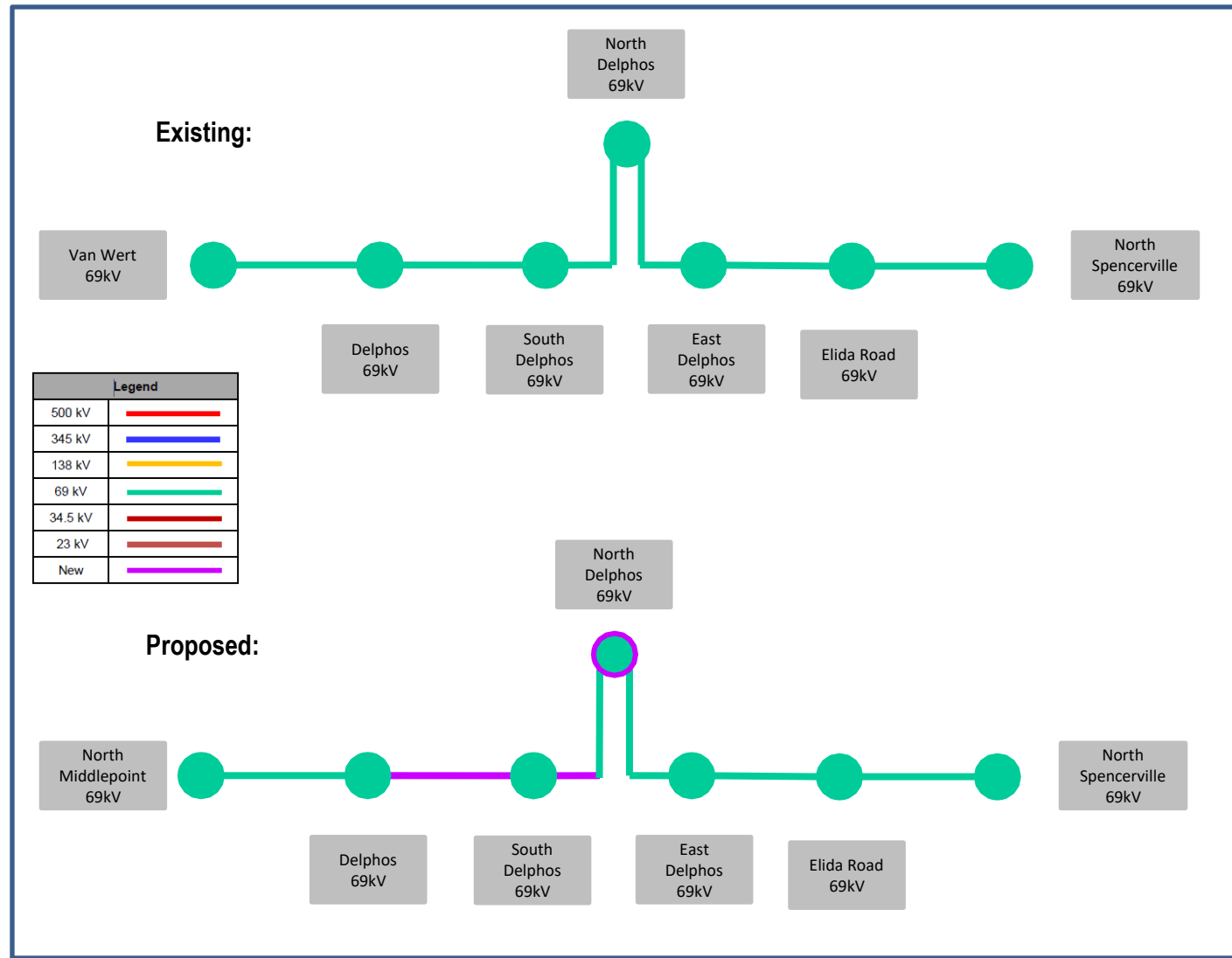
This project will be worked in coordination with projects B3346 which is proposing to rebuild the other 7.3 mile of the South Delphos – Delphos and North Delphos – South Delphos 69 kV lines.

Alternatives Considered:

Given that portions of the line assets are already being rebuilt under B3346 and the fact that they directly serve stations in the area, rebuilding the assets was the only viable alternative identified.

Projected In-Service: 6/1/2026

Project Status: Conceptual



Need Number: AEP-2022-OH042

Previously Presented: Need Meeting 07/22/2022

Process Stage: Solution Meeting 7/21/2023

Project Driver:
Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:
Haviland - Paulding 69kV Line (1951 vintage):

- Length of Line: 10.73 Miles
- Total Structure Count: 175
 - Wooden, Steel Monopole Structures
- Conductor Types: 4/0 ACSR 6/1 (Penguin), 336.4 ACSR 18/1 (Merlin),
- Outage History: 7 Momentary and 3 Permanent outages – average duration of 24.6 hours, 1.185M CMI between 2015 and 2020.
- Open Conditions: 16 open conditions on 14 unique structures, including burnt insulators, conductor splice issues, broken/missing ground leads and pole rot.

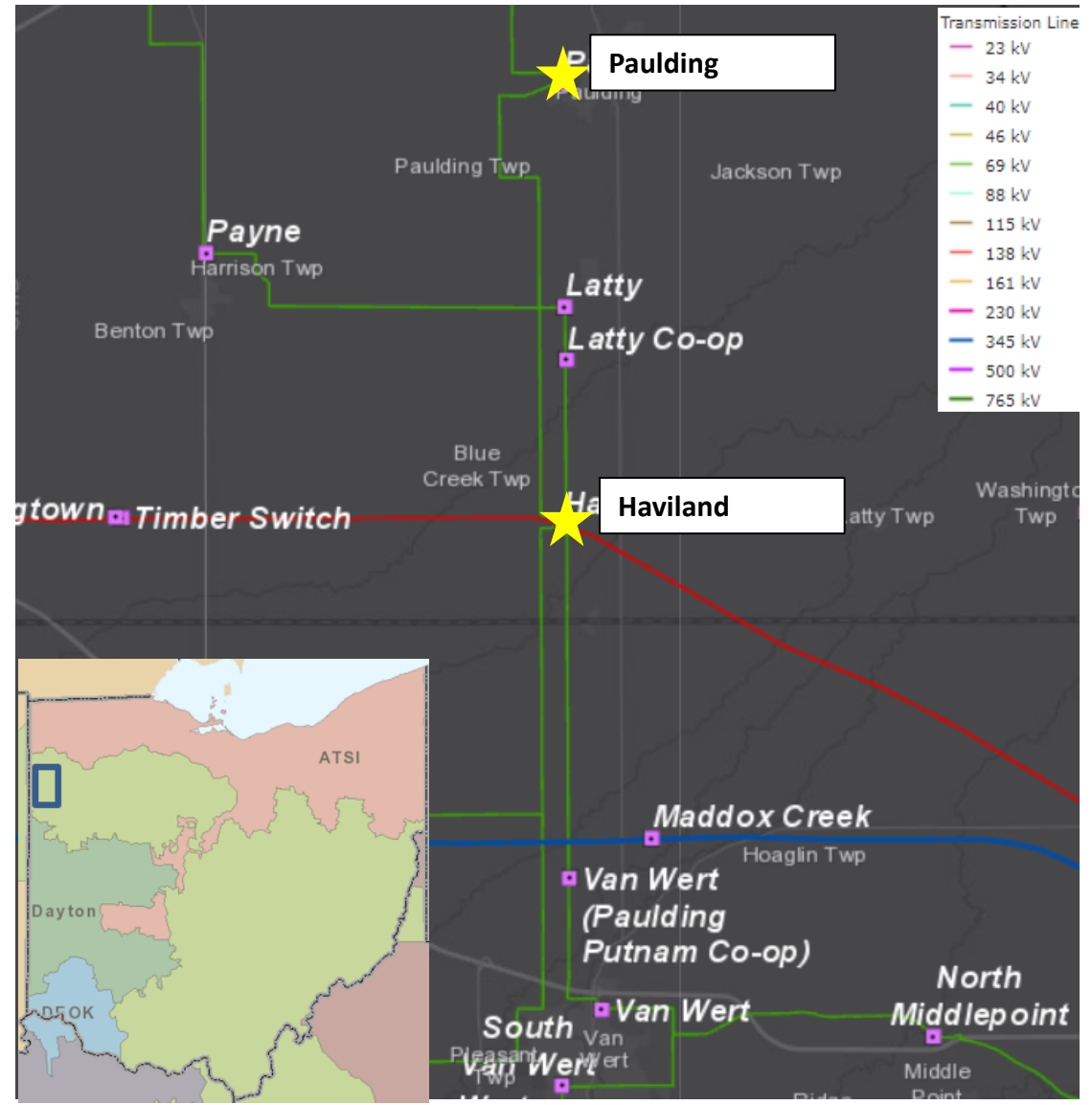
The Haviland- Paulding line does not meet 2017 NESC Grade B loading criteria or current AEP structural strength requirements. The line is insulated with mix of insulator types, many which do not meet current AEP standards for CIFO and minimum leakage distance requirements.

14 representative structures were assessed by a ground crew. 58% of those structures had reported conditions, which included the following: one structure had flashed insulators and a broken “S” downlead, one structure had a split shell near the center phase, one structure had a push-brace structure separating, one structure had brown porcelain insulators with AL bases + caps (failure risk), one structure had spliced conductors, one structure had a broken “S” downlead, one structure had anchor damage and a slacking top down guy, and one structure had a bowed pole at the distribution underbuild.

Additional Information:

During the 2012 Derecho storm Haviland - Paulding experienced multiple cascading pole failure events. These failed structures were replaced with steel monopole type structures. There are 30 newer steel structures, representing 17% of the structures on the line.

AEP Transmission Zone M-3 Process Paulding Co., OH



AEP Transmission Zone M-3 Process Paulding-Haviland Rebuild

Need Number: AEP-2022-OH042

Process Stage: Solution Meeting 7/21/2023

Proposed Solution:

Haviland - Paulding 69kV: Rebuild the existing 10.73 mile-long line using 795 ACSR Drake conductor. **Estimated Cost \$18.74M**

Paulding: Perform remote end work **Estimated Cost \$1.40M**

Haviland: Perform remote end work **Estimated Cost \$1.03M**

Total Estimated Transmission Cost: \$21.189M

Alternatives Considered:

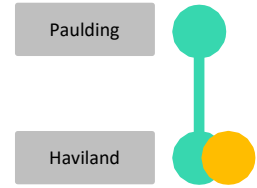
Consideration was given to rebuilding the Haviland - Paulding and Haviland - Payne line as double circuit from Haviland to near Latty switch. Modification of previously submitted Haviland - South Hicksville project S2394 would have been required. Rebuilding the line as double circuit would require retiring the newer steel monopole structures installed during storm restoration (30+). Because of these reasons the decision was made to proceed forward instead with the proposed solution.

Model: PJM 2027 RTEP

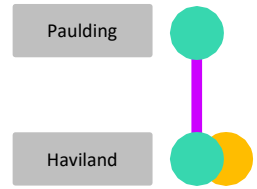
Projected In-Service: 1/1/2026








Project Status: Scoping

Existing



Proposed



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

Need Number: AEP-2023-OH013

Process Stage: Solutions Meeting 7/21/2023

Previously Presented: Need Meeting 1/20/2023

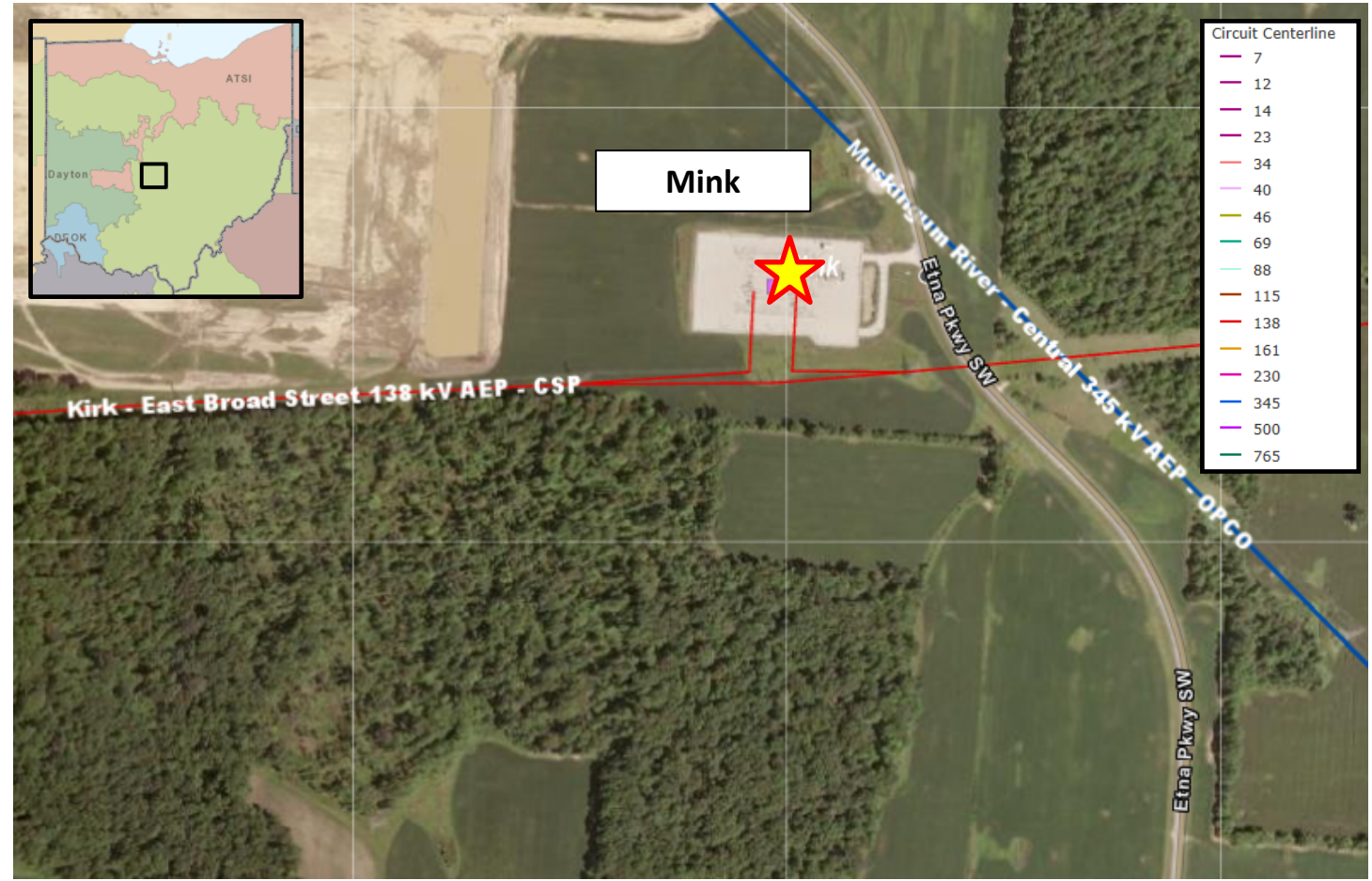
Project Driver: Customer Service

Service Specific Assumption Reference: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

AEP Ohio has requested to add capacity at Mink station, due to continuous load growth in the area. The load requests have exhausted existing capacities at Mink station as well as Etna (OP) station. The anticipated peak load is approximately **30 50** MVA. The requested in-service date is **November March** 2025.

Model: 2025 RTEP



Need Number: AEP-2023-OH013

Process Stage: Solutions Meeting 7/21/2023

Proposed Solution:

At Mink station, install 2 – 138kV, 3000 A, 63 kA breakers in the breaker and half configuration and associated work to terminate two new distribution transformers. Estimated Cost: **\$ 2.7M**

Total Estimated Transmission Cost: \$ 2.7M

Alternatives Considered: No viable transmission alternatives identified to add distribution sources in the area considering the available space at Mink station.

Projected In-Service: 3/28/2025

Project Status: Engineering

Model: 2027 RTEP

Existing:



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

Proposed:



Need Number: AEP-2022-OH004

Process Stage: Solutions Meeting 7/21/2023

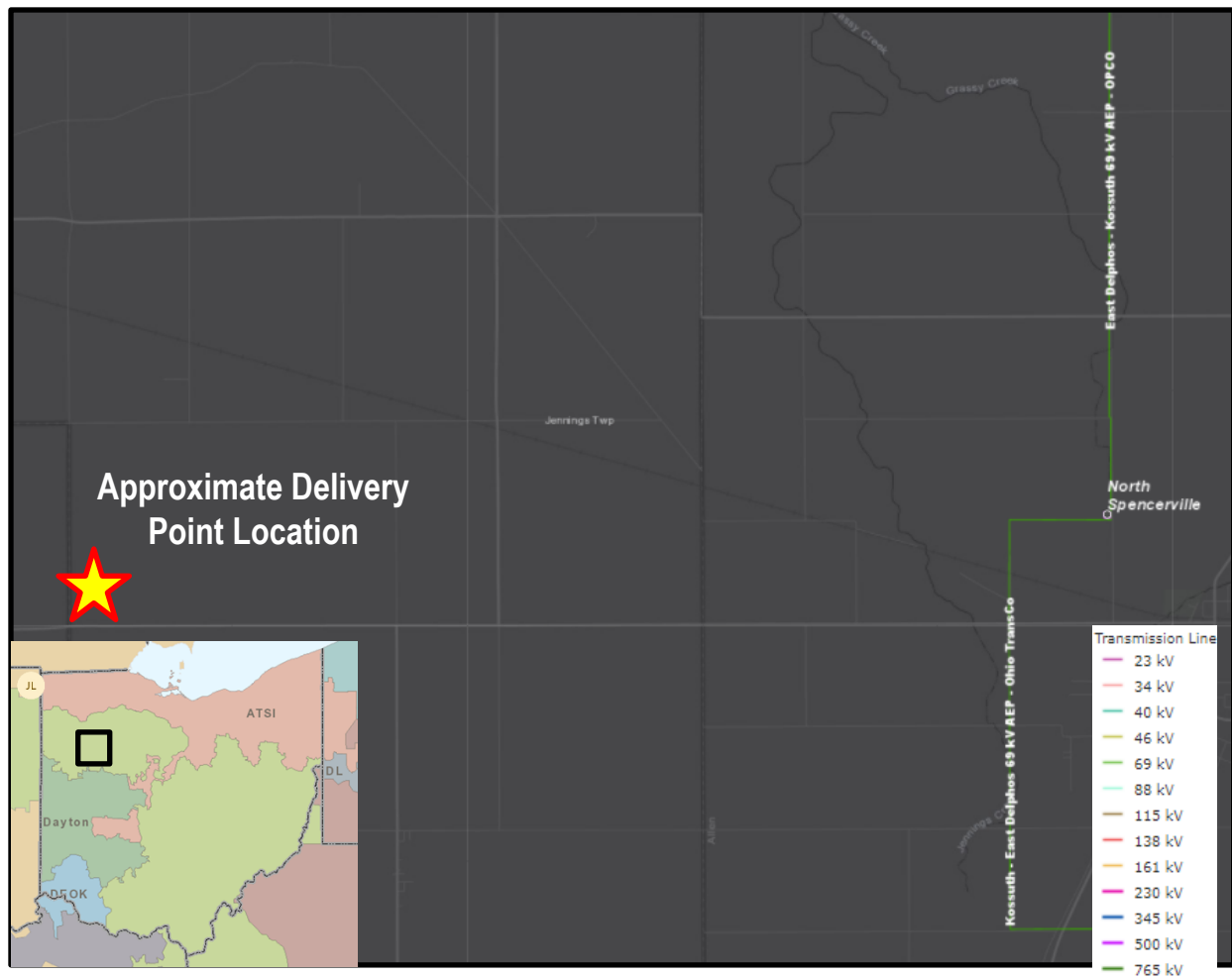
Previously Presented: Need Meeting 1/21/2022

Project Driver: Customer

Specific Assumption Reference: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:

Buckeye Power has requested a new 69kV delivery point in Van Wert county Ohio on behalf of Midwest Electric, Inc. The projected demand at the delivery point is 3.3 MW with an expected annual growth rate of 1.0%. Emergency loading is projected to be 4.9 MW



Need Number: AEP-2022-OH004

Process Stage: Solutions Meeting 7/21/2023

Proposed Solution:

Elgin – North Spencerville: Construct approximately 5 miles of 69kv single circuit. Install ADSS. Cost: \$12.13M

North Spencerville: Install a DCIM expansion and new 69kv circuit breaker. Install bypass switch called West Spencerville Cost: \$0.5M

Kossuth-E Delphos: Install ~0.05 miles of 69kv single circuit. \$0.31M

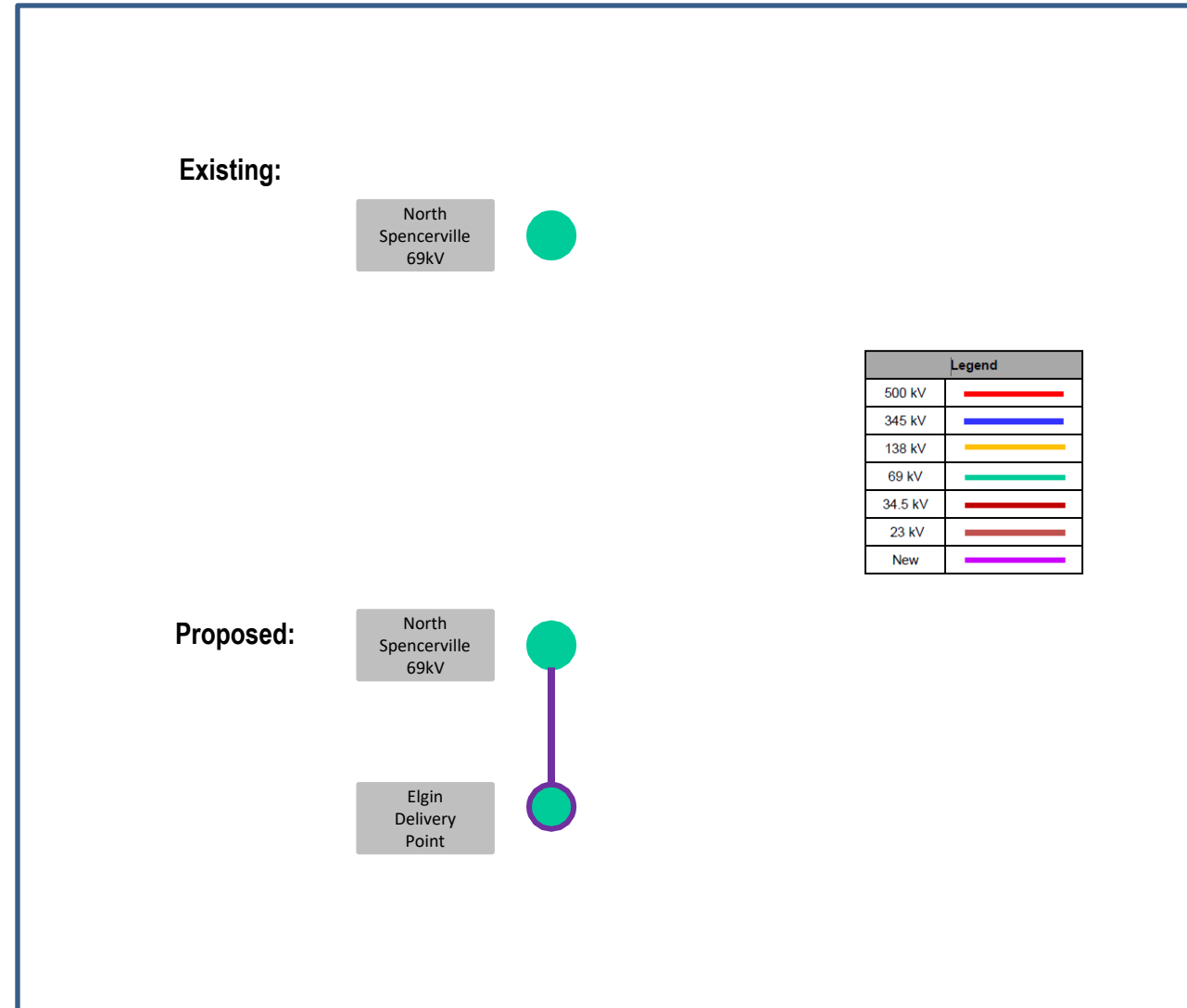
Alternatives Considered:

Due to the lack of existing transmission infrastructure in the area and the delivery’s anticipated load, serving the load from the 69 kV was the only viable transmission option.

Projected In-Service: 12/01/2024

Project Status: Functional

Model: RTEP 2024



Appendix

High Level M-3 Meeting Schedule

Assumptions	Activity	Timing
	Posting of TO Assumptions Meeting information	20 days before Assumptions Meeting
	Stakeholder comments	10 days after Assumptions Meeting
Needs	Activity	Timing
	TOs and Stakeholders Post Needs Meeting slides	10 days before Needs Meeting
	Stakeholder comments	10 days after Needs Meeting
Solutions	Activity	Timing
	TOs and Stakeholders Post Solutions Meeting slides	10 days before Solutions Meeting
	Stakeholder comments	10 days after Solutions Meeting
Submission of Supplemental Projects & Local Plan	Activity	Timing
	Do No Harm (DNH) analysis for selected solution	Prior to posting selected solution
	Post selected solution(s)	Following completion of DNH analysis
	Stakeholder comments	10 days prior to Local Plan Submission for integration into RTEP
	Local Plan submitted to PJM for integration into RTEP	Following review and consideration of comments received after posting of selected solutions

Revision History

7/11/2022– V1 – Original version posted to pjm.com

7/20/2022– V2 – Slides #29,30, Corrected the Need # from AEP-2021-OH035 to AEP-2022-OH004

7/21/2022– V3 – Slides #20, Changed the new station name to York Station