Sub Regional RTEP Committee: Western
AEP Supplemental Projects

January 21, 2022

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
Plain City, OH

Need Number: AEP-2021-OH049

Process Stage: Need Meeting 9/17/2021

Previously Presented:

Needs Meeting 7/16/2021

Project Driver: Customer Service

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

Problem Statement:

Jerome Delivery Point (UREC) 138 kV:

- Buckeye Power Inc., on behalf of Union Rural Electric Cooperative Inc., has requested new transmission service in Plain City, Ohio.
- The delivery point will be used to serve a customer with high potential for rapid load growth. The initial load will be ~~62.5~~ 106 MW with a potential future peak load demand of ~~250~~ 244 MW.
- Service is requested by ~~January 2025~~ June 2024.
- The customer recently communicated a much more aggressive load ramp/build out schedule that would put their peak load at approximately 160 MW by early 2025 at the site.

Model: 2026 RTEP

AEP Transmission Zone M-3 Process
Union County, Ohio

Need Number: AEP-2021-OH040

Process Stage: Needs Meeting 1/21/2022

Previously Presented:

Needs Meeting 7/16/2021

Project Driver:

Customer Service

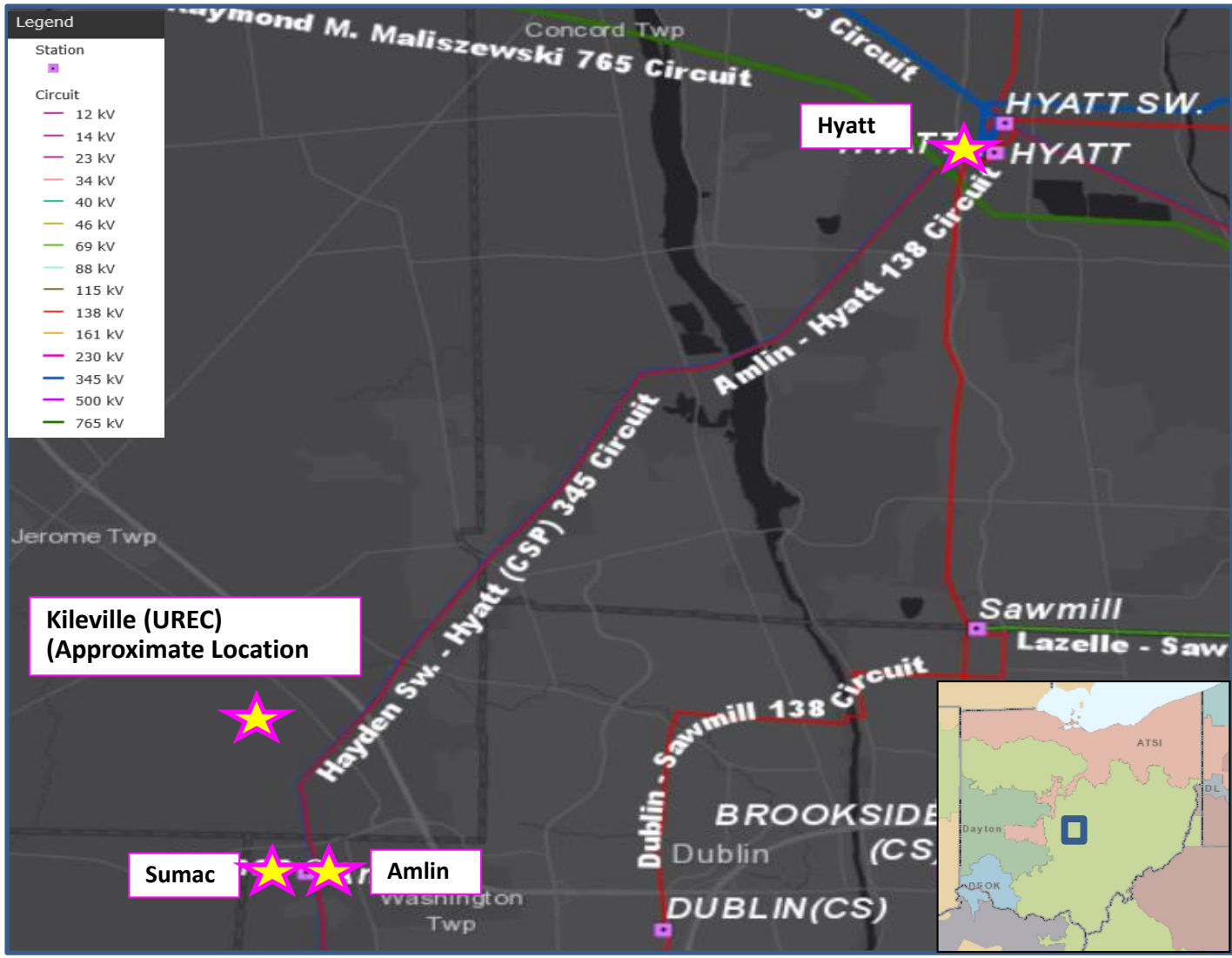
Specific Assumption Reference:

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

Problem Statement:

Kileville Delivery Point (UREC) 138 kV:

- Buckeye Power Inc., on behalf of Union Rural Electric Cooperative Inc., has requested new transmission service in Plain City, Ohio.
- The delivery point will primarily be used to serve a large data center customer with high potential for rapid load growth. The Initial load will be ~~40~~ 106 MW with a potential future peak load demand of 240 MW.
- Service is requested by June 2023.
- The customer recently communicated a much more aggressive load ramp/build out schedule that would put their peak load at approximately 160 MW by the middle of 2024 at the site.



AEP Transmission Zone: Supplemental
Fieldale, VA Area

Need Number: AEP-2022-AP001

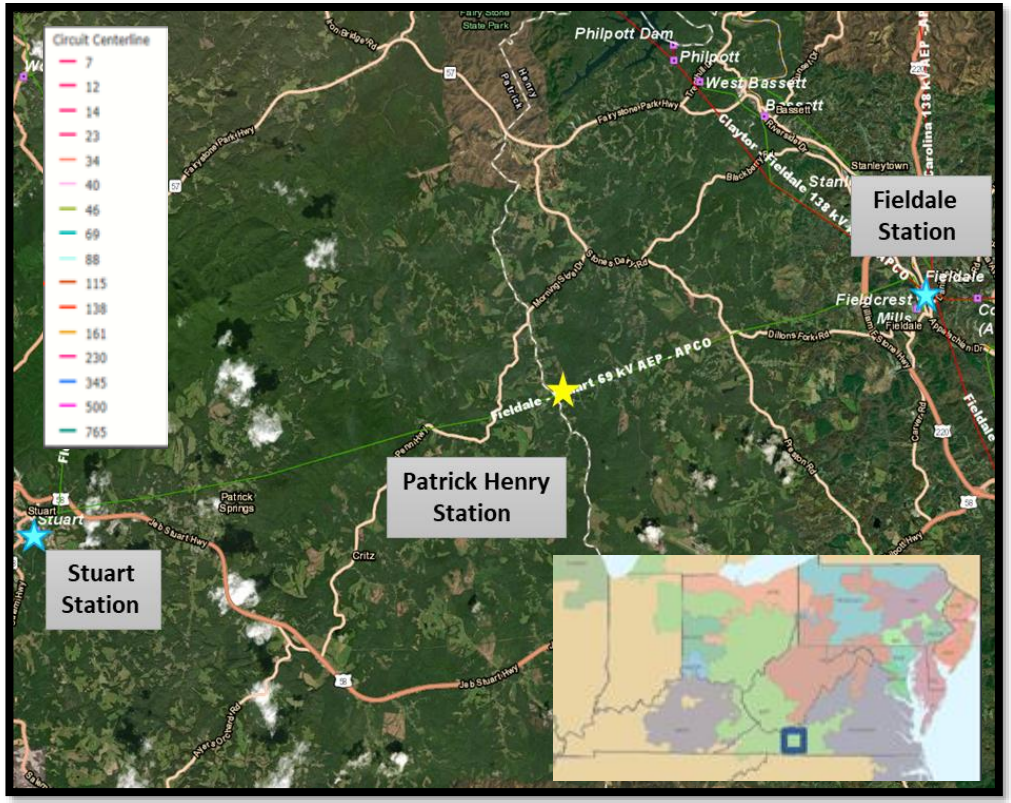
Process Stage: Needs Meeting 1/21/2022

Supplemental Project Driver: Customer Service

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

Problem Statement:

- AEP Distribution has requested a new delivery point (Patrick Henry)
- Future capacity and contingency overload is anticipated on the Stuart #2 69/34.5 kV (30 MVA) transformer, which is projected to be loaded to 44.2 MVA or 101% of its 44.1 MVA winter capability by winter 2025/26
- The Stuart/Critz 34.5 kV circuit averages 945,000 customer minutes of interruption (CMI) per year during the last nine years (considering permanent outages only). There are over 2800 customers served from the Critz circuit over 263 line miles, making it one of the largest 34.5kV distribution circuits in VA. The projected winter peak is 19.1 MVA.
- This new delivery point request will reduce load and exposure on the West Bassett/Blackberry (111 miles), Stuart/Critz (263 miles), and Fieldale/Rangeley (118 miles) 34.5 KV distribution circuits and create a tie to the Fieldale/Carver (75 miles) 34.5kV circuit to improve area transfer capability.



AEP Transmission Zone M-3 Process
Montgomery County, VA

Need Number: AEP-2022-AP002

Process Stage: Needs Meeting 1/21/2022

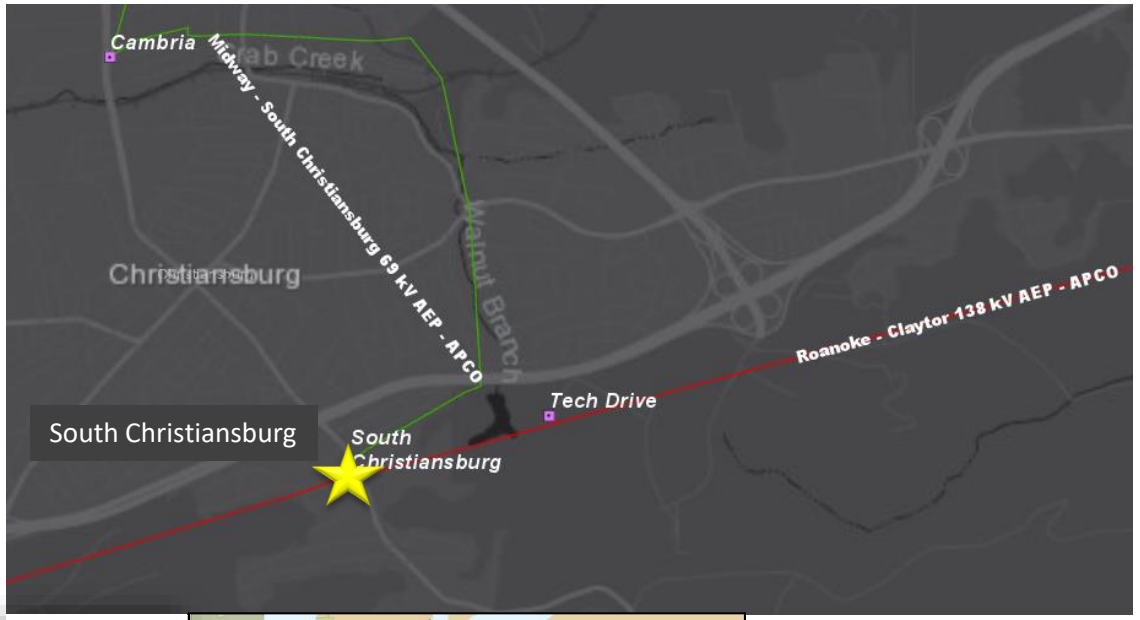
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

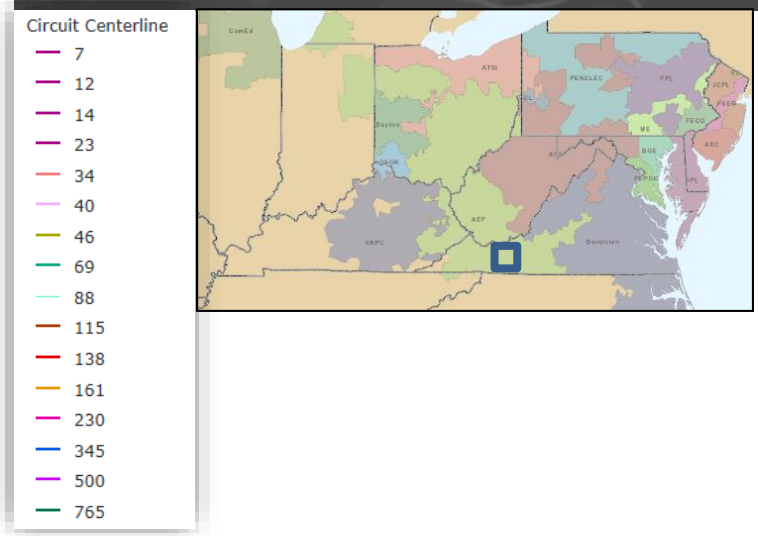
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

South Christiansburg Station:

- 138/69-12 kV Transformer #1
  - 1972 Vintage Transformer
  - Elevated levels of carbon dioxide in the DGA indicates decomposition of the increasingly brittle paper insulation that impairs the unit's ability to withstand future short circuit or through fault events.
  - Rising power factor and decreasing dielectric strength are both indications of an increase in particles within the oil. This decreases the ability of the oil to withstand fault events, which can further damage the paper insulation. The values of dielectric strength and power factor indicate the dielectric strength of the insulation system (oil and paper) is in declining condition, which impairs the unit's ability to withstand electrical faults.
  - The advanced age of this unit's insulation materials (49 years old) is of concern. As the insulating paper materials age, they become brittle.
  - This unit regularly leaks nitrogen. Loss of nitrogen is typically related to small leaks that are difficult to locate and repair.
  - There are oil leaks around the temperature wells.
- The 69kV circuit breaker at South Christiansburg station is 1965 vintage and is oil filled without oil containment. This circuit breaker has exceeded the manufacturer's designed number of full fault operations. The manufacturer provides no support for this type of breaker and spare parts are not available. As of March 24, 2021, there are 54 remaining FK-69-2500-5 circuit breakers on the AEP system, including the 1 at this station.
- The transformers use obsolete 138kV MOAB/ground-switch protection systems, which require remote-breaker tripping for isolating transformer faults





AEP Transmission Zone M-3 Process
Montgomery County, Virginia

Need Number: AEP-2022-AP003

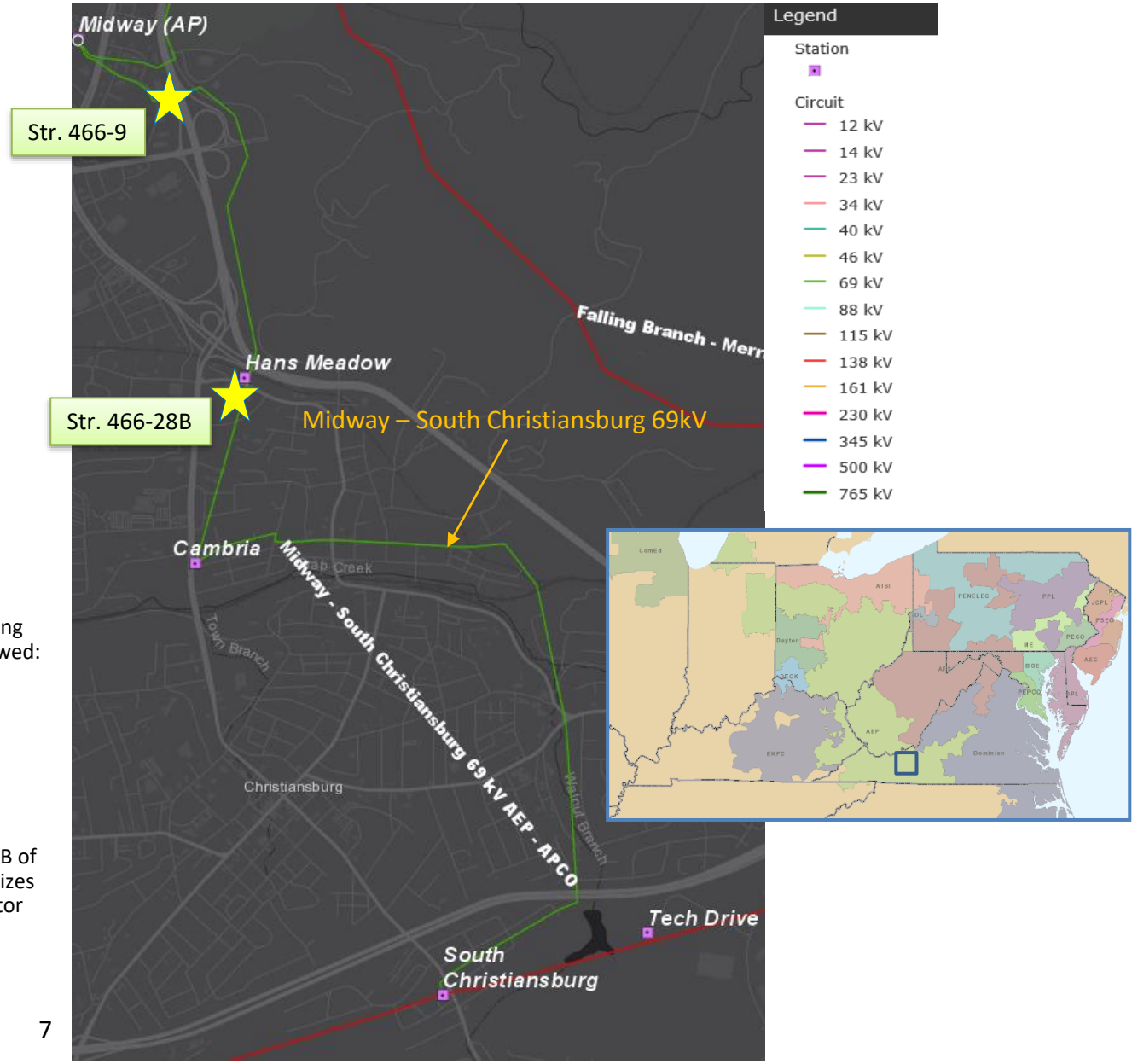
Process Stage: Need Meeting 1/21/2022

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: Midway – South Christiansburg 69kV Line
Original Install Date (Age): 1967
Length of Line: ~5.7 mi
Total structure count: 111
Original Line Construction Type: Wood
Conductor Type: 3/0 ACSR, 4/0 ACSR, 336,400 ACSR, 556,500 ACSR
Momentary/Permanent Outages: 4 Momentary and 0 Permanent
Line Conditions:

- The line structures fail to meet 2017 NESC Grade B loading criteria, current AEP structural strength requirements, and the current ASCE structural strength requirements.
- The vertical post insulators on the line do not meet current AEP standards for CIFO and minimum leakage distance requirements.
- Additional assessments were taken on a representative sample of the 1960s era structures, indicating numerous conditions that are expected to be present on the remainder of the line. The results showed:
    - Pole top weathering on multiple structures
    - Weathered/splitting/cracking crossarms
    - Woodpecker damage
    - Corroded hardware and insulator end fittings
- 19 structure related open conditions affecting the crossarm, knee/ vee brace, or pole including rot, damaged, and insect damage conditions.
- 80 of 111 structures are 1960s vintage. There is a 1.3 mile segment from Structure 466-9 to 466-28B of more recent construction associated with the previous widening of U.S. Route 460. This section utilizes 14 steel poles installed in 2007 and 7 wood poles installed in 1999 or 2007. In addition, the conductor on this section is 2007 vintage 556,500 CM ACSR 26/7 (Dove) and is not a need at this time.
- 16 independent structures with at least one open condition, 18% of the structures on this circuit, excluding the 21 structure segment from Structure 466-9 to 466-28B.



AEP Transmission Zone M-3 Process
Montgomery County, Virginia

Need Number: AEP-2022-AP003

Process Stage: Need Meeting 1/21/2022

Supplemental Project Driver: Equipment Condition/Performance/Risk

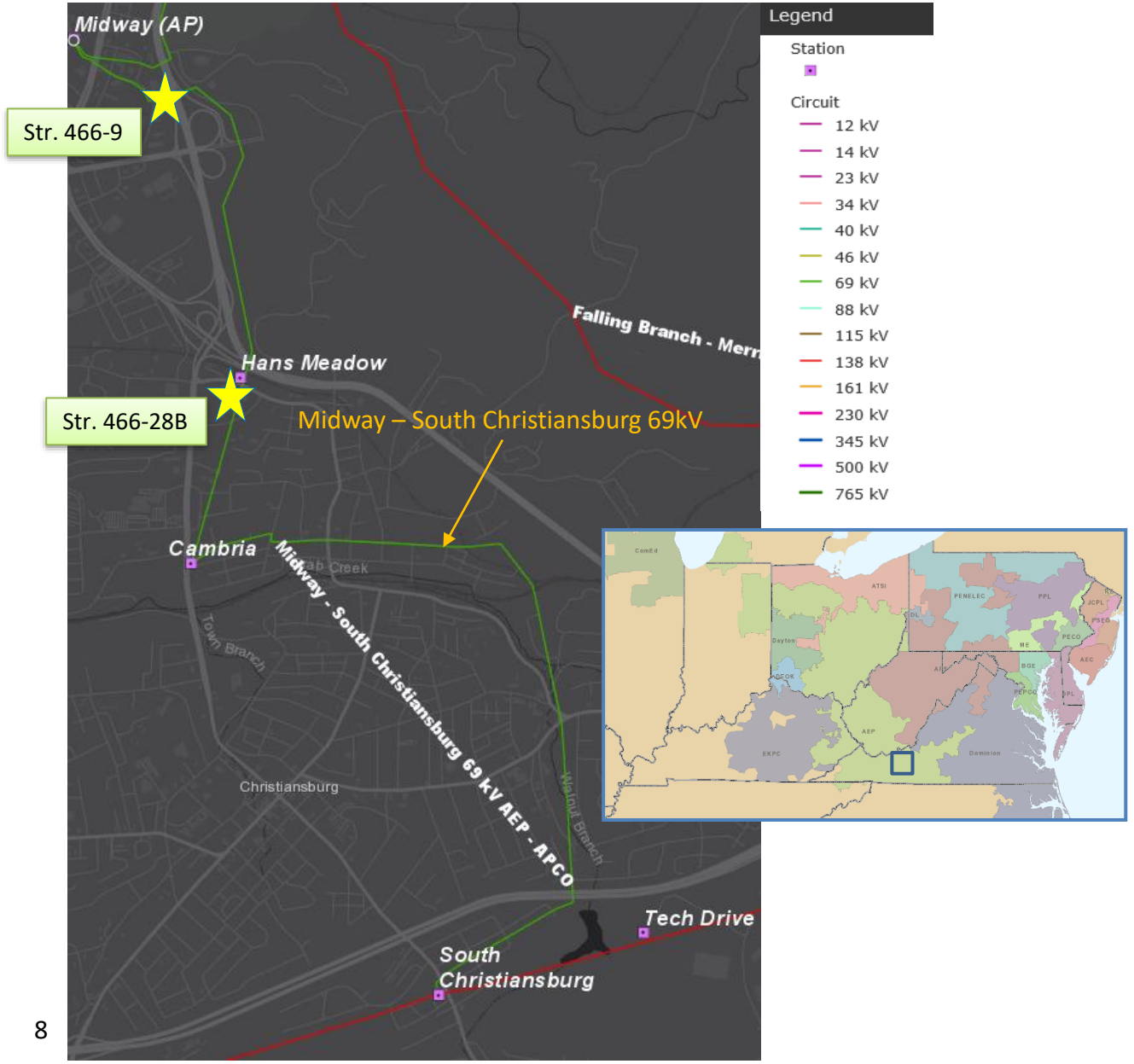
Specific Assumption Reference:

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

Problem Statement Continued:

Line Conditions Con't:

- The butt wrap grounding and typical shield angle is inadequate per current AEP Standards and can cause poor lightning performance. The current grounding system, poor shielding angle, and the electrical strength of the insulators do not meet current AEP and industry accepted criteria, making the line susceptible momentary and permanent outages, affecting customer reliability.
    - The inadequate grounding limits the available path to ground during any type of line fault, increasing the intensity the conductor and related hardware have to withstand during the fault. The reduced electrical strength of the insulators could lead to electrical damage to structures and hardware during a fault if the insulator were to fail from elevated electrical stresses.
    - The line serves a peak load of 43 MVA at Cambria and Hans Meadow Substations.



Need Number: AEP-2022-IM001
Process Stage: Needs Meeting 1/21/2022
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Problem Statement:

Robison Park 34.5kV

34.5kV Circuit Breaker S:
- 1956 FK Oil Breaker without oil containment
- No longer vendor supported and spare parts are not available.
- This type of breaker has a document history of failures in AEP including compressor failures, valve defects, trip failures caused by latching and motor component failures and contamination from aging gaskets.

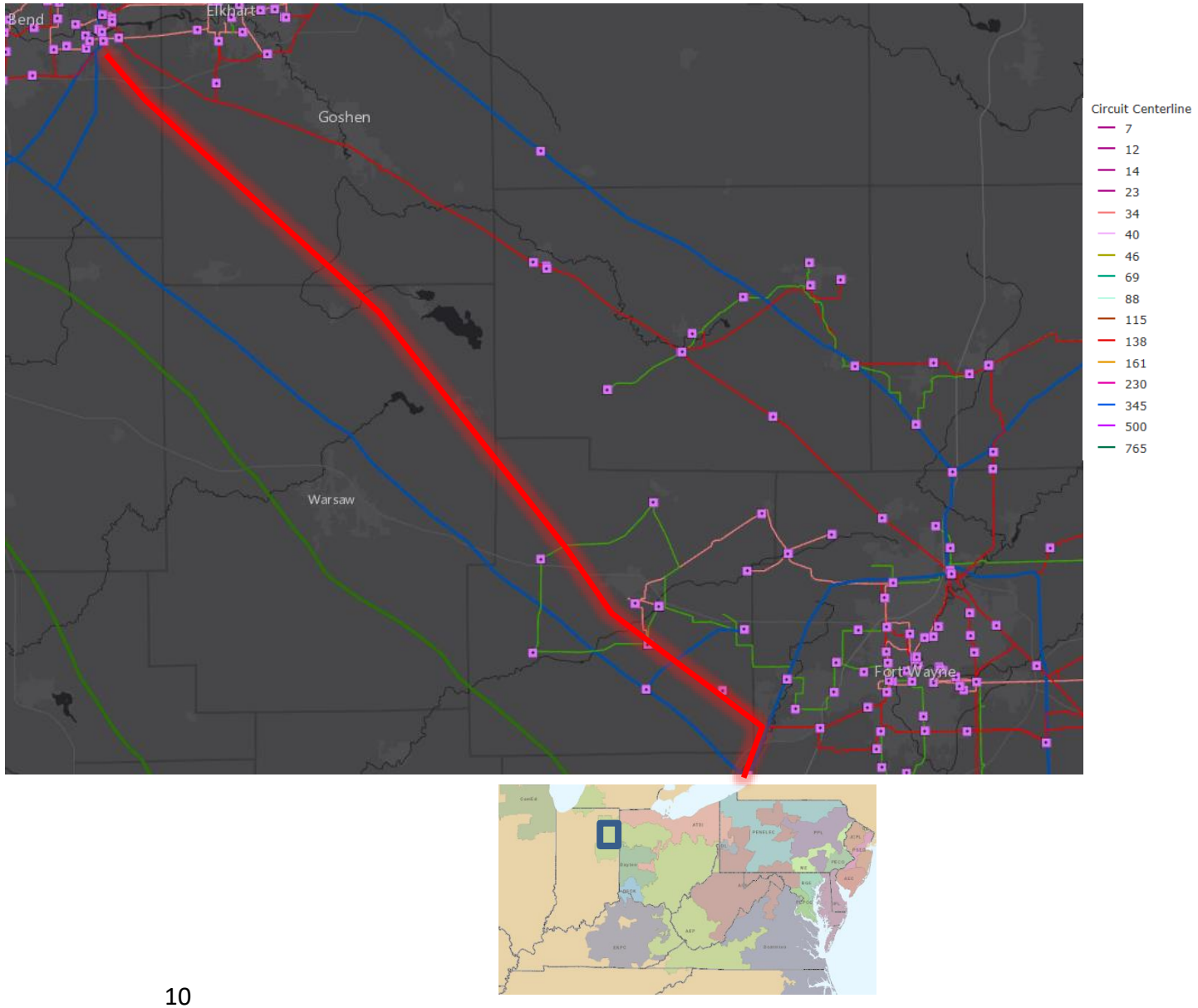
34.5kV Ground bank:
- 1927 Unit with no oil containment
- Elevated levels of CO, CO2, Ethylene, and Hydrogen indicating breakdown of the interior components of the unit
- Extensive visual corrosion

AEP Transmission Zone M-3 Process
Ft Wayne – South Bend , Indiana

Need Number: AEP-2022-IM002
Process Stage: Needs Meeting: 1/21/2022
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Model: N/A
Problem Statement:

Twin Branch - Sorenson 138kV line (65.1 miles):

- Line is 1949 Steel lattice construction
- Since 2014 there have been 6 momentary outages to this line
- Currently there are 172 (47%) structures with at least one open condition.
- Currently there are 222 open conditions including damaged legs, broken strands, damaged conductor, broken shield wire strand, broken/burnt insulators, broken/burnt insulators, or broken and missing shield wire hardware.
- The Shielding Angle is inadequate for AEP standards which can lead to poor performance of the line for lightening strikes.

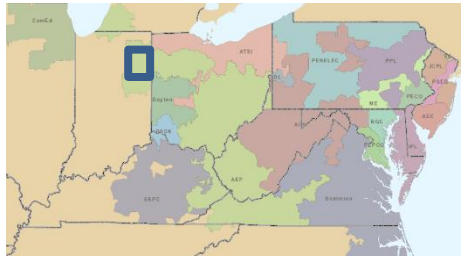


AEP Transmission Zone M-3 Process
Columbia, Indiana

Need Number: AEP-2022-IM003
Process Stage: Needs Meeting: 1/21/2022
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Model: N/A
Problem Statement:
Line Name: Richland – Tri Lakes 69kV

Original Install Date (Age): 1965

- Length of Line: 8.66 Miles
- Total structure count: 122
- Original Line Construction Type: 1960s Wood Pole
- Conductor Type: 4/0 ACSR
- Outage History since 2015
    - Momentary/Permanent Outages and Duration: 20 Momentary and 6 Permanent
    - CMI: 125,904
- Condition Summary
    - 71 structures (58%) have at least one open condition including cracked, rotten, woodpecker damaged and leaning poles; Chipped, Loose, Contaminated and rusted Insulators.
    - 40 representative structures were assessed by drone with 12 assessed by a ground crew. Of these the following was observed
        - Wood decay was moderate to advanced on structures at ground line and poles have rot top.

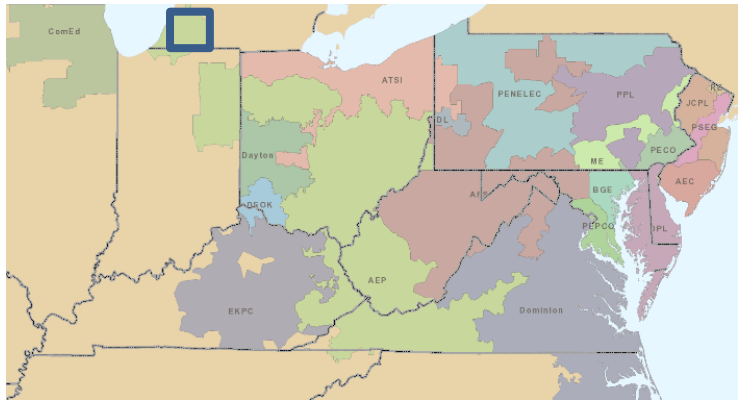


AEP Transmission Zone M-3 Process
Benton Harbor, MI

Need Number: AEP-2022-IM004
Process Stage: Need Meeting 1/21/2022
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Model: N/A
Problem Statement:

Hickory Creek – Main Street 138kV (~3.53 miles):

- 57 total structures (a mixture of wood and steel)
  - 44 were installed in 1968
  - 7 were installed in 1929
  - The remaining more recent
- The line consists of 1968 636 ACSR 26/7 Grosbeak conductor
- Since 2016
  - Main Street – Pletcher 138kV has experienced 2 momentary and 1 permanent outage
  - Main Street – Napier 34.5kV has experienced 1 permanent outage resulting in 739,134 customer minutes of interruption
- Structures fail NESC Grade B and AEP Strength requirements. Grounding methods utilize butt wraps on every other structure, which is inadequate for current AEP standards
- 40 representative structures were assessed by ground and drone
  - 50% have ground line heart and/or shell rot
  - High percentage of wood poles have woodpecker damage and moderate to advanced wood decay from insect and bird damage
- There are 11 structures with at least one documented open condition not included in the ground and aerial assessment.



Need Number: AEP-2022-OH001

Process Stage: Needs Meeting 1/21/2022

Supplemental Project Driver:

Customer Service

Specific Assumption Reference:

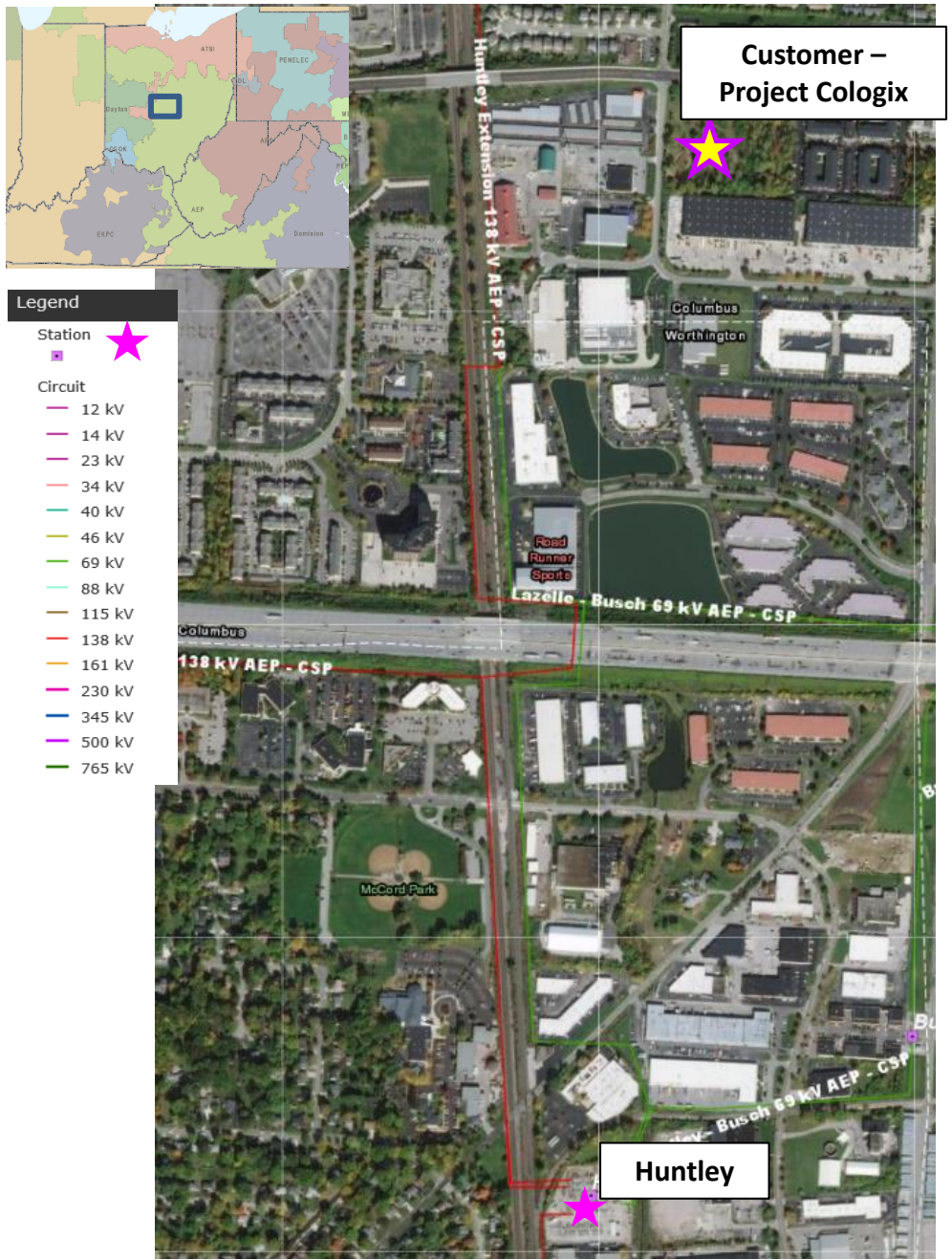
AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

Customer Service:

- A customer has requested transmission service at a site North of AEP's existing Huntley station in Worthington, OH.
- The customer has indicated a demand of 40 MW at the site.
- They are seeking an in service date of 4/1/2023 for their permanent transmission service.

Model: 2026 RTEP



AEP Transmission Zone M-3 Process
Haverhill, Ohio

Need Number: AEP-2022-OH002

Process Stage: 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:

North Haverhill Station

Circuit Breakers (69kV): M & P (1200 A)

- Breaker Age: 1968 (M), 1977 (P)
- Interrupting Medium: (Oil)
- Fault Operations:
    - Number of Fault Operations: M-13 & P-36
- 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. This model family has experienced major malfunctions associated with their hydraulic mechanisms, 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.

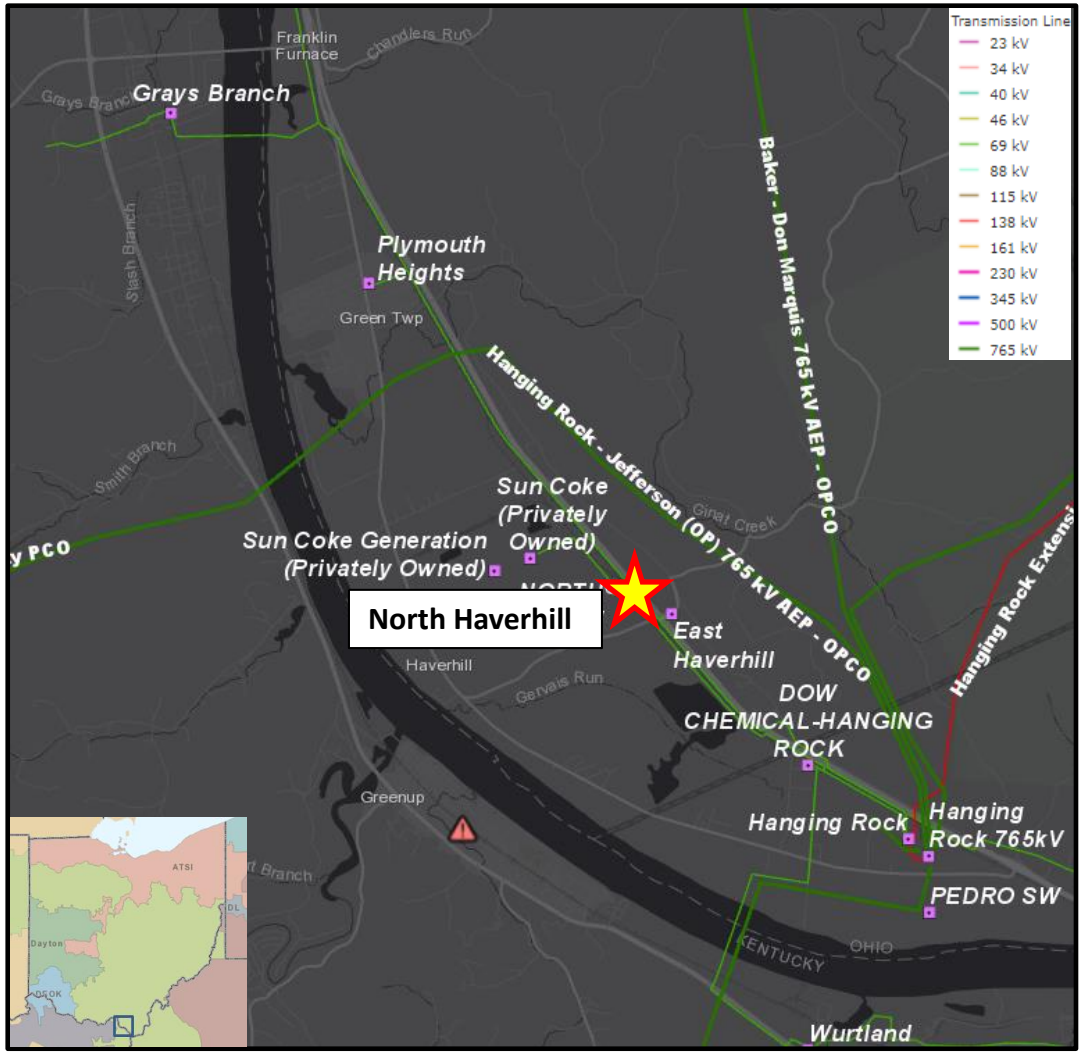
Circuit Switcher (69kV): AA

- Switcher Age: 1991 (1200 A)
- Interrupting Medium: (SF6)

This family of circuit switchers have no gas monitor and currently in-service units on the AEP System have experienced 80 malfunctions from May 2002 to August 2019. The major malfunction events include gas loss, interrupter failures, operating mechanism failures, and trip or reclose failures. Models manufactured from January 1986 to December 1995 have a high potential for broken spring carriers in the low gas target assembly. This component malfunction presents the possibility of an actual low gas situation going unnoticed due to the indicator not activing. Interrupters can only be replaced, not repaired, as they are hermetically sealed.

Relaying:

- Currently, 65 of the 65 relays (100% of all station relays) are in need of replacement. 38 of these are of the electromechanical type and 2 of the static type which have significant limitations with regards to spare part availability and fault data collection and retention as these relays are no longer supported by the manufacturer. There are also 25 microprocessor based relays commissioned in 2004-2009 that have firmware that is no longer supported.



AEP Transmission Zone M-3 Process
Van Wert, Ohio

Need Number: AEP-2022-OH004

Process Stage: Need Meeting 1/21/2022

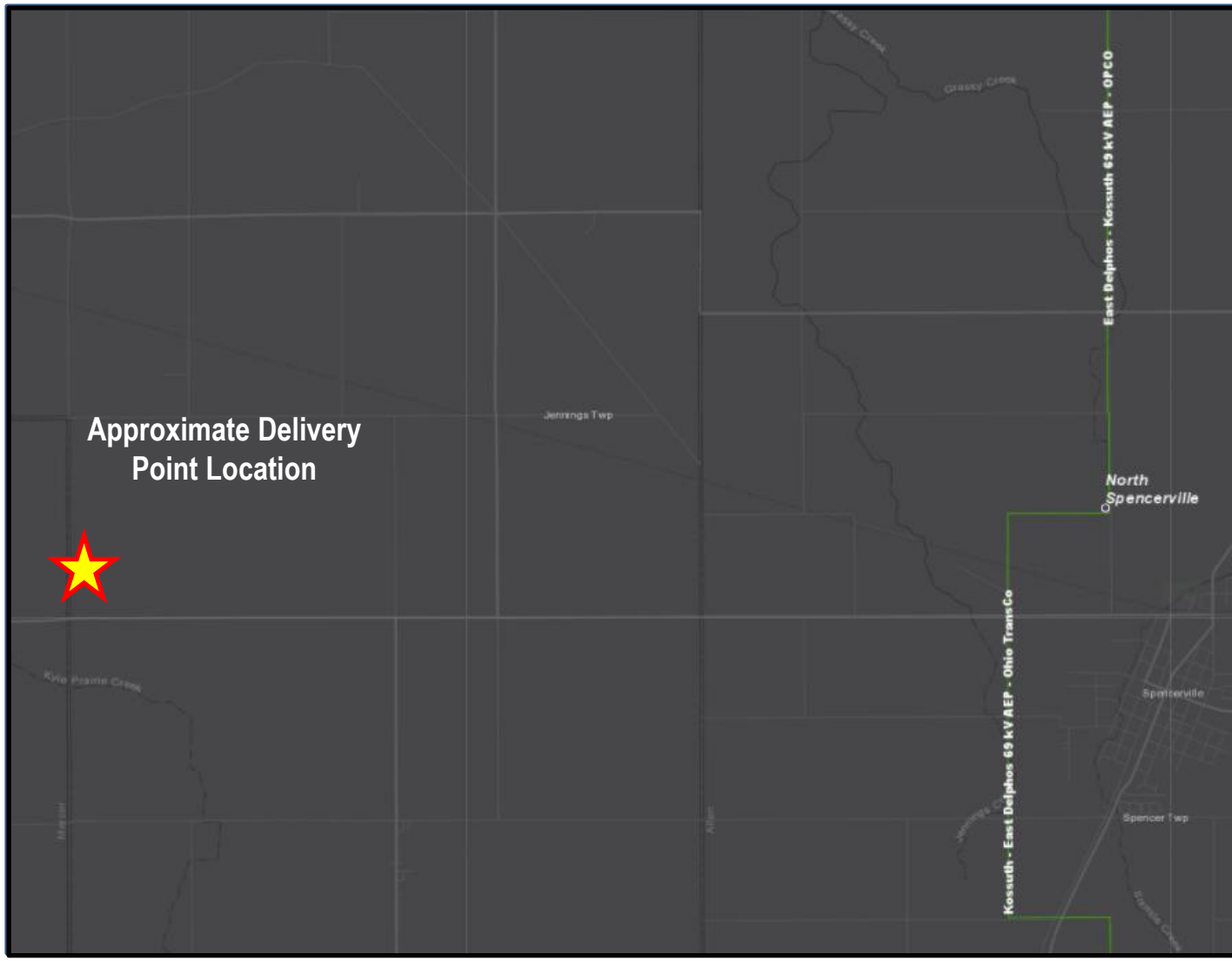
Project Driver: Customer Service

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

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.

They are seeking an in service date of December 2024 for the delivery point.



AEP Transmission Zone M-3 Process
East Lima, OH

Need Number: AEP-2022-OH006

Process Stage: Need Meeting 1/21/2022

Project Driver:

Equipment Material/Condition/Performance/Risk

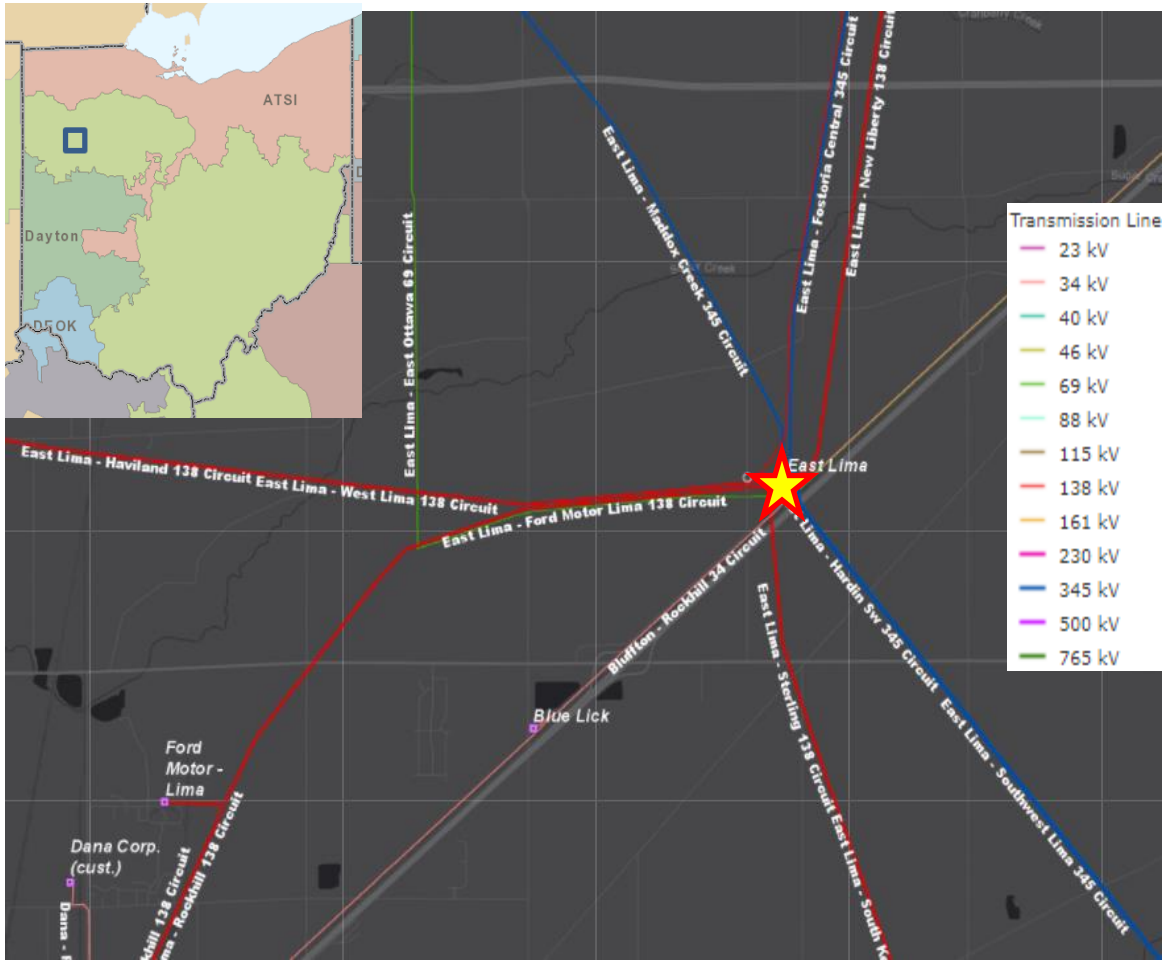
Specific Assumption Reference:

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

Problem Statement:

East Lima 69kV Circuit Breakers U,V:

- Breaker Age: U 1967, V 1967
- Interrupting Medium: (oil)
- Fault Operations:
  - Number of Fault Operations: U 107, V 68
  - Manufacturer recommended Number of Operations: 10
- **Additional Breaker Information**: This breakers are CF-48-69-2500 type oil breaker. 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. This model family uses the OA-3 hydraulic mechanism, which has been associated with several mis-operations across the AEP fleet.
- **Relays:** Currently, 70 of the 129 relays (54% of all station relays) are in need of replacement. 54 of these are of the electromechanical type and 2 of these are of the static type which have significant limitations with regards to spare part availability and fault data collection and retention. 14 relays are microprocessor type outside of their life expectancy



AEP Transmission Zone M-3 Process
Kenton, OH

Need Number: AEP-2022-OH007

Process Stage: 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 :

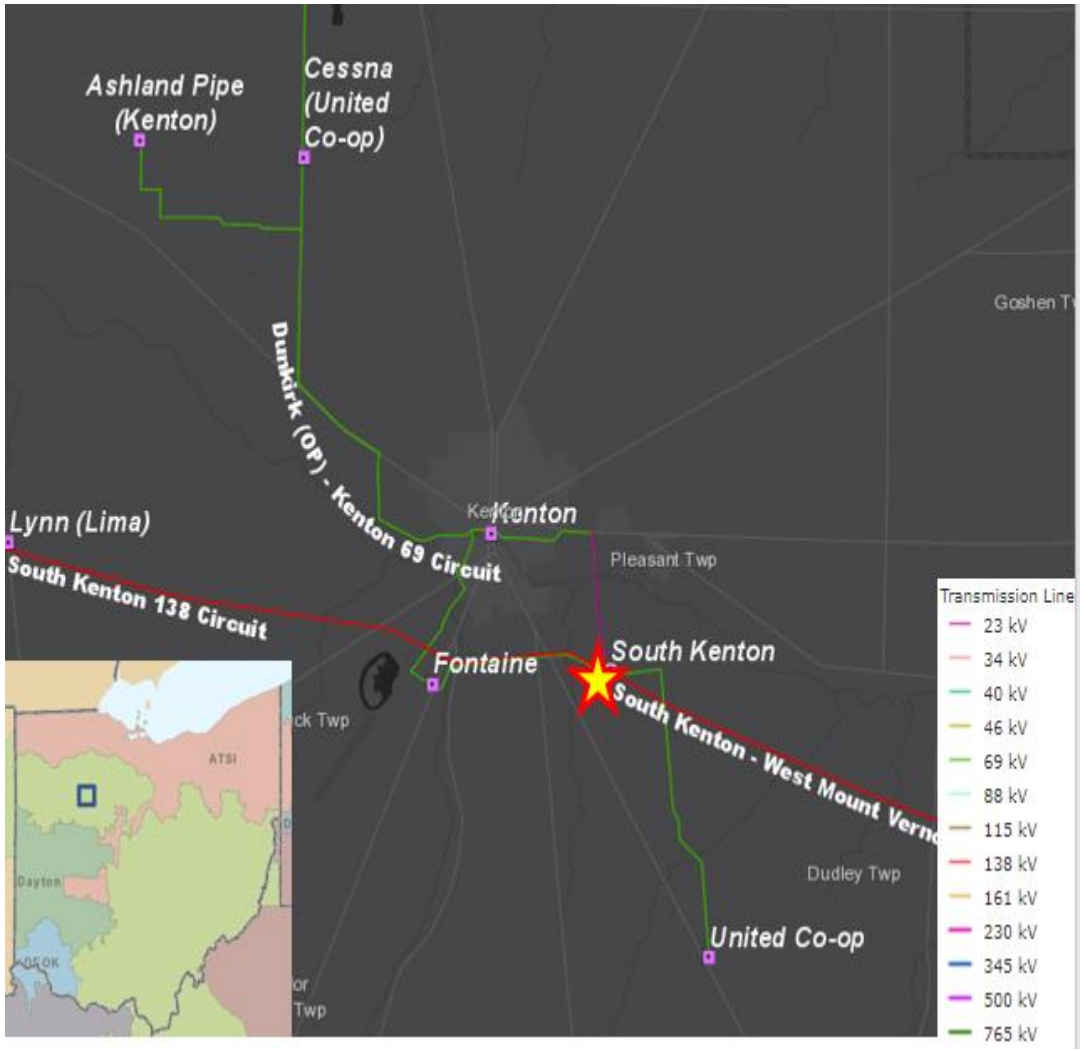
- Breaker Age: A 1953 (138 kV), B 1952 (138 kV), E 1954 (69 kV)
- Interrupting Medium: (Oil)
- Fault Operations:
  - Number of Fault Operations: A 42, B 49,E 26
  - Manufacturer recommended Number of Operations: 10
- Additional Breaker Information: These breakers are FK-439. These breakers are oil filled 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
Muskingum & Perry Counties, OH

Need Number: AEP-2022-OH008

Process Stage: Needs 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)

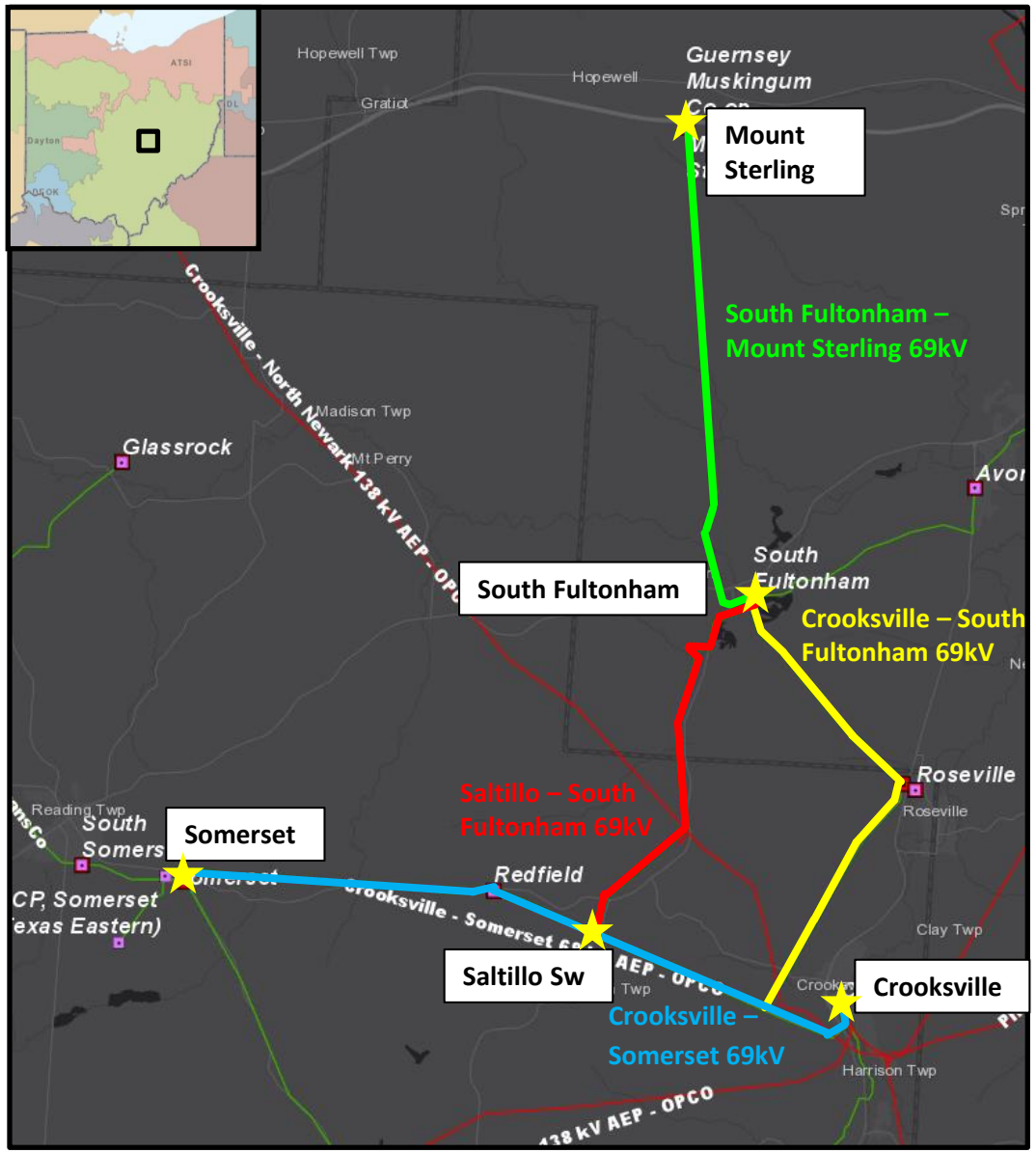
Problem Statement:

Crooksville – Somerset 69kV (1916):

- Line Length: ~10.4 Miles
- Total Structure Count 150
  - Structure Type: Wood / Steel Lattice
- Conductor Type: 3/0 ACSR 6/1 (Pigeon), 2/0 Cu 7 (20COP), & 4/0 ALUM/6201
- Outage History: 12 Momentary and 4 Permanent Outages, total CMI = 25,389 between 11/2016 – 11/2021.
- Open Conditions: 64
  - 13 structure related open conditions including rust, rotted, broken, and burnt conditions, and vines.
  - 1 open condition related to burnt conductor.
  - 32 shielding/grounding conditions including broken and missing wires.
  - 18 hardware based open conditions consisting of burnt, broken, missing, and chipped insulators as well as damaged guy wires

Saltillo - South Fultonham 69 kV (1952):

- Line Length: ~5.91 Miles (Normally open point at Saltillo Switch towards Crooksville)
- Total Structure Count 58
  - Structure Type: Wood
- Conductor Type: 4/0 ACSR 6/1 (Penguin) and 4/0 ALUM ALLOY
- Outage History: 3 Momentary and 1 Permanent Outages between 11/2016 – 11/2021
- Open Conditions: 22
  - 5 open structure related conditions
  - 2 conductor related conditions
  - 3 shielding/grounding conditions and 12 hardware related conditions.



AEP Transmission Zone M-3 Process
Muskingum & Perry Counties, OH

Problem Statement Continued:

South Fultonham – Mount Sterling 69kV (1958):

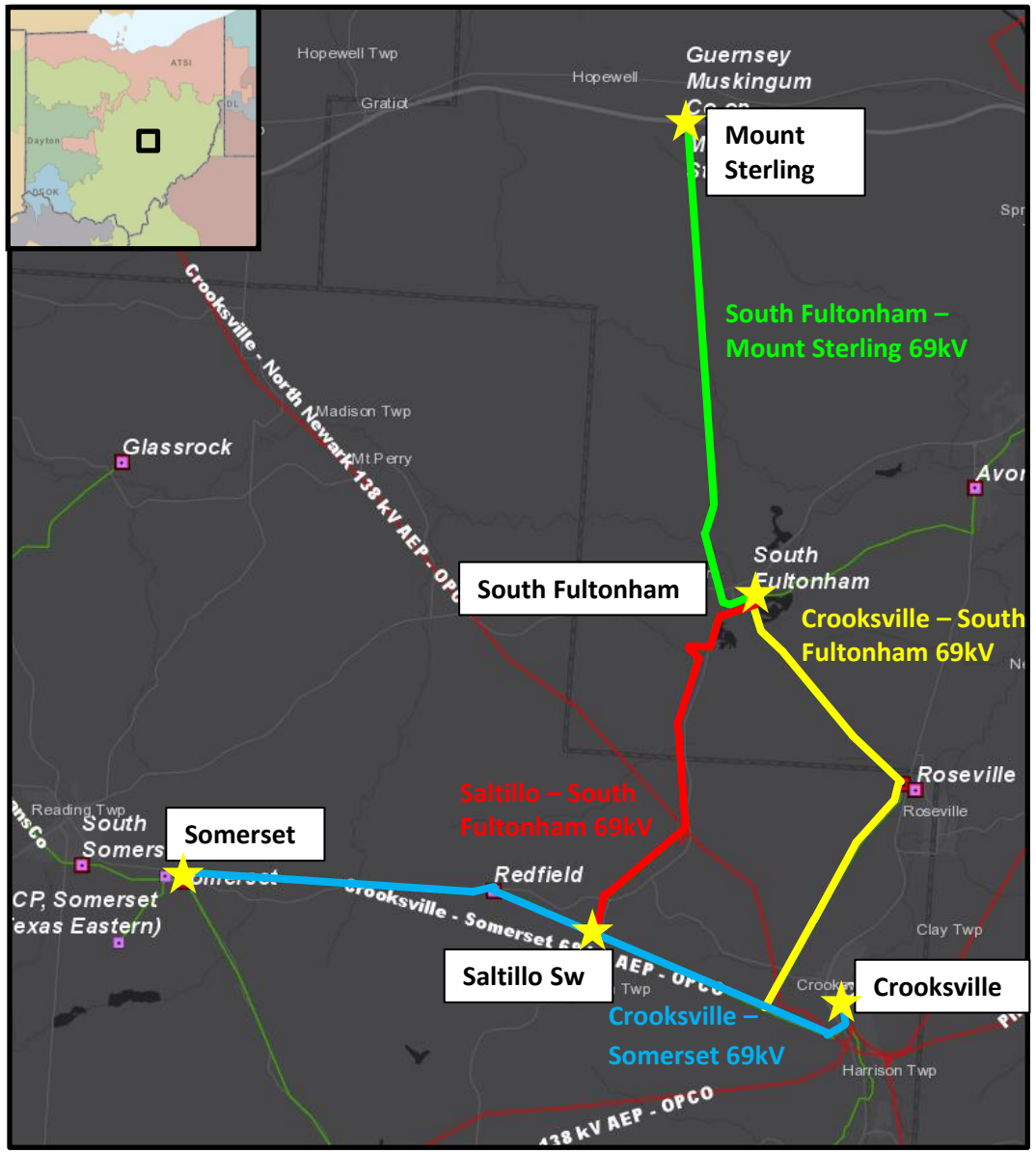
- Line Length: ~7.2 Miles
- Total Structure Count 75
  - Structure Type: Wood
- Conductor Type: 1/0 ACSR 6/1 (Raven), 336.4 MCM ACSR 18/1 (Merlin)
- Outage History: 12 Momentary and 7 Permanent Outages, total CMI = 1,221,812 between 11/2016 – 11/2021.
- Open Conditions: 24
  - 6 structure related open conditions including rot top, split pole, rot heart, and burnt pole.
  - 7 open condition related to damaged conductor splice/dead ends.
  - 8 shielding/grounding conditions related to damaged shield wires and a broken ground lead wire.
  - 3 hardware based open conditions consisting of burnt insulators and a chipped insulator.

Crooksville – South Fultonham 69kV (1958):

- Line Length: ~7.4 Miles
- Total Structure Count 67
  - Structure Type: Wood
- Conductor Type: 3/0 ACSR 6/1 (Pigeon), 2/0 Cu 7 (20COP), & 4/0 ACSR 6/1 (Penguin)
- Outage History: 10 Momentary and 2 Permanent Outages, total CMI = 700,805 between 11/2016 – 11/2021.
- Open Conditions: 39
  - 13 structure related conditions rot top of poles/crossarms, split poles, insect and woodpecker damage.
  - 12 open conditions related to conductor issues including broken strands.
  - 14 hardware based open conditions consisting of burnt insulators and broken insulators.

Crooksville 69kV Circuit Breaker "W":

- Breaker Age: 1962
- Interrupting Medium: (Oil)
- Fault Operations: 19
- This breaker is 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



AEP Transmission Zone M-3 Process
Coshocton County Ohio

Need Number: AEP-2022-OH013

Process Stage: Need Meeting 1/21/2022

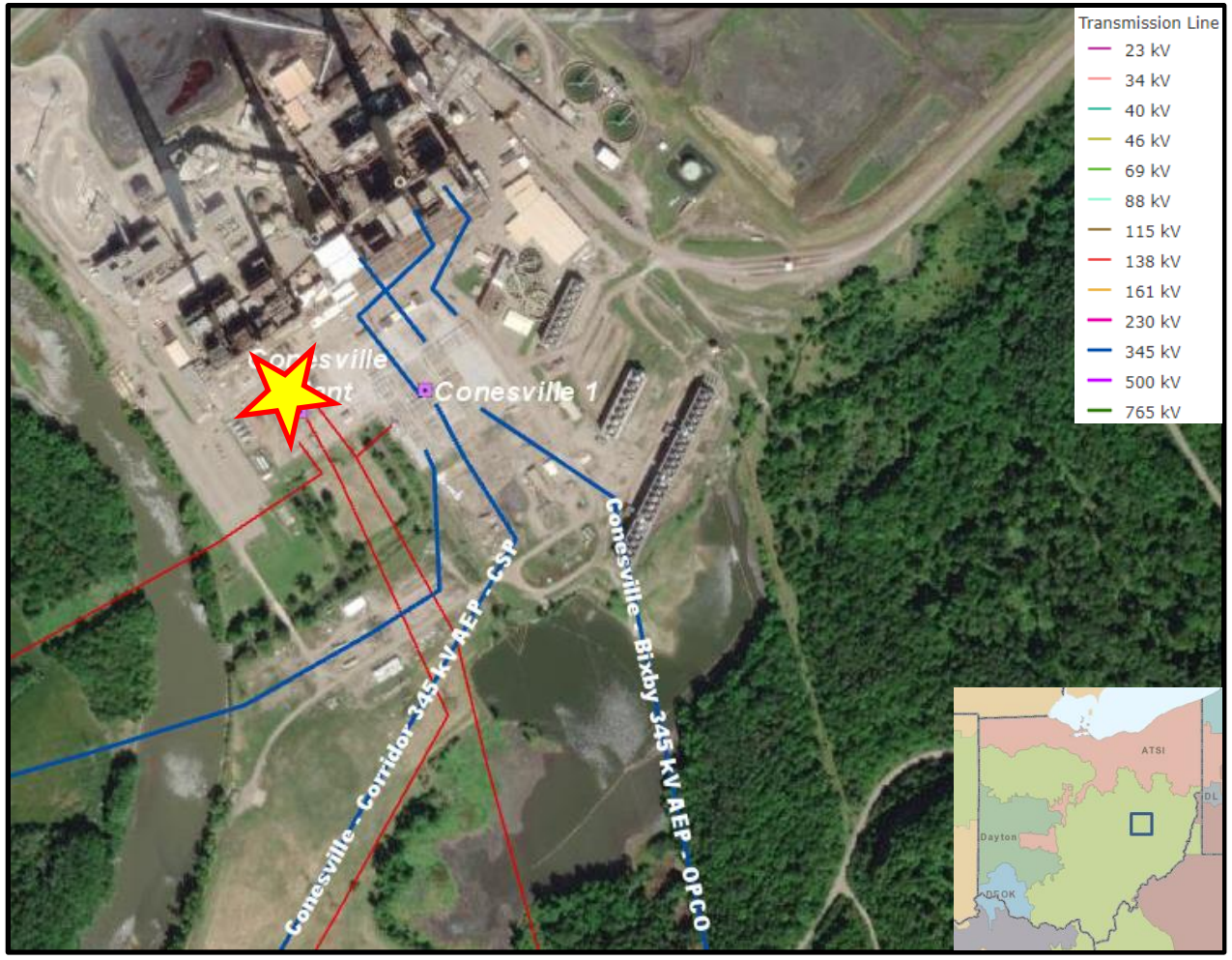
Project Driver: Equipment Material/Condition/Performance/Risk

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

Problem Statement:

Conesville 138 kV Cap Bank BB (86.4 Mvar):

- This capacitor bank has experienced continuous can failures over the last 4 years.
    - 10/15/2021-10 cans
    - 08/4/2021-10 cans
    - 09/11/2020-2 cans
    - 03/31/2020-10 cans
    - 05/16/2017-4 cans
- After the last can failures in October of 2021 the capacitor was not put back into service until such time a long term solution could be evaluated to address the reoccurring issues. It was detiremented that the bank had seen several overvoltage events that had permanently damaged the capacitor due to it's lack of any voltage margin in it's design.



AEP Transmission Zone M-3 Process
Toronto, Ohio

Need Number: AEP-2022-OH015

Process Stage: Need Meeting 1/21/2022

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:

South Toronto Station Circuit Breaker: D (69 kV/1200 A)

- Breaker Age: 1951
- Fault Operations: 23 (recommended manufacturers limit: 10)
- This breaker is 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.

Relays: 42 of the 47 relays (89% of all station relays) are in need of replacement. 39 of these are of the electromechanical relays and there are 3 static relay types which have significant limitations with regards to spare part availability and fault data collection and retention. In addition, these relays lack of vendor support.

Operational Flexibility and Efficiency:

The 138/69kV transformer high-side protection consists of a 138kV ground-switch MOAB system, which requires remote-end fault clearing at FirstEnergy's Weirton and Wylie Ridge 138kV stations, creating a 3-terminal line.

There are two 69kV T-line hard taps outside the station: one serving the Timet industrial customer, and one on the Ft. Steuben-Hammondsville 69kV circuit.

AEP Transmission Zone M-3 Process
Gallia & Lawrence Counties, Ohio

Need Number: AEP-2022-OH016

Process Stage: Needs Meeting: 1/21/2022

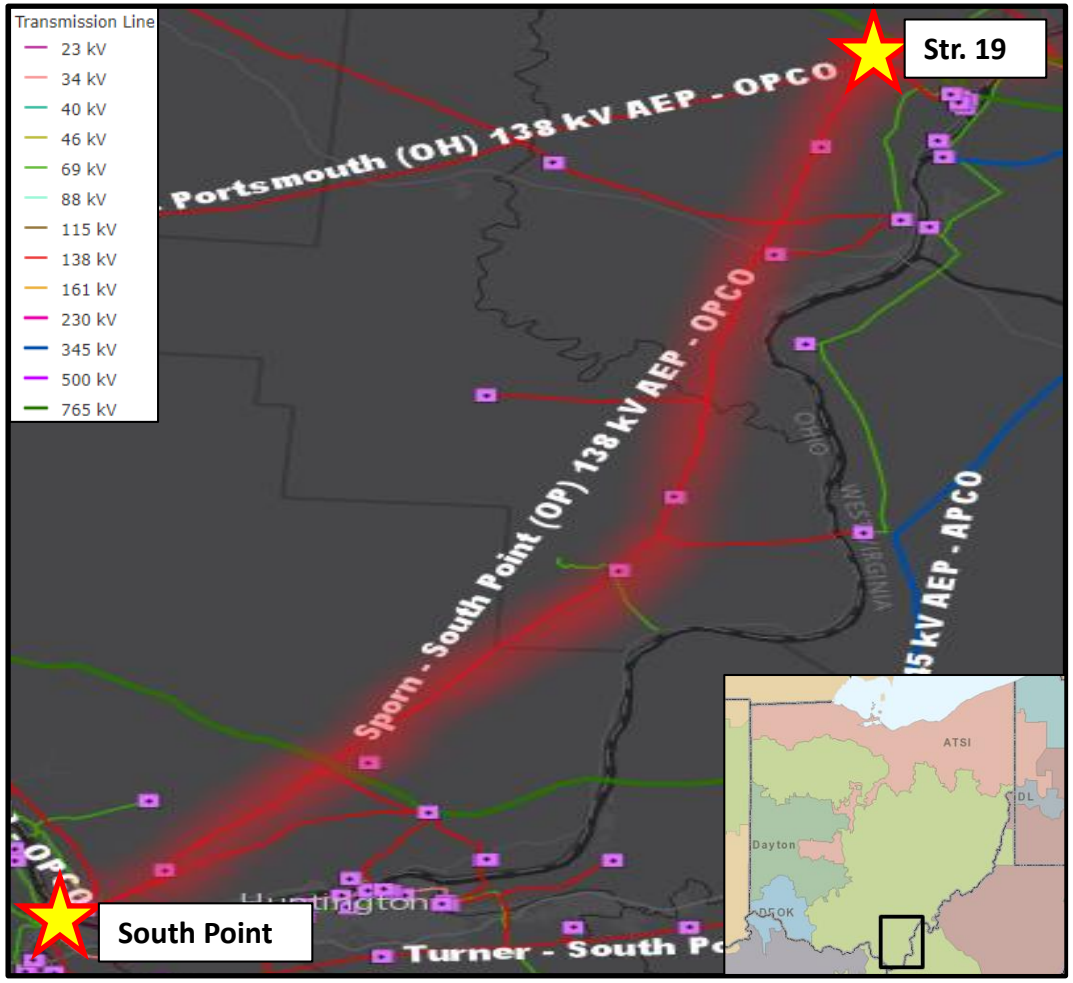
Project Driver: Equipment Material/Condition/Performance/Risk; Customer Service

Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs; AEP Connection Requirements (AEP Assumptions Slides 13)

Problem Statement:

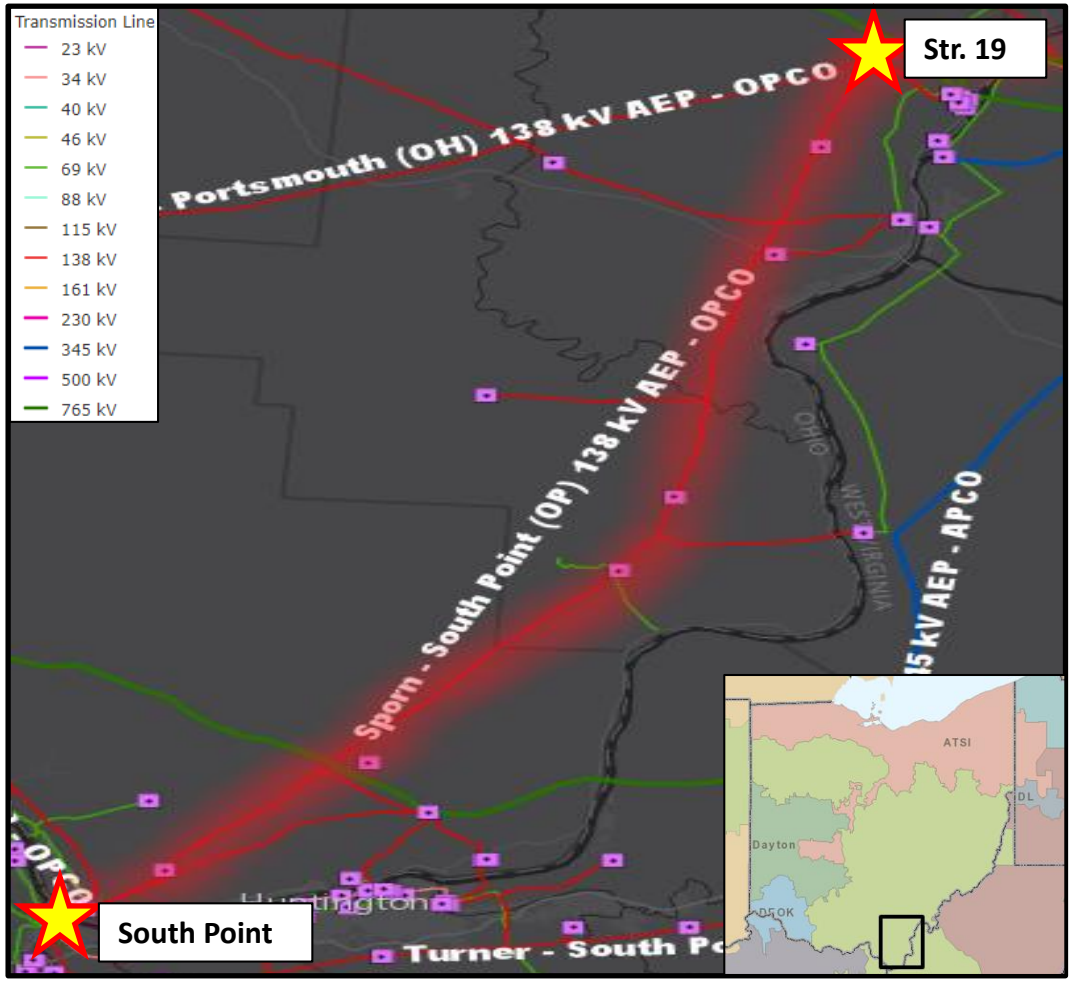
<u>South Point – Sporn 138kV Line (South Point – Str. 19)</u>

- 46 mile long line consisting of double circuit steel lattice towers with vertical and horizontal insulators, originally installed in 1925 with a 397,500 CM ACSR 30/7 (Lark) conductor.
- Outage History:
  - Momentary (22) & Permanent Outages (3)
  - CMI: 20,458 (Past Five Years)
- Total Structure Count: 179
  - Steel Lattice: 171 from 1925
  - Steel: 8 from 2015
- Open Conditions: 67 Total Conditions
  - There are 49 structures with at least one open condition, which relates to 27% of the structures on this line.
  - 3 structure based open conditions consist of bent legs 2 and brush clearance on tower brace 1.
  - 64 hardware based open conditions consists of broken insulators, burnt insulators, damaged body of hardware, damaged insulators, missing corona rings, rusty hardware, heavy rust on hardware, and worn hardware.



AEP Transmission Zone M-3 Process
Gallia & Lawrence Counties, Ohio

- The majority of the structures currently without conditions are of the same vintage and can reasonably be expected to incur similar conditions in the future. Please also reference the AEP presentation on the pre-1930s era lattice lines: https://www.pjm.com/-/media/committees-groups/committees/srrtep-w/20191218/20191218-aep-system-pre-1930s-tower-lines.ashx
  - Risks on Pre-1930s Tower Lines include:
    - Original designs do not account for modern wind and ice loading requirements.
    - The configuration of the structures are inadequate for lightning protection to meet modern power quality expectations.
    - Conductor splice and connection hardware deterioration.
    - Fraying/rusting of the conductor once the steel core is exposed (typically at the belly of the sag).
    - Copper conductor is often brittle and hard to repair.
    - Corrosion and deterioration of conductor hardware and ceramic bell insulators.
    - Wear on attachment hardware from conductor movement.
    - Corrosion and deterioration of lattice steel and steel bolts.
    - Loss of galvanizing coating on above and below grade steel and potential ground line deterioration of the legs.
    - Steel grillage foundation deterioration.
- Load at Risk: 24 MW (Solida Switch, Scottown Switch, Leaper Switch, Viking Switch, Thivener Switch, and Cartwright Switch)



AEP Transmission Zone M-3 Process
Jefferson County, Ohio

Need Number: AEP-2022-OH017

Process Stage: Need Meeting 1/21/2022

Project Driver: Equipment Condition/Performance/Risk

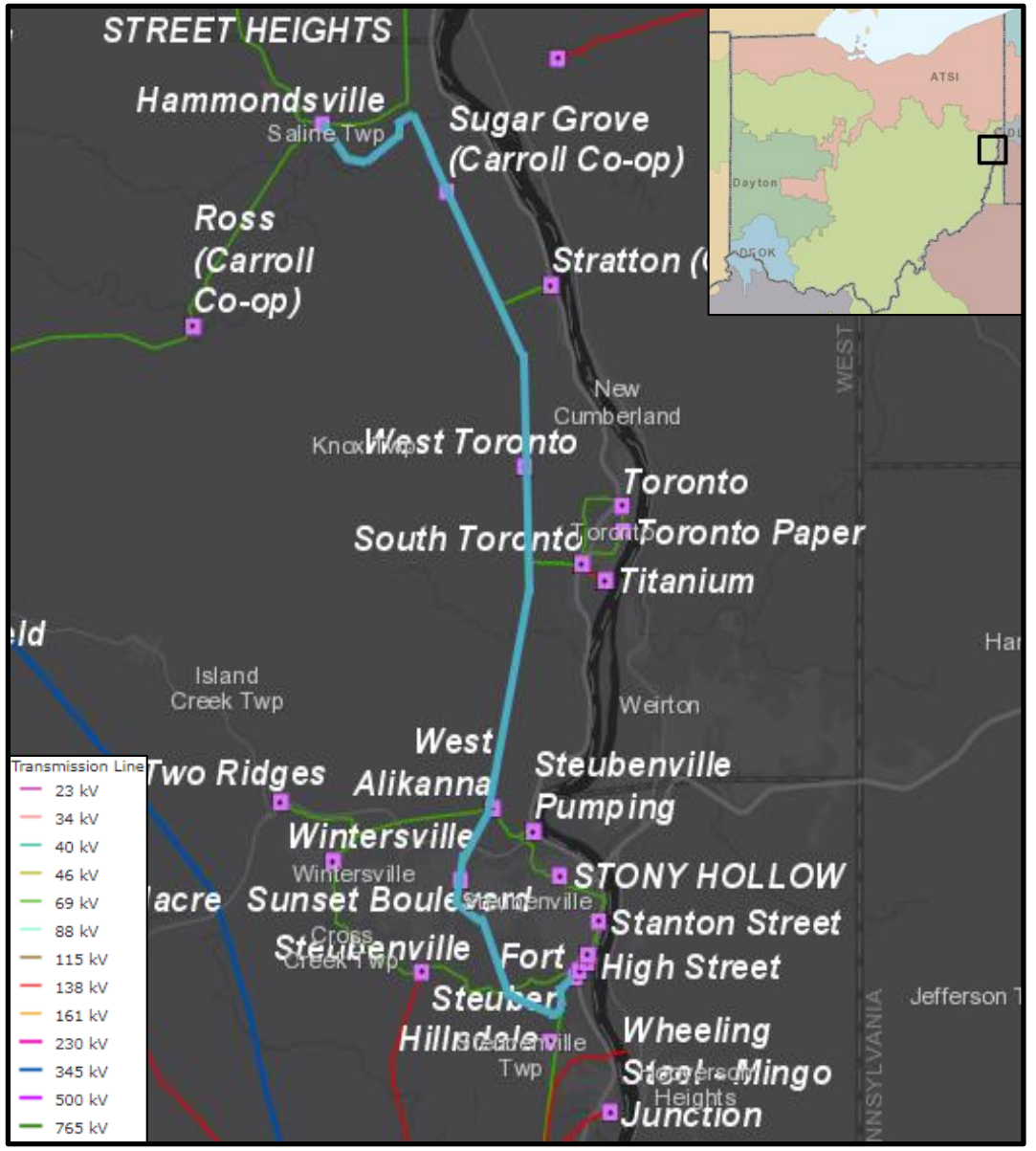
Specific Assumption References:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13); AEP Presentation on Pre-1930s Lines

Problem Statement:

Fort Steuben – Hammondsville 69kV Transmission Line

- Length: 20.76 Miles
- Total Structure Count: 222
    - Structure Types: 71% 1928 Steel Lattice, 23% 1950-1969 Wood Pole, 6% 1970-2014 Wood Pole and 2 Steel Poles
    - Conductor Types: 45% 1964 #1 Copper 3, 44% 1964 1/0 Copperweld 7, 6% 1964 336 CM ACSR 18/1 Merlin, 2% 338,000 CM ACSR 29/7 (338AC) The remaining conductors make ~2% of the line 4/0 COPPER 7 (40COP), 795,000 CM ACSR 26/7 (Drake), 1/0 Copperweld 7 (10C), & #1 COPPER 3 (#1COP)
- Outage History (5-year)
    - Momentary Outages 29
    - Permanent Outages 11
    - Total CMI 3.89 Million (39.1 MVA of peak load impacted)
- Open Conditions: Currently, there are 99 structures with at least one open condition, which relates to 44.6% of the structures on the line. There are currently 9 structure based open conditions consisting of bent horizontal brace and lacing, insect damage, twisted leg, leaning traverse pole, rot top and woodpecker holes. There are currently 7 conductor based open conditions consisting of broken strands, damaged conductors and improper installation. There are currently 5 ground lead wire based open conditions consisting of broken wires, floating OPGW, corroded shield wire and disconnected structure ground. There are currently 74 hardware open conditions consisting of broken armor rod strands, looses guys, rusted hardware, broken/burnt/loose/rusty insulators, broken molding structure, bent step bolt and worn U-bolt.
- Pre 1930's Steel Lattice Conditions: design doesn't account for ice/wind loadings, conductor steel core strength has diminished, inadequate lightening protection, significant wear/corrosion of hardware and insulators, loss of galvanizing and corresponding strength of steel lattice members, and weakened foundations and tower legs.



AEP Transmission Zone M-3 Process
Ottawa, OH

Need Number: AEP-2022-OH018

Process Stage: Need Meeting 1/21/2022

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

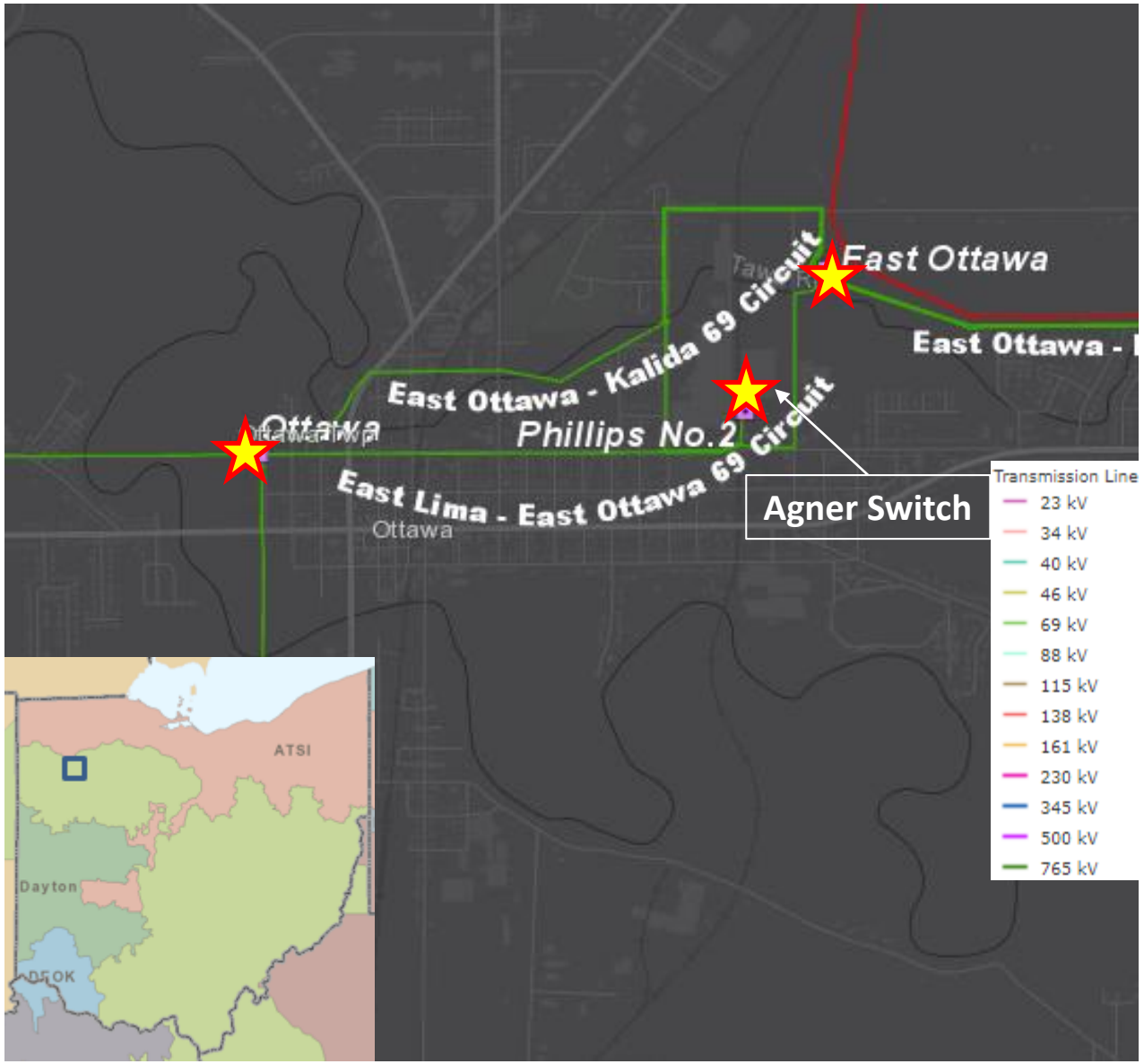
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

Ottawa – East Ottawa 69kV Line (1966):

- Length of Line: 1.57 Miles
- Total Structure Count: 53
    - Wooden Monopoles
    - Vertical ceramic insulators
- Conductor Types: 336.4 ACSR 18/1 (Merlin)
- Outage History: 17 Momentary and 3 Permanent outages, CMI 911,294
- The structures on the Ottawa – East Ottawa 69 kV line do not meet current AEP structural strength requirements, along with not meeting the current ASCE structural strength requirements. The line is insulated with porcelain insulators which do not meet current AEP standards for CIFO and minimum leakage distance requirements. The line is grounded utilizing the butt wrap method which does not meet current AEP standards. The line shielding angle on the typical tangent structure is measured at 41.12° degrees, which is inadequate for AEP current shielding angle requirements. The shielding angle, butt wrap grounds, and leakage distance requirements all lead to poor lightening performance.
- Open Conditions: 3 (insect damage and missing ground lead)

Agner Switch: Switch utilizes a wood pole and was originally installed in 1995. Bowing of the pole and deterioration of the switches has led to switch alignment issues where it does not operate normally.



Need Number: AEP-2022-OH023

Process Stage: Need Meeting 1/21/2022

Project Driver:

Customer Service

Specific Assumption Reference:

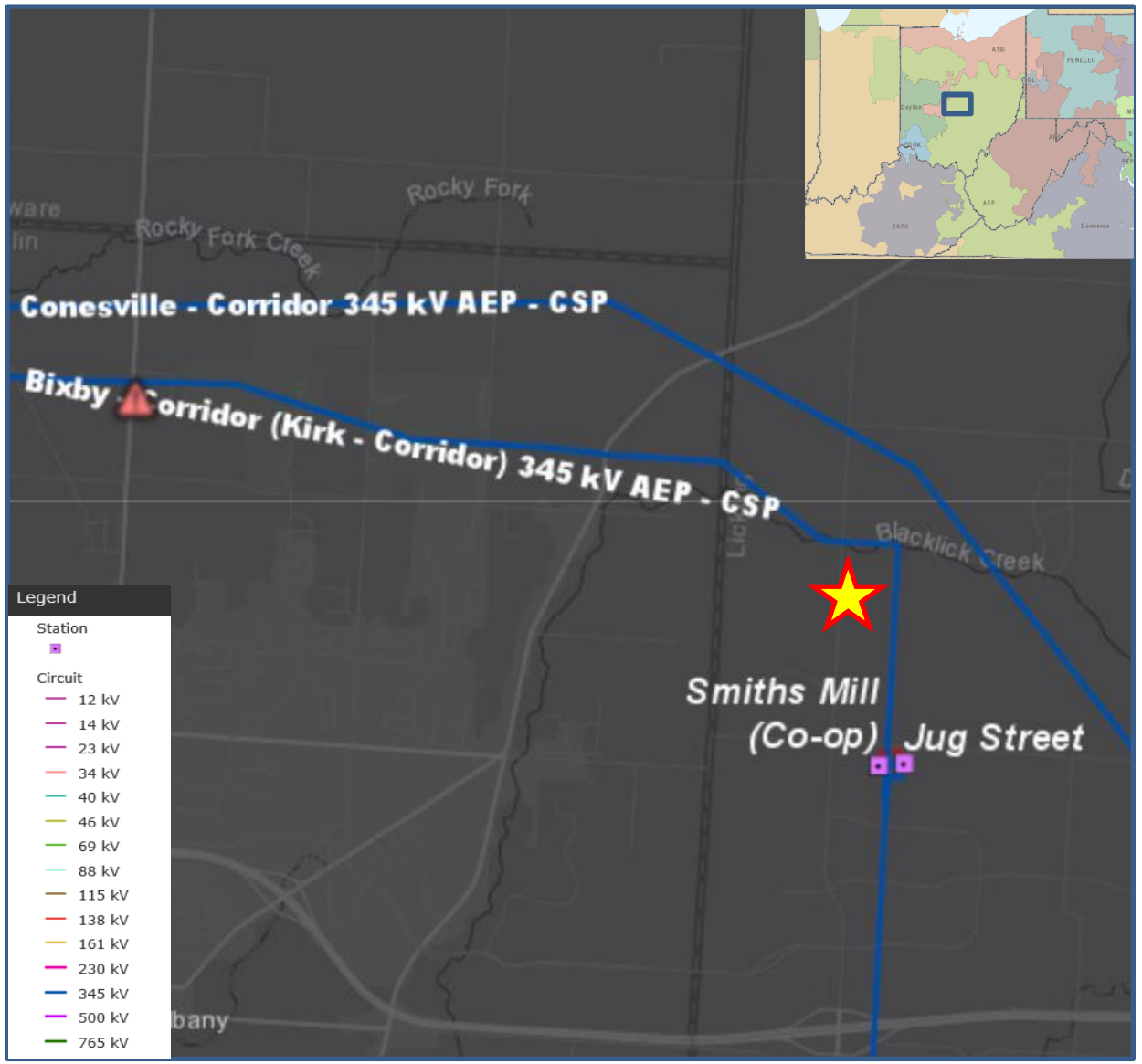
AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

Customer Service:

- A customer has requested transmission service at a site North of AEP's existing Jugg Street station in Columbus, OH.
- The customer has indicated an initial peak demand of 90 MW with an ultimate capacity of up to 360 MW at the site.
- Initial customer requested in-service date of June 1, 2024.

Model: 2026 RTEP



Need Number: AEP-2022-OH024

Process Stage: Need Meeting 1/21/2022

Project Driver:

Customer Service

Specific Assumption Reference:

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

Problem Statement:

Customer Service:

- A customer has requested transmission service at a site North of AEP's existing Roberts station in Columbus, OH.
- The customer has indicated an initial peak demand of 90 MW with an ultimate capacity of up to 360 MW at the site.
- Initial customer requested in-service date of June 1, 2024.

Model: 2026 RTEP

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

AEP Transmission Zone: Supplemental Northern Melita Area Improvements

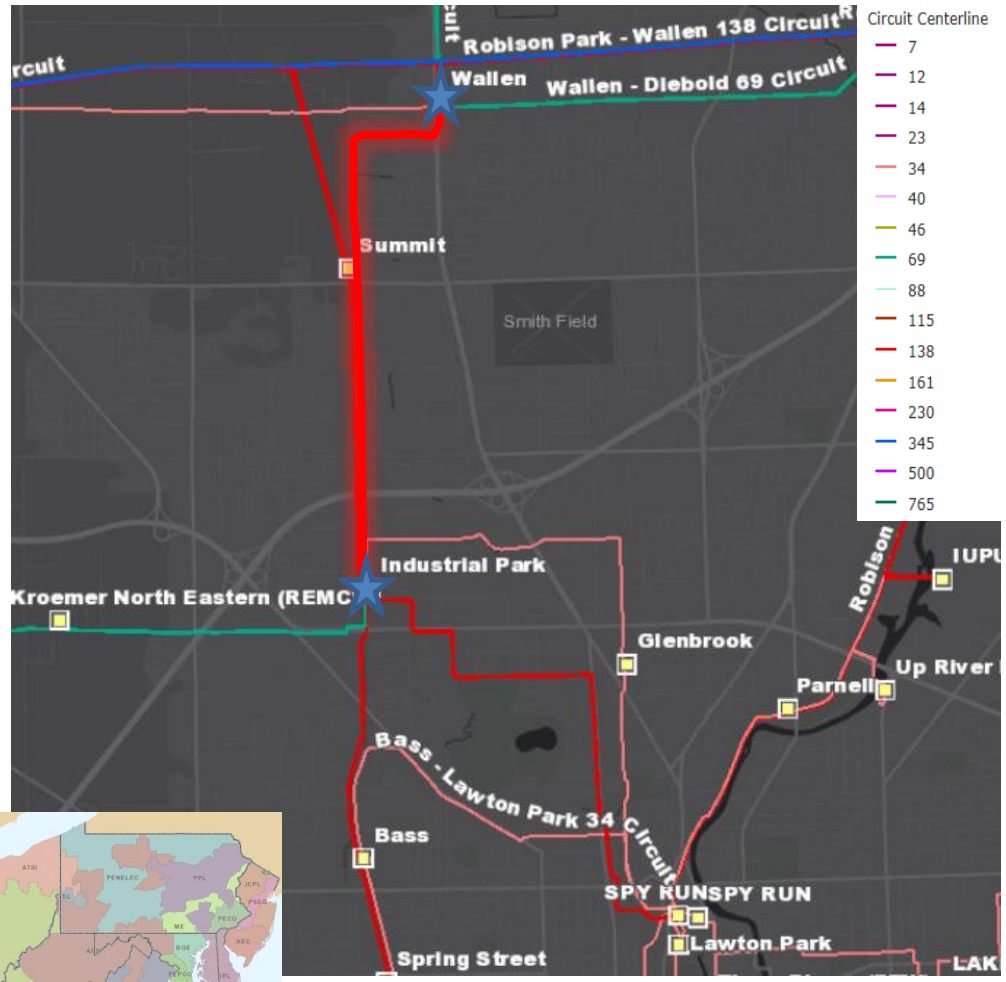
Need Number: AEP-2019-IM017
Process Stage: Solutions meeting 1/21/2022
Previously Presented: Needs Meeting 04/23/2019
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)
Problem Statement:

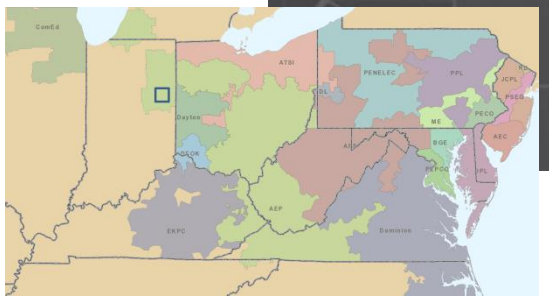
Industrial Park – Wallen 34kV (~3.3 Miles)

- 1925 vintage steel lattice construction
- There are currently 5 open conditions on this line with majority being structure issues. The O&M cost of the line is expected to increase as the age of the line increases.
- Six wired Copper conductor with copper weld shield wire. Copper conductors become brittle with age and Copper weld conductor has long been obsolete

Industrial Park 138kV

- Breakers F, D & E 34kV
  - 1967 vintage Oil breakers
  - Fault Operations: F(18), D(0) & E(14) – Recommended(10)
- Breakers G 69kV
  - 1967 vintage Oil breakers
  - Fault Operations: G(50) – Recommended(10)
- Oil filled breakers have much more maintenance required due to oil handling that their modern, vacuum counterparts do not require. Finding spare parts for these units is difficult or impossible, and these models are no longer vendor supported.
- Multiple wood pole 138kV transformer lead support structures inside Industrial Park Station





AEP Transmission Zone: Supplemental Northern Melita Area Improvements

Need Number: AEP-2020-IM006
Process Stage: Solutions meeting 1/21/2022
Previously Presented: Needs Meeting 2/21/2020
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)
Problem Statement:

McKinley 138/69/34.5kV

- Breakers G 34kV
  - 1956 vintage Oil breakers
  - Fault Operations: G(10) – Recommended(10)
- Oil filled breakers have much more maintenance required due to oil handling that modern, vacuum counterparts do not require. Finding spare parts for these units is difficult or impossible, and these models are no longer vendor supported. Oil spills can result in significant costs associated with mitigation.

McKinley – Spy Run 34.5kV line asset (~5 miles)

- 1960 vintage wood crossarm construction
- There are currently 42 open conditions on this line across 37 unique structures (27% of the line) including, but not limited to, split crossarms, rot top, rot heart and broken grounds.
- Structures are in the river flood plains and in the flood control berm.

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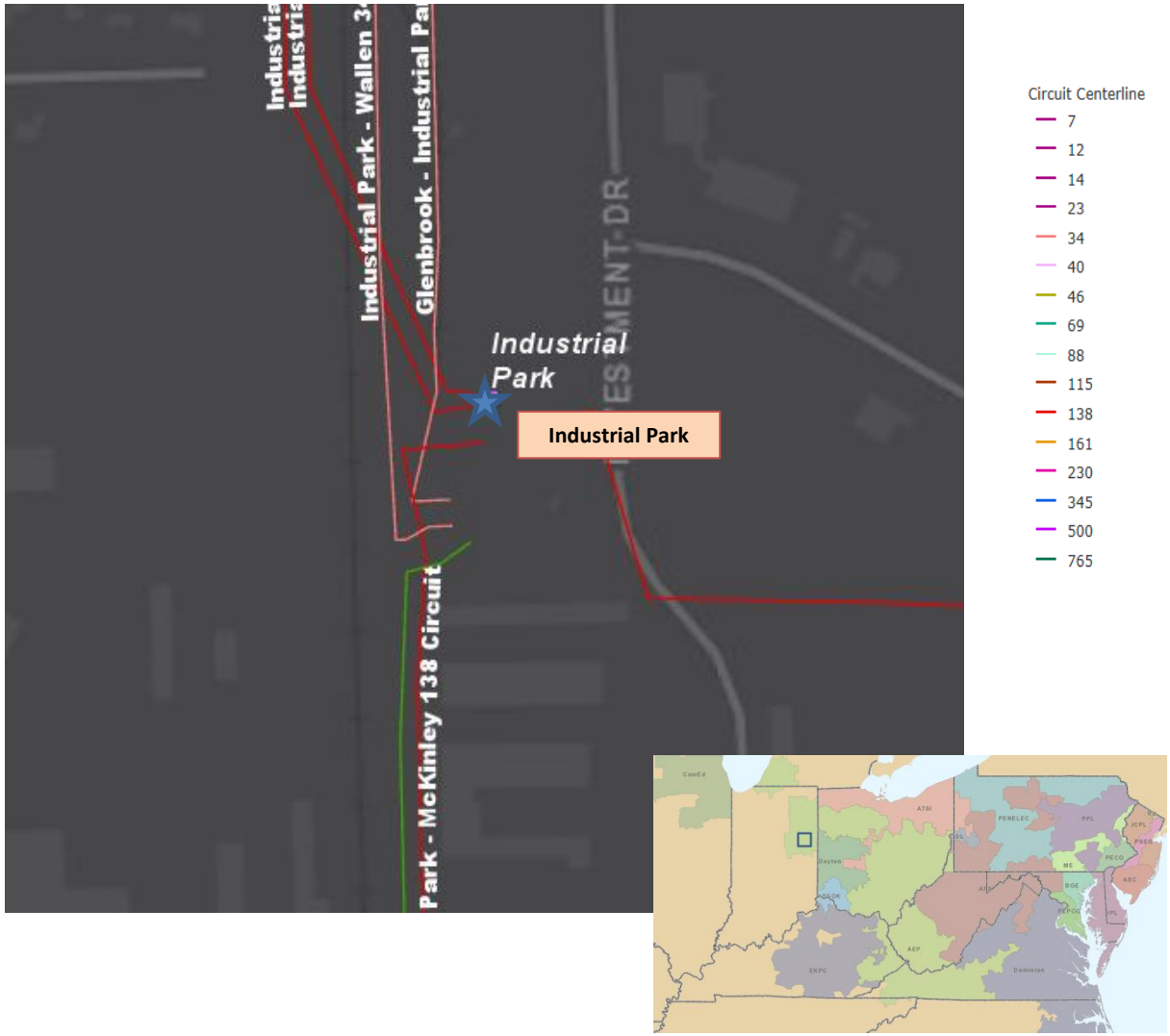
AEP Transmission Zone: Supplemental Northern Melita Area Improvements

Need Number: AEP-2020-IM025
Process Stage: Solutions meeting 1/21/2022
Previously Presented: Needs Meeting 11/20/2020
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)
Problem Statement:

Industrial Park 138/69/34.5kV Station:

138/69/34.5kV Transformer 1

- Manufactured in 1967
- Transformer has increased levels of CO2 indicated in the dissolved gas analysis.
- Level of CO2 indicates decomposition of the paper insulating materials which impairs units ability to withstand faults.
- The downward Interfacial Tension trend paired with upward power factor trend indicate that there are increased particles within the oil, which decreases the dielectric strength of the transformer.
- Doble tests on the bushings indicate changes in the bushing power factor and capacitance. This change indicates these bushings are at a greater risk of failure.



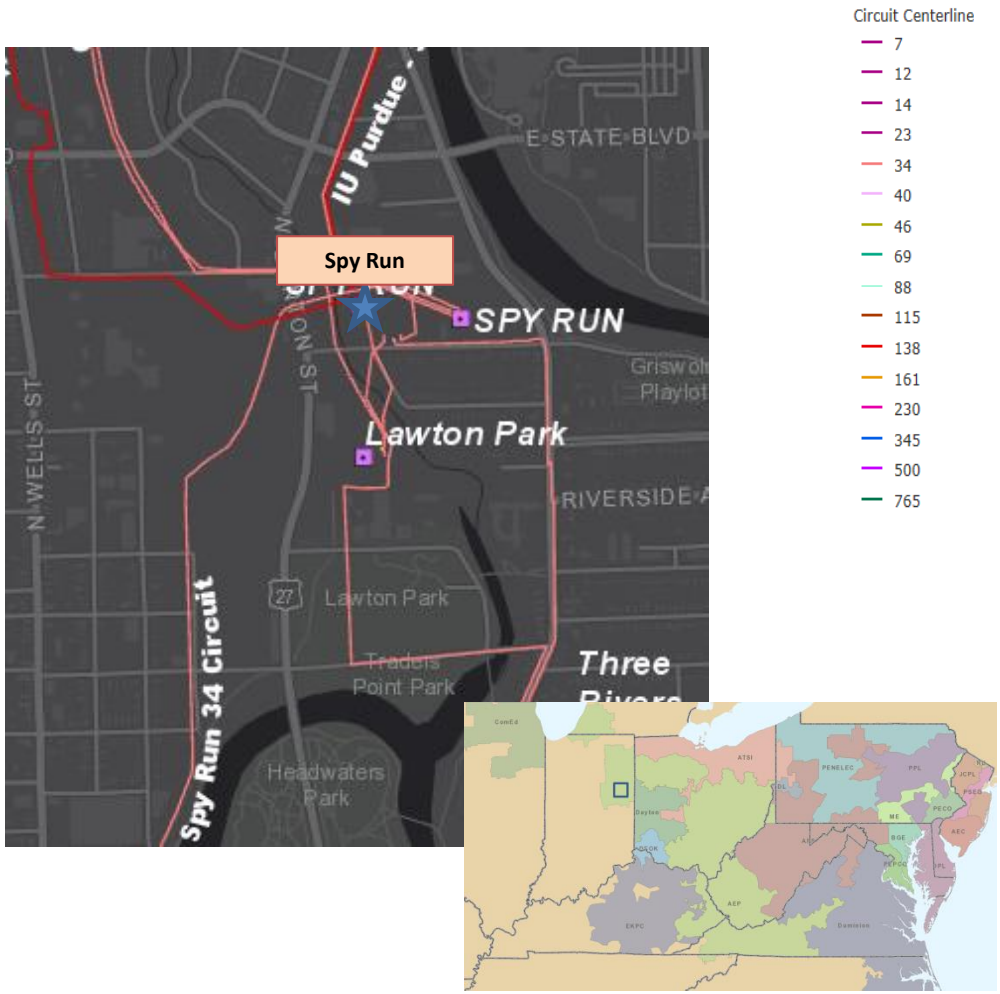
AEP Transmission Zone: Supplemental Northern Melita Area Improvements

Need Number: AEP-2021-IM004
Process Stage: Solutions meeting 1/21/2022
Previously Presented: Needs Meeting 02/17/2021
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)
Problem Statement:

Spy Run 138/34.5kV Station

138/34.5kV Transformer 3

- Manufactured in 1975
- Per DGA analysis, this transformer has increased levels of gassing of Ethylene, Ethane, and CO2
- The low level of dielectric strength indicates acid coating insulation with sludge ready to deposit in the transformer, increasing the risk of failure.
- The levels of moisture and dielectric strength indicate the insulation system is in poor condition, reducing the ability of the unit to withstand through faults.



AEP Transmission Zone: Supplemental Northern Melita Area Improvements

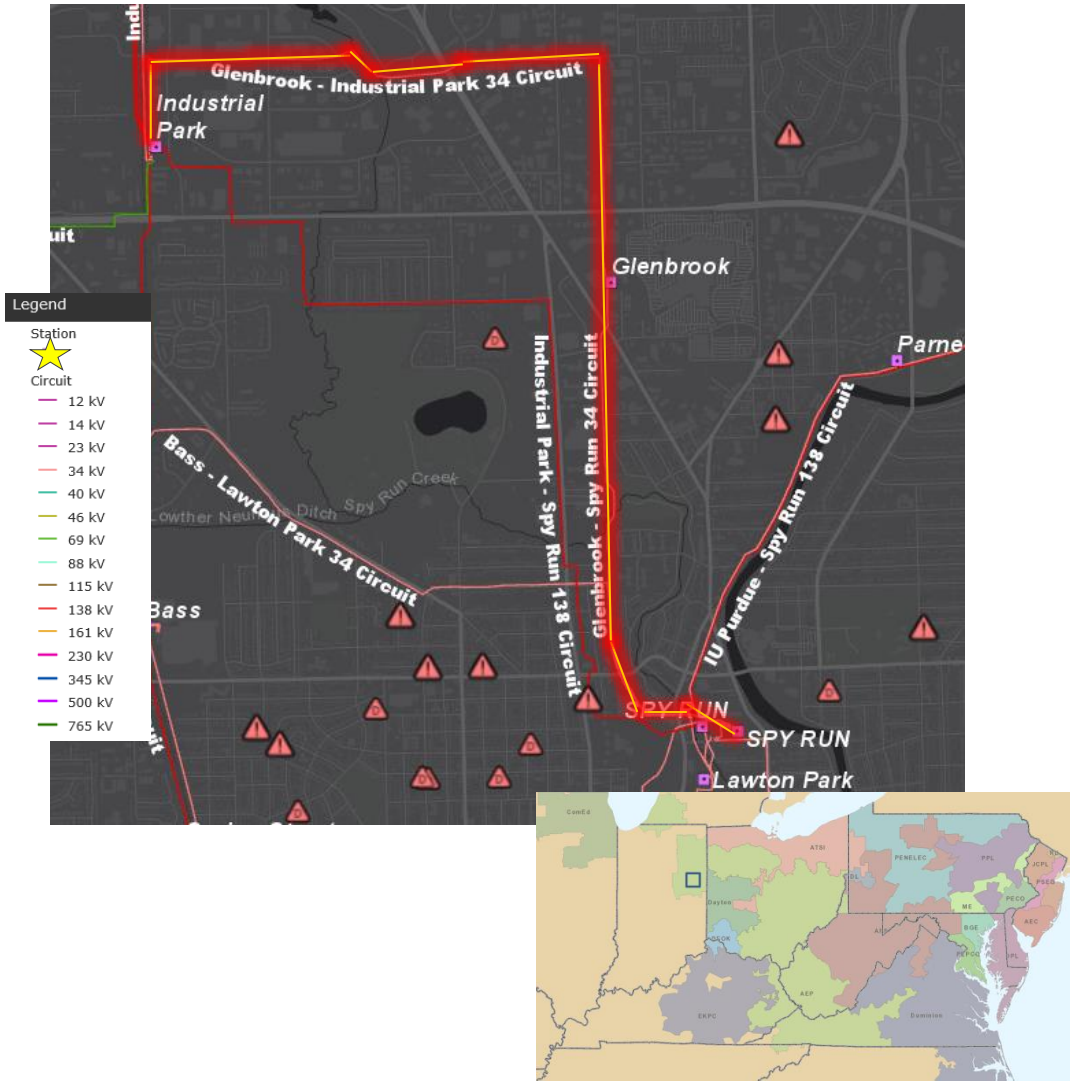
Need Number: AEP-2021-IM005
Process Stage: Solutions meeting 1/21/2022
Previously Presented: Needs Meeting 3/19/2021

Supplemental Project Driver: Equipment Material/Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

- **Industrial Park – Spy Run 34.5kV ~4.2 Miles**
  - Wood pole line originally constructed in 1965
  - 45 structures have at least one open condition (37% of line) including Rot Top, Insect Damage and Woodpecker holes
  - 18 structures were assessed by an aerial drone and 12 assessed by ground crew. 6 structures had heart rot, 12 structures had insect/woodpecker damage.
  - 121,563 CMI over the past 5 years with 2 outages
  - Structures do not meet 2017 NESC Grade B loading criteria, do not meet current AEP structural strength requirements, and do not meet the current ASCE structural strength requirements.

Model: N/A

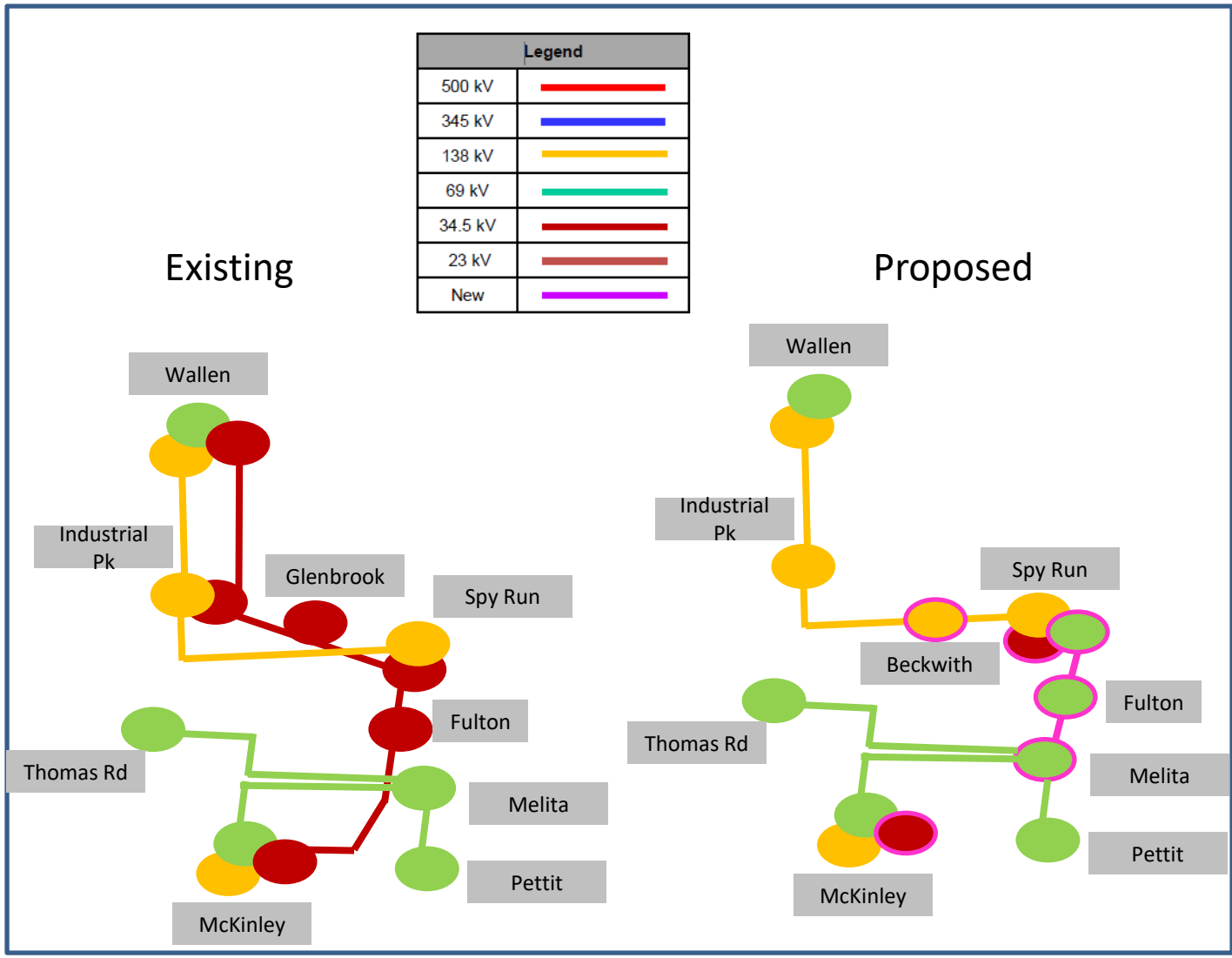


AEP Transmission Zone: Supplemental
Northern Melita Area Improvements

Need Number: AEP-2019-IM017, AEP-2020-IM025, AEP-2021-IM004, AEP-2021-IM005 & AEP-2020-IM006
Process Stage: Solutions Meeting 1/21/2022
Proposed Solution:

General Solution Summary:

The Northern Ft Wayne 34.5kV network is comprised of 1920's steel and 1960's wood that have been identified as needs on the previous slides. By constructing a new distribution station to replace Glenbrook and transformer replacements at Industrial Park, Spy Run and Fulton, AEP is reducing the amount of urban line rebuild to less than 20% of the original mileage and retiring the rest. Not only will this save ratepayer investment, but will also reduce the impact to the urban city center and will remove the 34.5kV drop-and-pick operating procedures from this segment of Fort Wayne.



AEP Transmission Zone: Supplemental
Northern Melita Area Improvements

Need Number: AEP-2019-IM017, AEP-2020-IM025, AEP-2021-IM004, AEP-2021-IM005 & AEP-2020-IM006
Process Stage: Solutions Meeting 1/21/2022
Proposed Solution:

Spy Run-Melita 69kV
- Rebuild the Spy Run – McKinley 34.5kV line as the ~2.2 mile Spy Run – Melita 69kV line and retire the remaining 2.8 miles.
  Estimated Cost: $12.15M – $24.8M depending on route considerations and underground construction through this heavily developed urban area.

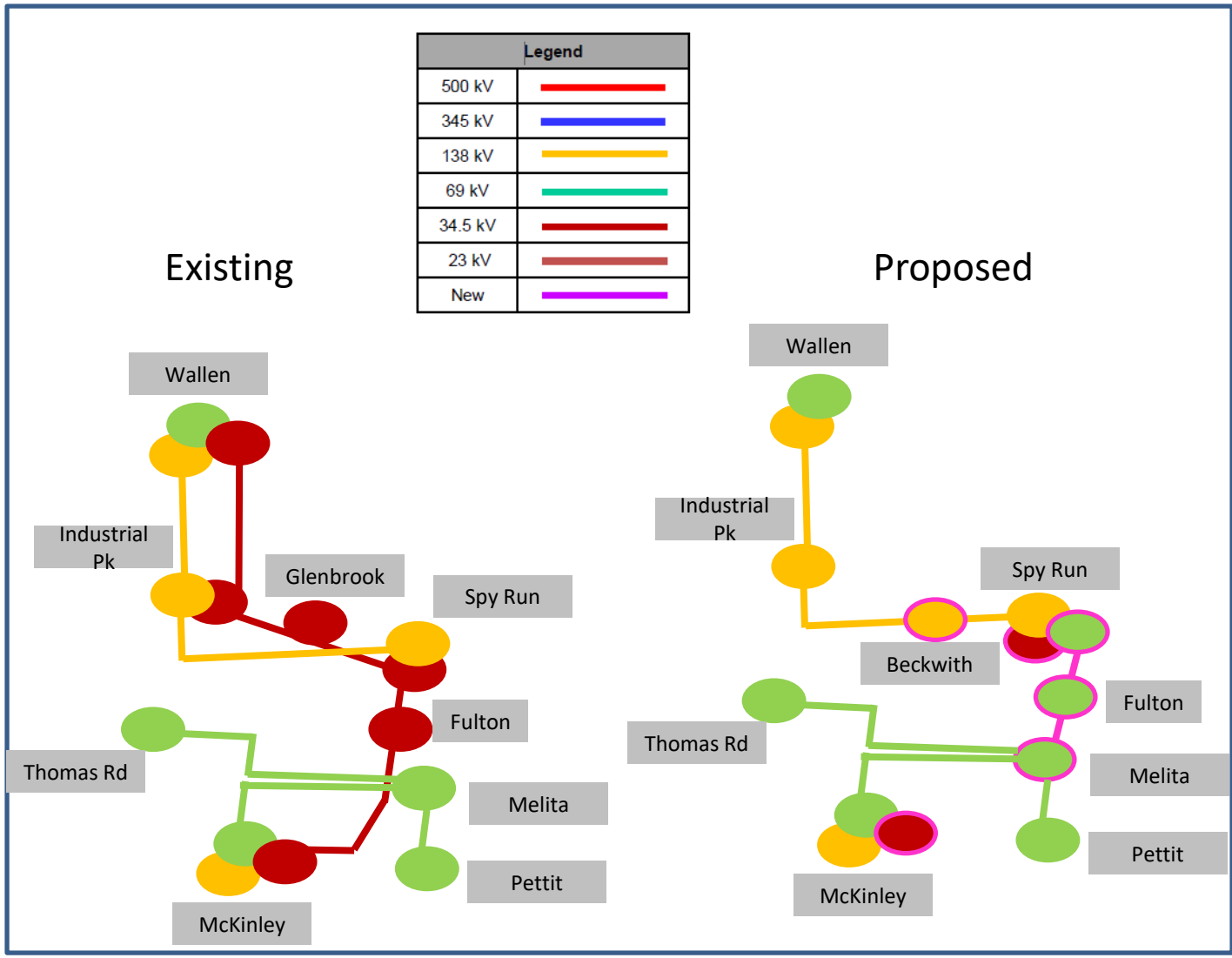
Melita Station
- Add a 69kV CB to Melita station.
  Estimated Cost: $1.2M

Fulton Station
- Rebuild the through-path of Fulton 34.5/12kV station at 69kV and replace the transformer with a 69/12kV unit.
  Estimated Cost: $0.6M

Spy Run Station
- At Spy Run station, replace transformer #3 with a 138/69/34.5kV unit. Move the Fulton exit from 34.5kV to 69kV.
  Estimated Cost: $2.6M

McKinley Station
- Retire CB "G" at McKinley station.
  Estimated Cost: $0.2M

Wallen Station
- Retire the 34.5kV voltage class equipment at Wallen station.
  Estimated Cost: $0.2M



AEP Transmission Zone: Supplemental
Northern Melita Area Improvements

Need Number: AEP-2019-IM017, AEP-2020-IM025, AEP-2021-IM004, AEP-2021-IM005 & AEP-2020-IM006
Process Stage: Solutions Meeting 1/21/2022
Proposed Solution:

Industrial Park
- At Industrial Park station, retire the entire 34.5kV voltage class, install a new 138/12kV load delivery to replace the 34.5/12kV delivery. Replace 69kV CB "G", Replace the 138/69kV XFR 1 and add a high side switcher to XFR 1.
  Estimated Cost: $11.1M

Wallen-Industrial Park 34.5kV
- Retire the ~3.3 mile Wallen – Industrial Park 34.5kV line.
  Estimated Cost: $2.9M

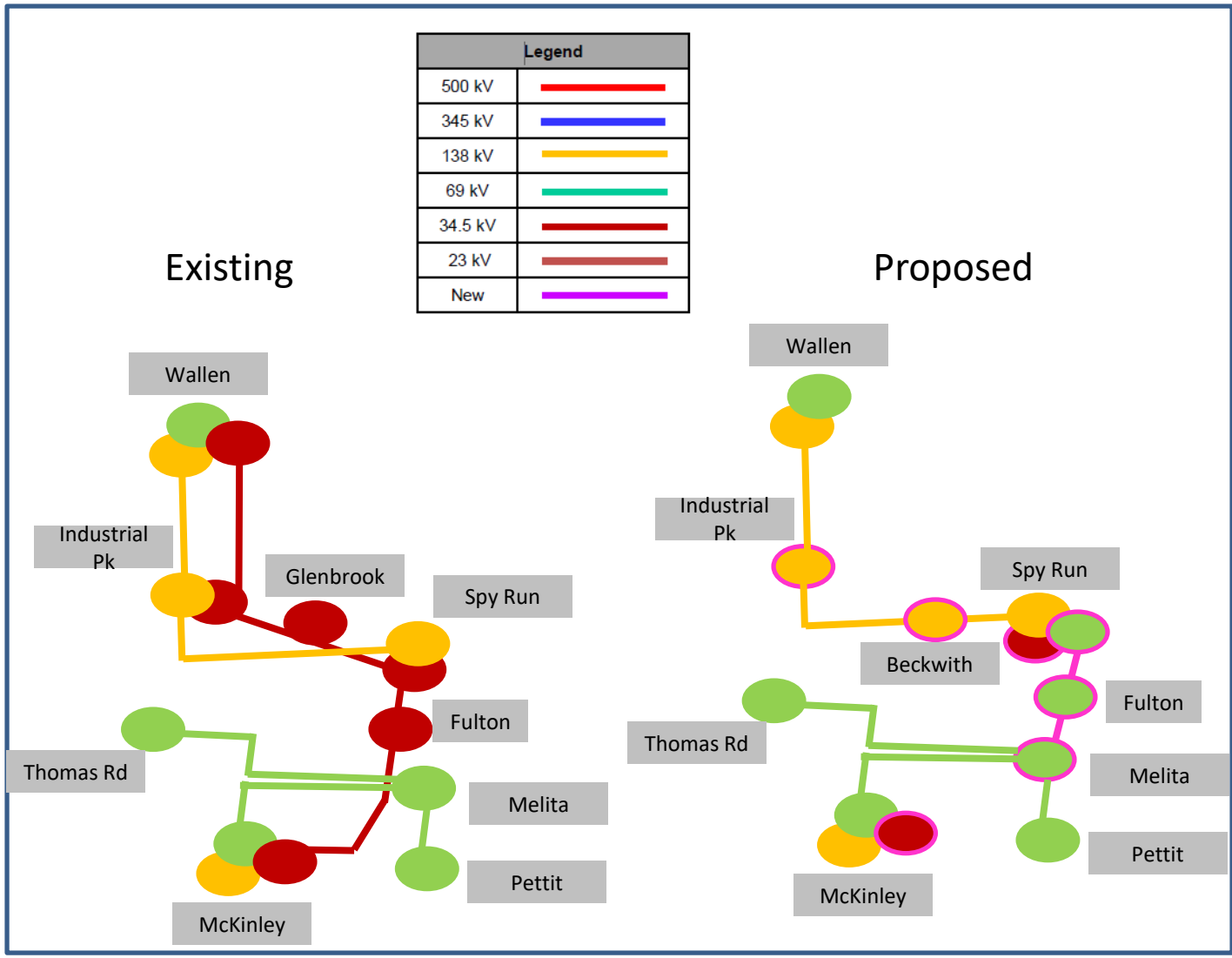
Glenbrook Station
- Retire Glenbrook 34.5/12kV substation
  Estimated Cost: $0M

Industrial Park-Spy Run 34.5kV
- Retire the ~4.2 mile 34.5kV Industrial Park – Spy Run line
  Estimated Cost: $2.2M

Beckwith Station
- Install a new 138/12kV Beckwith substation to take the place of Glenbrook with 2 25MVA XFR's and a 138kV bus tie CB.
  Estimated Cost: $1.5M

Industrial Park-Spy Run 138kV
- Cut in the Industrial Park – Spy Run 138kV to Beckwith station.
  Estimated Cost: $0.6M

Total Estimated Transmission Cost: $35.25M-$47.9M



AEP Transmission Zone: Supplemental
Northern Melita Area Improvements

Need Number: AEP-2019-IM017, AEP-2020-IM025, AEP-2021-IM004, AEP-2021-IM005 & AEP-2020-IM006
Process Stage: Solutions Meeting 1/21/2022

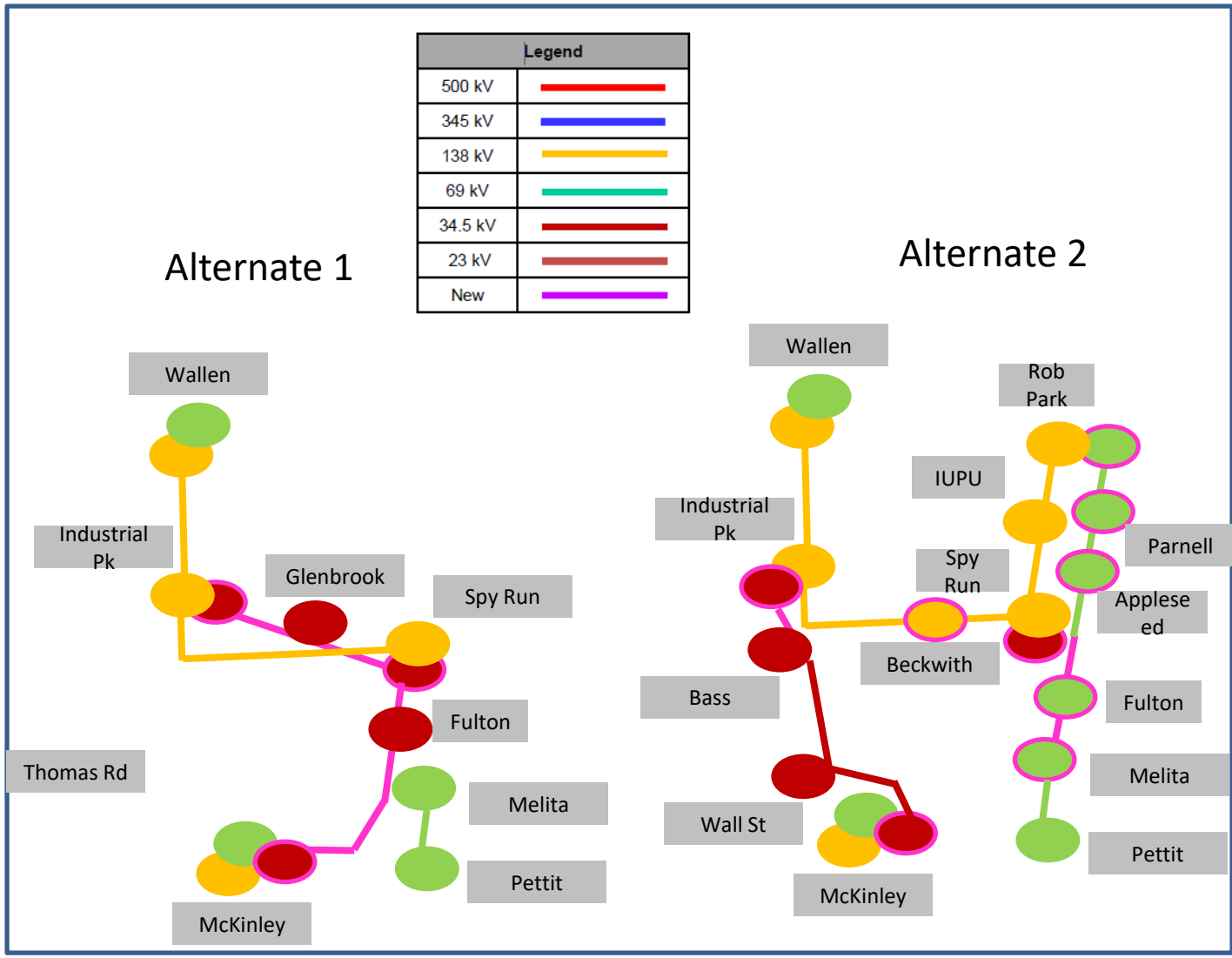
Alternatives Considered:
Alternate 1
Rebuild the McKinley – Spy Run and Industrial Park – Spy Run line as is and leave it at 34.5kV operation. This would cost more and would provide less benefit to the system and so wasn't chosen.
Estimated Cost: $38.1M-$50.75M

Alternate 2
Instead of terminating Melita into Spy Run, bypass the station and terminate into Rob Park, rebuild Parnell and Appleseed and re-energize the circuit to 69kV. This would also require McKinley – Spy Run 34.5kV to be reterminated into Industrial Park. This would cost more and would put 72.6MW of Fort Wayne load served from Industrial Park – Rob Park subject to N-1-1 outages.
Estimated Cost: $38.95M-$51.6M

Ancillary Benefits: Removes 7.5 miles of 34.5 kV line and converts 2.2 miles to 69 kV, moving the Glenbrook and Fulton delivery points to 138 kV and 69 kV respectively. The existing 34.5 kV feeds are out of phase with the surrounding 138 and 69 kV systems, requiring a drop-and-pick outage whenever the 34.5 kV source is out of service. This project simplifies the transferability of the existing load and removes 7.5 miles of line through urban Fort Wayne area.

Projected In-Service: 5/1/2023

Project Status: Scoping



AEP Transmission Zone M-3 Process
Canton, Ohio

Need Number: AEP-2020-OH019

Process Stage: Solution Meeting 1/21/2022

Previously Presented: Need Meeting 05/22/2020

Supplemental Project Driver:

Customer Service, Equipment Material Condition, Performance and Risk; Operational Flexibility & Efficiency

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slides 7, 8)

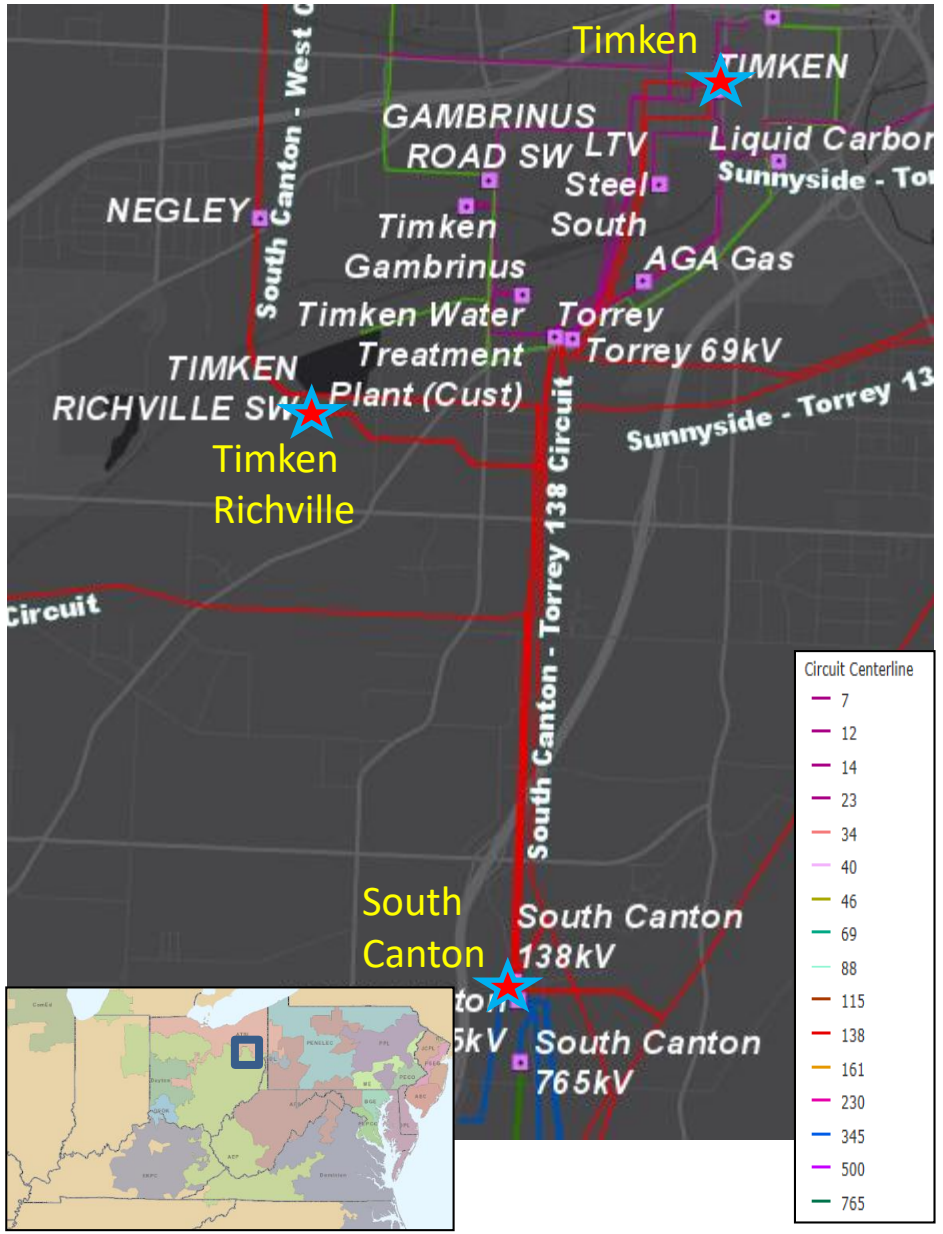
Problem Statement:

Customer Service:

- **Timken Richville 138kV Station**
  - Peak customer load is 150 MW; steel mill with an arc furnace.
  - Outage history: the customer has experienced 2 prolonged outages over the past 5 years. Any interruption to service is disruptive and costly for this facility.
  - The customer's sensitive equipment includes a continuous caster, electric arc furnace, and refining furnaces. If there is a loss of power it could lead to the customer having to dump the molten steel and risks the steel solidifying in the equipment. These events would be very detrimental to the company's long-term business operations.

Operational Flexibility & Efficiency:

- **Timken Richville 138kV Station**
  - The station contains 2- 138kV lines and 2- 138kV customer feeds with only a single 138kV bus-tie breaker. A fault on either of the 138kV lines or bus will take out up to 75 MW of load for a single event (1/2 of peak load).
  - A fault on either 138kV circuit requires tripping one of the customer's 138kV breakers to clear the fault. If the customer's equipment were to fail to clear a line fault, a single 138kV circuit fault would expand to take out both 138kV circuits connected to Timken Richville, dropping the customer entirely and requiring additional remote-end clearing (at South Canton or Timken station).



AEP Transmission Zone M-3 Process
Canton, Ohio

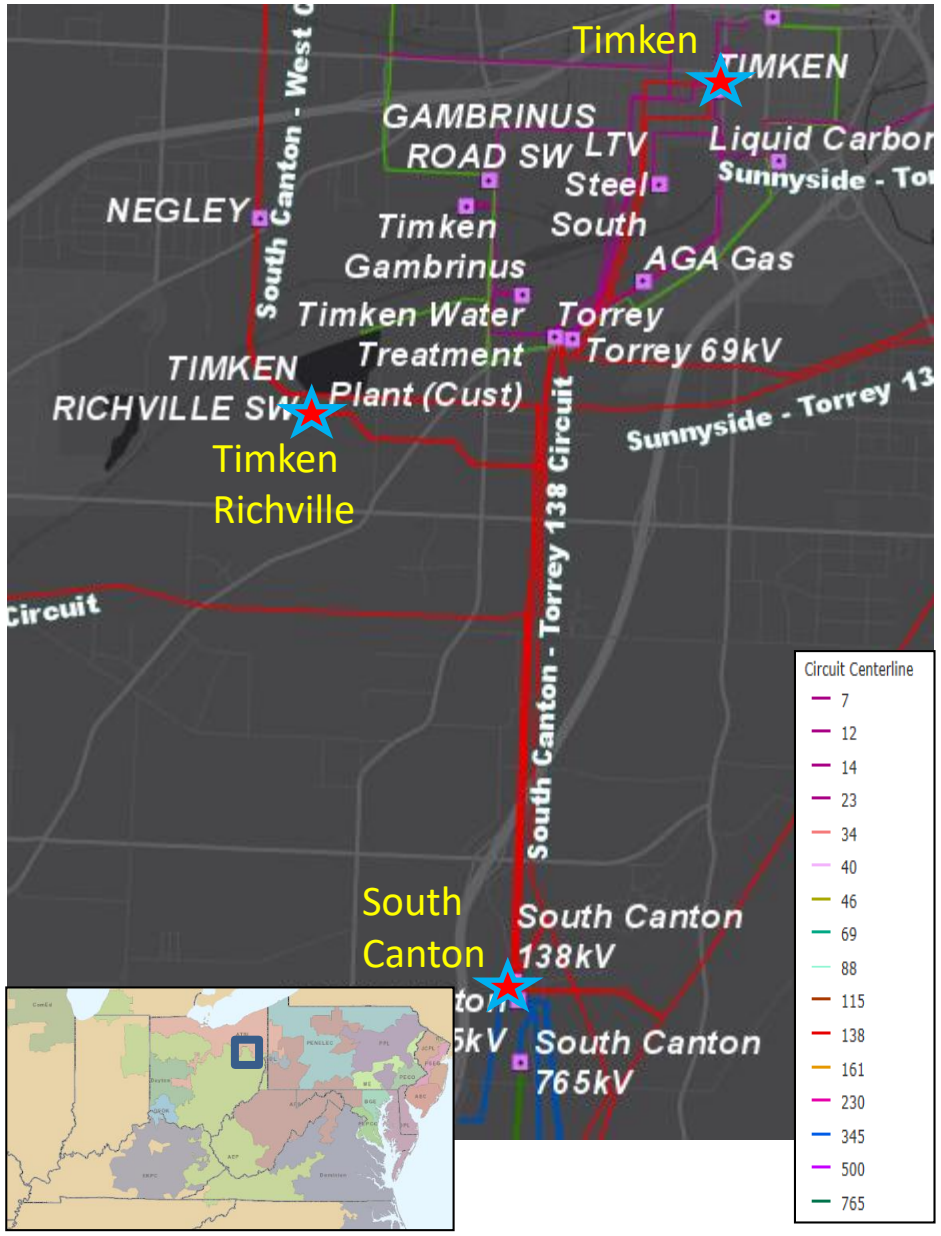
Need Number: AEP-2020-OH019

Process Stage: Solution Meeting 1/21/2022

Previously Presented: Need Meeting 05/22/2020

Equipment Material Condition, Performance and Risk:

- **Timken Richville 138kV Station**
  - The station was constructed in 1985 and 32 of the 34 protective relays in the station are electromechanical (with 2 static relays). Electromechanical relays lack vendor support, don't have SCADA, and lack fault data collection.
  - The line protection to Timken and to South Canton consists of an outdated pilot wire scheme that is increasingly prone to failure.
  - The RTU is a legacy model that is no longer supported by the manufacturer.
  - AC station service comes from the customer's substation, which is a reliability concern.
  - The control house ceiling is made of an asbestos-cement product (transite).
  - There is no fence separating AEP's substation from the customer's substation, which is a physical security risk.
  - The metering PT's and CT's show signs of heavy rusting.



AEP Transmission Zone M-3 Process
Timken Richville Upgrade

Need Number: AEP-2020-OH019

Process Stage: Solution Meeting 1/21/2022

Proposed Solution:

At Timken Richville, install 2- 138kV circuit breakers on the 2 line exits to Timken & South Canton. Retire the old control house and install a new prefabricated building with new relaying. Remote end settings updates only required at South Canton. **Estimated Cost: $3.55 Million**

At Timken, upgrade the 138kV line relays to coordinate with Timken Richville and Southeast Canton. Retire the pilot-wire and electromechanical relays. Install new 3-phase CCVT's. **Estimated Cost: $0.63 Million**

At Southeast Canton, upgrade the 138kV line relays to Timken. Retire the pilot-wire and electromechanical relays. **Estimated Cost: $0.51 Million**

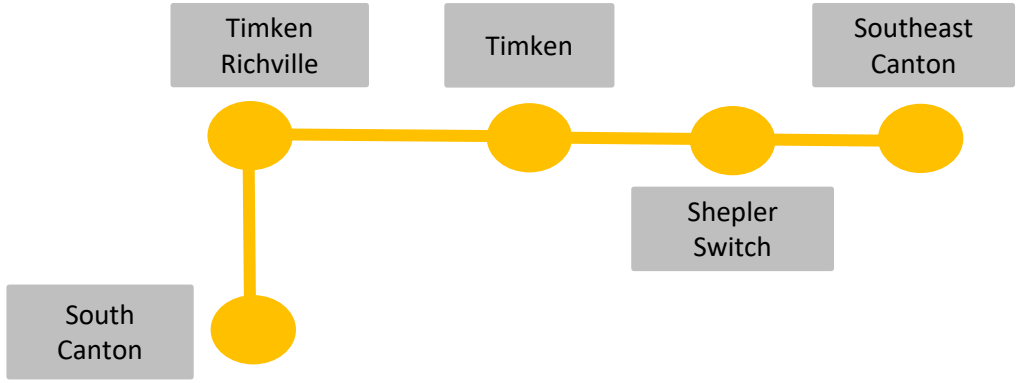
Total Estimated Transmission Cost: $4.69 Million

Alternatives Considered: At Timken Richville, a 138kV ring bus design would have been preferred over an in-and-out layout, which would have required the installation of 1 additional breaker. However, a ring bus design would have required expansion of the station onto the customer's property, significant re-work of the station structures, and modifications to the 138kV transmission lines. Cost of approx. $8.5 Million

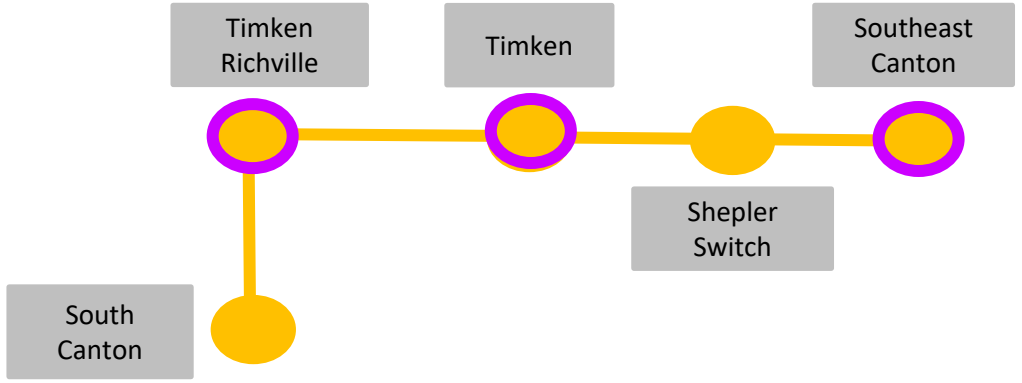
Projected In-Service: 8/1/2023

Project Status: Scoping

Existing:



Proposed:



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

AEP Transmission Zone M-3 Process
Montgomery County, VA

Need Number: AEP-2021-AP026

Process Stage: Solutions Meeting 01/21/2022
Previously Presented: Needs Meeting 06/15/2021

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

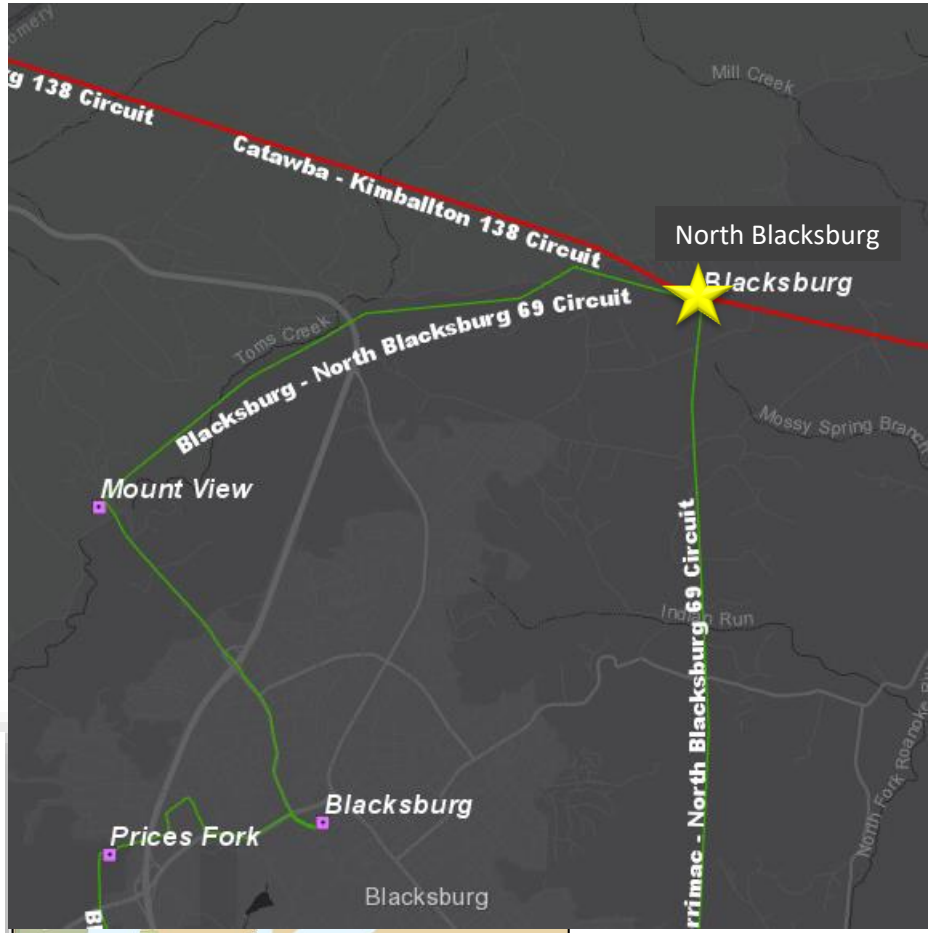
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

North Blacksburg Station:

- 138/69-12 kV Transformer #1
  - 1972 Vintage Transformer
  - The presence of Ethane, along with the indication of overheating faults, indicates decomposition of the paper insulation that impairs the unit's ability to withstand future short circuit or through fault events.
  - The dielectric is driven by the upward trend in insulation power factor, which indicates an increase in particles within the oil.
  - The transformer has had issues with proper oil flow.

- 138/12 kV Transformer #2
  - 1967 Vintage Transformer
  - The presence of Acetylene, confirms the insulation system (oil and paper) is in poor condition and also indicates electrical discharge faults of low energy have occurred within the main tank causing electrical breakdown of the unit.
  - The transformer has significant rust spots and weld leaks.
  - This is allowing voltage phase imbalances, specifically high voltage, to pass through to distribution customers served from North Blacksburg station.



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AEP Transmission Zone M-3 Process
Montgomery County, VA

Need Number(s): AEP-2021-AP026

Process Stage: Solutions Meeting 01/21/2022

Proposed Solution:

North Blacksburg Station

- Replace existing Transformer #1 with a 130 MVA 138/69-12 kV transformer.
- Replace existing Transformer #2 with a 25 MVA 138/12 kV transformer and add bus regulators.
- Add a 69kV circuit breaker on the low side of Transformer #1

Estimated Total Transmission Cost: $4.06 M

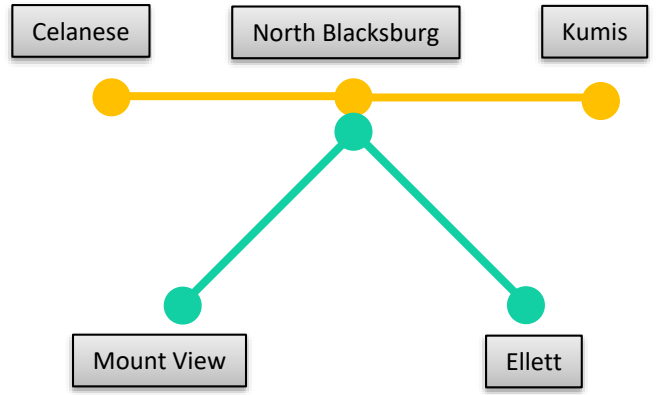
Ancillary Benefits: A 69kV breaker in between Transformer #1 and the 69kV bus would maintain two way service to Blacksburg Station which supplies a large load for Virginia Tech State University in the event of a high side fault.

Alternatives Considered: No viable transmission alternates were identified.

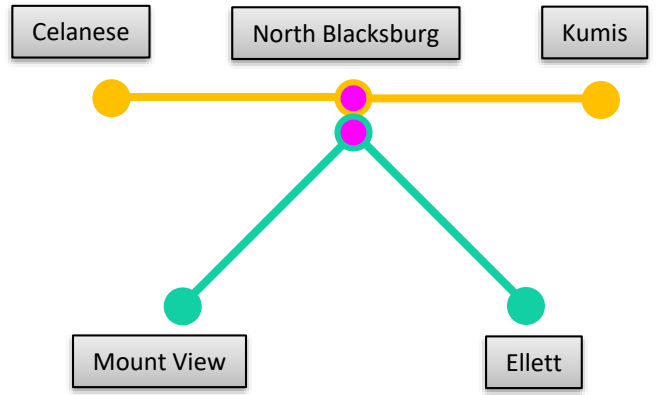
Projected In-Service: 11/01/2024

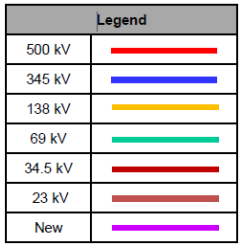
Project Status: Scoping

Existing



Proposed



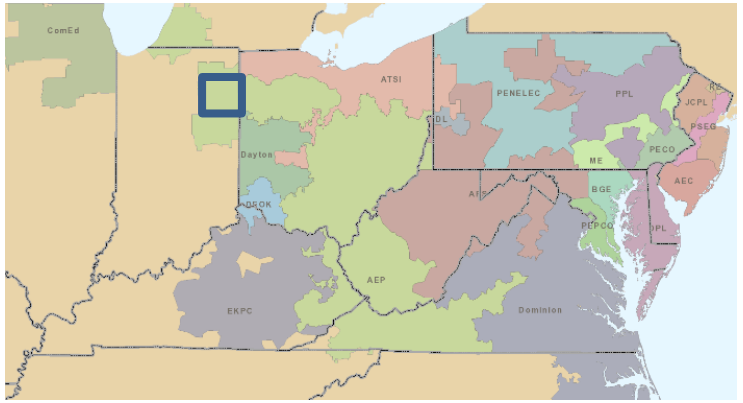


AEP Transmission Zone M-3 Process
Robison Park – Sowers 138kV

Need Number: AEP-2021-IM022
Process Stage: Solution Meeting 01/21/2022
Previously Presented: Needs Meeting 7/16/2021
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Problem Statement:

Robison Park – Sowers 138kV line:

- 13.6 miles of this 18 mile line is 1966 wood H Frame construction
- 4.3 miles of this 18 mile line is 1966 Steel lattice and isn't identified as a need at this time.
- 17.9 miles of this 18 mile line is 1966 636 Grosbeak ACSR conductor
- The wood structures fail AEP Strength requirements and ASCE structural strength standards and AEP Shielding requirements
- The 2015-2020 time period has seen 4 momentary and 3 permanent outages
- Line has been subject to 464,404 CMI to customers served out of Grabill station.
- 15 structures were inspected by drone with 16 assessed by ground crew
    - Moderate shell decay on most wood poles
    - Most Cross Arms have moderate decay on top side of arms
    - 40% of structures had broken/missing gounds.
- 11 structures with open conditions are on this line currently including disconnected X Braces/Crossarms, Rot Top and broken ground leads.



AEP Transmission Zone: Supplemental
Robison Park – Sowers 138kV

Need Number: AEP-2021-IM022
Process Stage: Solution Meeting 01/21/2022

Proposed Solution:

Robison Park – Sowers 138kV line:
Rebuild the 13.6 miles of wood construction with double circuit capable 138kV with one side strung. Reconductor 4.3 miles of the steel lattice section with 795 Drake ACSR. This 4.3 mile section is already constructed as double circuit capable.
Estimated Cost: $42.3M

Replace switches and risers at Grabill switch to accommodate the line rebuild.

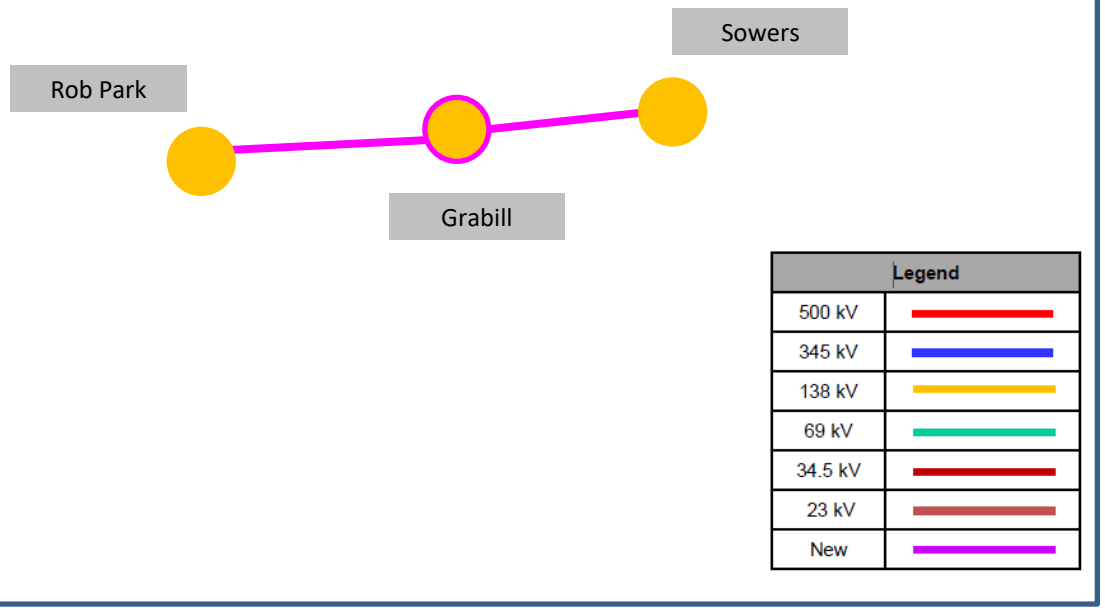
Estimated Cost: $1M

Total Estimated Transmission Cost: $43.3M

Alternates:

Rebuild line as single circuit. A load growth of 25MW near Varner would require another source brought into Sowers for N-1-1 outages of Auburn – Varner and Sowers – Rob Park due to low voltage issues. The load addition requested under AEP-2020-IM022 already accounts for 10MW. There have been other spec load requests for additional load growth in this area, including at Varner station, which would require this second circuit in the future. The first 4.3 miles of the line out of Rob Park station are already built to double circuit capability and wouldn't need rebuilt to allow this future connection.

Projected In-Service: 11/01/2025
Project Status: Scoping



AEP Transmission Zone: Supplemental Kenzie Creek Rehab

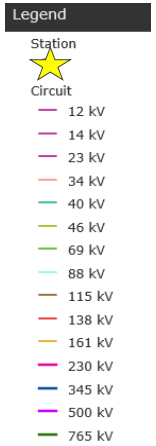
Need Number: AEP-2021-IM021
Process Stage: Solution Meeting 11/19/2021
Previously Presented: Needs Meeting 07/16/2021

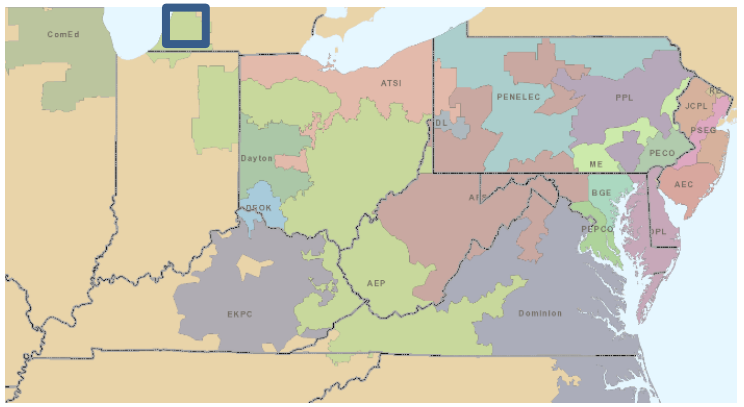
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

- **Kenzie Creek 345/138/69kV**
- CB "F", "F1", "F2", "G" and "G1" are 1990's vintage 145-PA type breakers
  - The 145-PA Type Breakers are experiencing marked increases in malfunctions. There have been 437 recorded malfunctions on 132 total units of this model type on the AEP System. The most common issues are related to loss of SF6 gas and mis-operations. The expected life of the bushing gaskets and door inspection port seals is 25 years. Seals that are no longer adequate can cause SF6 leaks to become more frequent. Low SF6 pressure in the breaker reduces the ability of the breaker to correctly interrupt a fault. Additionally, low pressure alarms and SF6 leaks lead to increased maintenance costs. The manufacturer provides no support or parts for this model of circuit breakers. Finally, SF6 leaks impact the environment.
  - The CB's have experience the following faults and are above the manufacturers recommended rating of 10
    - Breaker G: 39
    - Breaker G1: 24
    - Breaker F1: 12
    - Breaker F: 29
    - Breaker F2: 34

Model: N/A





Kenzie Creek Rehab

Need Number: AEP-2021-IM021

Process Stage: Solution Meeting 11/19/2021

Proposed Solution:

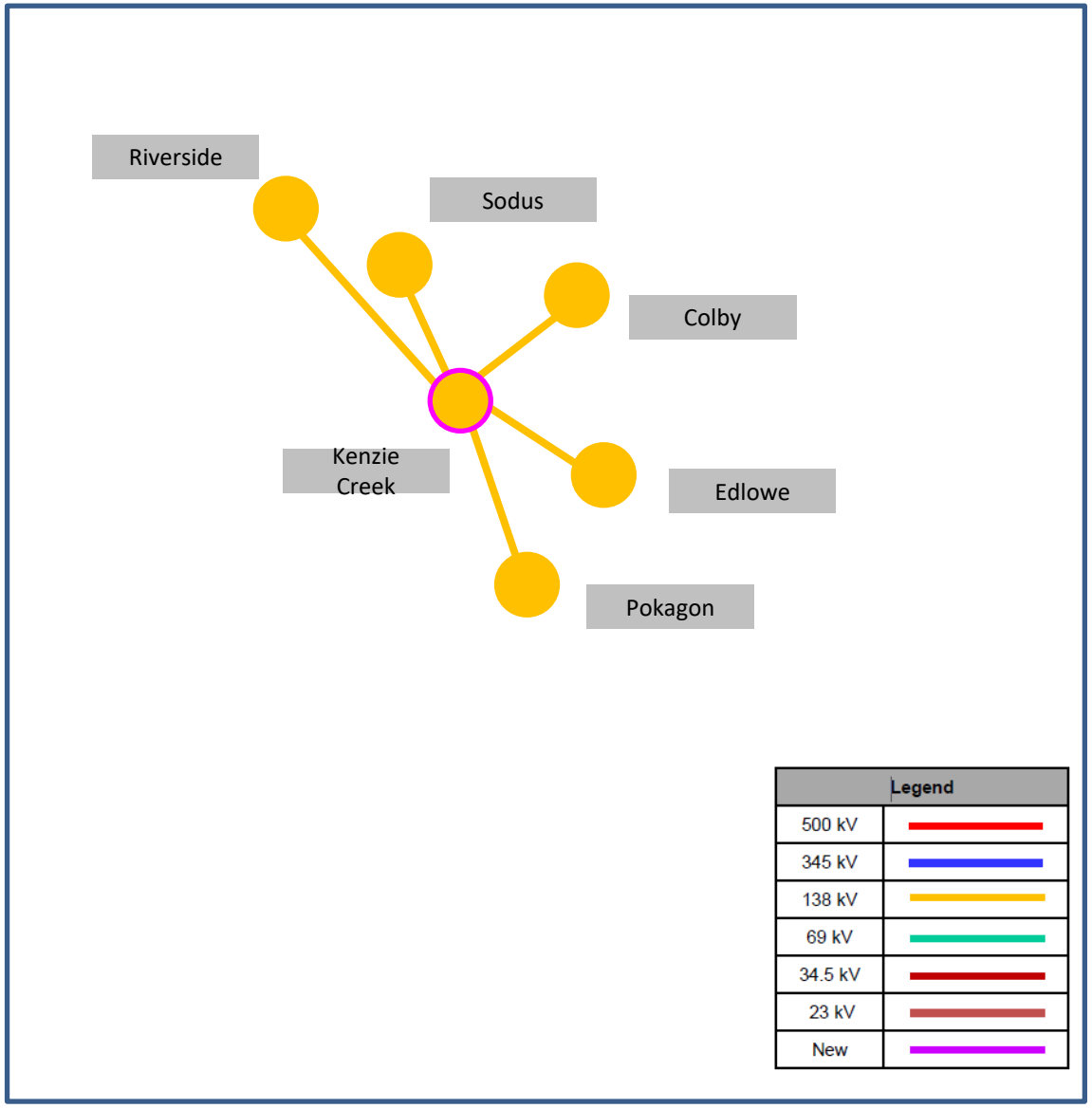
Kenzie Creek 345/138/69kV station:
Replace 138kV CB's "F", "F1", "F2", "G" and "G1" with 40 kA circuit breakers.
Estimated Cost: $ 1.8M

Alternates:

No viable alternates were identified. Replacing the gasket seals is not an option since the manufacturer does not produce these any more and does not support this breaker type.

Projected In-Service: 3/3/2024

Project Status: Scoping



AEP Transmission Zone M-3 Process
Dover Customer Service

Need Number: AEP-2021-OH042

Process Stage: Solution Meeting 01/21/2022

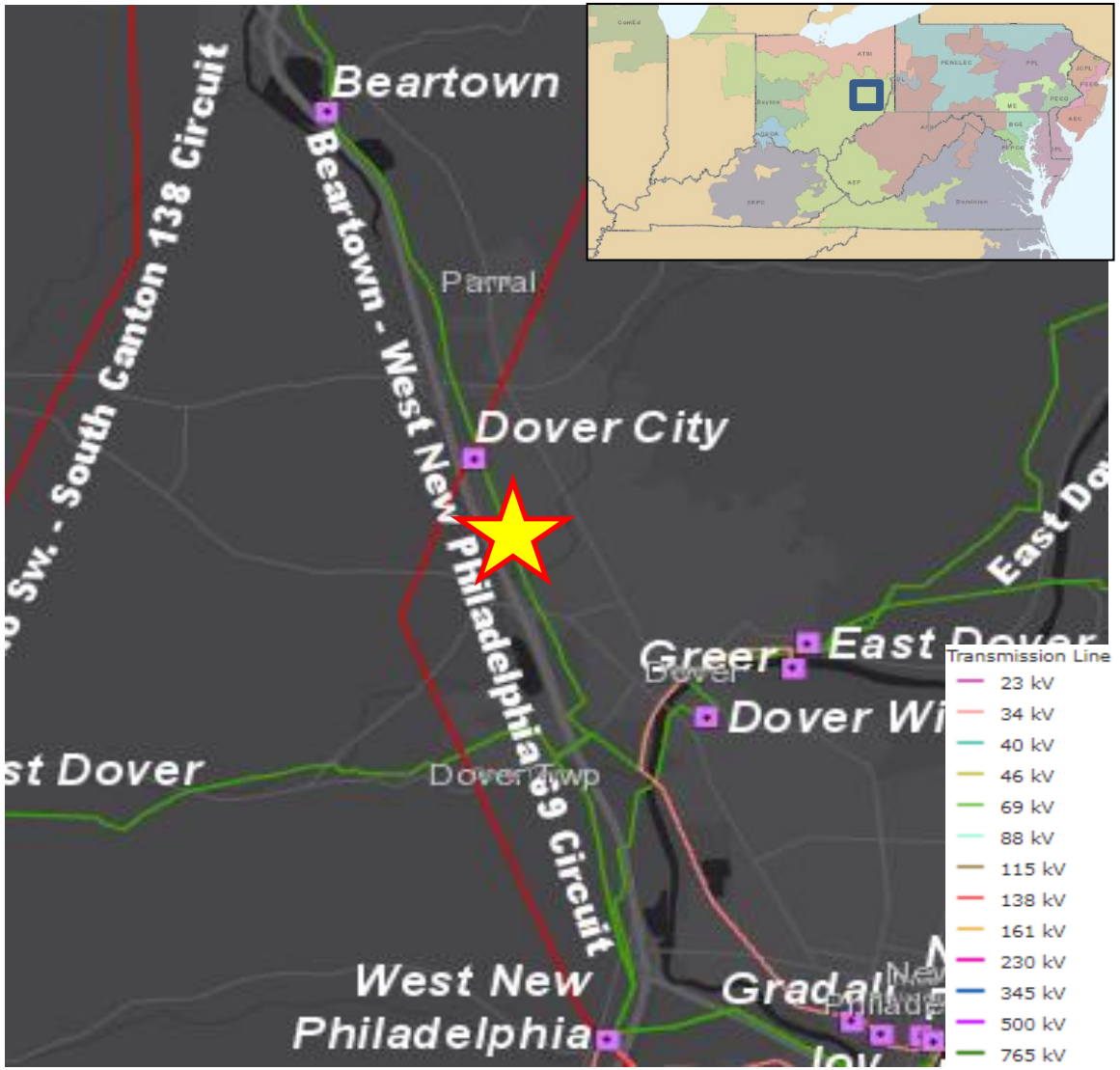
Previously Presented: Need Meeting 08/16/2021

Project Driver: Customer Service

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

Problem Statement:

An industrial customer in Dover, Ohio has requested new transmission service. The expected peak demand is 3 MW, with a requested in-service-date of July 2022.



AEP Transmission Zone M-3 Process
Dover Customer Service

Need Number: AEP-2021-OH042

Process Stage: Solution Meeting 01/21/2022

Proposed Solution: Tap the Beartown-West New Philadelphia 69kV circuit and install a 3-way switch ("Stout Switch"). Extend 2 spans of radial 69kV T-line to reach the customer's substation.

Total Estimated Transmission Cost: $1.41 Million

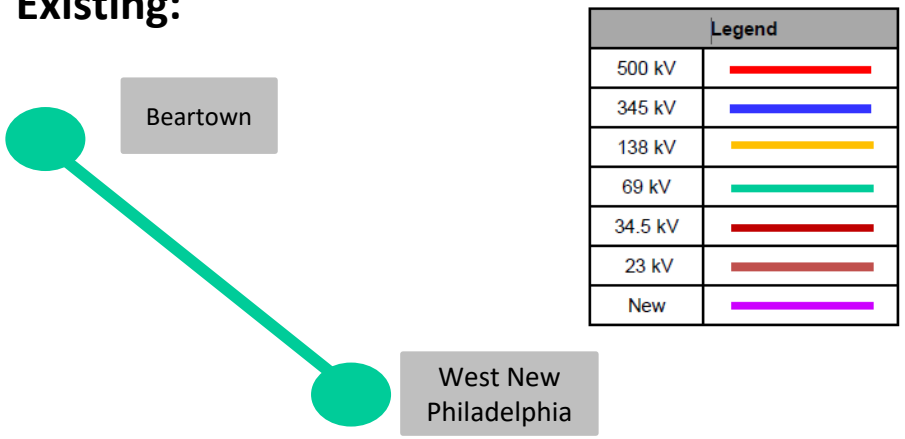
Alternatives Considered: Rather than install a 3-way switch pole, a new AEP 69kV substation with a box bay structure was also considered, which would also have contained the 69kV metering equipment. However, this would have been nearly twice the cost of the proposed solution, so was not chosen for this project.

Projected In-Service: 07/01/2022

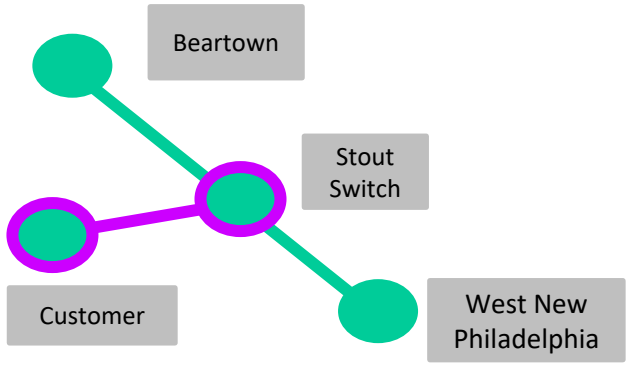
Project Status: Scoping

Model: 2026 PJM RTEP

Existing:



Proposed:



AEP Transmission Zone M-3 Process
Pumpkin Station

Need Number: AEP-2021-OH061

Process Stage: Solution Meeting 01/21/2022

Previously Presented: Need Meeting 11/19/2021

Project Driver:

Customer Service; Operational Flexibility and Efficiency

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs; AEP Connection Requirements (AEP Assumptions Slides 12-13)

Problem Statement:

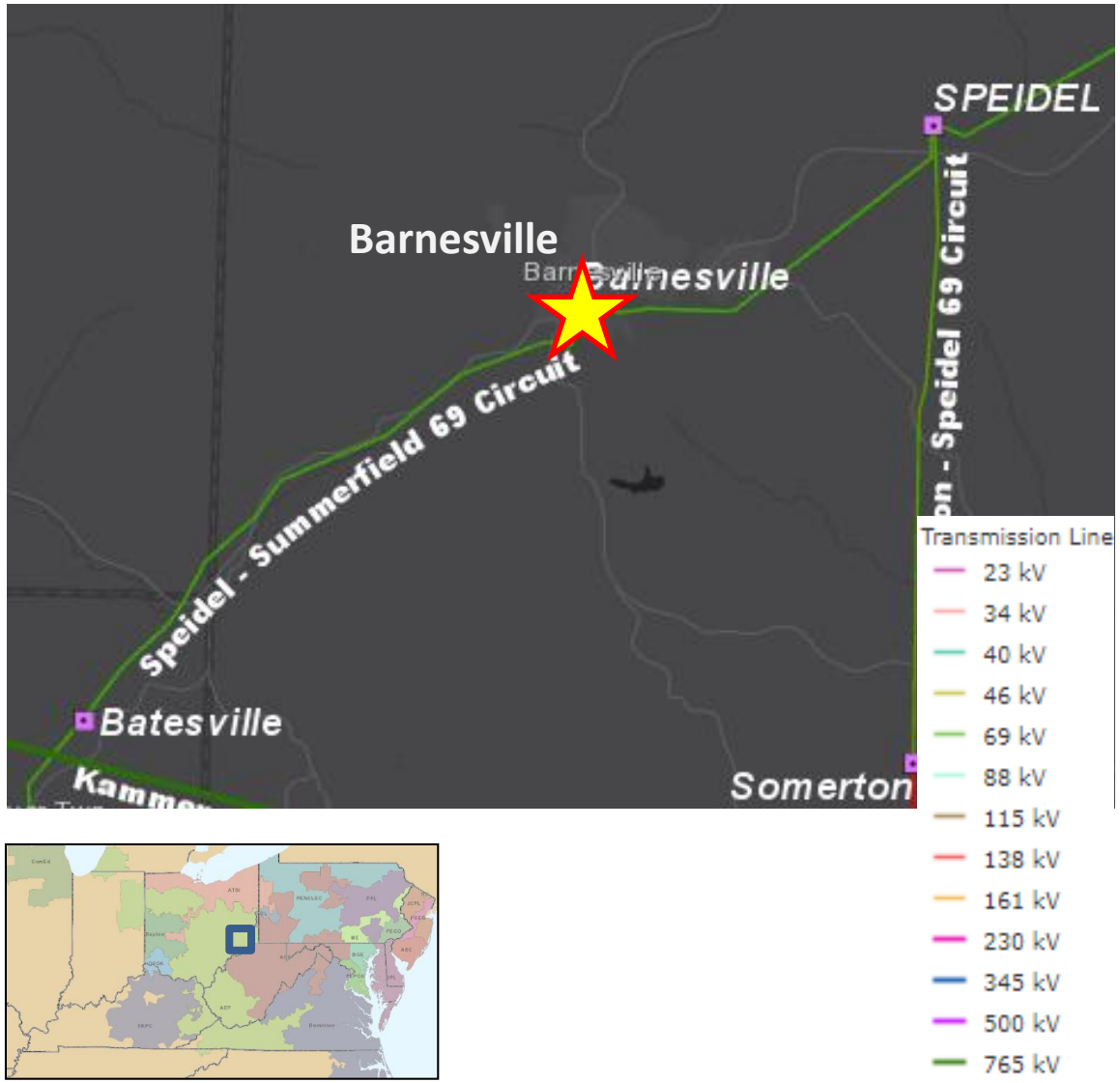
Customer Service:

AEP Ohio has requested a new load delivery point due to capacity loading limits at the Barnesville 69/12kV substation. The station is limited by its power transformer and secondary cables. The transformer was manufactured in 1968, has poor oil quality, and has bushing issues reported.

Operational Flexibility and Efficiency:

The station is served radially via a 0.4-mile 69kV tap. This T-line tap dates back to 1942, with original #1 copper conductor, and currently has 2 open conditions. Other projects in the area have proposed to rebuild the remainder of the 69 kV line in the area.

Barnesville has an obsolete MOAB/ground-switch for the transformer protection system. This requires remote-end breaker clearing many miles away, and drops another tapped AEP Ohio distribution station in the process (Batesville).



AEP Transmission Zone M-3 Process
Pumpkin Station

Need Number: AEP-2021-OH061

Process Stage: Solution Meeting 01/21/2022

Proposed Solution: Install a new distribution station ("Pumpkin") adjacent to the 69kV transmission through-path south of Barnesville. Retire Barnesville station. **Estimated Cost $0.83 Million** (does not include Distribution costs for the station)

Retire the 0.4-mile 69kV transmission line tap into Barnesville station. **Estimated Cost: $0.46 Million**

Loop the Speidel-Summerfield 69kV transmission line into Pumpkin station. **Estimated Cost: $1.38 Million**

Total Estimated Transmission Cost: $2.67 Million

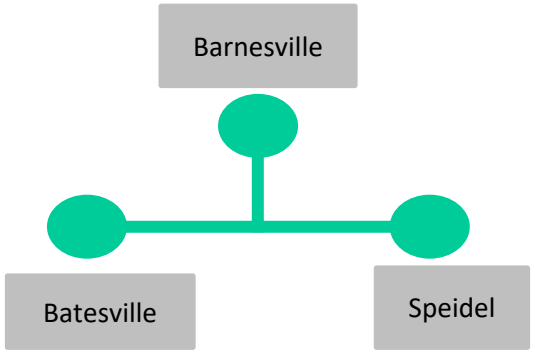
Alternatives Considered: Attempting to rebuild the existing Barnesville station was not a viable option, due to space constraints at the station and its congested location in the middle of town. In addition, the 1940's-vintage 69kV transmission line is not able to be rebuilt due to many siting and right-of-way issues along the route.

Projected In-Service: 12/01/2023

Project Status: Scoping

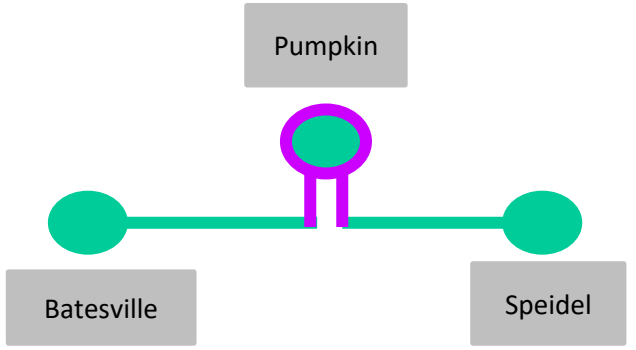
Model: 2026 PJM RTEP

Existing:



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

Proposed:



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

1/11/2022 – V1 – Original version posted to pjm.com

1/24/2022 – V2 – Slide #16, Corrected Need number to AEP-2022-OH006

– Slide #46, Corrected Projected IS Date for AEP-2021-IM021