

Sub Regional RTEP Committee: Western AEP Supplemental Projects

October 15, 2021

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

Need Number: AEP-2021-OH052**Process Stage:** Need Meeting 10/15/2021**Project Driver:** Equipment Material/Condition/Performance/Risk; Operational Flexibility & Efficiency**Specific Assumption Reference:** AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slides 13-14)**Problem Statement:****Reedurban Station:**

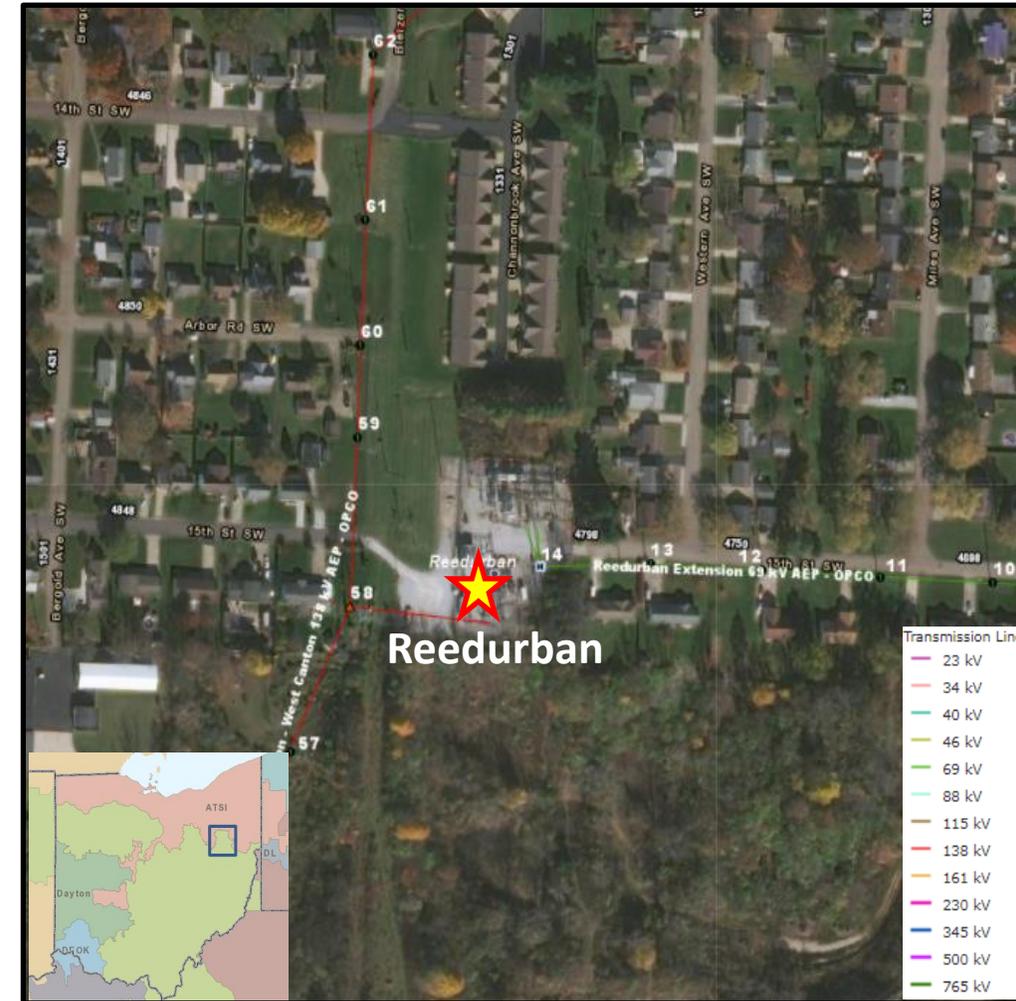
Circuit Breaker: R (69 kV)

- Breaker Age: 1979
- Fault Operations: 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.
- 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 misoperations across the AEP fleet.
- The manufacturer provides no support for this family of circuit breakers and spare parts are not available.

Relays: 8 of the 25 relays (21% of all station relays) are in need of replacement. All 8 of these are of the electromechanical type which have significant limitations with regards to spare part availability and fault data collection and retention. The 69kV circuit to Gambrinus used an obsolete pilot wire communications channel.

The control house has a number of concerns: poor ventilation, rusting roof, lead-based paint, and physical security issues. Portions of the perimeter are not built to current standards. All station cables are direct-buried without a cable trench, leading to increased probability of failure. The station service is an obsolete design (delta configuration, with corner ground, which is a safety concern).

AEP Transmission Zone M-3 Process Canton, Ohio



AEP Transmission Zone M-3 Process Canton, Ohio

Need Number: AEP-2021-OH052

Process Stage: Need Meeting 10/15/2021

Problem Statement:

Operational Flexibility & Efficiency

The Miles Avenue-Reedurban-South Canton 138kV circuit is a 3-terminal line, due to the 138-69kV transformer source at Reedurban, and the lack of 138kV line breakers at Reedurban (contains motor-operated switches today, requiring remote-end breaker operation). Three-terminal lines are more difficult to reliably protect and are a risk for overtripping and misoperations.



Need Number: AEP-2021-OH053

Process Stage: Need Meeting 10/15/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

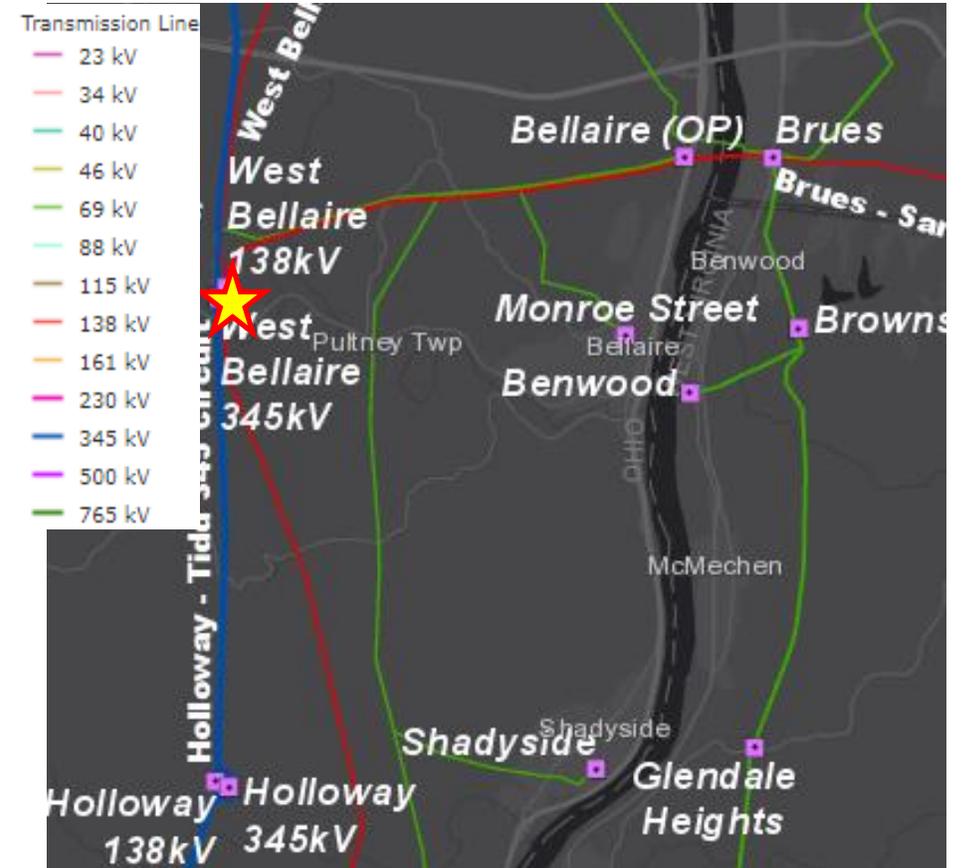
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

West Bellaire 138 – 69 kV Transformer #2:

Transformer #2 has failed due to a short circuit event verified by extremely high excitation currents and oil sampling results.

- Transformer Age: 1969, rewound in 1989
- Nameplate Rating: 115/128.8 MVA



Need Number: AEP-2021-OH054

Process Stage: Need Meeting 10/15/2021

Supplemental Project Driver:

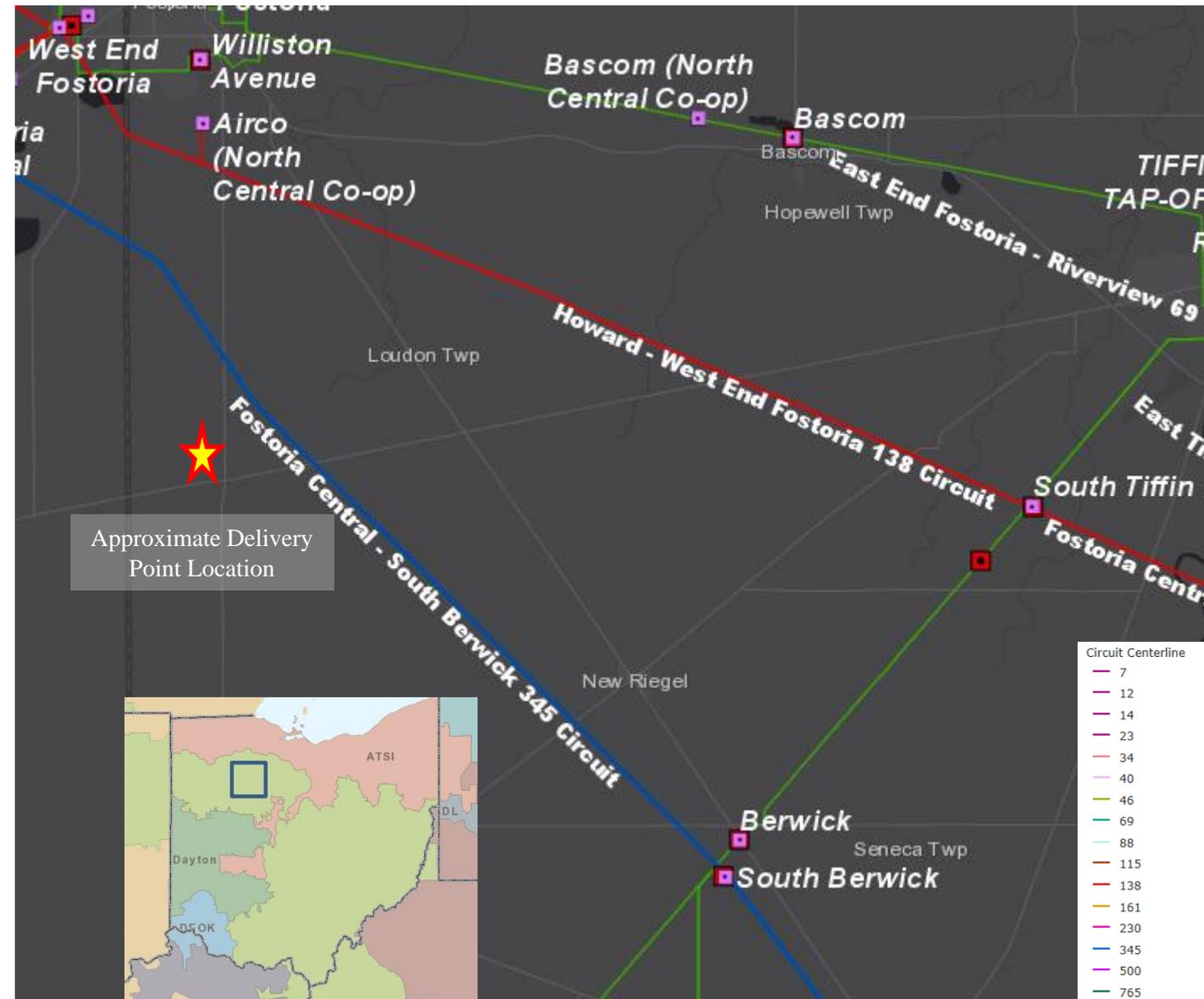
Customer Service

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 12)

Problem Statement:

- Buckeye Power, on behalf of North Central Electric Co-op, is requesting a new 138kV delivery point tapped off of the Fostoria Central – Melmore 138kV Circuit by August 2022. Anticipated peak load is about 6.2 MVA.



Need Number: AEP-2021-OH037 (Related to need number AEP-2021-OH010. The redlined information from that need will be moved to this one)

Process Stage: Need Meeting 10/15/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 11)

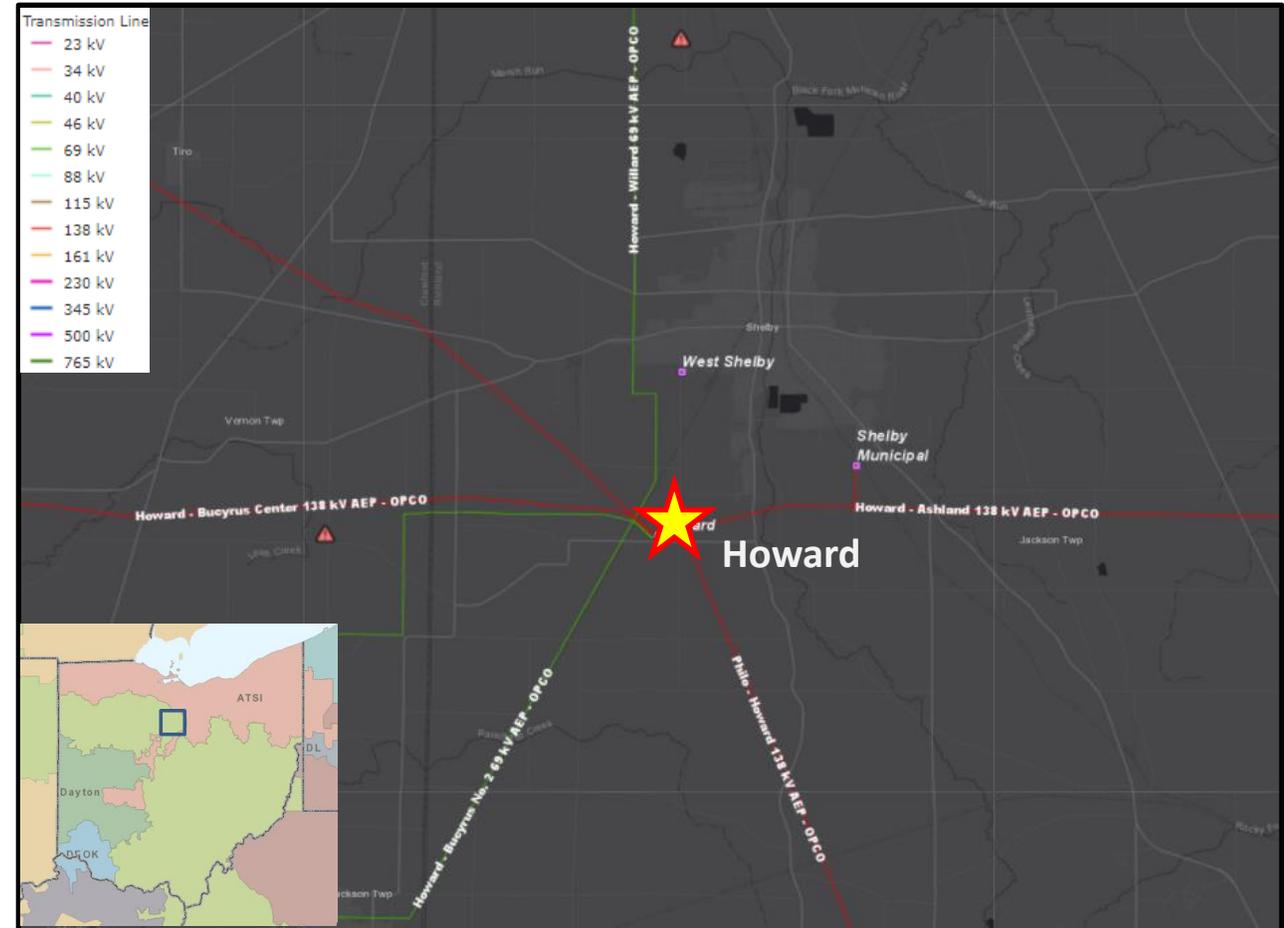
Problem Statement:

Circuit Breakers: A, B, & E

Breaker Age:

- 1990: A, B, & E
- Interrupting Medium: (SF6)
- Fault Operations:
 - Number of Fault Operations: A 13, B 30, & E 13
 - Manufacturer recommended Number of Operations: 10

Additional ASEA-Brown Boveri 145-PA model Breaker Info: As of May 11, 2020, there have been 437 recorded malfunctions of this 145-PA model family on the AEP System. The most common issues documented 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; all four of these units have reached this age. Seals that are no longer adequate can cause SF6 leaks to become more frequent. ABB provides no support for this 145-PA family of circuit breakers, and ABB no longer manufactures spare parts for these breakers.



Problem Statement Continued:

Circuit Switcher: CS-CC

Switcher Age:

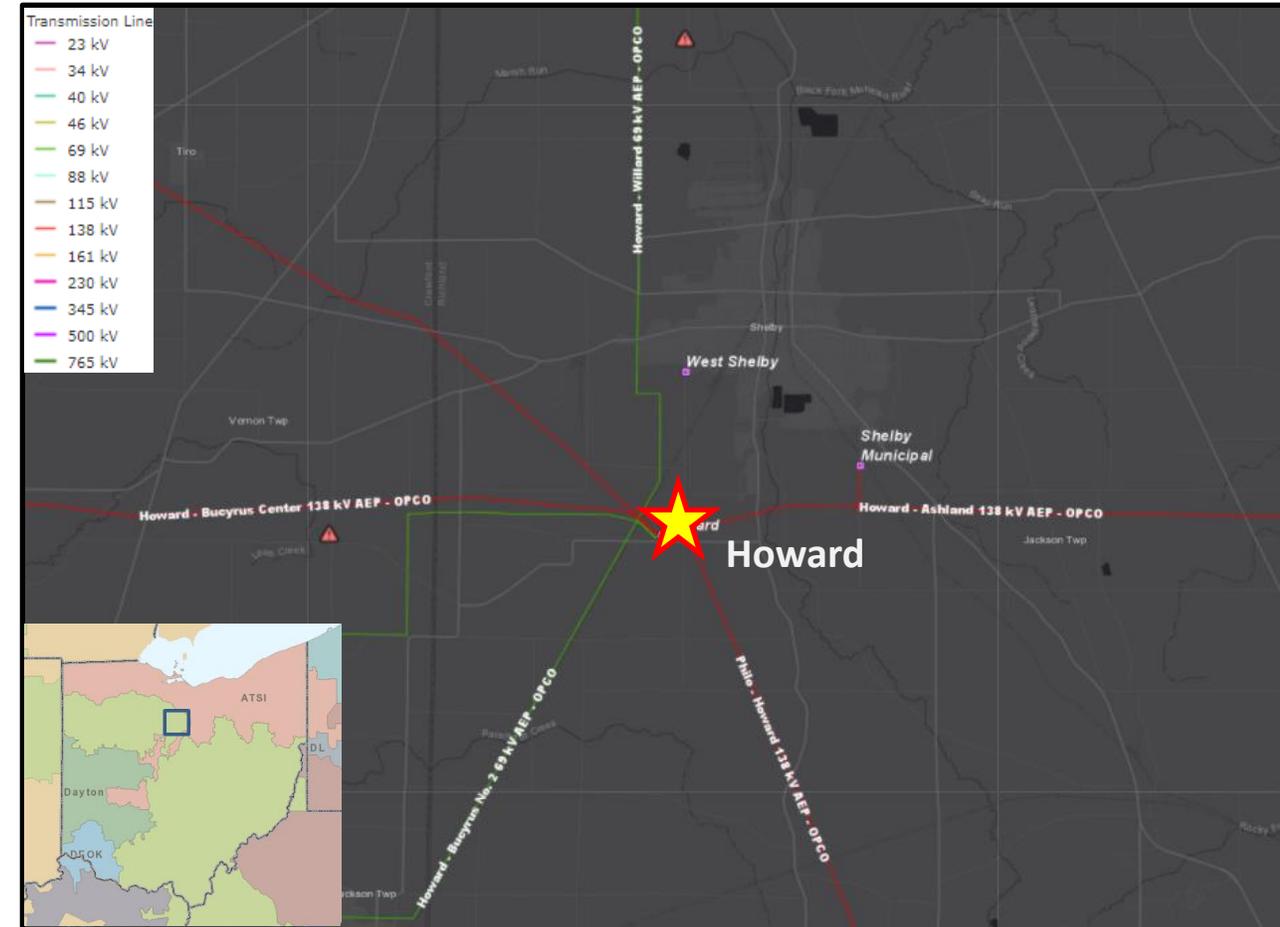
- 2000
- Interrupting Medium: (SF6)
- Fault Operations:
 - Number of Fault Operations: 0
 - Manufacturer recommended Number of Operations: 10

Additional SF6 Mark V Type Information: 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. Failed operational components including high contact resistance, gas loss, and interrupter failure represent half of these malfunctions. Parts are expensive, especially because interrupters can only be replaced, not repaired, as they are hermetically sealed. Currently, 107 of the

Relays:

- 122 relays (88% of all station relays) are in need of replacement. 83 of these are of the electromechanical type and 8 of the static type which have significant limitations with regards to spare part availability and fault data collection and retention. In addition, these relays lack of vendor support. There are also 16 microprocessor based relays commissioned between 2006 and 2011 that may have firmware that is unsupported

The existing RTU installed at Howard Substation is a legacy GE D200MEII/Ethernet unit. This unit is now beyond its warranty period, with limited to no spare parts availability and no vendor support.



AEP Transmission Zone M-3 Process Pike County, KY

Need Number: AEP-2021-AP031

Process Stage: Need Meeting 10/15/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

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

Problem Statement:

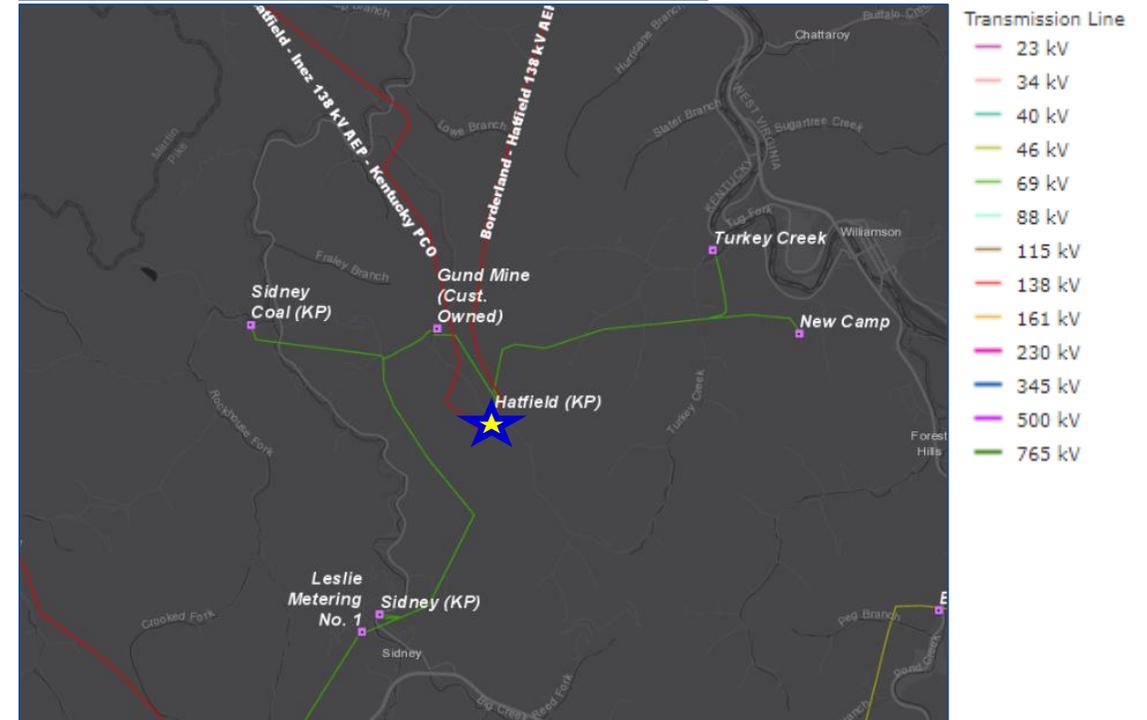
Hatfield Substation:

Transformer #1 (138/69/46kV):

- The high side MOAB/Ground Switch scheme on TR1 protection.
- TR-1 bank is tapped off the 138kV Bus without 138kV line breakers, creating a three terminal line with the 138 kV line exits.

Transformer #2 (46/7.2kV 111 MVA):

- Grounding Transformer for station service
- 1990 Vintage unit
- DGA indicates elevated levels of CO2 gas concentration
- Bushings are at a greater risk of failure due to capacitive layer deterioration and change in bushing power factor.
- High decomposition of the paper insulating materials.
- Wood tie foundations
- Oil containment is in need of repair or replacement
- GND TR-2 is a legacy transformer, from a previous station setup that has been preserved as a source of station service. The grounding bank and associated bus work increases the exposure for failure in order to provide station service.

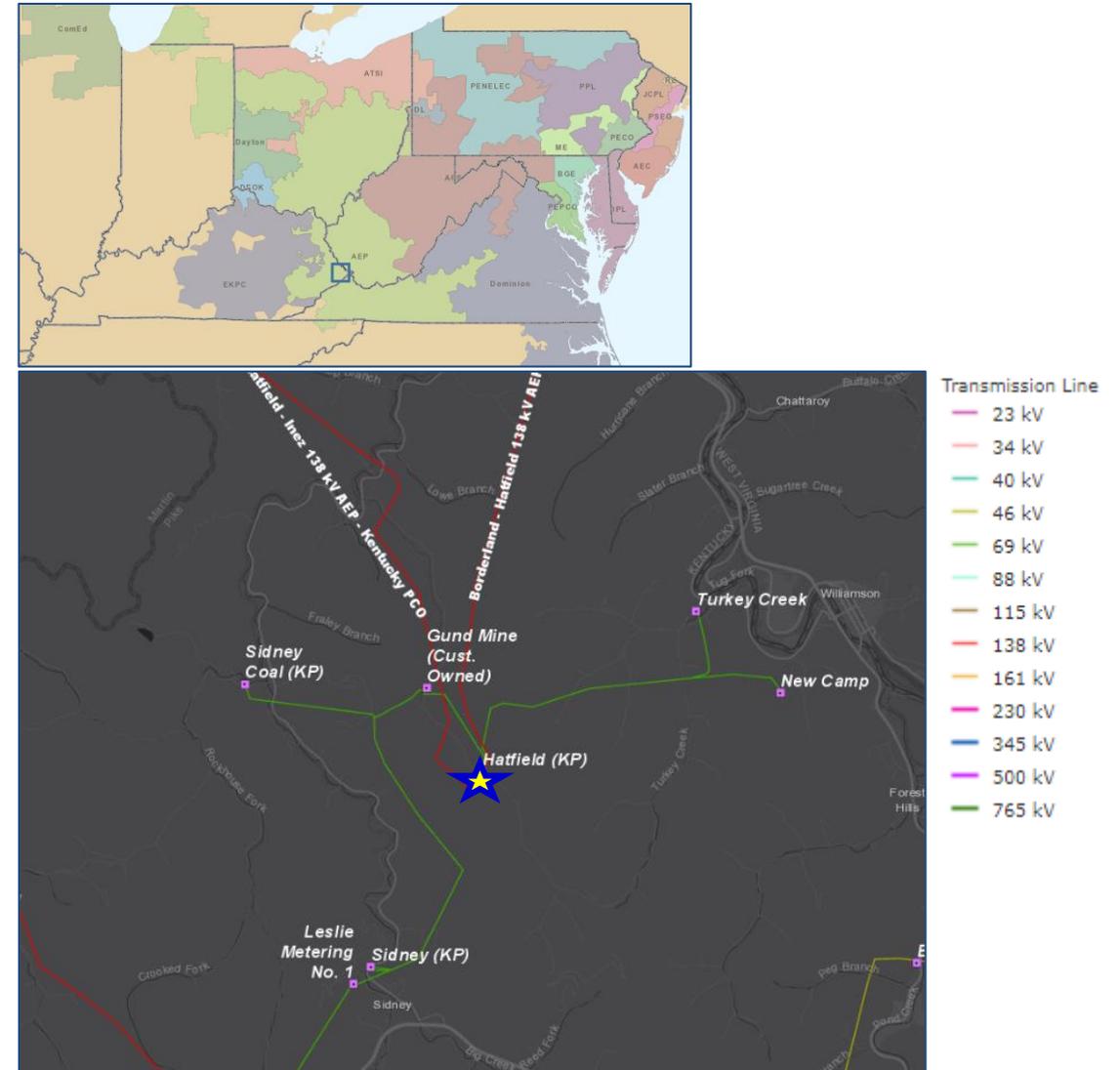


69 kV Circuit Breaker B:

- Breaker Age 1990
- Interrupting Medium: (SF6)
- Fault Operations: 65
- Additional information on this breaker: This particular breaker has had 35 reported malfunctions related to gas leaks. In addition, its CTs have previously been removed and dried.

Relays:

- Currently, 41 of the 45 relays (91% of all station relays) are in need of replacement. There are 38 of the electromechanical type and 3 of the static type, which have significant limitations with regards to spare part availability and fault data collection and retention. In addition, these relays lack of vendor support.



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-OH004

Process Stage: Solutions Meeting 10/15/2021

Previously Presented: Needs Meeting 2/17/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

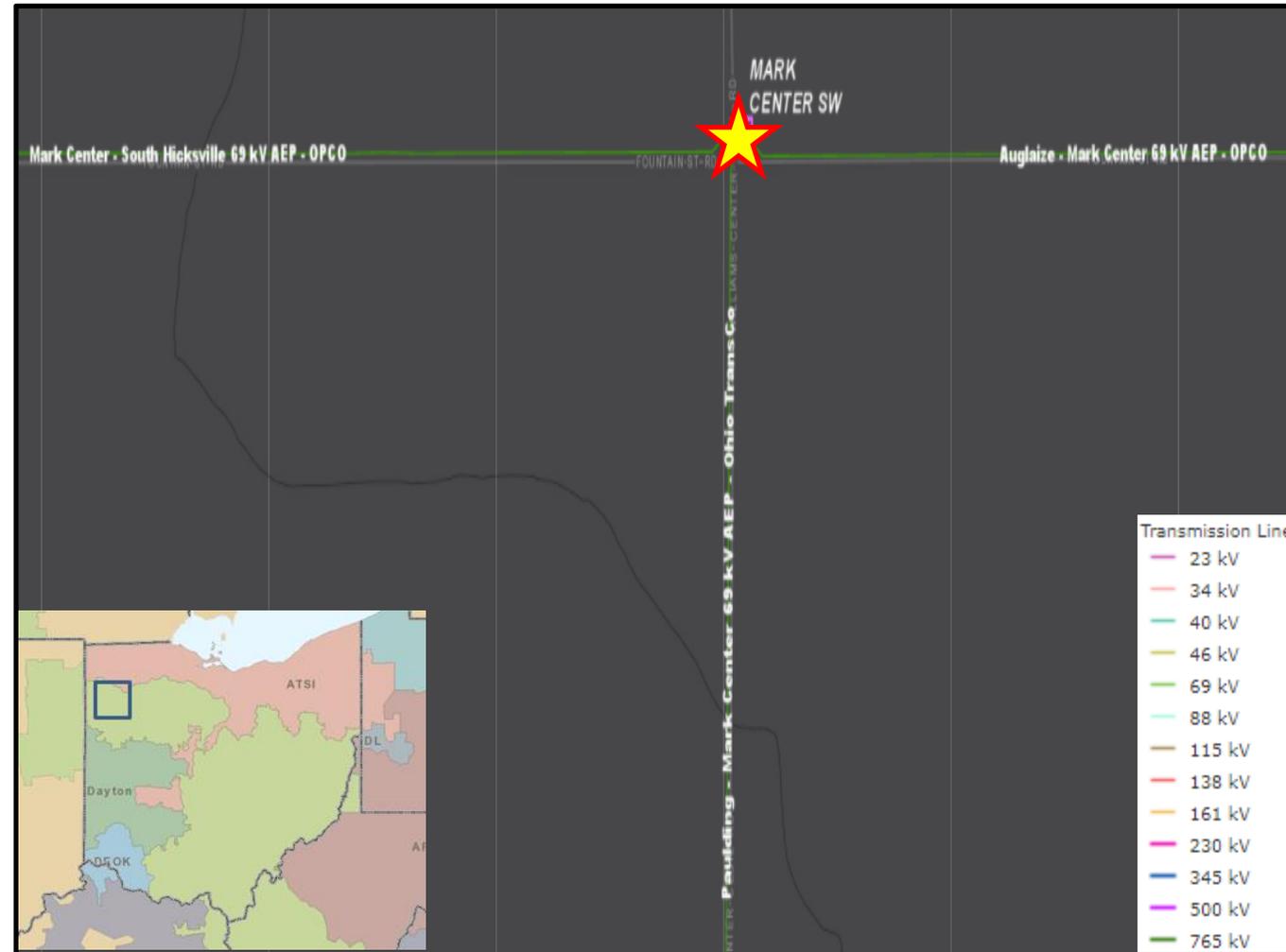
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Mark Center Switch 69kV:

Circuit Breakers B, C, & D:

- Breaker Age: B 1956, C 1967, & D 1975
- Interrupting Medium: (Oil)
- Fault Operations:
 - Number of Fault Operations: B 26 , C 140, & D 40
 - **Additional Breaker Information:** The breakers are oil filled without oil containment; oil filled breakers have much more maintenance required due to oil handling. Oil spills are common and can result in significant environmental mitigation costs.
- **Relays:** Currently, 41 of the 47 relays (87% of all station relays) are in need of replacement. 39 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, SCADA functionality, and fault data collection and retention.



AEP Transmission Zone M-3 Process Mark Center Rebuild Project

Need Number: AEP-2021-OHO04

Process Stage: Solutions Meeting 10/15/2021

Proposed Solution:

- Rebuild Mark Center station in the clear as Platter Creek station. Install 4 new 3000A, 40kA, 69 kV breakers at the new Platter Creek ring bus and add a DICM. Upgrade NW Coop 69 kV metering. **Estimated Cost \$6.37M**
- Retire existing Mark Center station. Relocate circuit switcher AA to Platter Creek. **Estimated Cost \$0.76M**
- Remote end work at South Hicksville station. **Estimated Cost \$0.57M**
- Relocate Mark Center – Continental to terminate at Platter Creek. **Estimated Cost \$0.37M**
- Relocate Mark Center – Paulding to terminate at Platter Creek. **Estimated Cost \$0.51M**
- Relocate Mark Center – South Hicksville to terminate at Platter Creek. **Estimated Cost \$0.40M**
- Relocate Mark Center- NW Co-op to terminate at Platter Creek. **Estimated Cost \$0.02M**

Total Estimated Transmission Cost: \$8.99M

Alternatives Considered:

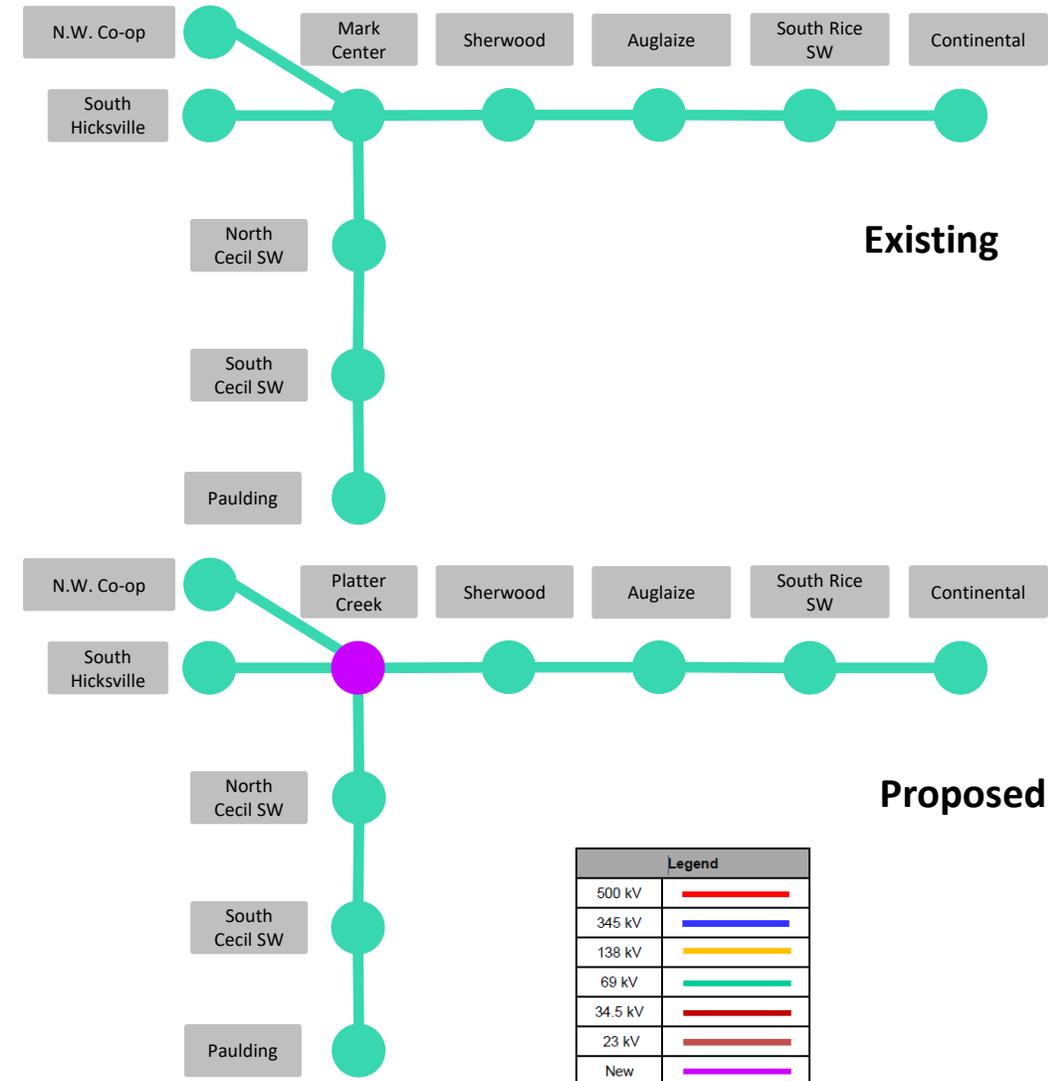
Rebuilding in the existing location was not an option due to space constraints. Rebuilding in the clear allows for better outage coordination with the radial feeds to load in the area and also allows for additional space to connect in IPPs in the area.

Projected In-Service: 03/31/2023

Project Status: Scoping

Related Project:

B3315 calls for the line relays to be changed out at Mark Center along with a cap bank replacement.



Need Number: AEP-2020-OH052

Process Stage: Solution Meeting 10/15/2021

Previously Presented: Need Meeting 3/19/2020

Supplemental Project Driver:

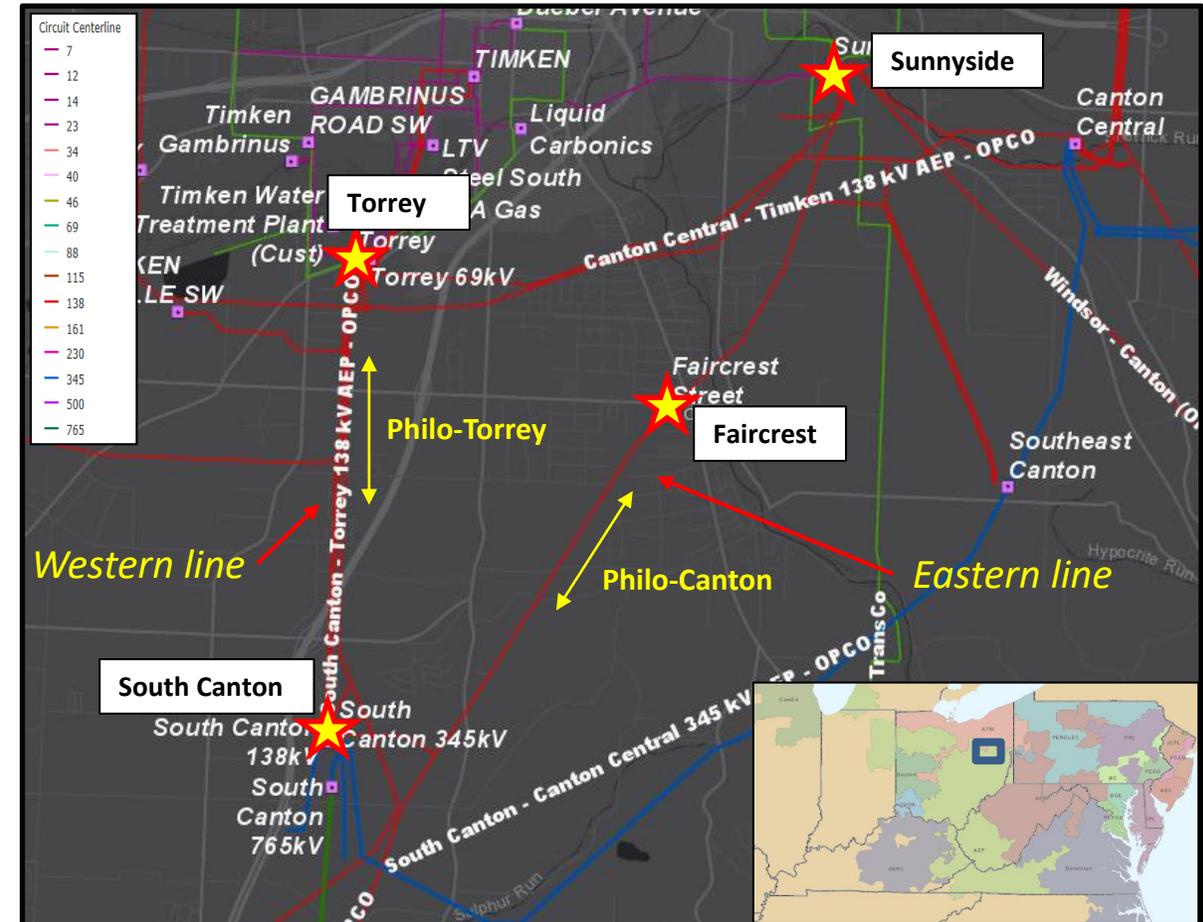
Equipment Material Condition, Performance and Risk; Operational Flexibility & Efficiency

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8), AEP Presentation on Pre-1930s Lines

Problem Statement:

- The South Canton - Sunnyside eastern 138kV transmission line is 5.5 miles long, originally constructed in 1923. The vast majority of the structures are still original, as well as the six-wired 336 ACSR conductor, insulators, and hardware. This line is made up of several circuits connected between South Canton and Sunnyside stations.
- Insulator assemblies are showing corrosion and deterioration, which could lead to additional failures and safety concerns.
- This line has experienced 3 momentary outages and 1 sustained outages over the past 10 years (2008/2018).



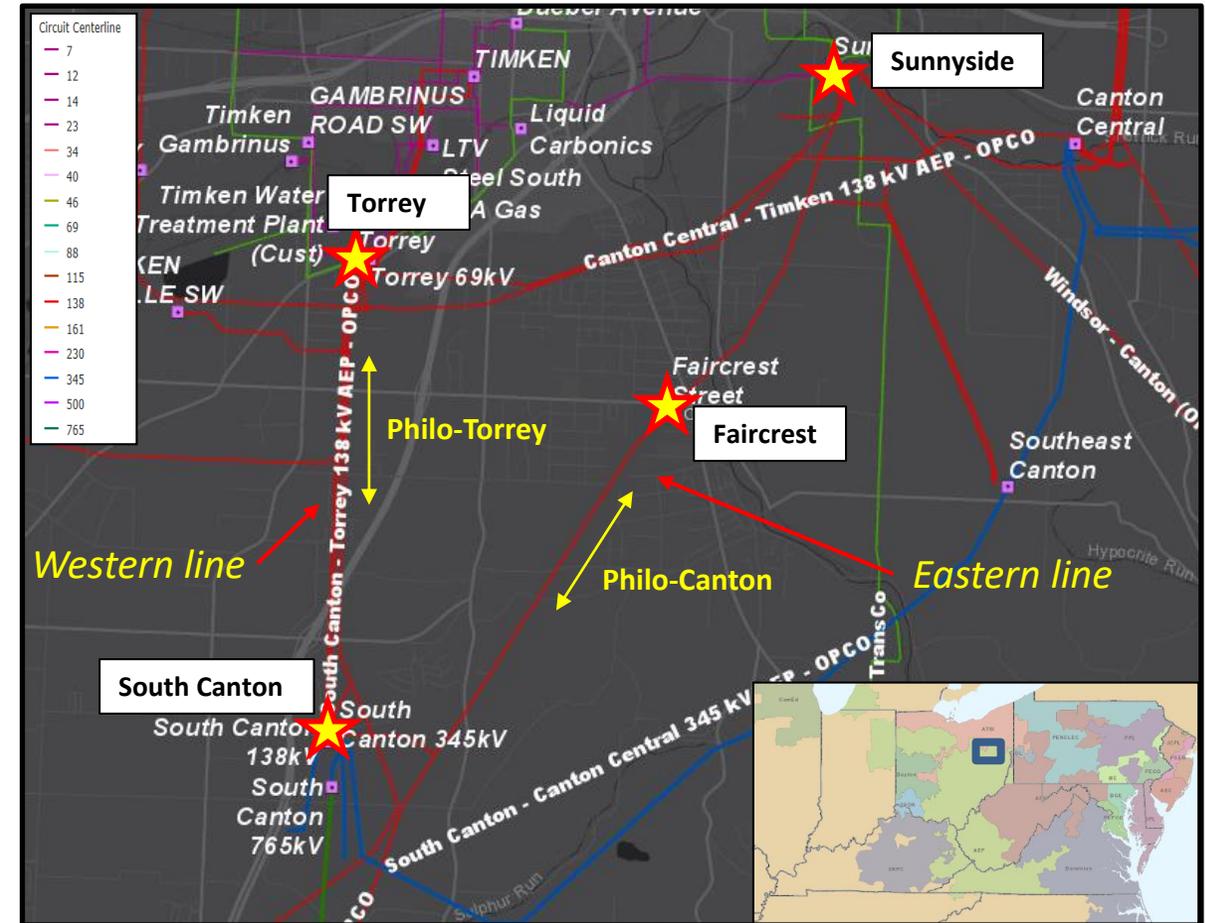
Need Number: AEP-2020-OH052

Process Stage: Solution Meeting 10/15/2021

Previously Presented: Need Meeting 3/19/2020

Problem Statement, continued:

- The South Canton-Torrey western 138kV transmission line is 3.5 miles long and consists of portions of the following circuits: Philo-South Canton (0.9 miles of the total circuit length of 75 miles); South Canton-Timken Richville (2.0 of 3.5 miles), and Timken Richville-Timken (0.6 of 3.4 miles). The line was originally built in 1942 with steel lattice towers. The conductor is 6-wired single-circuit, with one side installed in 1942 (397 ACSR) and the other side installed in 1954 (477 ACSR). The line does not meet current grounding and shielding requirements, due to the condition of the obsolete shield wire size (159 ACSR), and the line shielding angle being inadequate. This T-line exhibits similar conditions as the examples listed in AEP’s 1930’s steel lattice tower line presentation.
- The 2- 138kV line switches at Faircrest station (part of S.Canton-SE Canton circuit) are barely functional, difficult to open/close, and date to 1971.
- The protection equipment on the Southeast Canton-Sunnyside 138kV circuit consists of legacy electromechanical relays and pilot wire communications channel. Electromechanical relays lack vendor support, don’t have SCADA, and lack fault data collection capabilities. Aging pilot wire is increasingly prone to failure and increased maintenance, leading to risk of having to rely on backup protection methods.



AEP Transmission Zone M-3 Process Canton, Ohio

Need Number: AEP-2020-OH052

Process Stage: Solution Meeting 10/15/2021

Proposed Solution:

Rebuild the Philo-Torrey 138kV transmission line between South Canton and Torrey (3.5 miles). The circuits affected are South Canton-Timken Richville and Timken Richville-Torrey 138kV. **Estimated Cost: \$7.64M**

Rebuild the Philo-Canton 138kV transmission line between South Canton and Sunnyside (5.5 miles). The circuits affected are South Canton-Southeast Canton and Southeast Canton-Sunnyside 138kV. **Estimated Cost: \$14.22M**

Replace the 138kV switches at Faircrest Street station to accommodate the new line structures. **Estimated Cost: \$0.12 M**

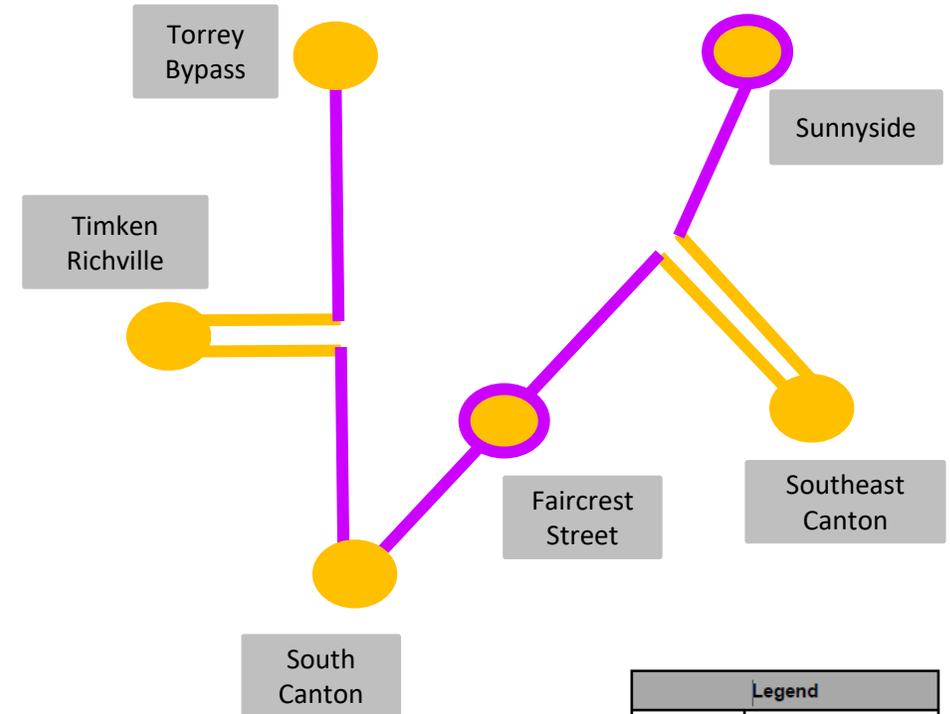
At Sunnyside, upgrade the relays on the 138kV circuit to Southeast Canton. The control building needs expanded to accommodate the new relay panels. **Estimated Cost: \$0.73 M**

Total Estimated Transmission Cost: \$22.71 Million

Alternatives Considered: No viable alternatives. The two transmission lines serve a number of customer stations in the Canton area, and are physically distant, so neither line can be retired.

Projected In-Service: 11/01/2025

Project Status: Scoping



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

Need Number: AEP-2021-OH010

Process Stage: Solutions Meeting 10/15/2021

Previously Presented: Needs Meeting 03/19/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 11)

Problem Statement:

Circuit Breaker: 69 kV breaker K

- Breaker Age:
 - 1959
- Interrupting Medium: (Oil)
- Fault Operations:
 - Number of Fault Operations: 27
 - Manufacturer recommended Number of Operations: 10

Additional Oil Filled Breaker Information: 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.

Circuit Breakers: A, B, & E

Breaker Age:

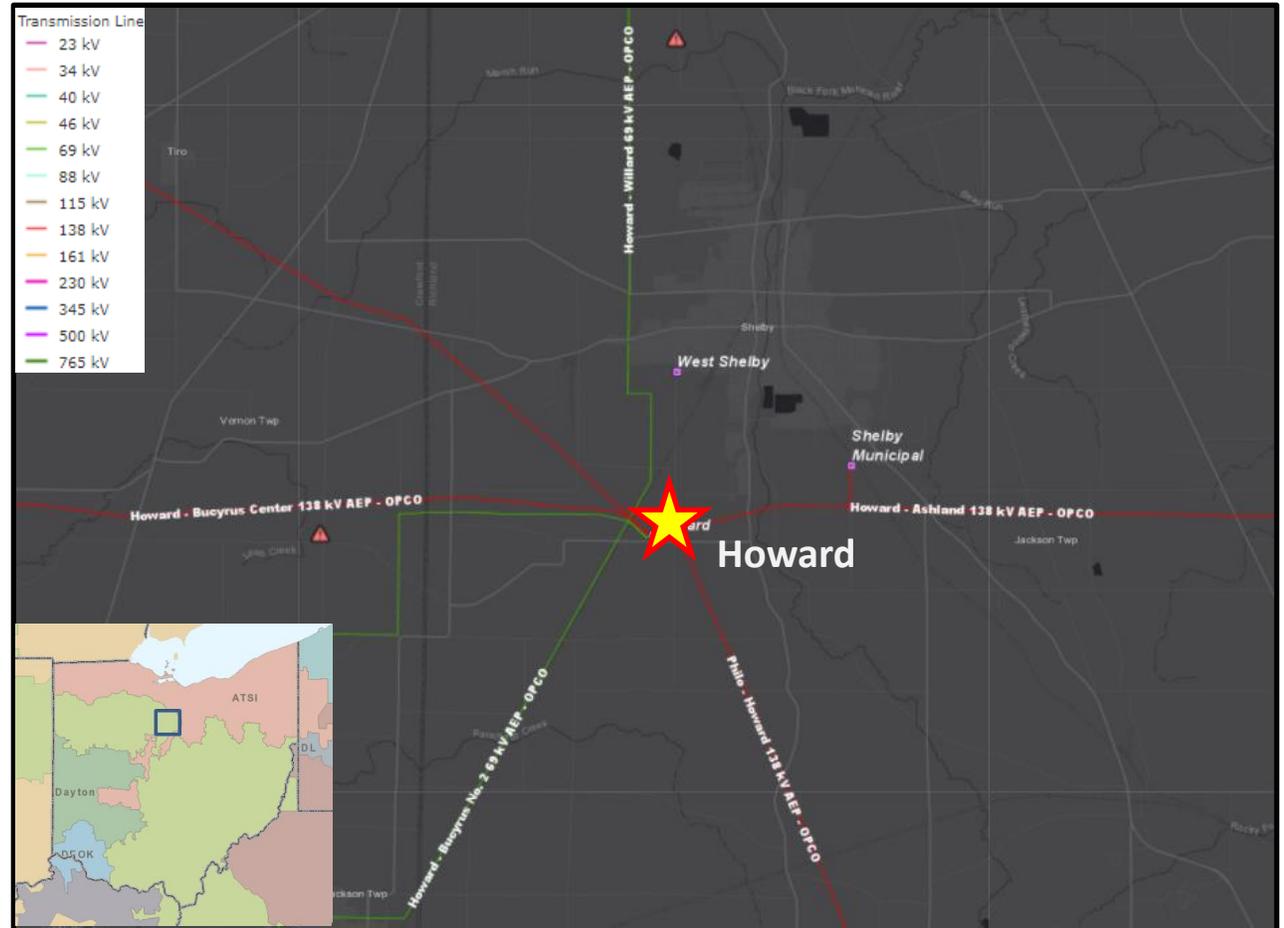
- 1990: A, B, & E

Interrupting Medium: (SF6)

Fault Operations:

- Number of Fault Operations: A 13, B 30, & E 13
- Manufacturer recommended Number of Operations: 10

Additional ASEA-Brown Boveri 145-PA model Breaker Info: As of May 11, 2020, there have been 437 recorded malfunctions of this 145-PA model family on the AEP System. The most common issues documented 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; all four of these units have reached this age. Seals that are no longer adequate can cause SF6 leaks to become more frequent. ABB provides no support for this 145-PA family of circuit breakers, and ABB no longer manufactures spare parts for these breakers.



Problem Statement Continued:

Circuit Switcher: CS-CC

Switcher Age:

- ~~2000~~

- ~~Interrupting Medium: (SF6)~~

- ~~Fault Operations:~~

- ~~Number of Fault Operations: 0~~

- ~~Manufacturer recommended Number of Operations: 10~~

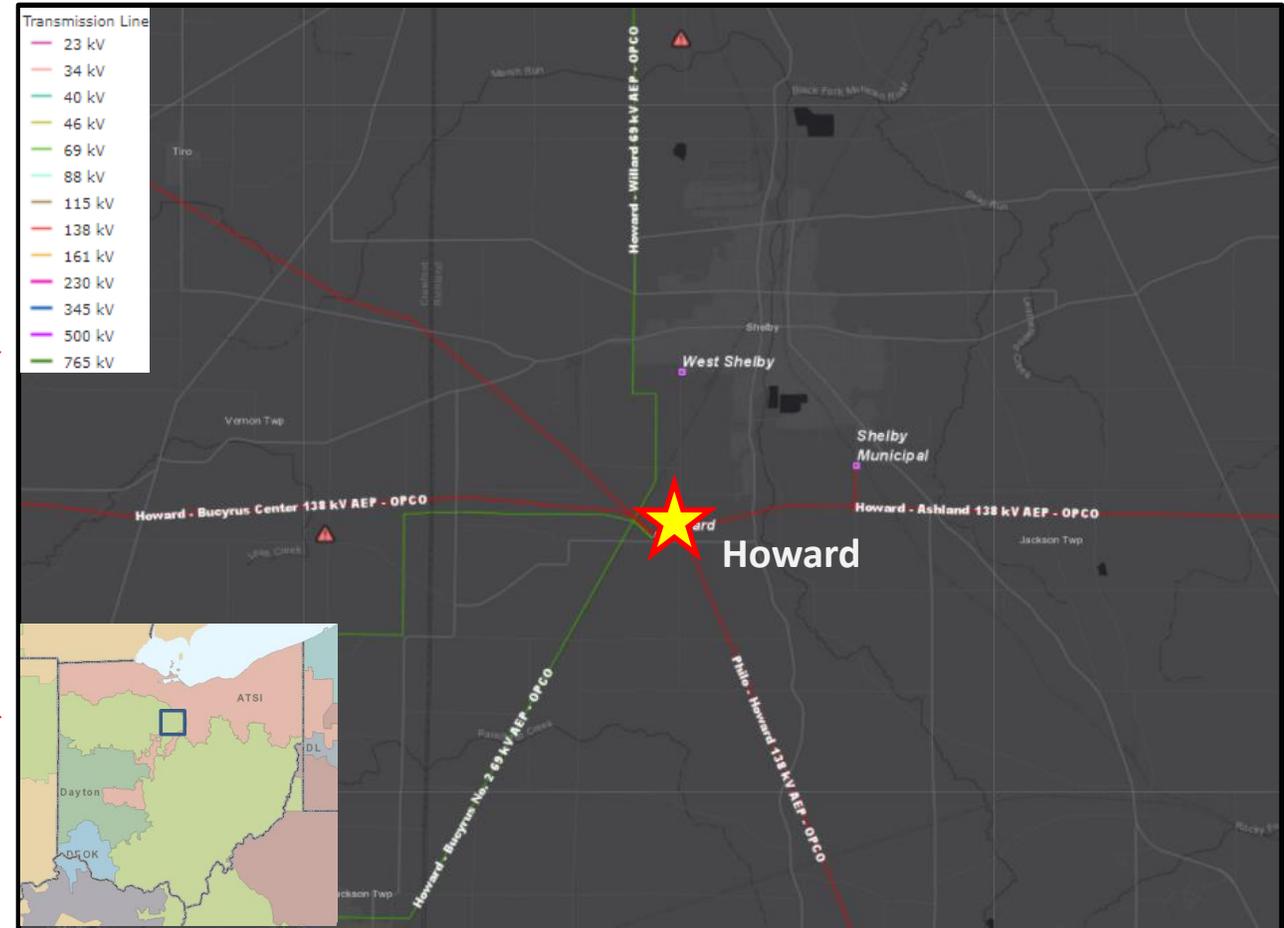
Additional SF6 Mark V Type Information: The Mark V family of circuit switchers have no gas monitor and currently in-service units on the AEP system have experienced 110 malfunctions from May 2000 to August 2019. Failed operational components including high contact resistance, gas loss, and interrupter failure represent half of these malfunctions. Parts are expensive, especially because interrupters can only be replaced, not repaired, as they are hermetically sealed. Currently, 107 of the

Relays:

- ~~122 relays (88% of all station relays) are in need of replacement. 83 of these are of the electromechanical type and 8 of the static type which have significant limitations with regards to spare part availability and fault data collection and retention. In addition, these relays lack of vendor support. There are also 16 microprocessor based relays commissioned between 2006 and 2011 that may have firmware that is unsupported~~

~~The existing RTU installed at Howard Substation is a legacy GE D200MEII/Ethernet unit. This unit is now beyond its warranty period, with limited to no spare parts availability and no vendor support.~~

The redlined information is moved to need number AEP-2021-OH037 and will be addressed separately.



Need Number: AEP-2021-OH010

Process Stage: Solutions Meeting 10/15/2021

Proposed Solution:

- Install a new 69kV 3000A 40kA breaker to replace breaker K at Howard station. **\$1.1 M**

Cost estimate: \$1.1 M

Ancillary Benefits:

Accelerating the replacement of this breaker allows the work to be better coordinated with the baseline rebuild of the Howard-Willard line under b3310. The rest of the needs identified under AEP-2021-OH037 will be presented separately.

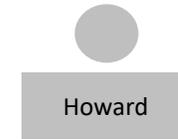
Alternatives Considered:

N/A

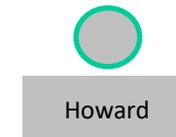
Projected In-Service: 5/1/2025

Project Status: Engineering

Existing:



Proposed:



Need Number: AEP-2021-OH014

Process Stage: Solutions Meeting 10-15-2021

Proposed Solution:

- **Cosgray 345 kV Station:** Greenfield 345 kV ring bus station laid out as a six breaker ring bus for future expansion that includes four (4) 345 kV 63 kA breakers initially. 345kV revenue metering equipment will be installed. **Estimated Cost: \$16M**
- **Hayden-Roberts #2 Tap & Extension:** Cut into the Hayden–Roberts No. 1 345 kV circuit with 2 dead end monopoles that will then tie directly in to the new Cosgray Station. Fiber extension & termination into new Cosgray Station. Remote end relay settings updates. **Estimated Cost: \$1.87M**
- **Cosgray-Customer Tie Line 1 & 2:** Install tie lines between Cosgray and the customer’s Station. **Estimated Cost: \$0.15M**

Total Estimated Transmission Cost: \$18.02M

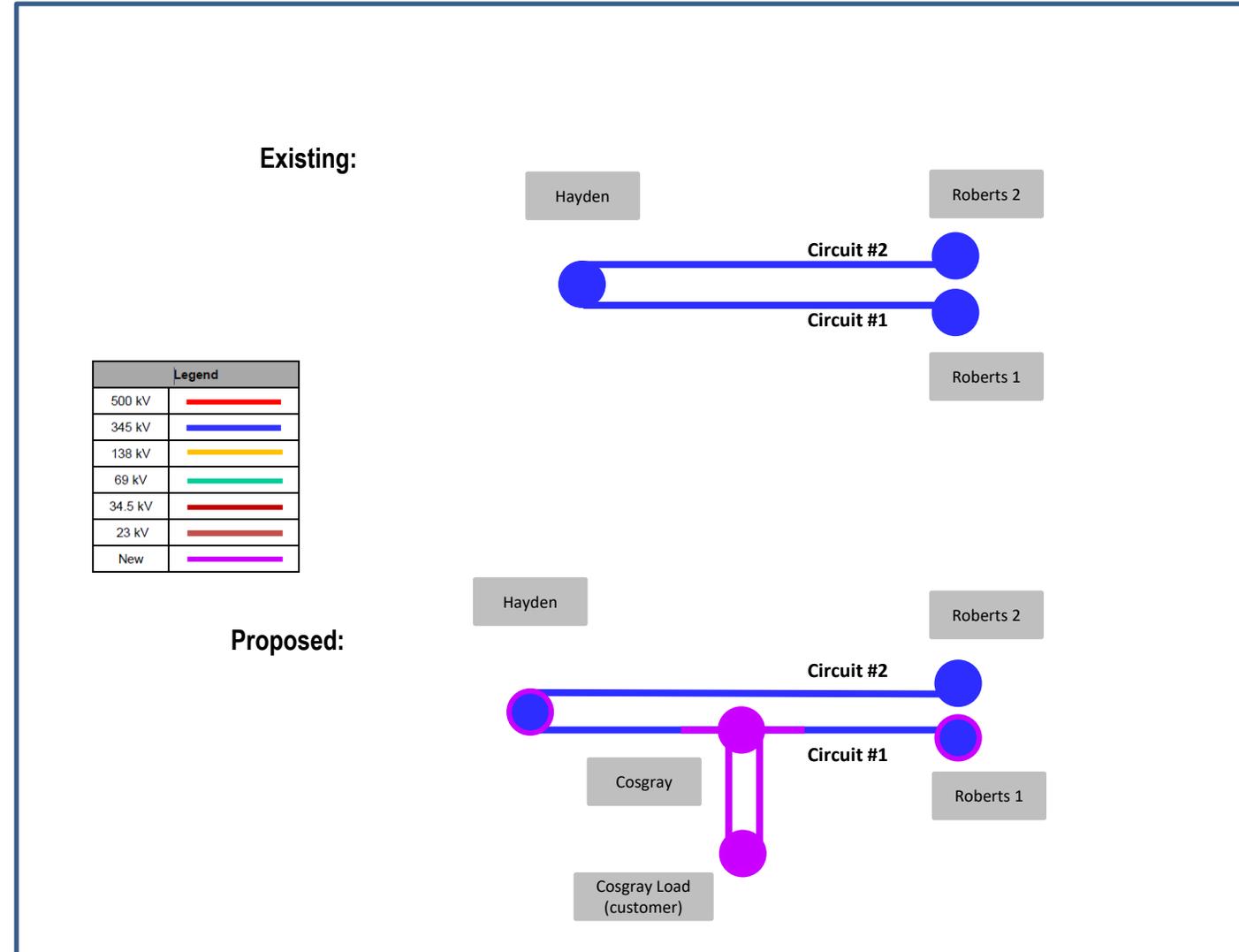
Alternatives Considered:

Serving the site via greenfield double circuit line approximately 0.8 miles to the customer site from the existing Hayden – Cole 138kV circuit, as well as a new 6 breaker ring was investigated. The significant amount of land development between the 138 kV line and the customer’s site significantly increased the risk in obtaining ROW and would have required constructing the 138 kV lines underground. Conceptual costs put the 138 kV service option on par with the 345 kV service option. Because of the schedule risks associated with the 138 kV service plan, the customer requested to move forward with taking service from AEP at 345 kV.

Projected In-Service: 5/1/2023

Project Status: Scoping

Model: RTEP 2026



Need Number: AEP-2021-IM001

Process Stage: Solution Meeting 10/15/2021

Previously Presented: Needs Meeting 02/17/2021

Project Driver: Equipment Material Condition, Performance and Risk

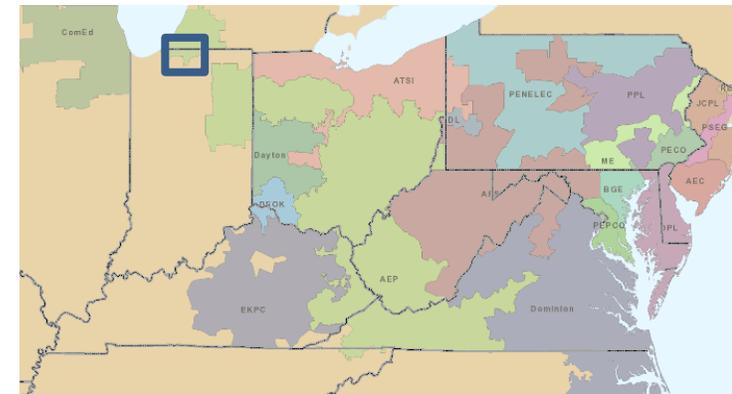
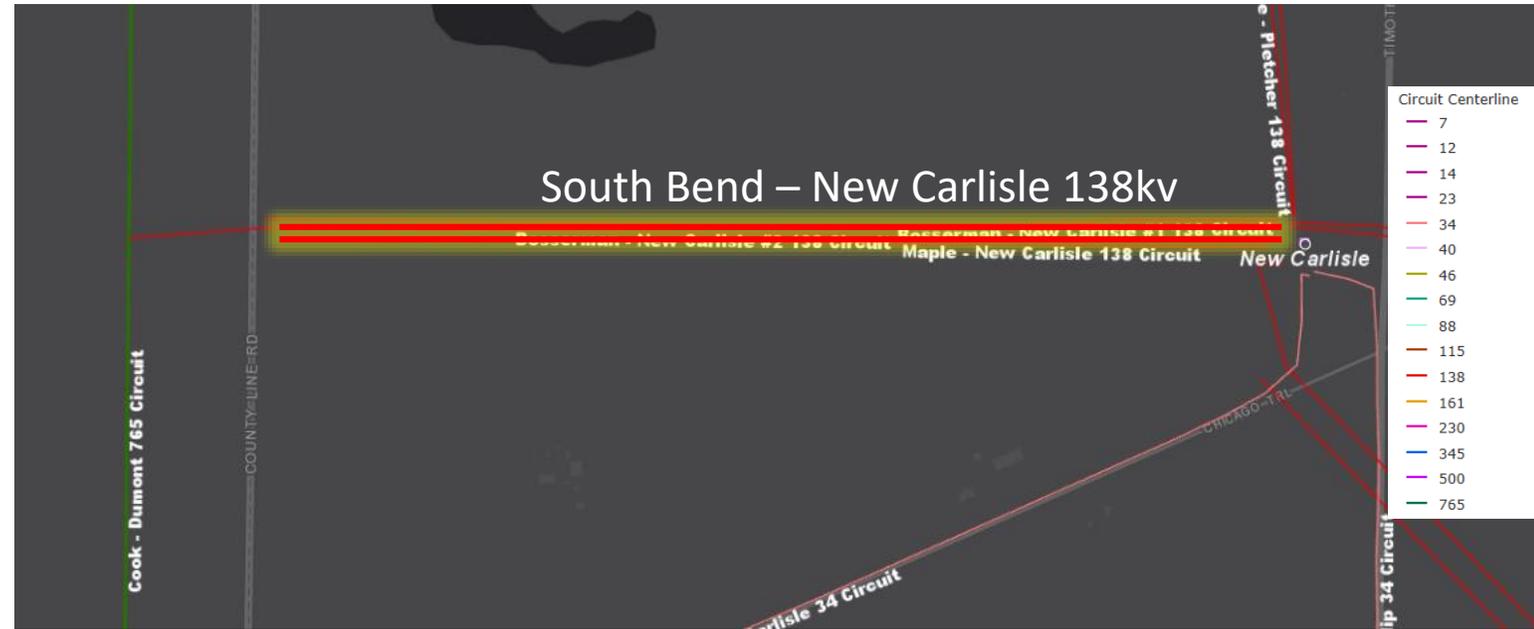
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13), AEP presentation on pre-1930s lines ([link](#))

Problem Statement:

South Bend – New Carlisle 138kV line:

- 0.88 miles of double circuit 1930 steel lattice line
- Original 397 MCM ACSR and steel structures are still on the line
- There is one structure with open conditions (20% of line) relating to worn shield wire hardware
- Circuit 1 has had 3 momentary outages and 3 permanent outages since 2015.
- Circuit 2 had 1 permanent outage since 2015
- Circuit is a tie with NIPSCO



Need Number: AEP-2021-IM002

Process Stage: Solution Meeting 10/15/2021

Previously Presented: Needs Meeting 02/17/2021

Project Driver: Equipment Material Condition, Performance and Risk

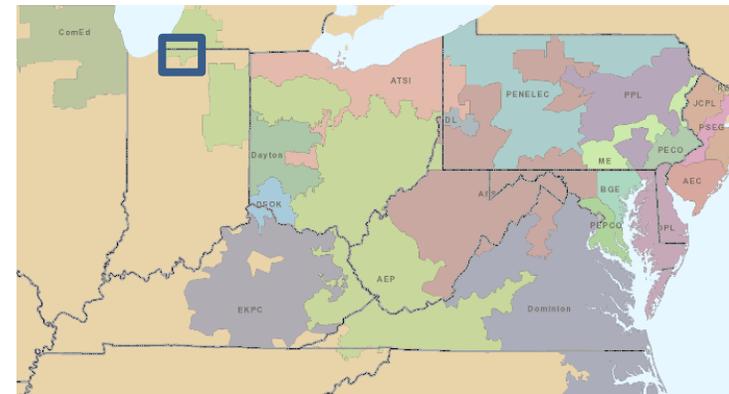
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

New Carlisle - Maple 138kV line:

- 0.86 miles of 1952 wood pole H frame line
- Utilizes original structures and 397 ACSR from 1952
- 5 structures have open conditions (63% of line) relating to pole rot, split or rot crossarms, broken ground lead wire, rusty guy wires, and cracked static bracket
- 2 momentary outages over the past 5 years
- Circuit is an interconnection with NIPSCO and MISO



Need Number: AEP-2021-IM001 and AEP-2021-IM002

Process Stage: Solution Meeting 10/15/2021

Proposed Solution:

New Carlisle - Maple 138 kV: Rebuild ~0.95 miles of 138 kV single circuit line with 1590 ACSR 45/7 Lapwing to match the NIPSCO owned conductor size.

Estimated Cost: \$1.76M

New Carlisle - Bosserman 138 kV: Rebuild ~0.95 miles of 138 kV double circuit line with 1590 ACSR 45/7 Lapwing to match the NIPSCO owned conductor size and transition fiber installation for NIPSCO connectivity. **Estimated Cost: \$1.86M**

New Carlisle – South Bend 138 kV: Remove ~0.86 mile of the existing 138 kV line. **Estimated Cost: \$0.17M**

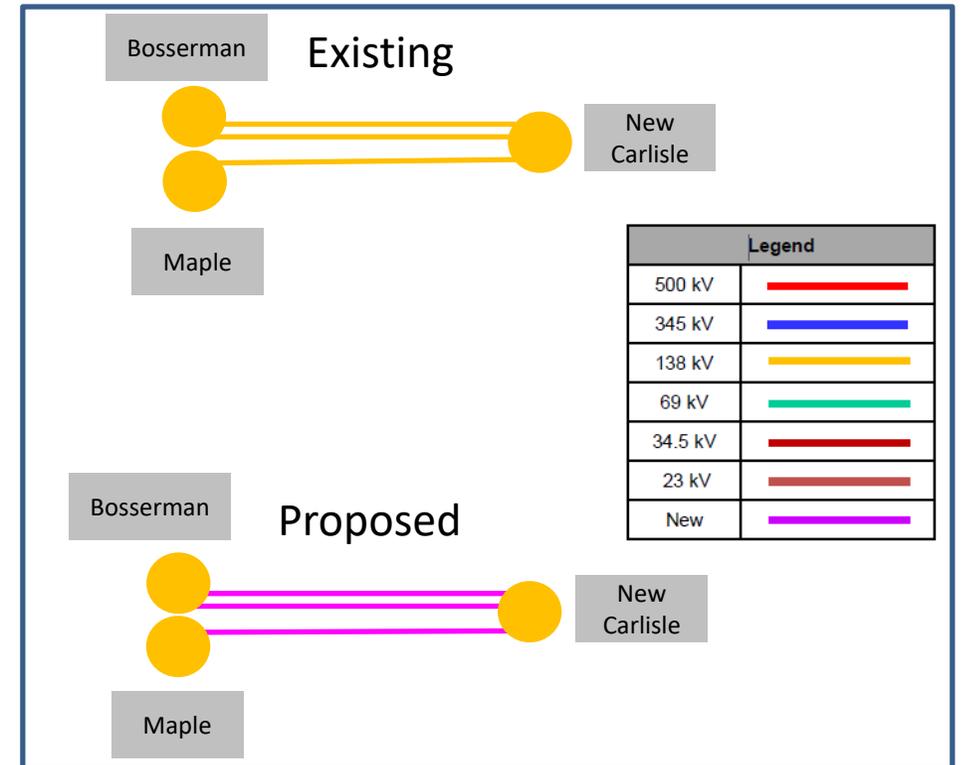
Bosserman 138 kV Station: Relay settings changes. **Estimated Cost: \$0.08M**

New Carlisle 138 kV station: Remote end relaying upgrades and settings changes. **Estimated Cost: \$0.82M**

Total Estimated Transmission Cost: \$4.69 M

Alternative: No viable transmission alternatives. No option to retire the line as it serves as an important tie to the NIPSCO system and no other options to rebuild in a new route that would be cost effective.

Projected IS Date: 10/28/2024



AEP Transmission Zone: Supplemental Lincoln Extension Retirement

Need Number: AEP-2021-IM010

Process Stage: Solution Meeting 10/15/2021

Previously Presented: Needs Meeting 04/16/2021

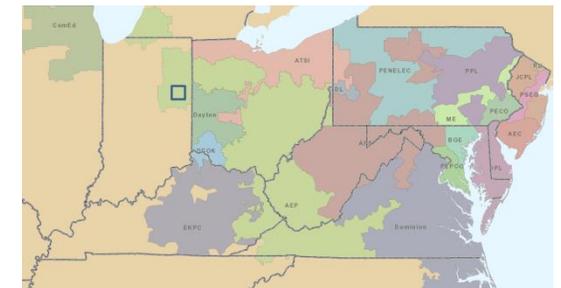
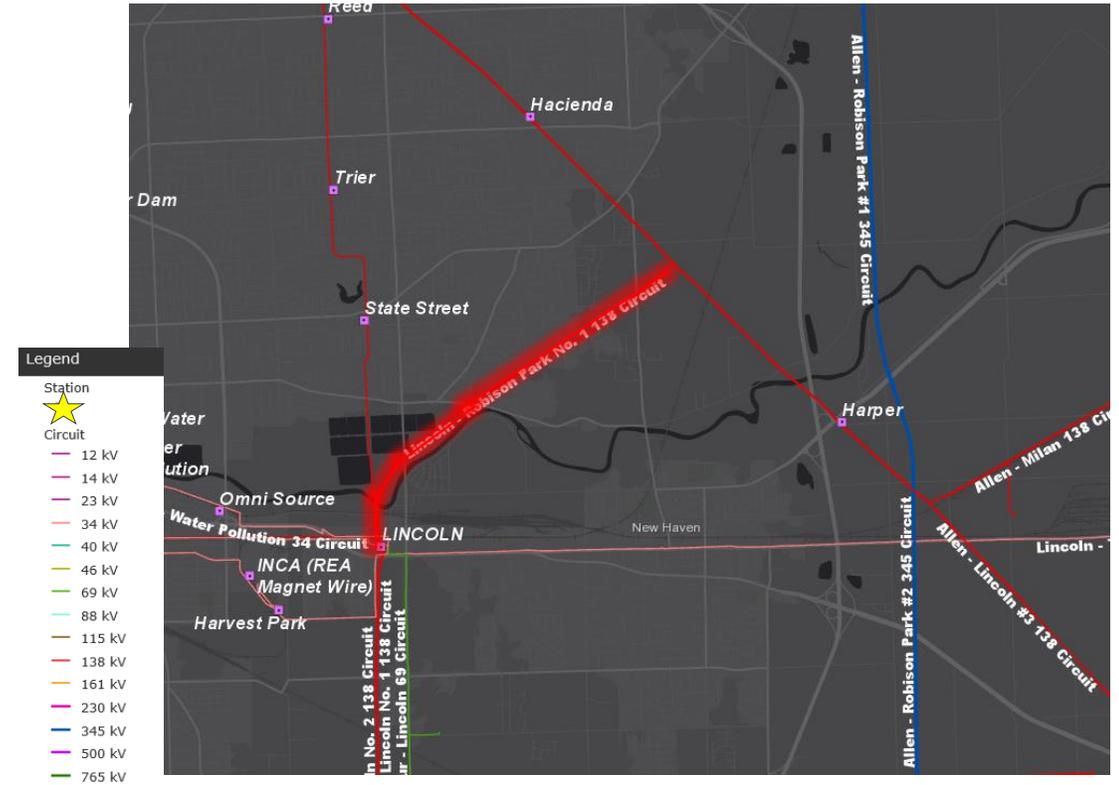
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

- **Lincoln Tap 138kV ~3.65 Miles**
 - Steel lattice double circuit 397 ACSR construction with all 20 structures original from 1947
 - 9 open hardware conditions on 7/20 structures
 - Insulator equipment and hooks with moderate wear
 - 50% of the towers had flashed insulator strings
 - Corrosion on insulator caps & pins

Model: N/A



Need Number: AEP-2021-IM010, AEP-2021-IM011

Process Stage: Solution Meeting 10/15/2021

Proposed Solution:

Retire the ~3.65 mile 138kV Lincoln extension and reconnect the existing line between Robison Park and Allen. The extension can be retired due to previous upgrades strengthening the underlying sub-transmission system through connections to other sources and a rebuild of the existing Robison Park-Allen and Lincoln-Robison Park lines which increased the 138 kV capacity. This extension does not impact the larger 138 kV network as Lincoln station will keep three 138 kV sources to serve the Fort Wayne area.

Cost: \$2.8M

At Lincoln station, retire 138kV CB “B” and “C”, Replace 138kV CB “I” and relocate 138kV CB “A” to the old CB “C” position.

Cost: \$2M

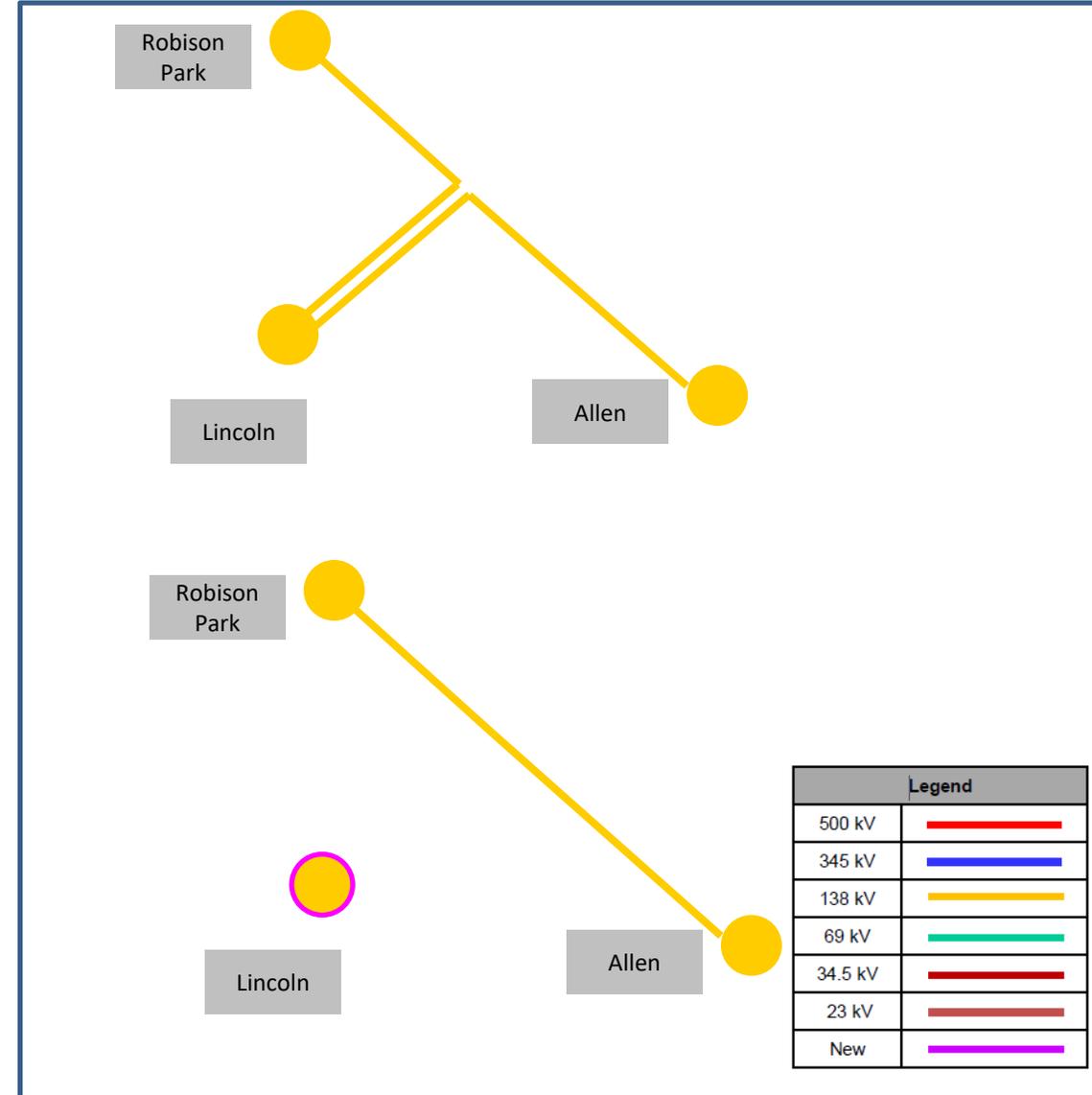
Total Estimated Transmission Cost: \$4.8M

Alternatives Considered:

Rebuild the line as is and replace the Lincoln CB’s.
Estimated Cost: \$12.3M

Projected In-Service: 3/25/2025

Project Status: Scoping



Need Number: AEP-2021-IM020

Process Stage: Solution Meeting 10/15/2021

Previously Presented: Needs Meeting 07/16/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk

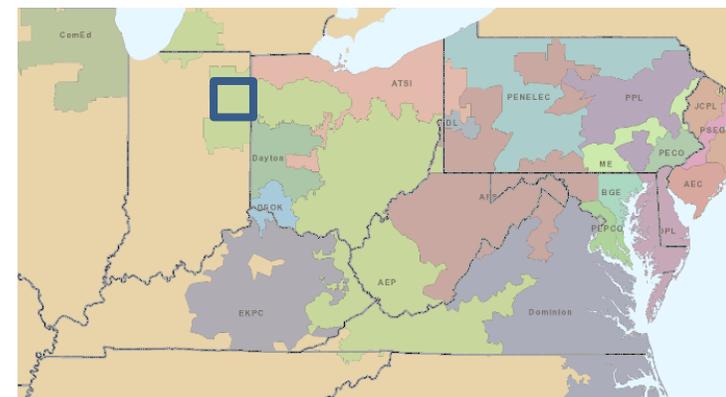
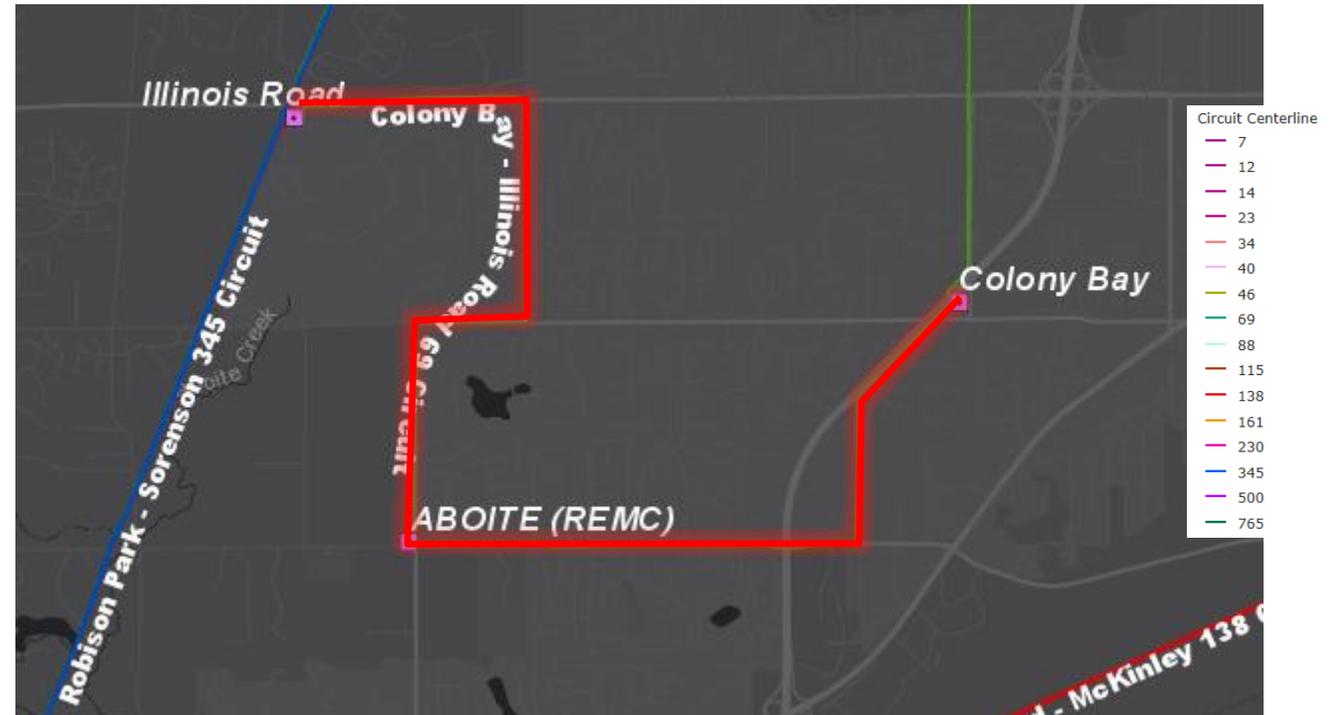
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Model: N/A

Problem Statement:

Colony Bay – Illinois Rd 69kV line (6.92 miles):

- 71 of the 189 poles are original 1969 wood poles.
- 6.33 miles of line is original 1969 556.5 AL conductor
- Since 2015 there have been 6 momentary outages
- Structures fail NESC Grade B, AEP Strength requirements and ASCE structural strength standards
- 14 of 36 structures assessed had issues such as ground line decay, insect/bird, shell damage
- 30% of structures on this line were identified as having beyond normal levels of decay.



AEP Transmission Zone: Supplemental Colony Bay – Illinois Rd 69kV

Need Number: AEP-2021-IM020

Process Stage: Solution Meeting 10/15/2021

Proposed Solution:

On the Colony Bay – Illinois Rd 69kV line, rebuild approximately 2.7 miles and re-conductor approximately 3.6 miles with 556.5 ACSR. The 3.6 miles to be reconducted has newer structures that do not need replaced due to various INDOT and Fort Wayne road widening projects that have replaced structures more recently but kept the original conductor in place.

Estimated Cost: \$10.7M

Aboite 69kV Switch:

Replace Aboite 69kV Switch due to the line structure replacements.

Estimated Cost: \$0.8M

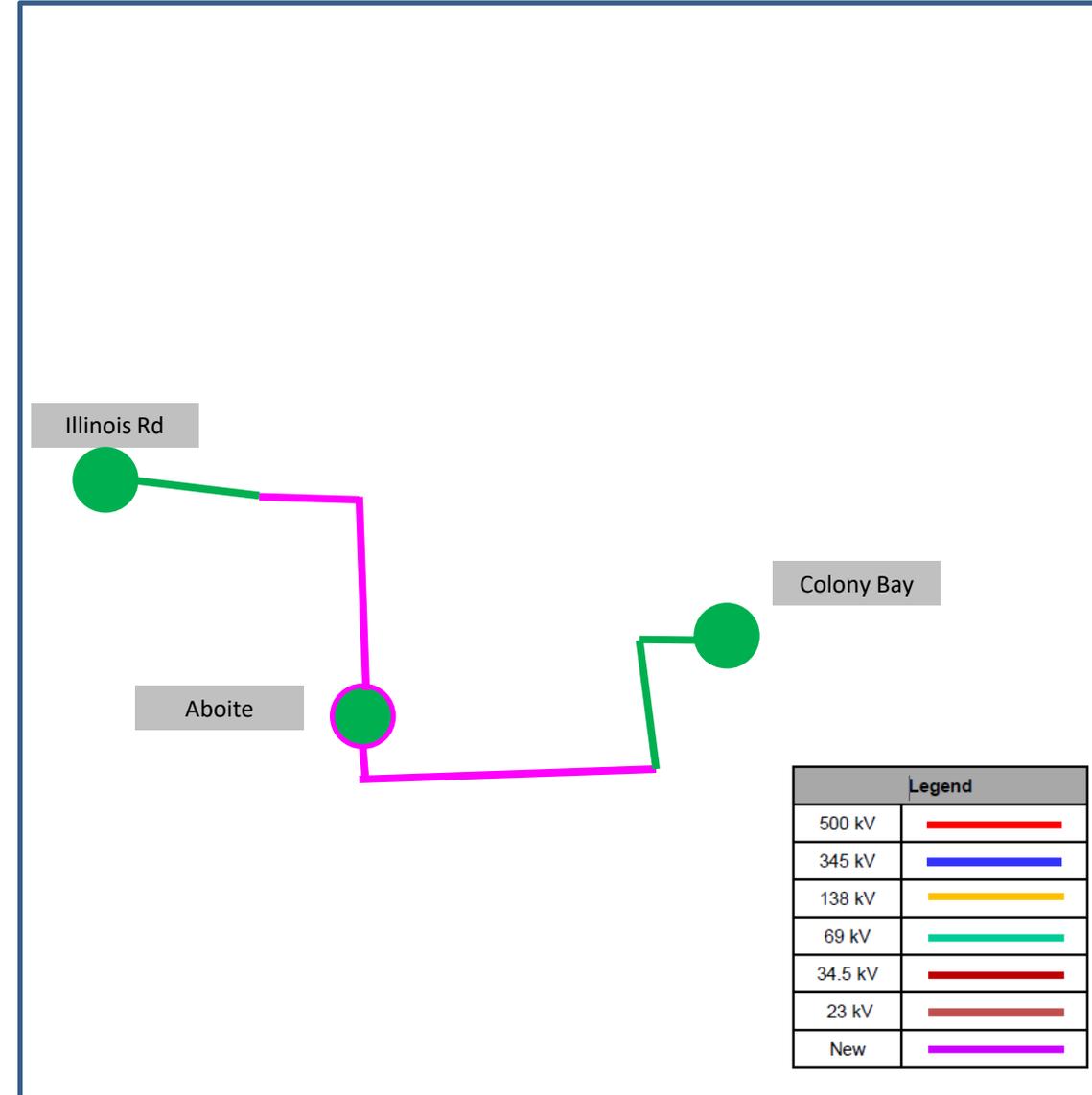
Total Cost: \$11.5M

Alternates:

Rebuild line as greenfield to minimize outages. This wasn't chosen due to increased cost and community impact due to the residential area and build up around the line.

Projected In-Service: 10/01/2025

Project Status: Scoping



AEP Transmission Zone M-3 Process Colby Area Improvements

Need Number: AEP-2019-IM010

Process Stage: Solutions Meeting 10/15/2021

Previously Presented: Needs Meeting 04/23/19

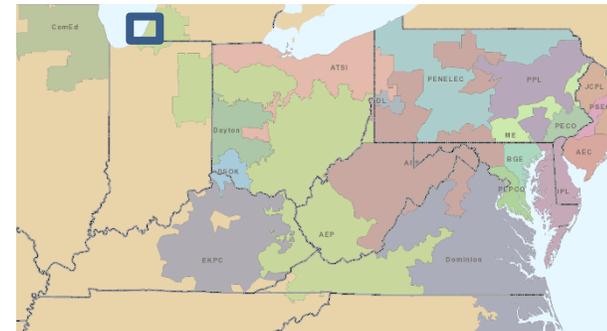
Supplemental Project Driver: Equipment Condition/Performance & Operational Flexibility

Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Colby Station -

- Breakers A, B, C, D, and E
 - 1963-1968 vintage oil breakers
 - CB Fault operations: CB A(38), C(67), D(86), E(12) – Recommended(10)
 - Breaker B control cabinet has documented corrosion concerns
 - Since 2017 breaker D's operation counter hasn't functioned
- Currently contains a 3-terminal line within the station.



Need Number: AEP-2020-IM001

Process Stage: Solutions Meeting 10/15/2021

Previously Presented Needs Meeting 02/21/2020

Supplemental Project Driver: Equipment
Condition/Performance/Risk

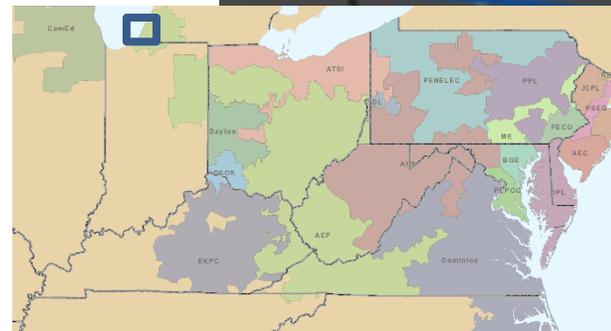
Specific Assumption Reference: AEP Guidelines for Transmission
Owner Identified Needs (AEP Assumptions Slide 8)

Model: N/A

Problem Statement:

Berrien Springs-Colby 69kV line

- 15.72 miles of wood pole structures with horizontal insulators rebuilt in 1995
- 148 structures with at least one open condition, 31% of the structures on the line
 - Open conditions include insect or woodpecker damage, broken or stolen ground wire conditions, and broken or burnt insulators. **The damage caused by the insects and woodpecker activity have decimated poles in this area.**
- Outages: 2 permanent since 2015
- CMI: 297,132



Need Number: AEP-2021-IM030

Process Stage: Solutions Meeting 10/15/2021

Previously Presented: Needs Meeting 09/17/2021

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

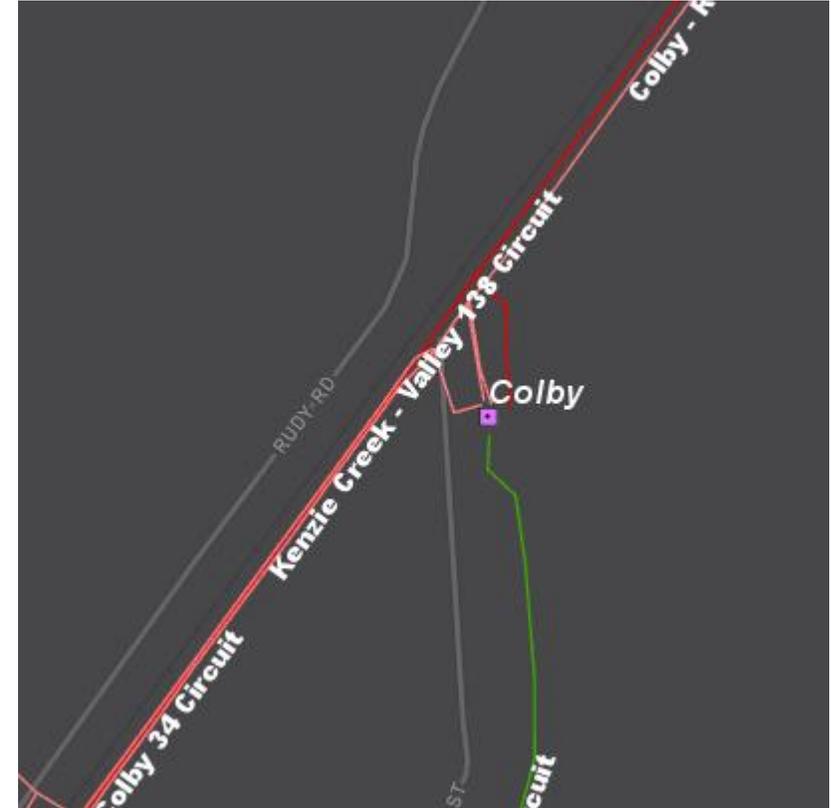
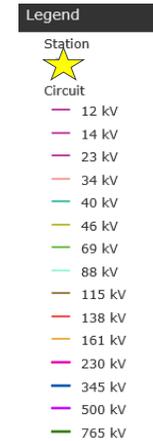
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

- **Colby 138/69/34.5kV**
 - 69/34.5kV XFR 1
 - 1965 Vintage unit
 - DGA indicates elevated levels of CO2 gas concentration
 - Decomposition in paper insulating materials
 - Wood tie foundations
 - No oil containment
 - 138/12kV XFR 2
 - 1970 Vintage LTC unit
 - DGA shows Ethylene levels exceeding Acetylene which indicates deteriorating internal components
 - Dielectric data indicates this LTC is at greater risk of failure.
 - Increase of Power factor indicates an increase of particles in the oil.
 - Wood tie foundation
 - 138kV Bus structures are corroding.
 - 34.5kV bus structures are corroding

Model: N/A

AEP Transmission Zone: Supplemental Colby Area Improvements



AEP Transmission Zone: Supplemental Colby Area Improvements

Need Number: AEP-2020-IM001, AEP-2021-IM030 & AEP-2019-IM010

Process Stage: 10/15/2021

Proposed Solution:

Blossom Trail – Colby 34.5kV:

Retire the ~10.2 miles of 34.5kV line between Blossom Trail – Dowagiac Tap.

Estimated Cost: \$3.0M

Rudy Tap 34.5kV:

Replace the failed Rudy Tap Switch

Estimated Cost: \$0.7M

Colby North Ext 138kV:

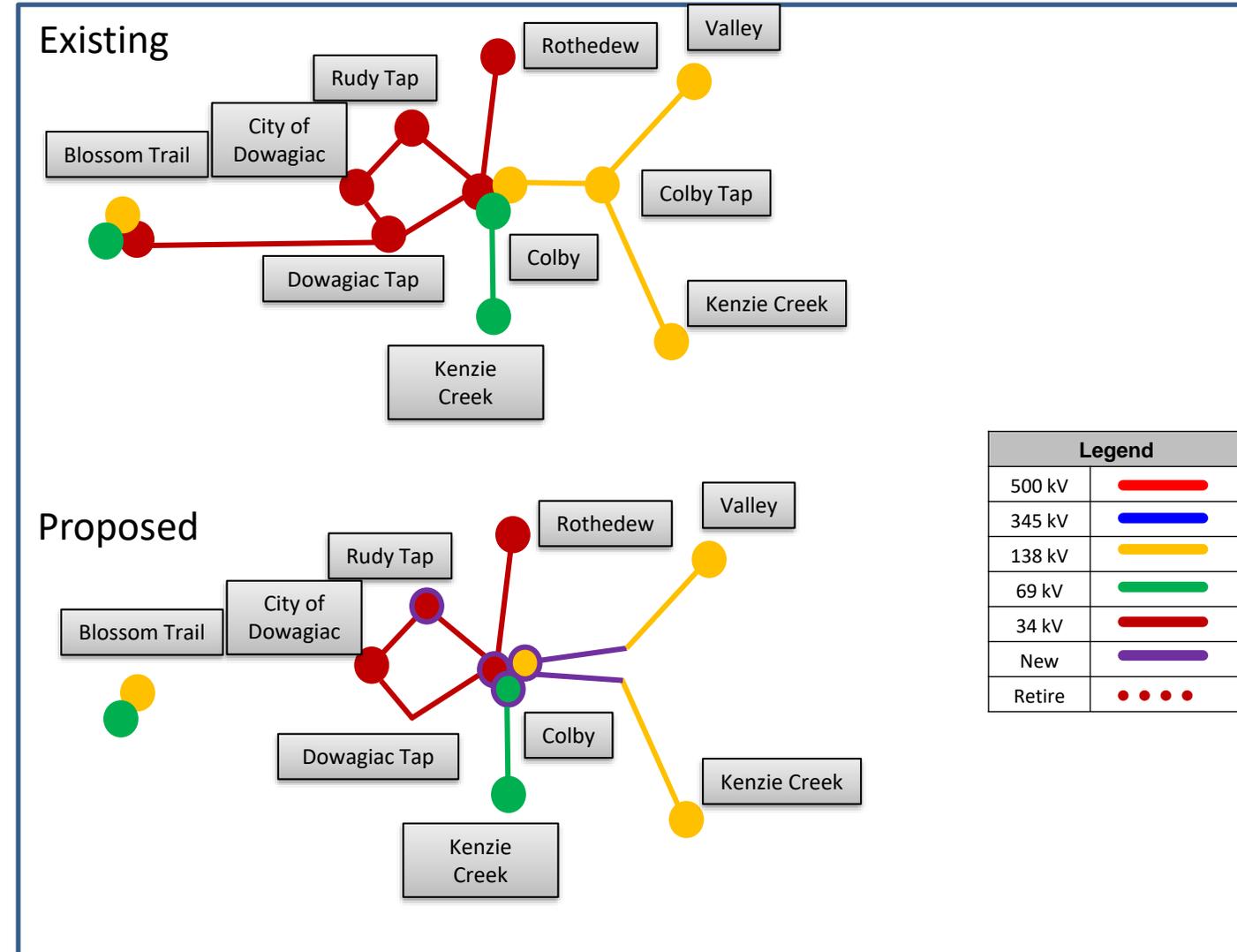
Reterminate the Valley 138kV line into Colby with a .1 mile new extension

Estimated Cost: \$1.1M

Colby South Ext 138kV:

Reterminate the Kenzie Creek 138kV line into Colby with a .25 mile new extension

Estimated Cost: \$1.5M



AEP Transmission Zone: Supplemental Colby Area Improvements

Need Number: AEP-2020-IM001, AEP-2021-IM030 & AEP-2019-IM010

Process Stage: 10/15/2021

Proposed Solution:

Colby – Rothedew 34.5kV line:
Reterminate the Rothedew 34.5kV line into Colby

Estimated Cost: \$0.3M

Colby - Dowagiac 34.5kV :
Reterminate the Dowagiac 34.5kV feed back into Colby station.

Estimated Cost: \$1M

Colby – Rudy Tap 34.5kV :
Reterminate the Rudy Tap 34.5kV feed back into Colby station.

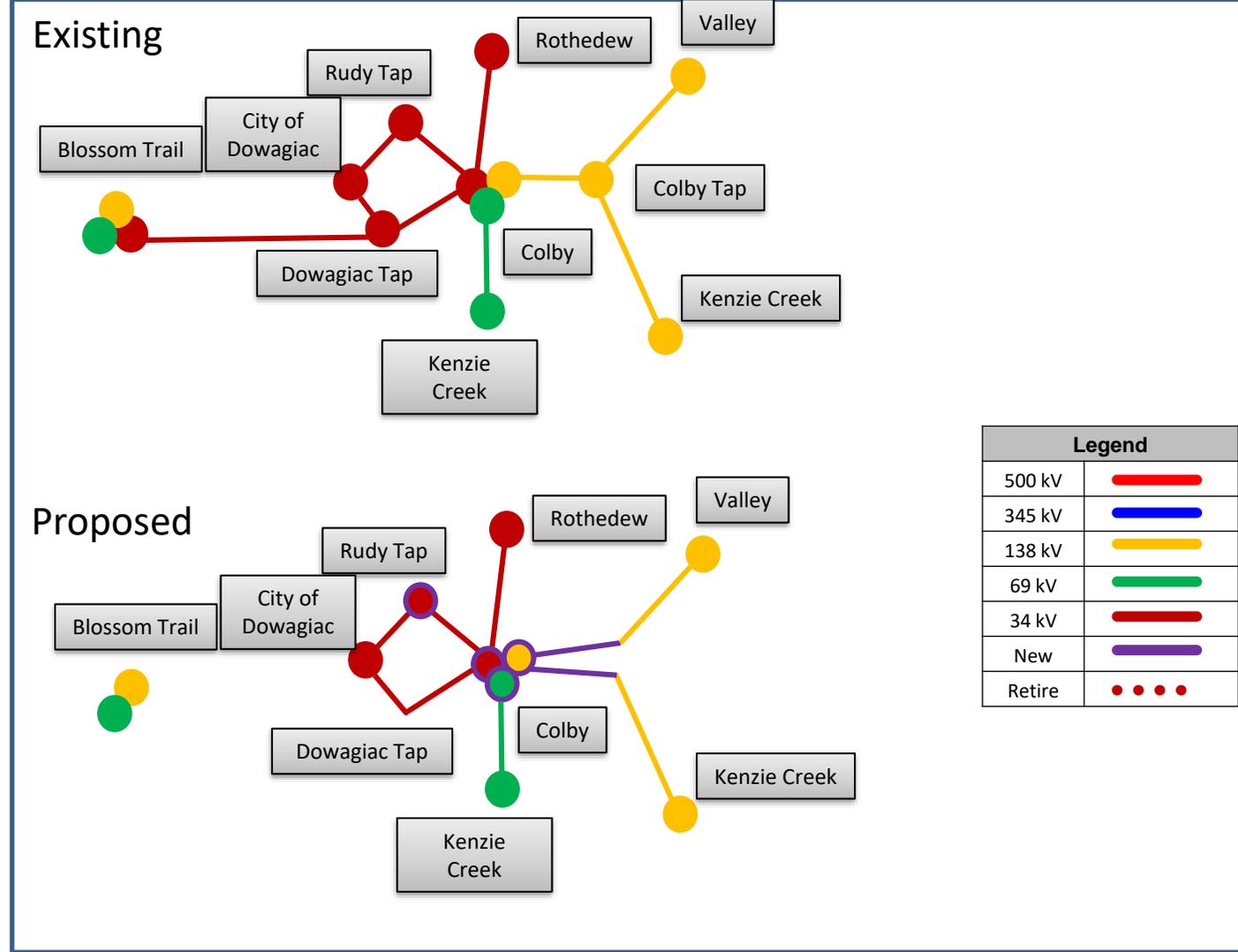
Estimated Cost: \$1M

Colby – Kenzie Creek 69kV :
Reterminate the Kenzie Creek 69kV feed back into Colby station.

Estimated Cost: \$0.7M

Colby 138kV Switch:
Retire the Colby 138kV Switch

Estimated Cost: \$0.2M



AEP Transmission Zone: Supplemental Colby Area Improvements

Need Number: AEP-2020-IM001, AEP-2021-IM030 & AEP-2019-IM010

Process Stage: 10/15/2021

Proposed Solution:

Colby 138/69/34.5kV:

On the existing property, build a new 138kV yard with 4 CB's built in a ring configuration. Install a new 138/34.5 50MVA XFR with a low side CB protecting the single line exit toward Rudy Tap to replace the source previously served by the retired line to Blossom Trail. Install 3 34.5kV CB's on a new 34.5kV bus that will be connected to the existing 138/69/34.5kV XFR, and the Rothedew and Dowagiac exits. Install a new 69kV CB toward Kenzie Creek.

Cost: \$11.9M

Blossom Trail 138/69/34.5kV:

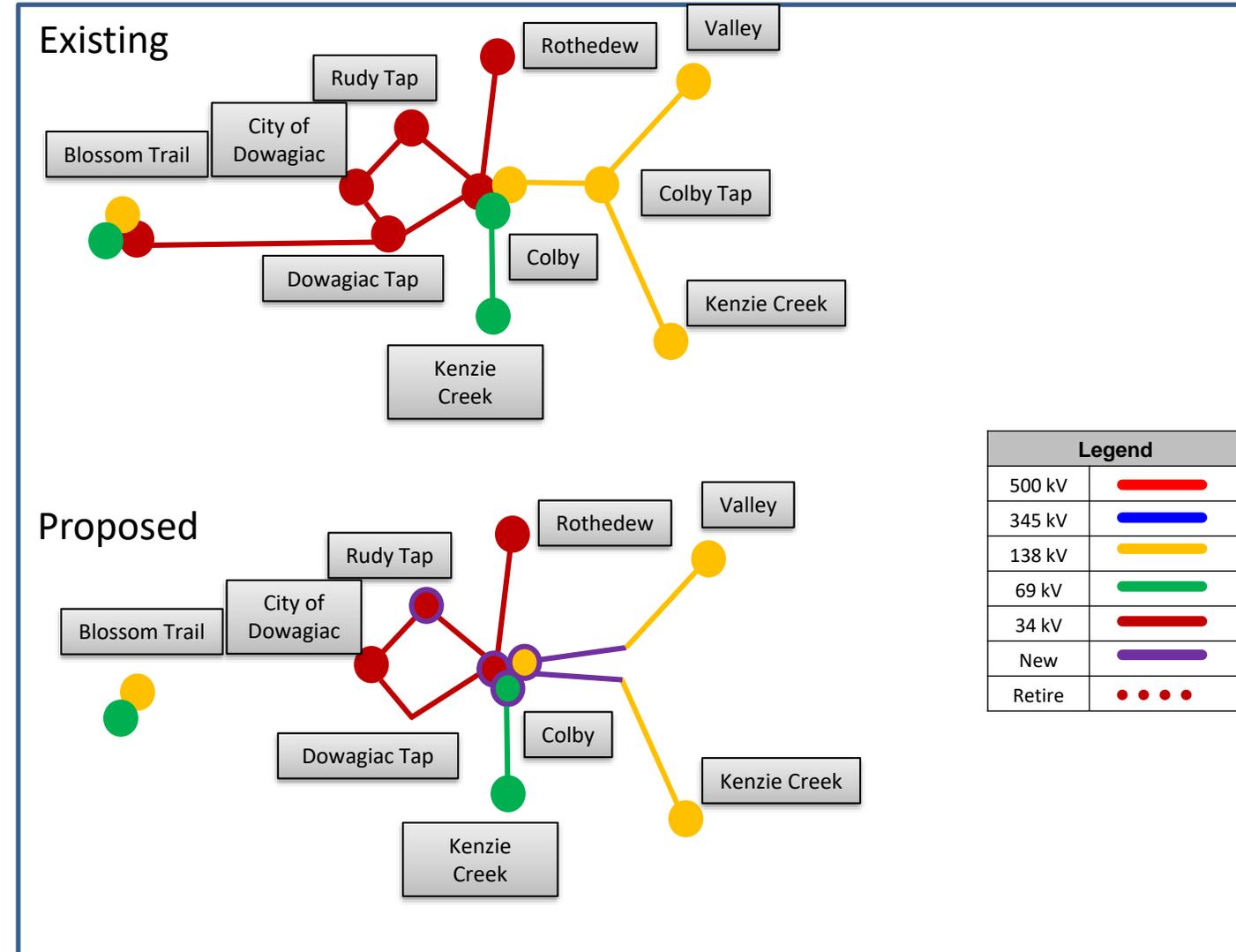
Remove CB "M" and reuse it at Colby station.

Cost: \$0.2M

Total Estimated Transmission Cost: \$21.6M

Ancillary Benefits:

Due to the planned retirement of Eau Claire and Indian Lake 34.5kV substations, installing a 138/34.5kV XFR at Colby will allow AEP to retire the 10.2 mile Blossom Trail – Colby 34.5kV line that has seen significant damage from woodpeckers and insects.



AEP Transmission Zone: Supplemental Colby Area Improvements

Need Number: AEP-2020-IM001, AEP-2021-IM030 & AEP-2019-IM010

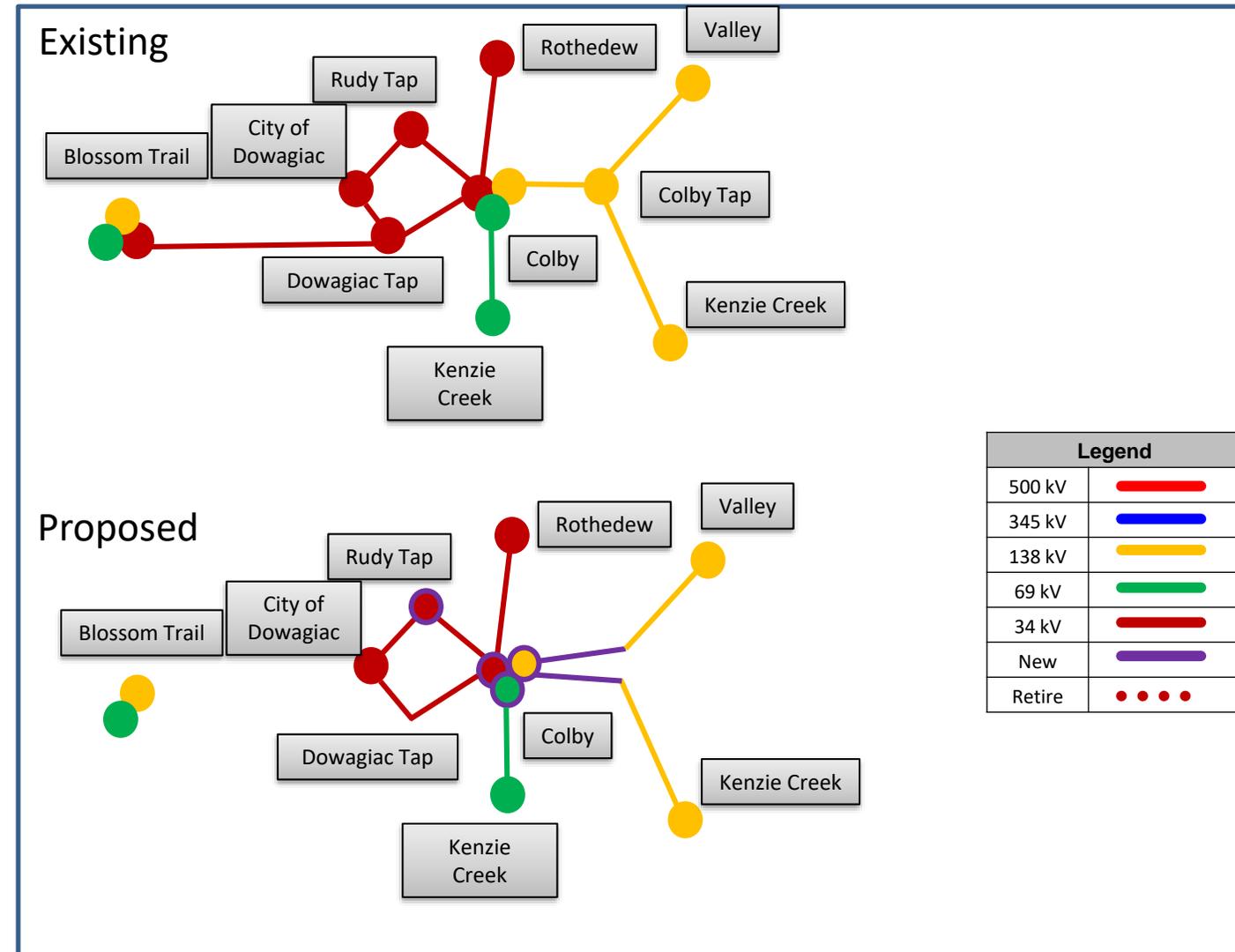
Process Stage: 10/15/2021

Alternatives Considered:

1. Build the station in the clear:
Due to the large amount of needs at this station this option was considered, but due to being surrounded by a railroad, a forested area, and an endangered butterfly habitat; this option was not pursued.
2. Rebuild Blossom Trail – Colby instead of adding a 2nd XFR.
This would require one less 138/34XFR and one less 138kV CB, but would require a 10.2 mile rebuild
Cost: \$41M

Projected In-Service: 6/13/2024

Project Status: Scoping



AEP Transmission Zone M-3 Process New Buffalo – Bridgman 69kV Rebuild

Need Number: AEP-2021-IM016

Process Stage: Solution Meeting 10/15/2021

Previously Presented: Needs Meeting 5/21/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk

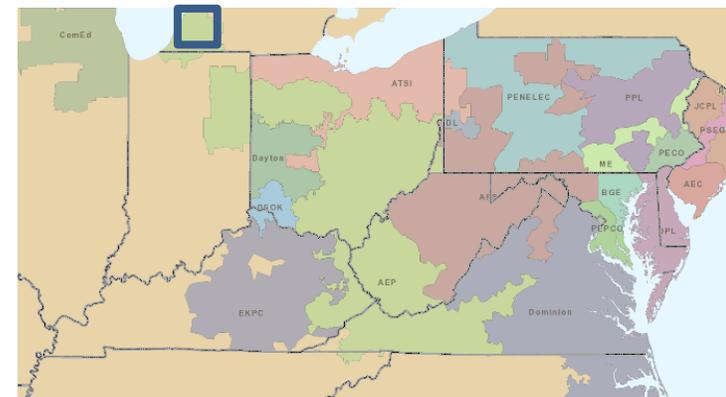
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Model: N/A

Problem Statement:

New Buffalo – Bridgman 69kV line:

- 22.1 miles of mostly 1964-68 wood pole
- Conductor is 336.4 ACSR and 4/0 ACSR
- Since 2015 there have been 4 momentary and 6 permanent outages on the Three Oaks – Bridgman circuit.
- Since 2015 there have been 8 momentary and 2 permanent outages on the Three Oaks – Bosserman circuit.
- 4,488,189 CMI from 2015-2020 on the Bosserman – Three Oaks circuit
- Structures fail NESC Grade B, and AEP Strength requirements with portions failing ASCE structural strength standards
- 23 of 53 structures assessed had wood decay such as rot, heavy checking or woodpecker damage.
- All inspected poles show moderate to heavy shell decay



Need Number: AEP-2021-IM016

Process Stage: Solution Meeting 10/15/2021

Proposed Solution:

New Buffalo – Bridgman 69kV line:

Rebuild the 22.1 mile New Buffalo – Bridgman 69kV line with 556.5 ACSR Dove.

Estimated Cost: \$55.5M

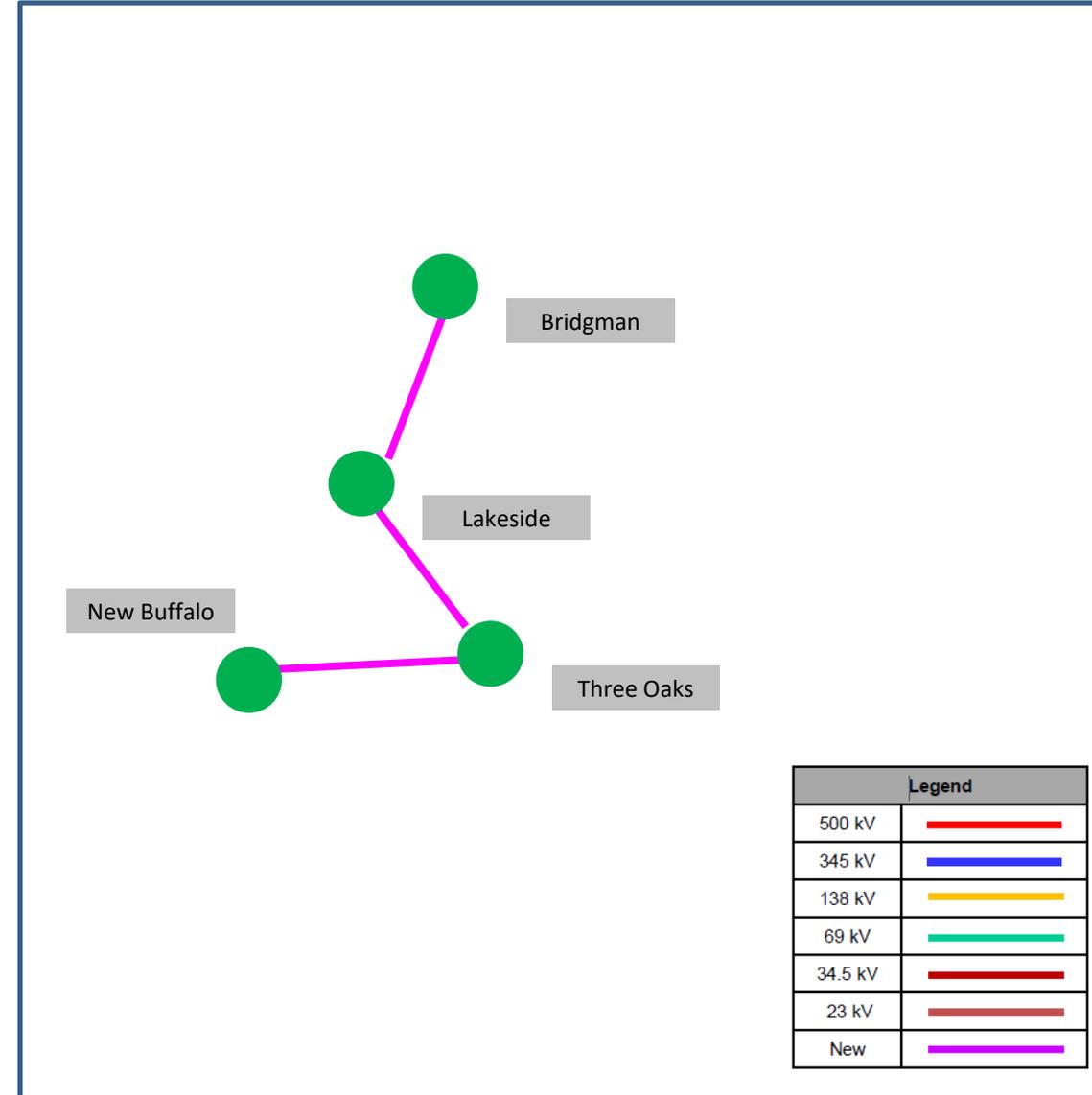
Alternates:

Considering the location and stations served from the line, retirement was not an option as building 138 kV to serve the distribution stations through this area would be cost prohibitive and results in similar amount of new line construction as the proposed rebuild. Further, this would leave New Buffalo (~15 MVA peak load) served from an 8 mile long 69 kV radial.

Rebuild line as greenfield to minimize outages. This wasn't chosen due to increased cost and community impact.

Projected In-Service: 10/01/2025

Project Status: Scoping



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

10/5/2021 – V1 – Original version posted to pjm.com

10/12/2021 – V2 – Slide #21, Project scope is changed and bubble diagram is updated

1/14/2022 – V3 – Slide #24, Added Projected IS Date and split costs correction