

Sub Regional RTEP Committee: Western AEP Supplemental Projects

April 16, 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

AEP Transmission Zone M-3 Process Kanawha, WV

Need Number: AEP-2021-AP015

Process Stage: Need Meeting 4/16/2021

Project Driver: Equipment Condition/Performance/Risk

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

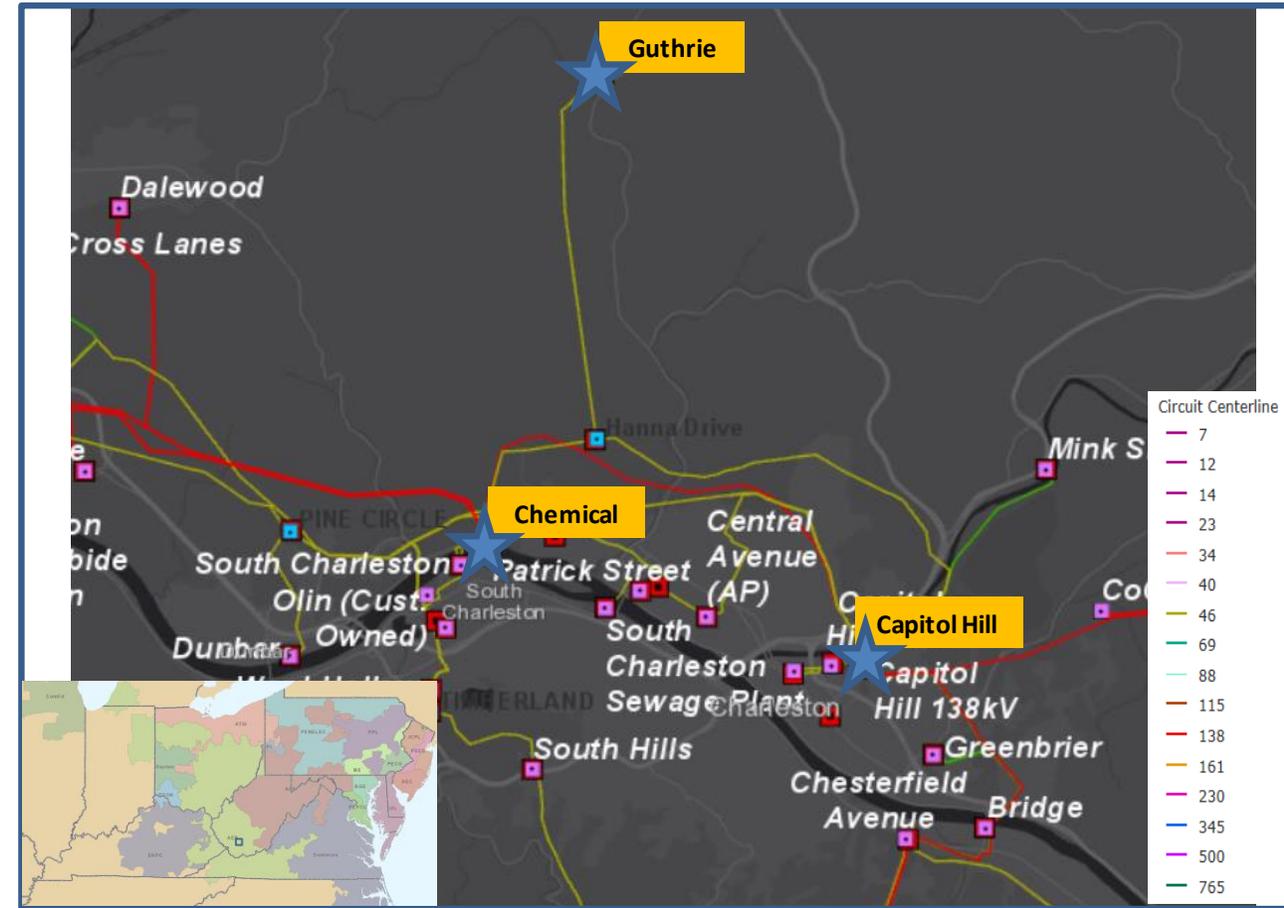
Problem Statement:

Capitol Hill - Chemical 46kV Circuit (~10.9 miles).

- Circuit is comprised mostly of vintage wood pole structures.
 - Original vintage wood structures from 1924, 1964 and 1928
 - The Capitol Hill – Chemical 46kV Line use primarily 1924 vintage 1/0 Copper conductor.
 - The circuits fails to meet 2017 NESC Grade B loading criteria, AEP structural strength requirements and ASCE structural strength requirements
- Since 2015, there have been 8 momentary and 10 permanent outages on the Capitol Hill – Chemical 46kV Circuit.
 - The momentary outages were attributed to lightning (4), wind (1), distribution (1), vehicle accident (1), and unknown (1) causes.
 - The permanent outages were due to vegetation fall-in from outside of the AEP ROW (8), lightning (1), and wind (1) causes.
 - These outages caused 3.1M minutes of interruption for customers at Guthrie Substation.
- Currently, there are 38 structures with at least one open structural condition, which relates to 38% of the structures
 - 88 structural open conditions affecting poles, crossarms, and knee/vee braces including rot, woodpecker holes, broken, split, damaged, and cracked conditions.
 - 8 open shielding or grounding conditions related to worn or damaged shield wire and broken or missing ground wire leads.
 - 3 open hardware conditions related to missing or worn shield wire hardware and broken guys.
 - 1 open ROW condition related to a slip.

Guthrie Tap 46kV Line (~4 miles included in total length above)

- Guthrie Tap 46kV Line serves 22 MVA of peak load served radially
- Line conductor is 1964 vintage 4/0 ACSR.



AEP Transmission Zone M-3 Process Kanawha, WV

Need Number: AEP-2021-AP016

Process Stage: Need Meeting 4/16/2021

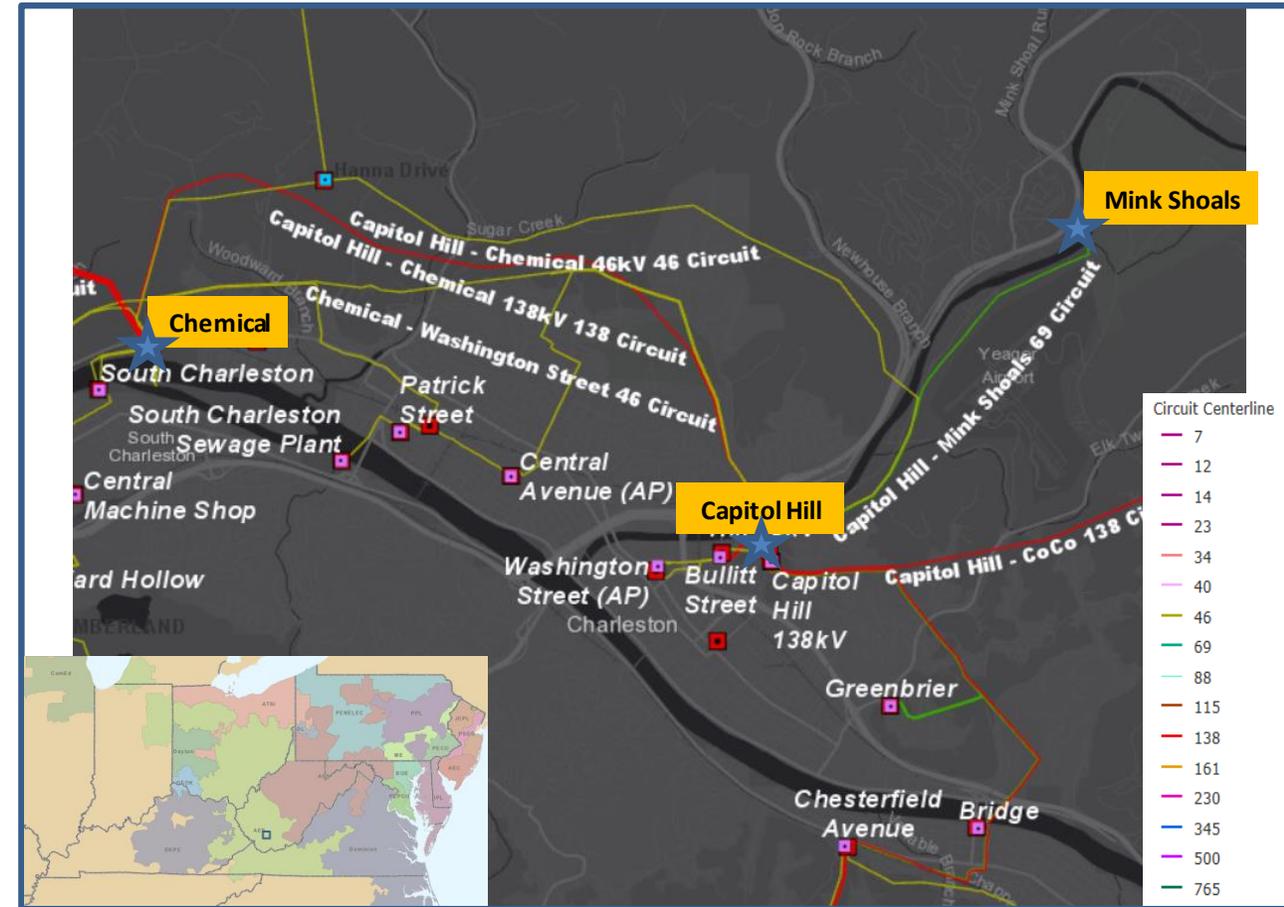
Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

Capitol Hill – Mink Shoals 69 kV (~3.1 miles)

- Circuit is comprised primarily of original vintage wood structures (1928)
 - Conductor utilized is comprised primarily of 1979 vintage 4/0 ACSR, 1928 vintage 3/0 ACSR, and 1980 vintage 795,000 CM ACSR conductors.
 - Circuit fails to meet 2017 NESC Grade B loading, current AEP structural strength requirements and current ASCE structural strength requirements
- Since 2015, there have been 11 momentary and 4 permanent outages on the Capitol Hill – Mink Shoals 69kV Circuit.
 - The momentary outages were attributed to lightning (5), wind (2), unknown (2), animal bus (1), and other station bus operation (1) causes.
 - The permanent outages were attributed to lightning (1), underground line conductor failure (1), vegetation fall-in from outside of the AEP ROW (1), and failed station protection system equipment (1) causes.
 - The permanent outages caused 656k minutes of interruption for 2,420 customers at Mink Shoals Substation.
- 6 structures with at least one open condition (12% of the structures)
 - 8 open structural conditions affecting poles and crossarms including damaged, rot top, woodpecker damaged, insect damaged, and rot heart conditions.
 - 3 open shielding conditions related to worn shield wire.
 - 2 open hardware conditions related to broken insulators.
 - 1 open ROW condition related to a slip.
 - Roughly 30% of the structures had some sort of decay beyond normal weather conditions.



Need Number: AEP-2021-AP017

Process Stage: Needs Meeting 4/16/2021

Supplemental Project Driver: Customer Service

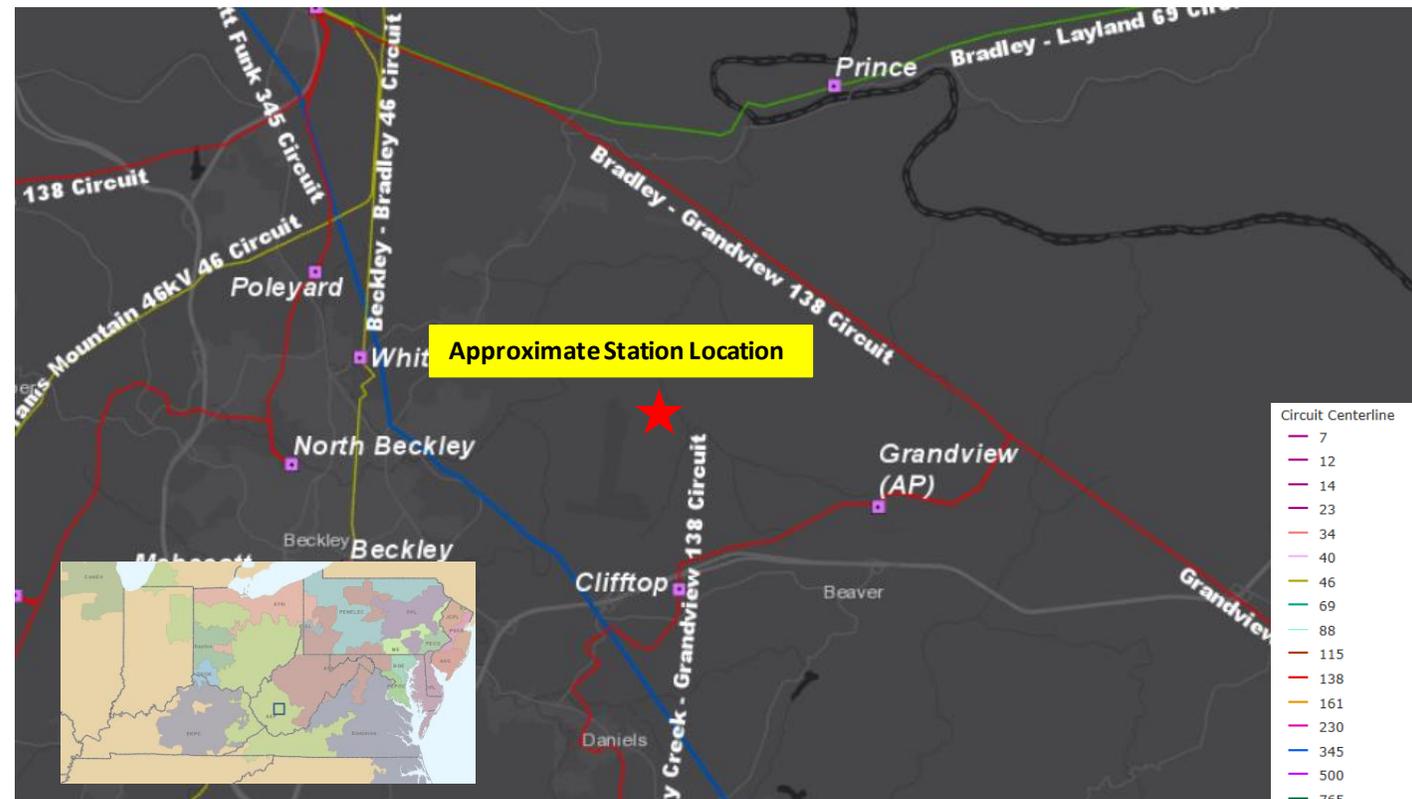
Specific Assumption References: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

APCO Distribution has requested a new distribution station supporting West Virginia Business Ready Sites Program (House Bill 144) located in Raleigh County, West Virginia.

Summer projected load: 16 MVA

Winter projected load: 16 MVA.



Need Number: AEP-2021-AP018

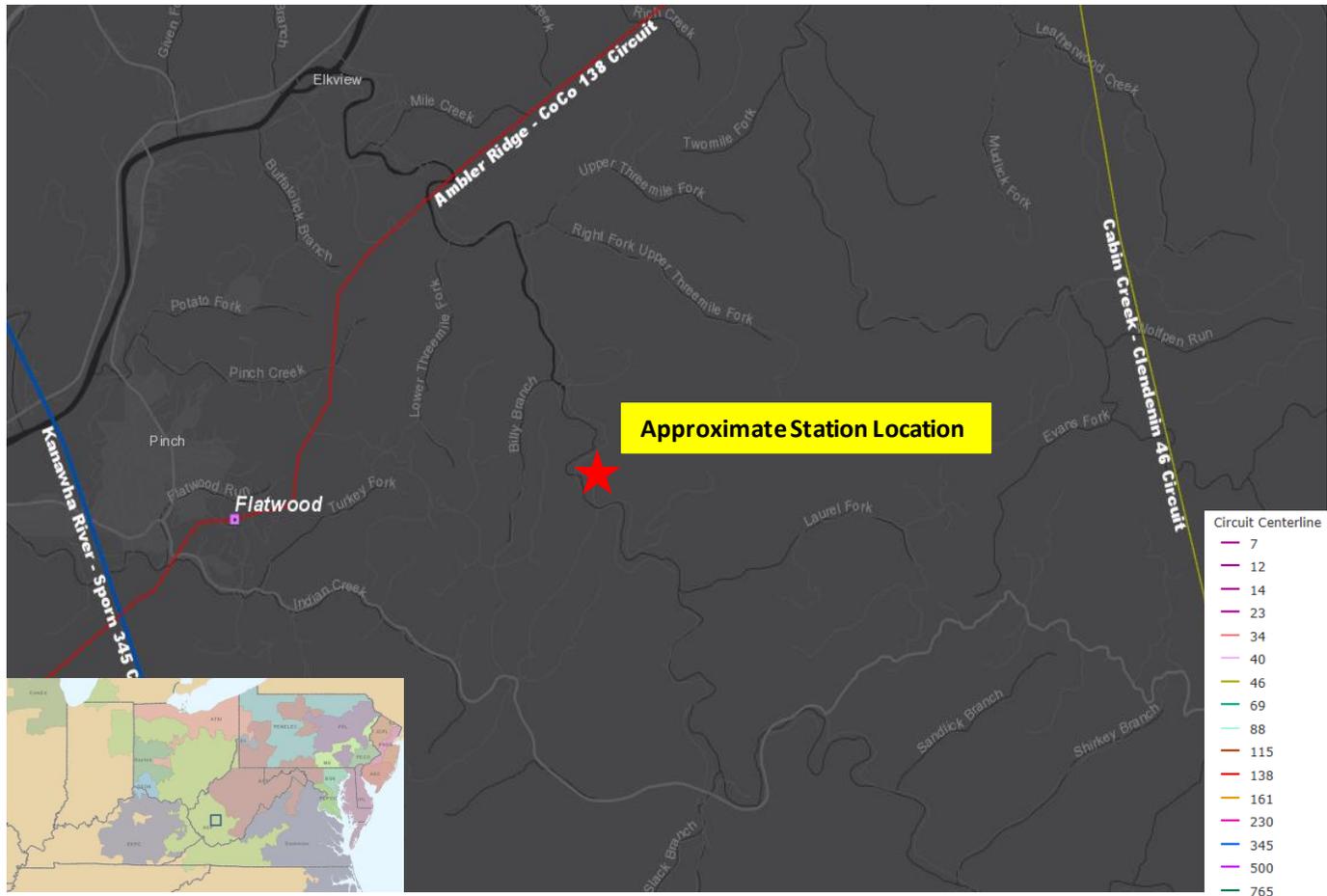
Process Stage: Needs Meeting 4/16/2021

Supplemental Project Driver: Customer Service

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

Problem Statement:

A customer has requested a new delivery point located in Kanawha County, West Virginia.
Summer projected load: 7 MVA
Winter projected load: 7 MVA.



AEP Transmission Zone M-3 Process Benton Harbor, MI Area

Need Number: AEP-2021-IM003

Process Stage: Needs Meeting 4/16/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk

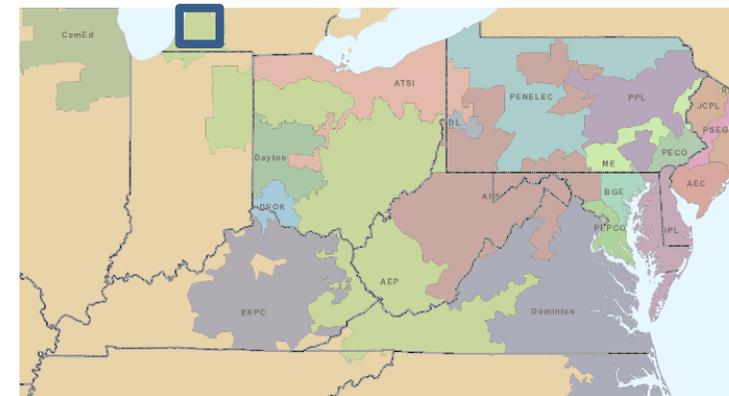
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Model: N/A

Problem Statement:

Riverside–Hartford 138kV line:

- 16.85 miles of mostly 1957 wood H-Frame construction
- Conductor is 397 MCM ACSR
- There are 48 structures with open conditions (36% of line). 40 of these are structure related affecting the crossarm, pole, or X-brace including rot, corrosion, cracked, woodpecker, and disconnected conditions.
- Additional assessment identified the following:
 - 15 structures were subject to some level of decay above normal weathering
 - 10 had crossarm decay
 - 9 had ground line decay
 - 4 had broken/flashed insulators
 - 64% of structures assessed had some level of decay



AEP Transmission Zone: Supplemental Fort Wayne, IN

Need Number: AEP-2021-IM010

Process Stage: Needs Meeting 04/16/2021

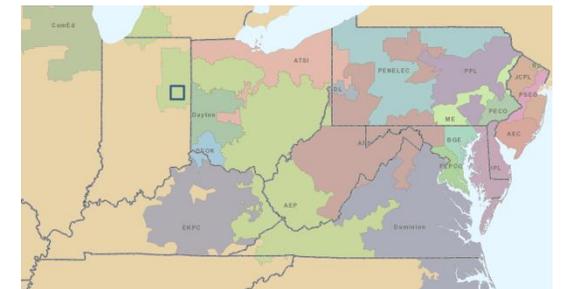
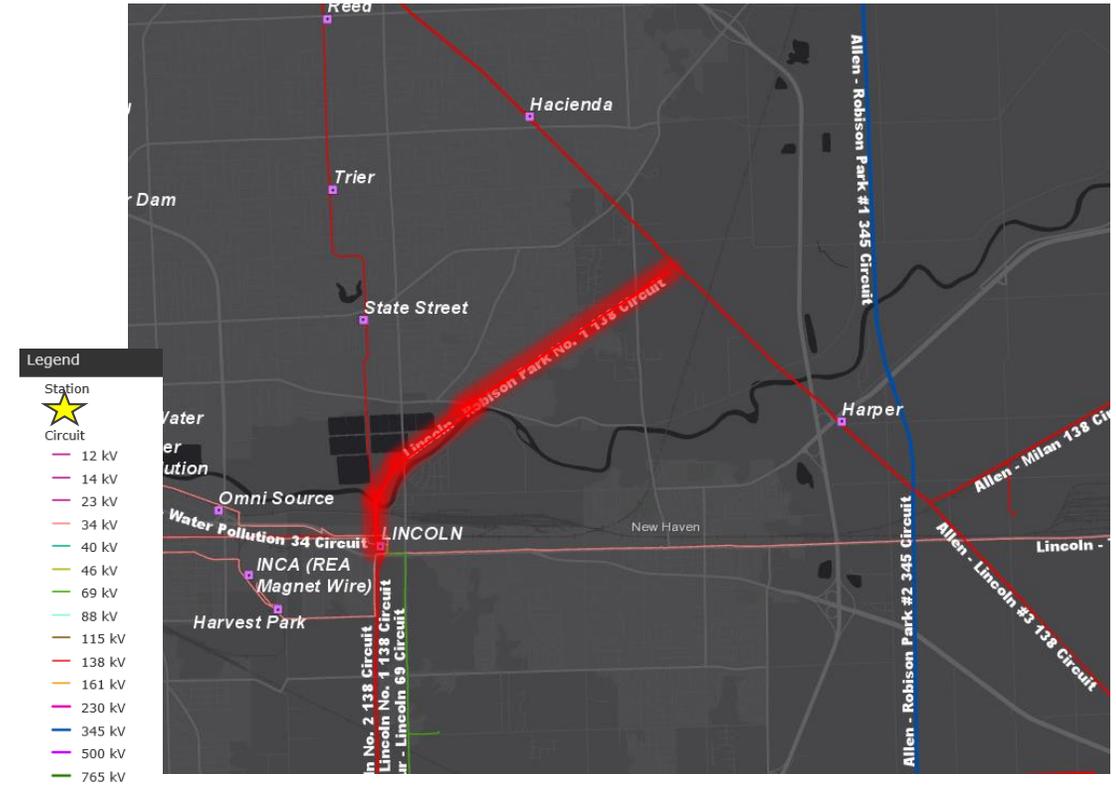
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

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



AEP Transmission Zone M-3 Process Marion/Grant, IN

Need Number: AEP-2021-IM014

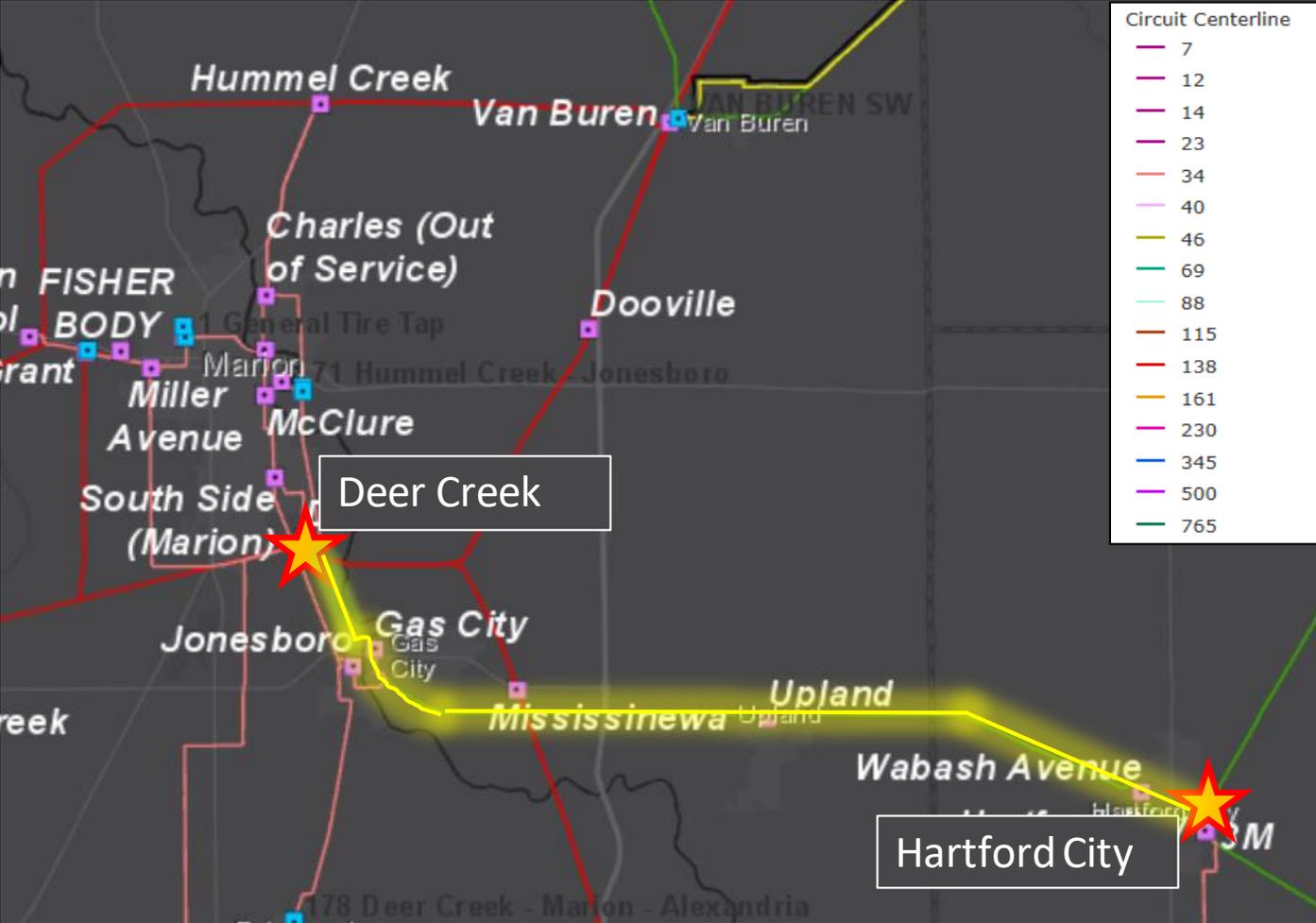
Process Stage: Needs Meeting 04/16/2021

Project Driver: Equipment Material Condition, Performance and Risk

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

Problem Statement:
Deer Creek – Hartford City 69 kV (vintage 1967):

- Length: 17.67 Miles
- Original Construction Type: Wood pole structures with cross arm construction and vertical post insulators.
- Original Conductor Type:
 - 336.4 kCM ACSR 18/1 Merlin (18.17 mi, vintage 1967)
 - 3/0 Copper 7 (30COP) (2.24 mi, vintage 1967)
- Momentary/Permanent Outages: 21 total outages: 10 (Momentary), 11 (Permanent).
- 5 Year CMI: 67,818
- Number of open conditions: 4
 - Open conditions include: Cross arm or pole with split and woodpecker conditions and broken or missing ground lead wire.
- Based on the ground crew assessment roughly 28% of the structures had advanced levels of decay on the poles
- Total structure count: 378 with 366 dating back to original installation.



AEP Transmission Zone M-3 Process Marion/Grant, IN

Need Number: AEP-2021-IM014

Process Stage: Needs Meeting 04/16/2021

Project Driver:

Equipment Material Condition, Performance and Risk

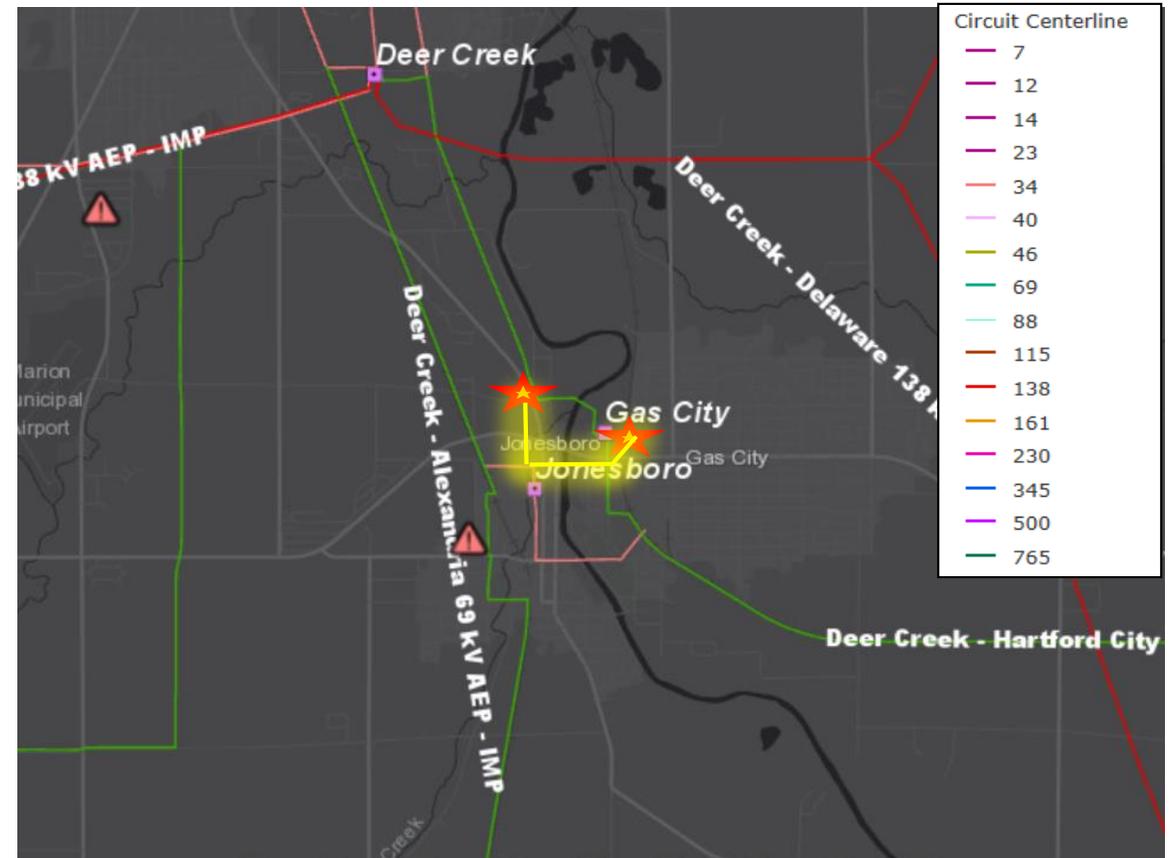
Specific Assumption Reference:

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

Problem Statement:

Jonesboro – Gas City 34.5 kV (vintage 1969):

- Length: 1.01 Miles
- Original Construction Type: Wood pole structures
- Original Conductor Type:
 - 336.4 ACSR 18/1 Merlin (0.65 mi, vintage 1969)
 - 3/0 Copper 7 (0.36 mi, vintage 1969)
- Number of open conditions: 12
 - Open conditions include: Cross arm or pole with split rot conditions, knee/vee brace with loose conditions, broken guy strain insulator and right of way encroaching buildings.
- Total structure count: 34 (original vintage)



AEP Transmission Zone M-3 Process Marion/Grant, IN

Need Number: AEP-2021-IM014

Process Stage: Need Meeting 04/16/2021

Project Driver:

Equipment Material Condition, Performance and Risk

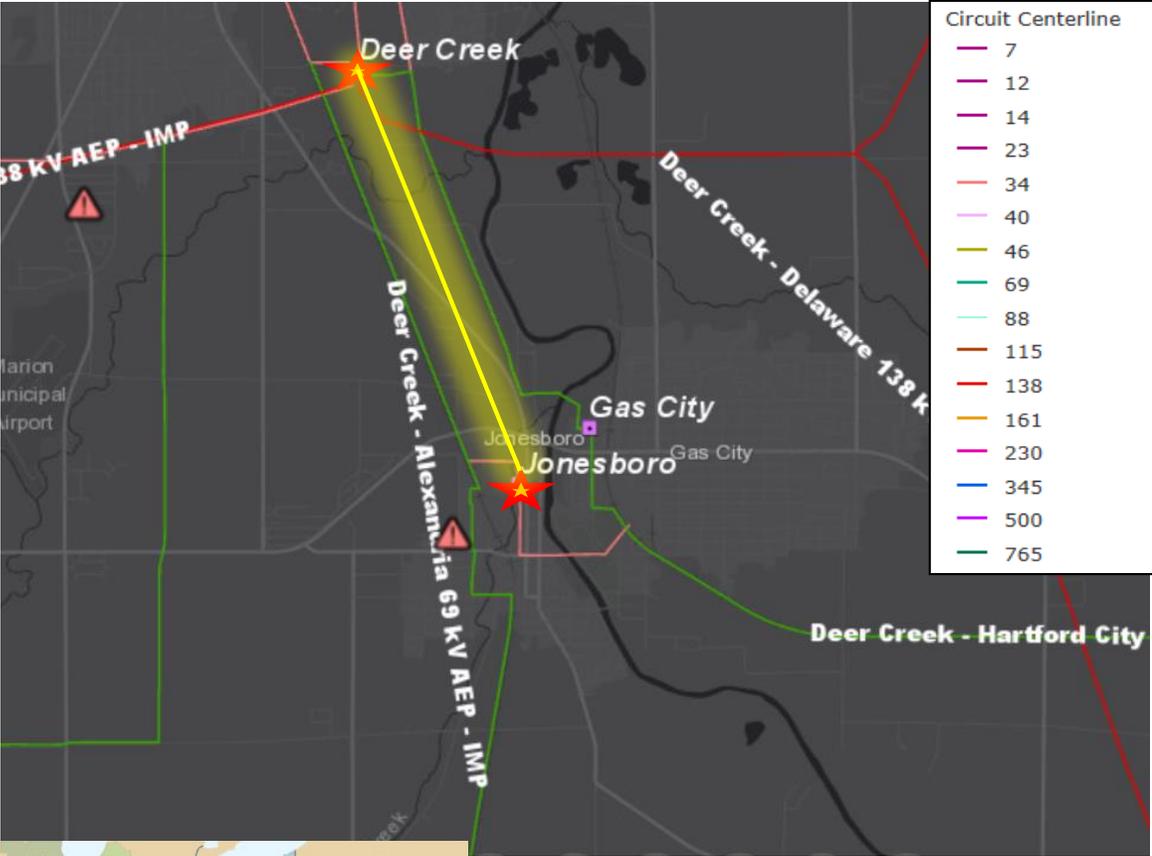
Specific Assumption Reference:

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

Problem Statement:

Deer Creek – Alexandria 34.5 kV (vintage 1968):

- Length: 2.19 Miles
- Original Construction Type: Wood pole structures
- Original Conductor Type:
 - 556.5 kCM ALUM/1250 19 Dahlia
- Number of open conditions: 7
 - Open conditions include: Cross arm or pole with rot top conditions, stolen ground lead wires and improperly installed shield wire.
- Total structure count: 61, with 60 dating back to original installation.



AEP Transmission Zone M-3 Process South Haven, MI

Need Number: AEP-2021-IM015

Process Stage: Needs Meeting 4/16/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk

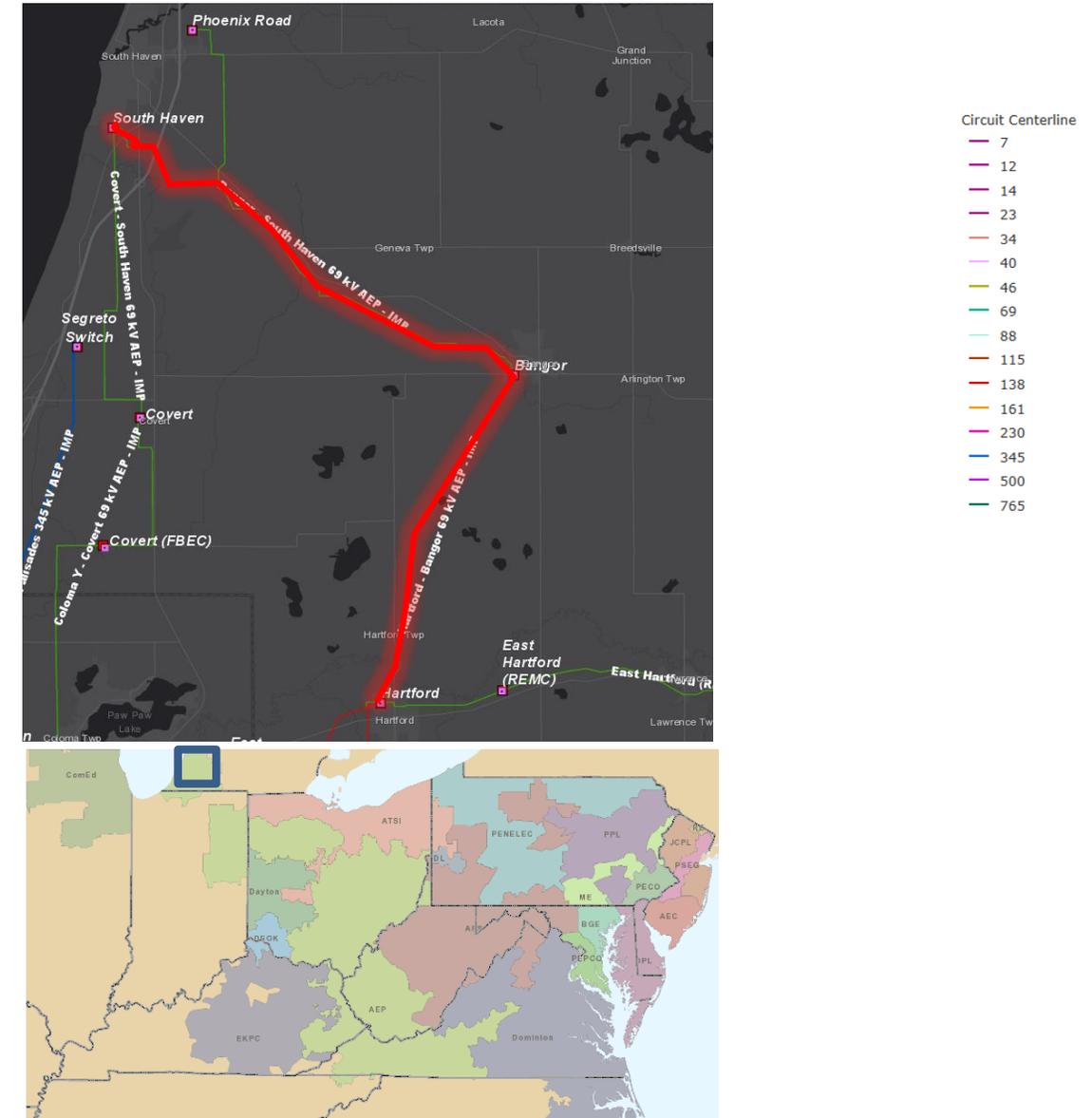
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Model: N/A

Problem Statement:

Hartford – South Haven 69kV line:

- 18.68 miles of mostly 1966 wood pole
- Conductor is 336.4 ACSR
- Since 2015 there have been 20 momentary and 4 permanent outages.
- 4,984,780 CMI from 2015-2020
- Structures fail NESC Grade B, AEP Strength requirements and ASCE strength requirements
- There are 90 structures with open conditions (29% of line). 52 of these are structure related including pole rot, split and woodpecker damage



AEP Transmission Zone M-3 Process Lima, Ohio

Need Number: AEP-2021-OH020

Process Stage: Need Meeting 04/16/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

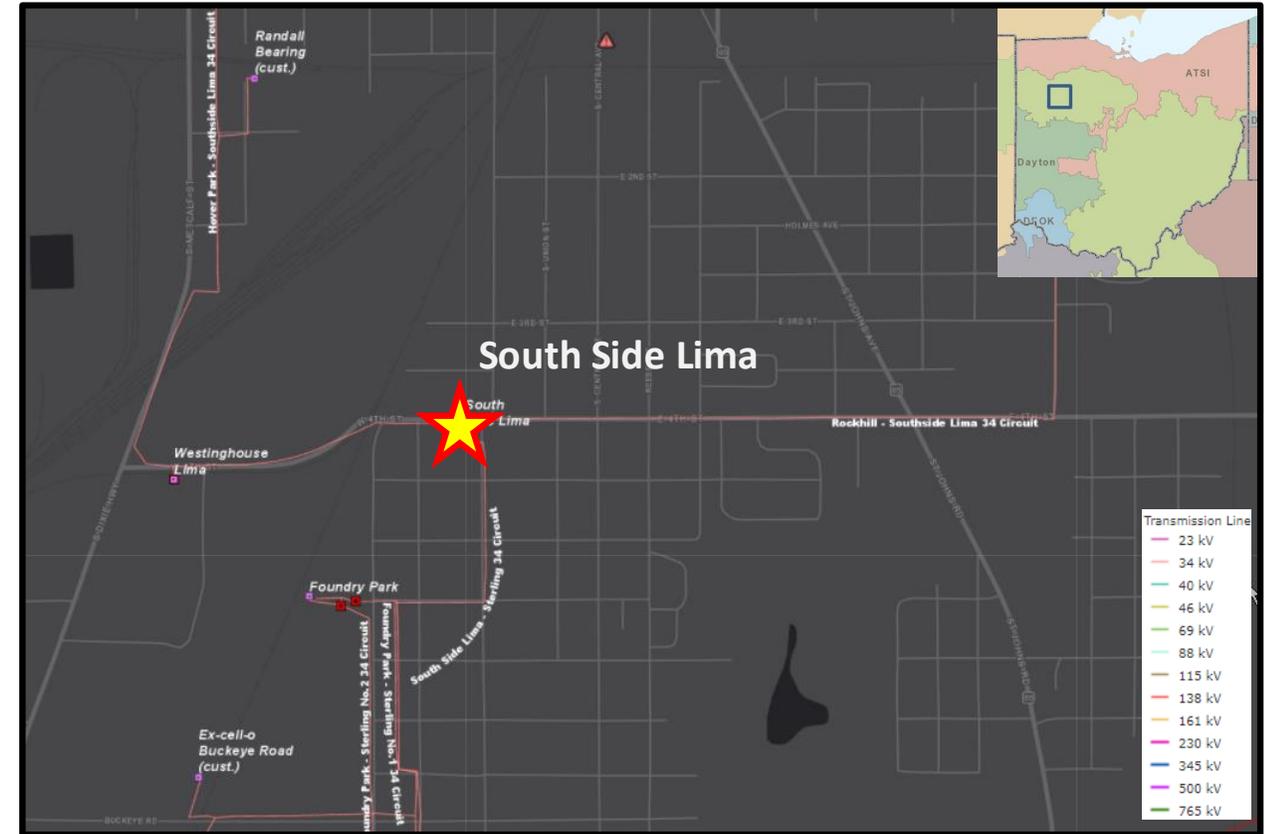
Specific Assumption Reference:

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

Problem Statement:

Circuit Breakers: A & B

- Breaker Age:
 - 1952: A & B
- Interrupting Medium: (Oil)
- 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.
- Note: the most recent PJM short circuit case shows these breakers may be over-dutied. AEP Operations is taking steps to ensure safe operation of these breakers until they are replaced.



AEP Transmission Zone M-3 Process

Crawford County, Ohio

Seneca County, Ohio

Need Number: AEP-2021-OH023

Process Stage: Need Meeting 4/16/2021

Project Driver: Equipment Material/Condition/Performance/Risk

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

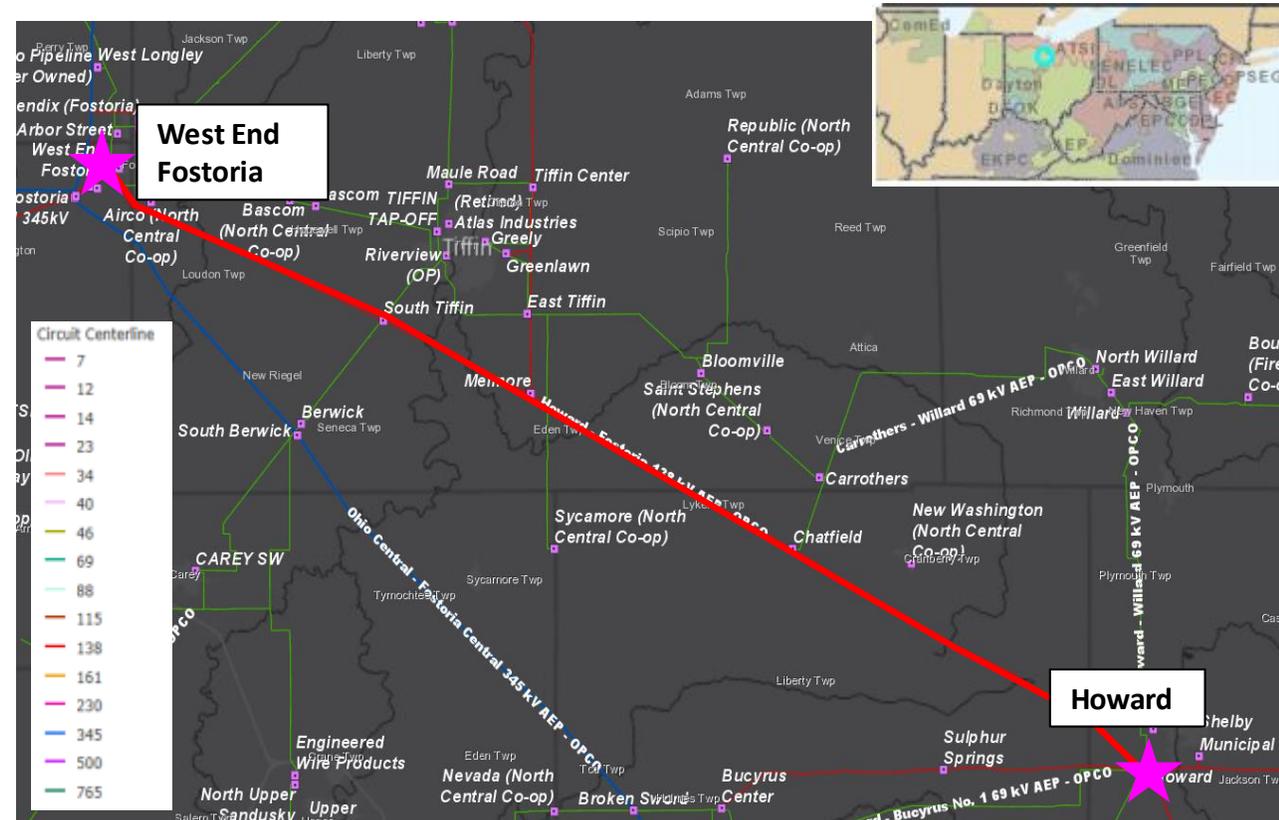
Problem Statement:

Line Name: Howard- Fostoria 138kV

- **Original Install Date (Age):** 1928
- **Length of Line:** 45.34 miles
- **Total structure count:** 264
- **Original Line Construction Type:** Steel Lattice
- **Conductor Type:** 397 CM ACSR 30/7
- **Outage History (last 5 years):** 11 momentary and 2 permanent
- **Condition Summary**
 - Number of open conditions: 126
 - Open conditions include: bent structure lacing, rusting, broken/loose/missing conductors, broken/burnt/chipped/insulators, bent/broken/burnt insulator assemblies and hardware, and broken/loose/worn shield wire.

Additional Notes:

- PJM Baseline Project b3249 will rebuild approximately ~10 miles of this line between Chatfield and Melmore
- 410MW of planned generation on this line in the IPP queue.



AEP Transmission Zone M-3 Process Crawford County, Ohio

Need Number: AEP-2021-OH024

Process Stage: Needs Meeting 04/16/2021

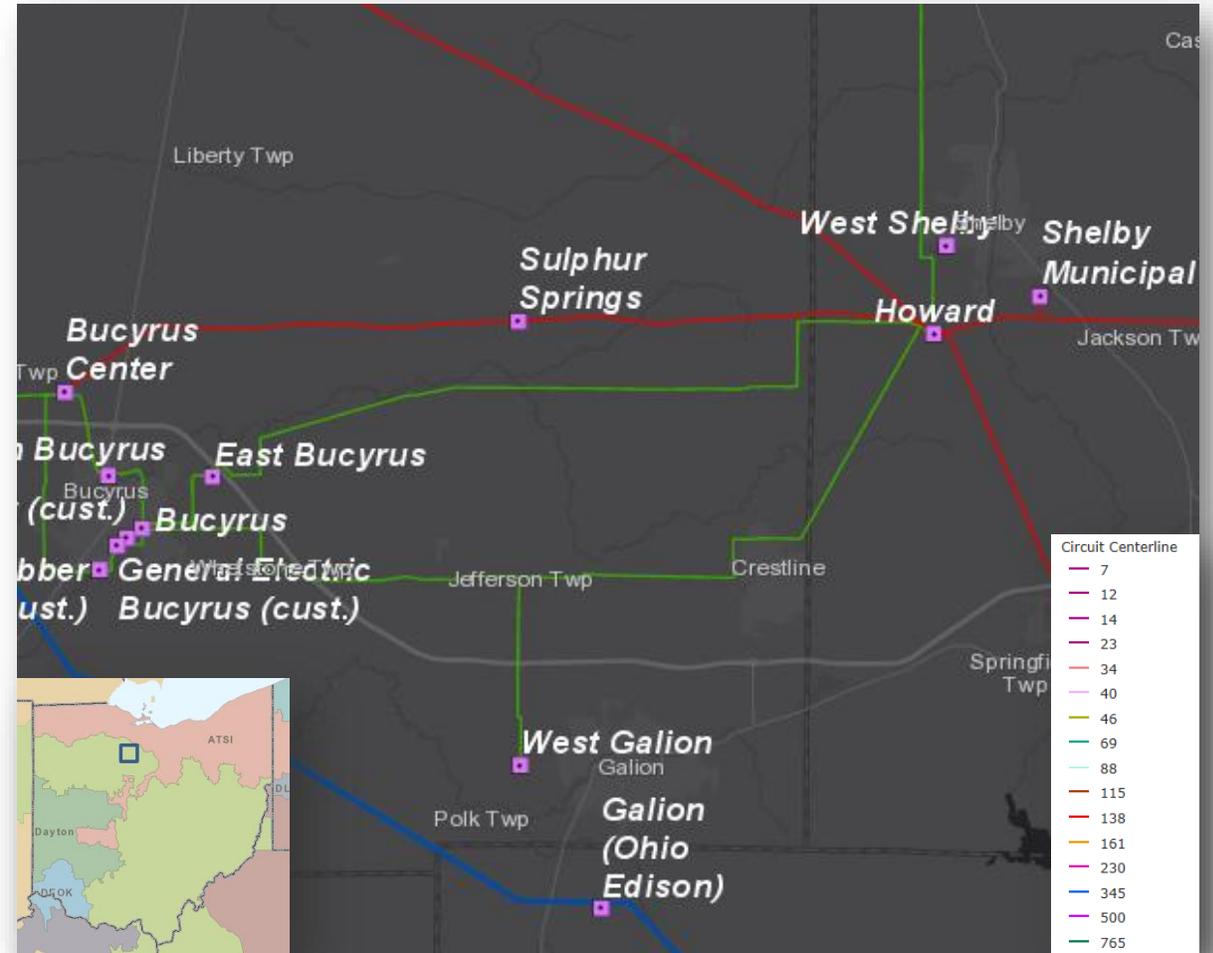
Project Driver: Equipment Material/Condition/Performance/Risk

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

Problem Statement:

Line Name: Bucyrus – Howard No.1 69kV

- **Original Install Date (Age):** 1948
- **Length of Line:** 18.05 miles
- **Total structure count:** 413
- **Original Line Construction Type:** Wood
 - 14 % of structures rehabbed since installation
 - Wood Cross Arms
- **Conductor Type:** 3/0 Copper 7 conductor
- **Outage History (past 5 years)**
 - 7 momentary and 2 permanent outages with an average duration of 5.37 hours
 - CMI: 60,120
- **Condition Summary**
 - Number of open conditions by type / defects / inspection failures: 78
 - Ground lead wire missing, stolen or broken, structure related conditions affecting the cross arm or pole including rot, split or woodpecker holes, contaminated or broken insulator hardware
- Number of Customers at Risk: 331, 11.527 MVA



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-2020-IM020

Process Stage: Solutions Meeting 4/16/2021

Previously Presented: Needs Meeting 8/14/2020

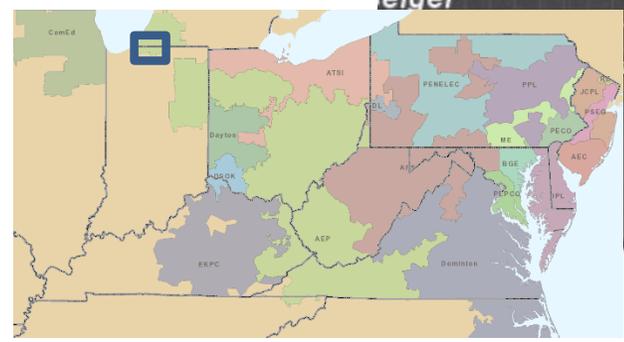
Supplemental Project Driver: Equipment Condition/Performance/Risk

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

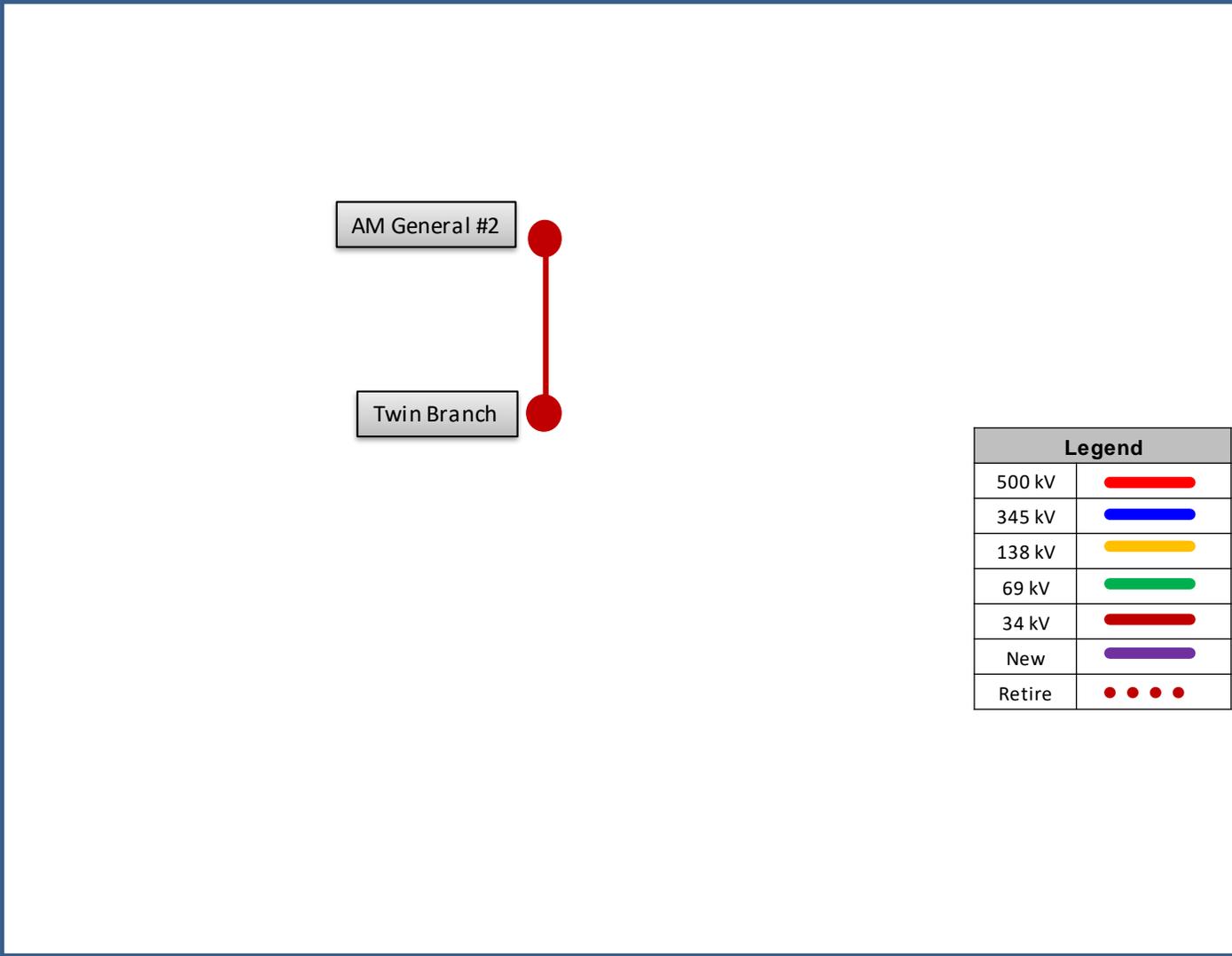
Problem Statement:

AM General-Twin Branch-Kline 34.5kV

- 1 mile of 1950's wood pole cross arm construction
- 7 structures, 28% of the line, with open conditions
 - Open conditions include: pole rot, broken or missing ground lead wires
- The grounding method utilizes butt wraps which is not current AEP standards
- During field assessment structures were found with vertical pole splitting, decay to cross arms, rot top, and upper pole decay



- **Need Number:** AEP-2020-IM020
- **Process Stage:** 4/16/2021
- **Proposed Solution:**
 - Rebuild 0.96 miles of the AM General #2 – Twin Branch 34.5 kV.
- **Total Estimated Transmission Cost: \$4.3M**
 - Note: Increased costs in this area due to commercial/urban development surrounding the existing line resulting in higher ROW costs and short line construction. Current scope requires foundations for 40% of the structures proposed in the rebuild, which also increases the costs. AEP will continue to investigate potential alternates to foundations in order to reduce costs where possible.
- **Alternatives Considered:**
 - Retire the AM General #2 – Twin Branch 34.5 kV. This alternative would remove one of the two feeds to the AM General stations and it is not a viable solution considering the location of the existing line and the customers served from it.
- **Projected In-Service:** 10/1/2024
- **Project Status:** Scoping



AEP Transmission Zone M-3 Process Van Buren Supplemental

Need Number: AEP-2020-IM018

Process Stage: Solutions Meeting 04/16/2021

Previously Presented: Needs Meeting 05/22/2020

Supplemental Project Driver: Equipment

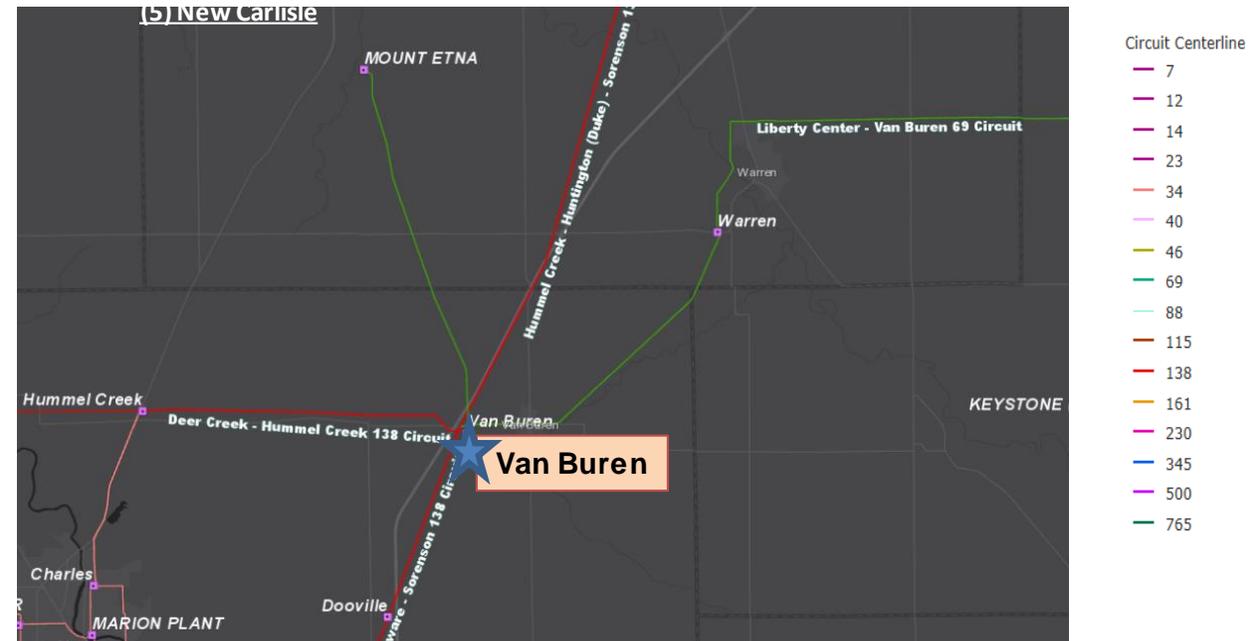
Material/Condition/Performance/Risk/Operational

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

Problem Statement:

Van Buren 138/69/12kv station

- 138/69/12 kV Transformer #1
 - 1967 vintage
 - Elevated moisture levels
 - Increased cost of maintenance due to leaking
 - Increased levels of decomposition of the paper insulating materials, leading to increased risk of failure
- Breaker B 69kV
 - 1964 vintage oil filled, CF-type breaker.
 - This type is oil filled without oil containment. Oil filled breakers have much more maintenance required due to oil handling that their modern, vacuum counterparts do not require.
 - Finding spare parts for these units is not possible due to these models no longer being vendor supported
- Van Buren is part of a three-terminal line configuration with the Delaware – Sorenson 138kV circuit.



Need Number: AEP-2020-IM018
Process Stage: Solutions Meeting 04/16/2021

Proposed Solution:

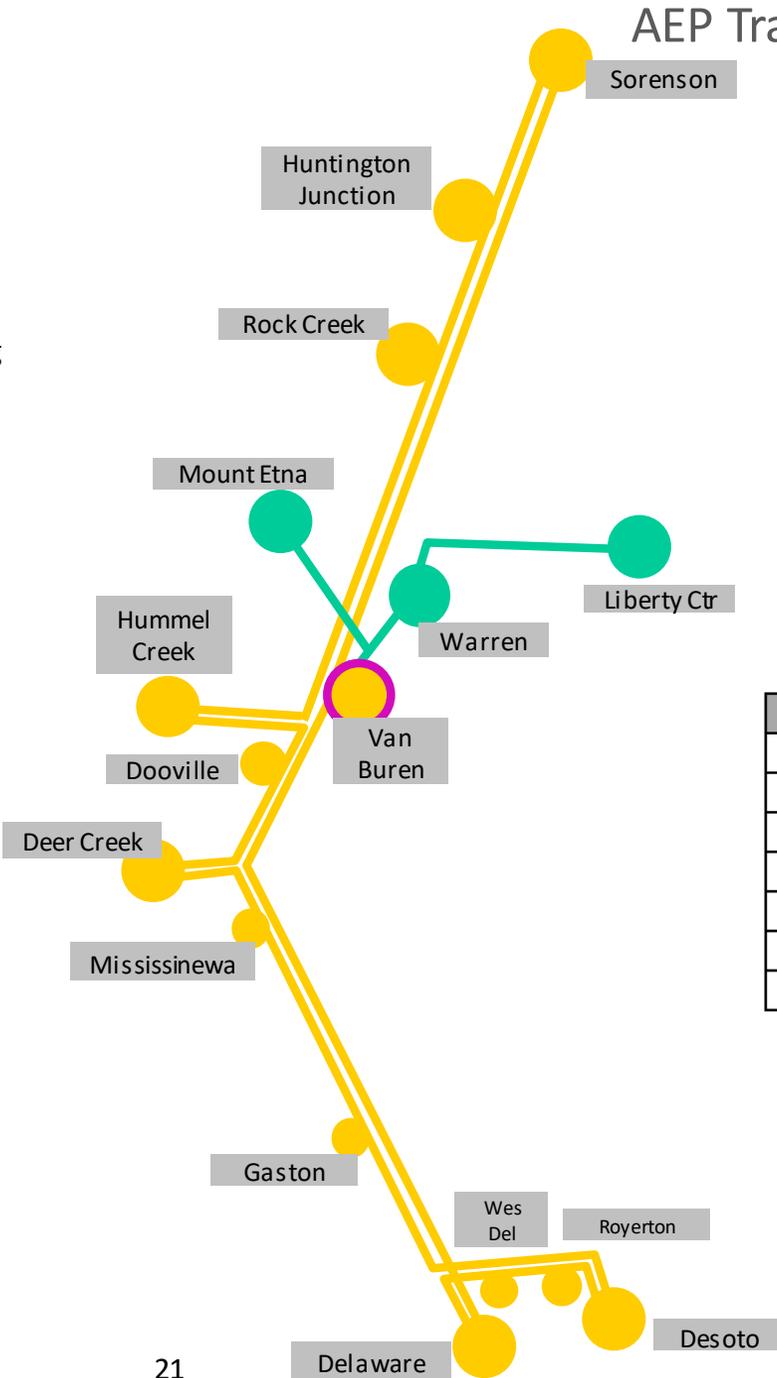
Expand and upgrade Van Buren station to a 3 138kV breaker ring bus to accommodate 3 elements (2 transmission lines and 1 transformer) and eliminate the three-terminal line. Replace 138/69/12kV transformer with separate 138/69kV and 69/12kV transformers to separate the Distribution load from the Transmission transformer's tertiary winding. Replace 69kV CB B.

Estimated Cost: \$9.1M

Alternatives Considered:

Considering the availability of space in and around the station to expand and the customers and 69 kV network served from the station, no additional alternates were identified.

Projected In-Service: 09/01/2022
Project Status: Scoping



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

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

4/2/2021 – V1 – Original version posted to pjm.com

4/5/2021 – V2 – Added Slides #20 and #21