Reliability Analysis Update

Sub Regional RTEP Committee - PJM West

January 15, 2021

Changes to Existing Projects

Baseline Reliability Projects

AEP Transmission Zone: Baseline B3131 Additional Scope

B3131 Previously Presented: 9/25/2019, 10/25/2019 and 3/19/2020 SRRTEP

Criteria: Winter Generator Deliverability and Basecase Analysis

Assumption Reference: PJM RTEP Study

Model Used for Analysis: 2024 RTEP Winter Peak Model

Proposal Window Exclusion: Substation Equipment and Below 200kV

Problem Statement:

The Haviland – East Lima 138kV line is overloaded for multiple contingencies in winter generator deliverability test and basecase analysis test. (N1-WT18, N1-WT19, N1-WT20, N1-WT21, N1-WT22, N1-WT23, N1-WT24, N1-WT25, GD-W244, GD-W3, GD-W4, GD-W5, GD-W7, GD-W8, GD-W19)

Original Scope:
At East Lima and Haviland 138 kV stations, replace line relays and wavetrap, on the East Lima-Haviland 138 kV facility. In addition, replace 500 MCM Cu Risers and Bus conductors at Haviland 138 kV. (**B3131**)

Estimated Cost: $1.5 M

Existing Facility Ratings:

From Bus ID	From Bus Name	To Bus ID	To Bus Name	Ckt Id	SN	SE	WN	WE
242989	05E LIMA 138.00	243017	05HAVILAND1 138.00	1	143	143	143	143

Preliminary Facility Ratings:

From Bus ID	From Bus Name	To Bus ID	To Bus Name	Ckt Id	SN	SE	WN	WE
242989	05E LIMA 138.00	243017	05HAVILAND1 138.00	1	167	~~245~~ 167	210	~~271~~ 210

Additional Scope:(Convert part of S1563.2) Rebuild approximately 12.3 miles of remaining Lark conductor on the double circuit line between Haviland and East Lima with 1033 54/7 ACSR conductor. (**B3131.1**)

S1563.2 estimated cost is reduced from $32.4M to $6.5M due to the conversion.

Estimated Cost for the additional Scope: $25.9M

Preliminary Facility Rating:

From Bus Name	To Bus Name	Ckt Id	SN	SE	WN	WE
05E LIMA 138.00	05HAVILAND1 138.00	1	210	210	258	258

Reason for the additional scope: The original scope for b3131 incorrectly included ratings that indicated the ground clearances on the line conductors between Haviland and East Lima stations would allow for the line to operate at its maximum operating temperature. As the detailed design and engineering effort for the supplemental line rebuild was underway, it was determined that the assumed sag clearances were not available and therefore the emergency ratings could only match the normal ratings of the line conductor. There was no derate on the line required due to the limiting element setting the line ratings to 143; however, additional scope is now needed to mitigate the identified overload by replacing the existing Lark conductor.

Required In-Service: 12/1/2024

Projected In-Service: 12/1/2024

First Review

Baseline Reliability Projects

AEP Transmission Zone: Baseline Chatfield - Melmore Rebuild

Process Stage: First Review

Criteria: Summer Generation Deliverability

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

Problem Statement:

FG: GD-S293

The Chatfield – Melmore 138kV line is overloaded for the loss of the Fostor – Melmore 138kV line with the stuck breaker at Melmore.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05CHATFL – 05MELMOR	167/167/210/210

AEP Transmission Zone: Baseline
Chatfield - Melmore Rebuild

Proposed Solution: Rebuild the Chatfield – Melmore 138kV line (~ 10miles) to 1033 ACSR conductor

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05CHATFL – 05MELMOR	296/413/375/464

Estimated Cost: $27.2M

Ancillary Benefit:

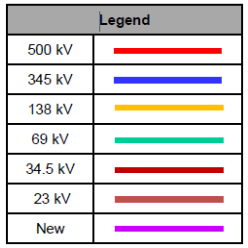
Project will rebuild approximately 10 miles of the 45 mile long Howard – Fostoria 138 kV double circuit line that utilizes lattice structures and 397.5 ACSR conductor that date back to the 1920's.

- From 2014-2019 there were 6 momentary and 3 permanent outages on the line.
- There are currently 232 open conditions identified on the 45 mile long Howard – Fostoria line related to structure and hardware issues.
- 248 of the 258 structures that make up the 45 mile Howard – Fostoria double circuit 138 kV line are lattice structures from the 1920's. The other 10 structures that make up the line are a mix of steel and wood structures dating between 1962 and 2016.
- ~99% of the circuit conductor is 397.5 ACSR that was installed in the 1920's.
- The baseline proposal is rebuilding 10 miles of the existing 45 mile long line to address the overloaded 397.5 ACSR conductor between Chatfield and Melmore.

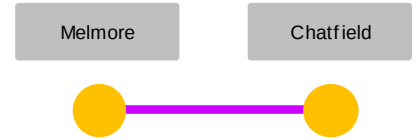
Alternatives: None

Required In-Service: 6/1/2025

Existing Configuration:



Future Configuration:



AEP Transmission Zone: Baseline Howard – Willard 69kV Rebuild

Process Stage: First Review

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

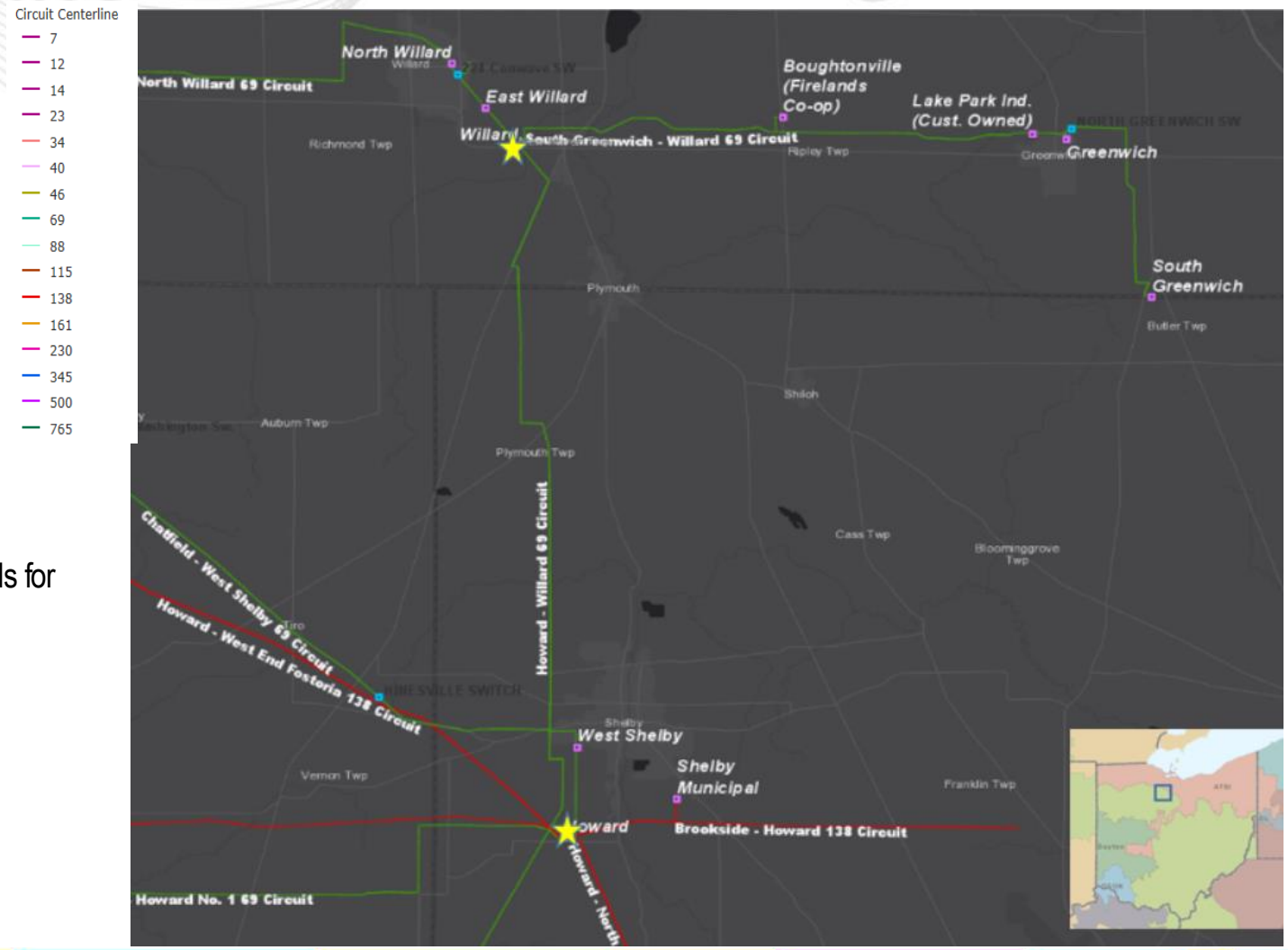
Problem Statement:

AEP-T31 through AEP-T36, AEP- T407

In the 2025 Summer RTEP case, The Howard - Willard 69 kV line overloads for various N-1 and N-1-1 contingencies in the near the Willard area.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05HOWARD – 05WILLARD 69KV	44/44/56/56



AEP Transmission Zone: Baseline Howard – Willard 69kV Rebuild

Proposed Solution:

Rebuild 10.5 miles of the Howard - Willard 69 kV line utilizing 556 ACSR conductor. **Estimated Cost:**19.0M

Upgrade relaying at Howard station. **Estimated Cost:**0.23M

Upgrade relaying at Willard station. **Estimated Cost:**0.23M

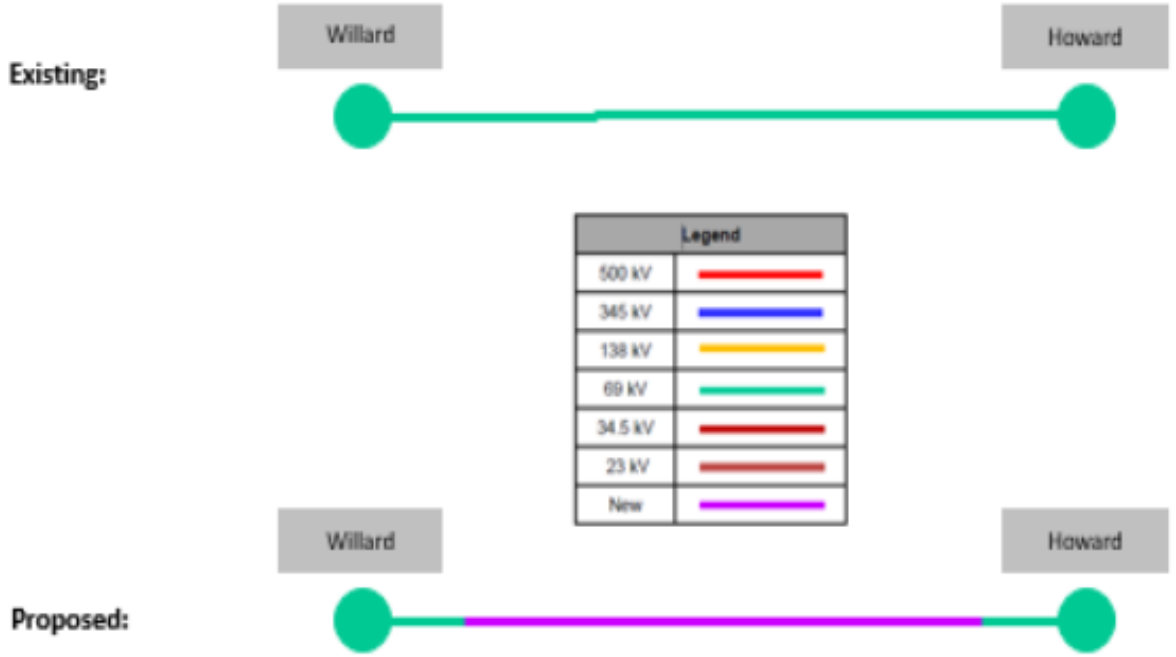
Total Estimated Cost: $19.46M.

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05HOWARD – 05WILLARD 69KV	82/90/107/113

Ancillary Benefits: The project will rebuild approximately 10.5 miles of the 14 mile Howard – Willard 69 kV line that utilizes 1920's vintage 3/0 ACSR and 3/0 Copper conductor.
Howard – Willard 69kV Circuit (~14 miles):

- From 2015-2020 this circuit has experienced 1 permanent and 11 momentary outages.
- Majority of structures are wood poles. Close to half of the wood pole structures are 1970's or older, with the bulk of them being 1940's vintage. Other structures have been replaced sporadically on the line throughout the years (80's-90's) with like for like wood pole replacements that would not support a larger conductor than the existing 3/0 ACSR/Copper.
- Certain portions of the line have been rebuilt in the 1990's and 2000's associated with relocations and utilize a larger 556 ACSR conductor. These sections will not be rebuilt as a part of this proposal.
- ~75% of the circuit conductor is 3/0 ACSR and Copper type that was installed in the 1920's. The other ~25% is 556 ACSR conductor on sections that will not be rebuilt as a part of this proposal.

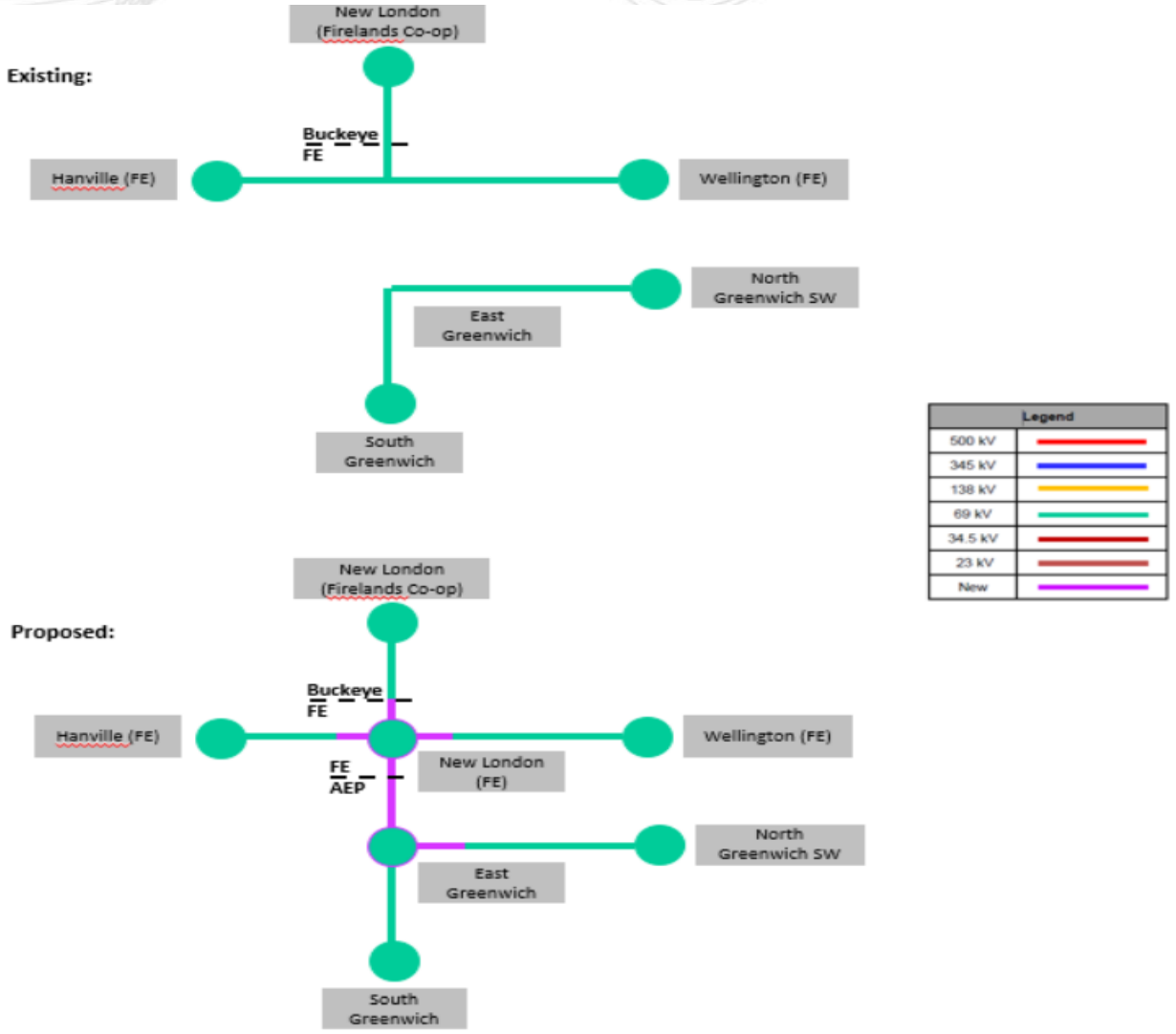


AEP Transmission Zone: Baseline Howard – Willard 69kV Rebuild

Alternatives:

Construct a greenfield 8 mile 69 kV line utilzing 556 ACSR conductor between a new East Greenwich station and a new New London station (AEP); Build the greenfield East Greenwich Station (AEP) in a three breaker ring configuration (AEP); Establish a greenfield four breaker ring station at New London (FE); Construct a new double circuit 2.5 mile 69 kV line to connect the existing Hanville - Wellington 69 kV line (FE) in and out to the greenfield New London Station. (FE) **Total Estimated Cost:** $30M+

Required In-Service: 6/1/2025



Recommended Solution

Baseline Reliability Projects

ATSI Transmission Zone: Baseline Greenfield 69 kV Substation

Process Stage: Recommended Solution

Criteria: Short Circuit

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

Problem Statement:

FG: ATSI-SC100

In the 2020 RTEP 2025 FERC 715 analysis breaker 501-B-251 at Greenfield substation was identified as over its Short Circuit capability

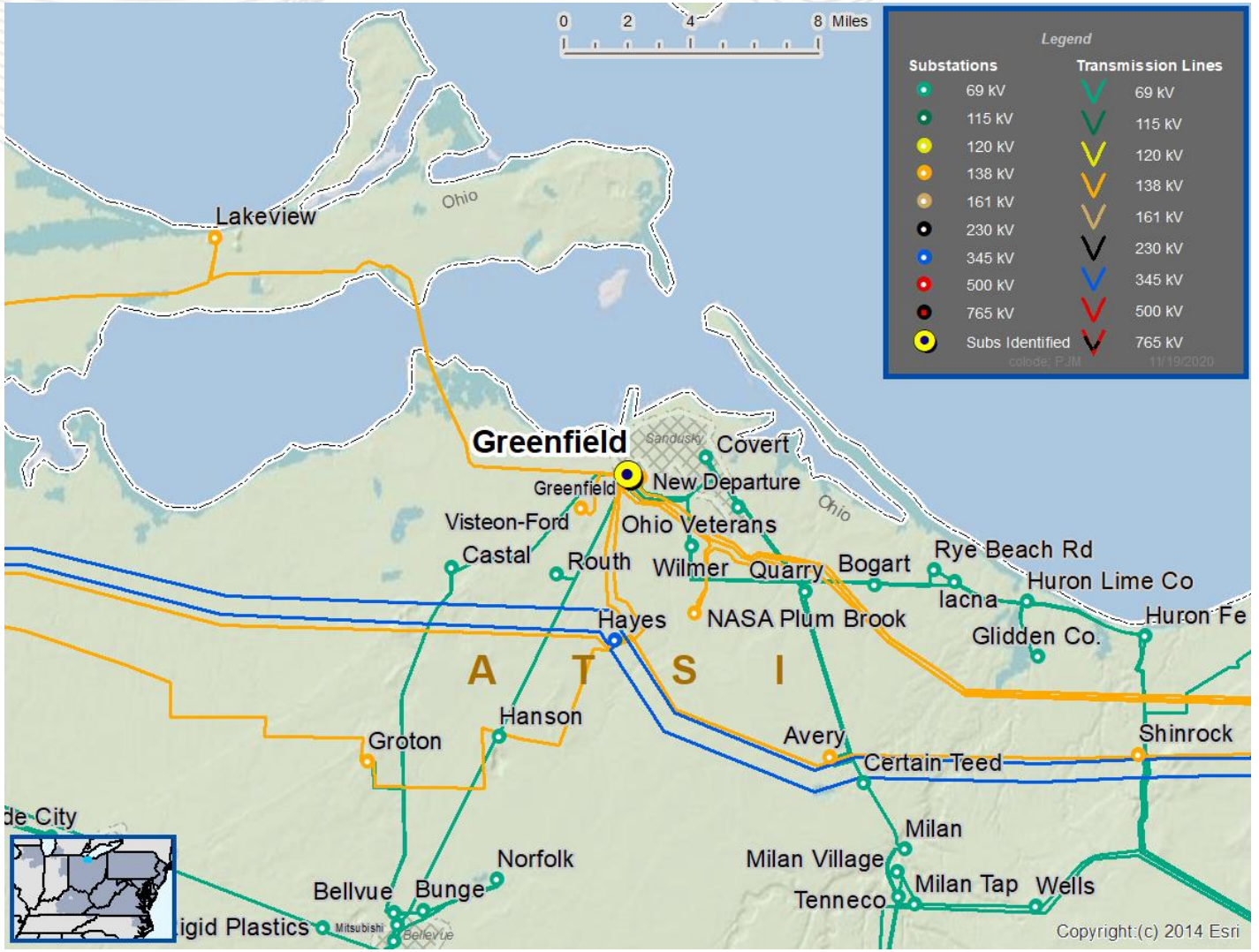
Proposed Solution: Replace the existing breaker 501-B-251 with a new 69 kV breaker with a higher (40 kA) interrupting capability **(B3260)**

Estimated Cost: $0.86M

Alternatives: N/A

Required In-Service: 12/1/2021

Previously Presented: 12/18/2020



AEP Transmission Zone: Baseline
Cabin Creek – Kelly Creek Rebuild

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

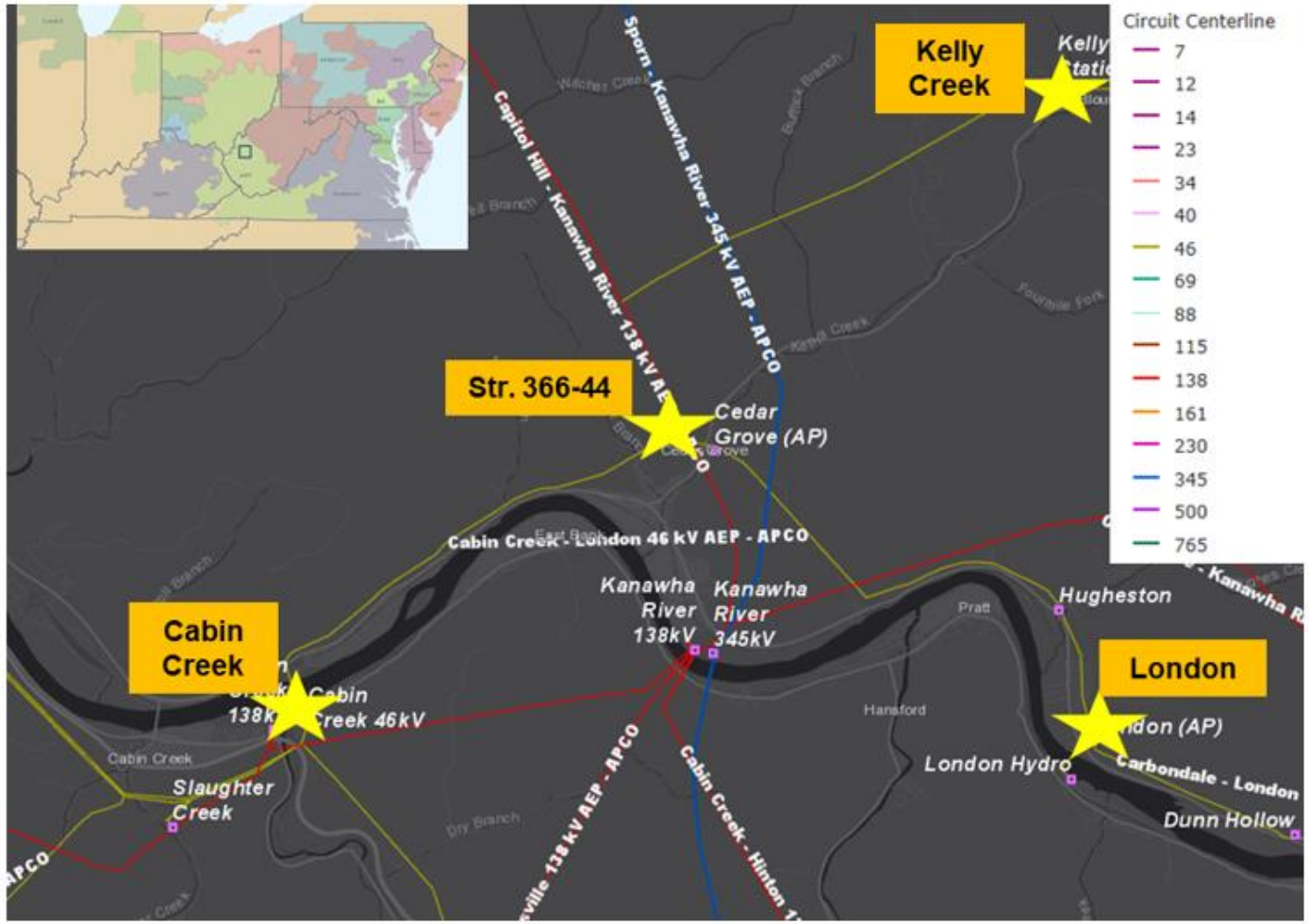
Problem Statement:

FG: AEP-T409 and AEP-410

In the 2025 Summer RTEP case, the Cabin Creek - Kelly Creek 46 kV line is overload for N-1-1 outage of the loss of the Amber Ridge – Linden Road 138kV line and the loss of Jarrett – Flatwood – Coco 138KV line.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
03KELLY CK – 05CABNCRK1 46kV	31/31/43/43



AEP Transmission Zone: Baseline
Cabin Creek – Kelly Creek Rebuild

Recommended Solution:

Rebuild the existing Cabin Creek - Kelly Creek 46 kV line (to structure 366-44), approximately 4.4 miles. This section is double circuit with the existing Cabin Creek - London 46 kV line so a double circuit rebuild would be required (**B3280**)

Estimated Cost: $17.9M

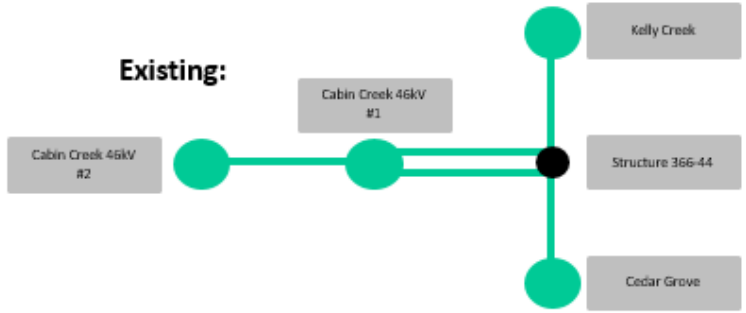
Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05KELLY CK – 05CABNCRK1 46kV	45/50/60/63

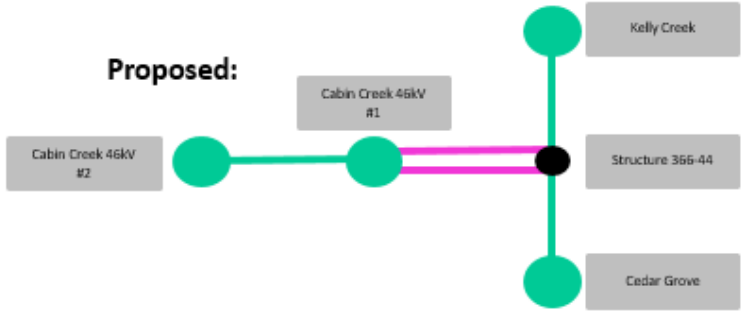
Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 12/18/2020



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



AEP Transmission Zone: Baseline
Lock Lane - Point Pleasant Rebuild

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

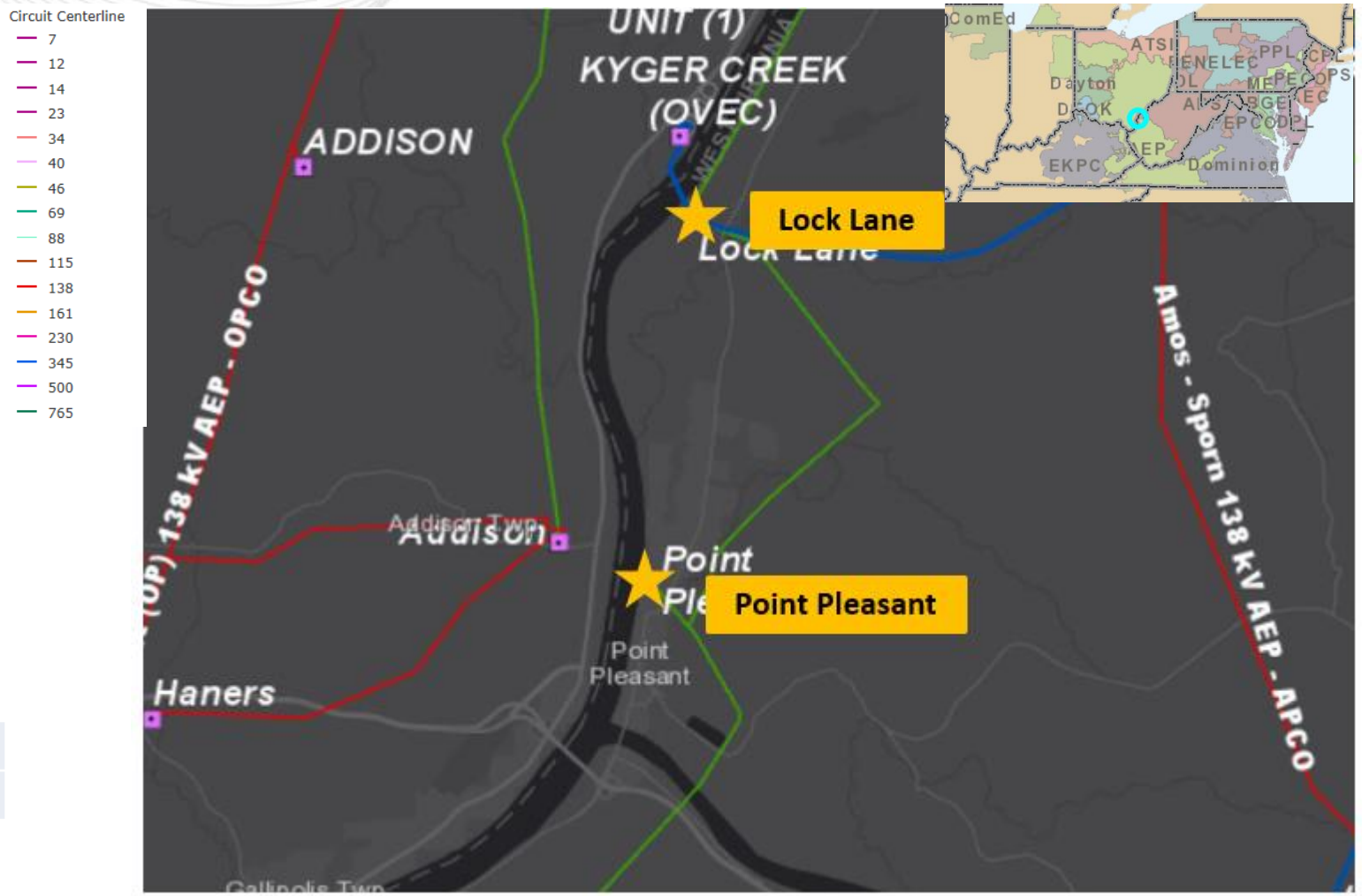
Problem Statement:

FG: AEP-T37,AEP-T38, AEP-T39, AEP-T40, AEP-T41, AEP-T42, AEP-T43

In the 2025 Summer and Winter RTEP cases, the Lock Lane – Point Pleasant 69kV line is overloaded in the event of an N-1-1 scenario that includes the loss of both 138kV sources into Apple Grove (Apple Grove – Sporn 138 kV and Apple Grove – South Point 138 kV).

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05LOCK LAN – 05PTPLEASN 69kV	44/44/56/56



AEP Transmission Zone: Baseline Lock Lane - Point Pleasant Rebuild

Recommended Solution:

Rebuild ~5.44 miles of 69kV line from Lock Lane to Point Pleasant.
(**B3284**) **Estimated Cost:** $13.5M

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05LOCK LAN – 05PTPLEASN 69kV	102/102/129/129

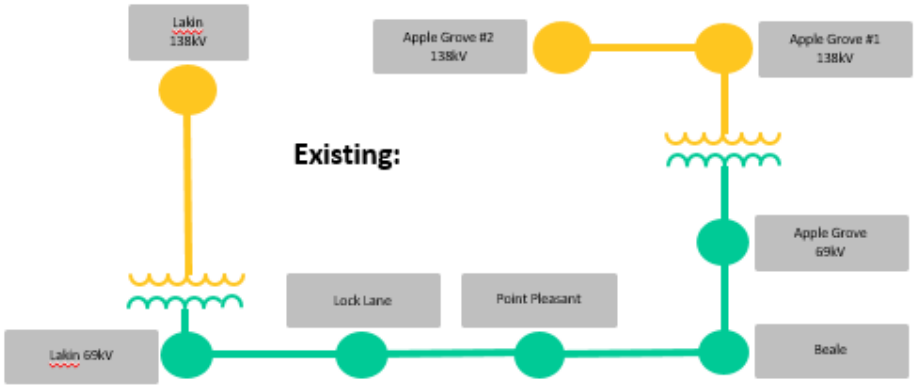
Ancillary Benefits:

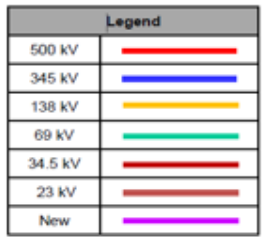
Addresses needs presented to stakeholders as AEP-2020-AP017.

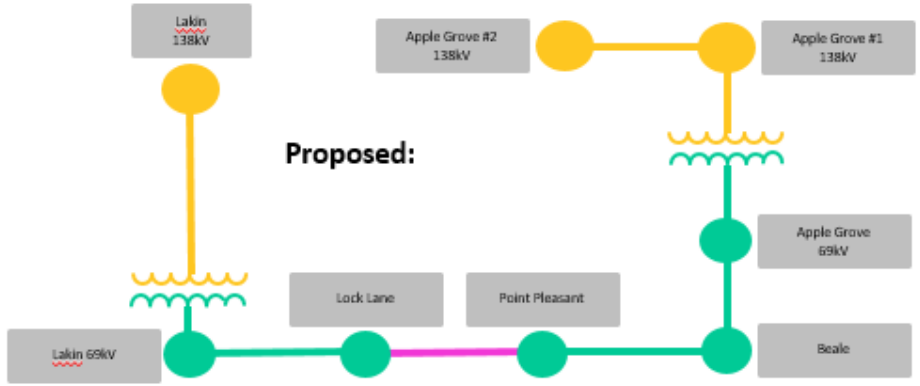
Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 12/18/2020







AEP Transmission Zone: Baseline Meigs Area Upgrades

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV & Substation equipment exclusion

Problem Statement:

FG: AEP-T12, AEP-T13, AEP-T14, AEP-T15, AEP-T143, AEP-T144, AEP-T145, AEP-T146, AEP-T182, AEP-T183, AEP-T184, AEP-T185

In 2025 Summer and Winter RTEP cases, the N-1-1 of the Ripley 138/69 kV 130 MVA transformer and the Ravenswood – Racine 69 kV and the N-1-1 of the Leon - Ripley 138 kV and the Ravenswood – Racine 69 kV overloads the following:

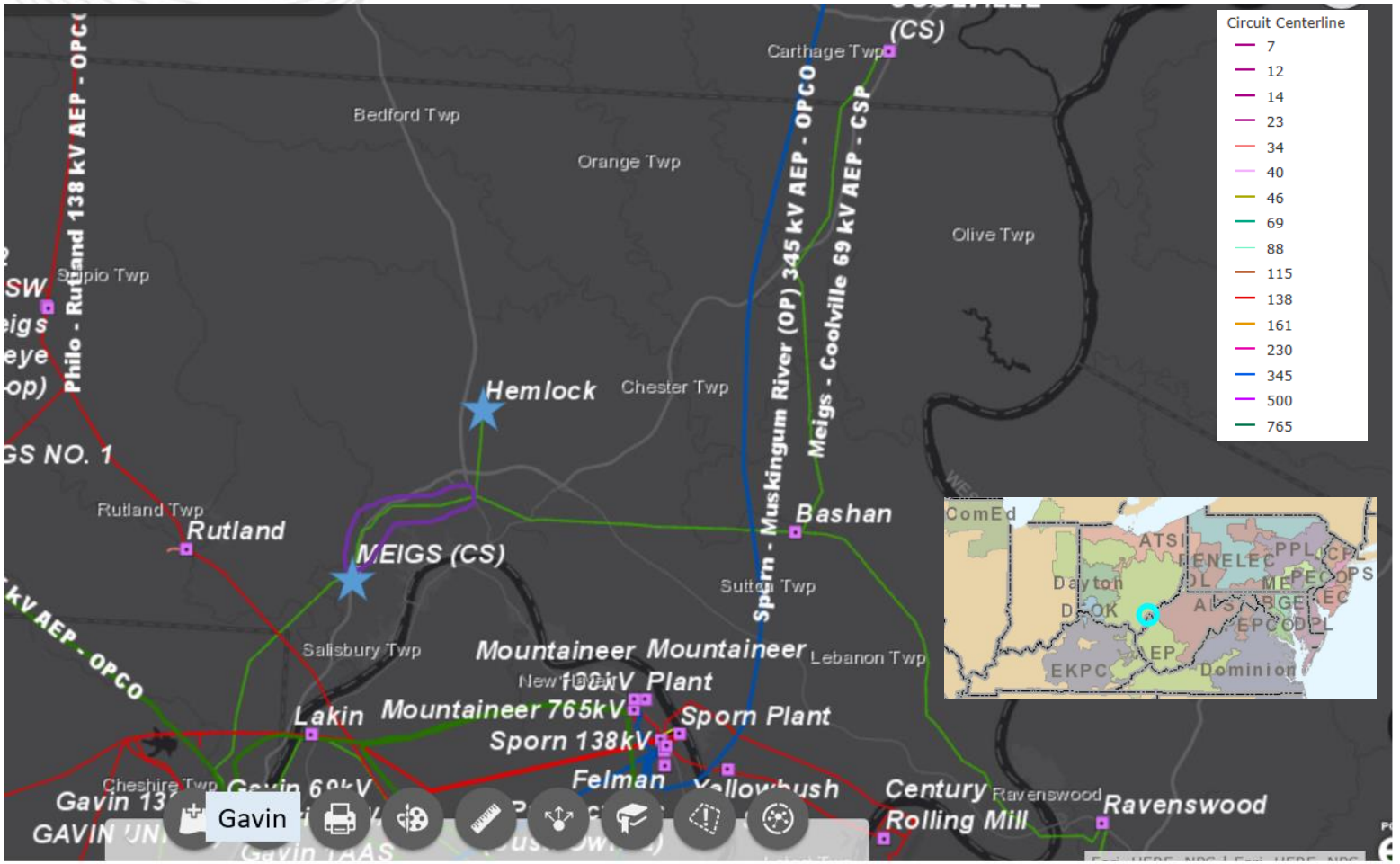
*Meigs – Gavin 69 kV to 101.75% of its WE rating of 82 MVA

*Meigs – Hemlock 69 kV to 120.11% of its WE rating of 63 MVA

*Meigs – Hemlock 69 kV to 121.74% of its SE rating of 50MVA

Existing Facility Rating:

Branches	SN/SE/WN/WE (MVA)
05MEIGS – 05HEMLOCK 69KV	50/50/63/63
05GAVIN1 – 05MEIGS 69KV	55/69/72/82



AEP Transmission Zone: Baseline Meigs Area Upgrades

Recommended Solution:

Replace the Meigs 69 kV 4/0 Cu station riser towards Gavin and rebuild the section of the Meigs – Hemlock 69 kV circuit from Meigs to approximately structure #40 (~4 miles) replacing the line conductor 4/0 ACSR with the line conductor size 556.5 ACSR. (**B3285**)

Estimated Cost: $12.14M

Preliminary Ratings:

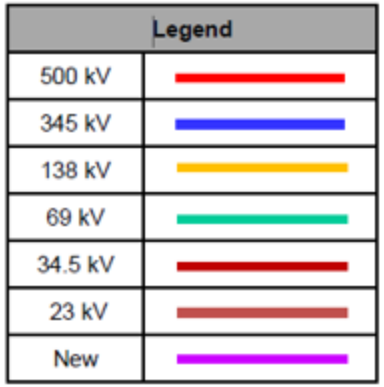
Branches	SN/SE/WN/WE (MVA)
05MEIGS – 05HEMLOCK 69KV	79/90/100/109
05GAVIN1 – 05MEIGS 69KV	75/75/94/94

Required In-Service: 6/1/2025

Projected In-Service: 9/15/2024

Previously Presented: 12/18/2020

Existing:



Proposed:

AEP Transmission Zone: Baseline Merrimac - Midway 69 kV Line

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

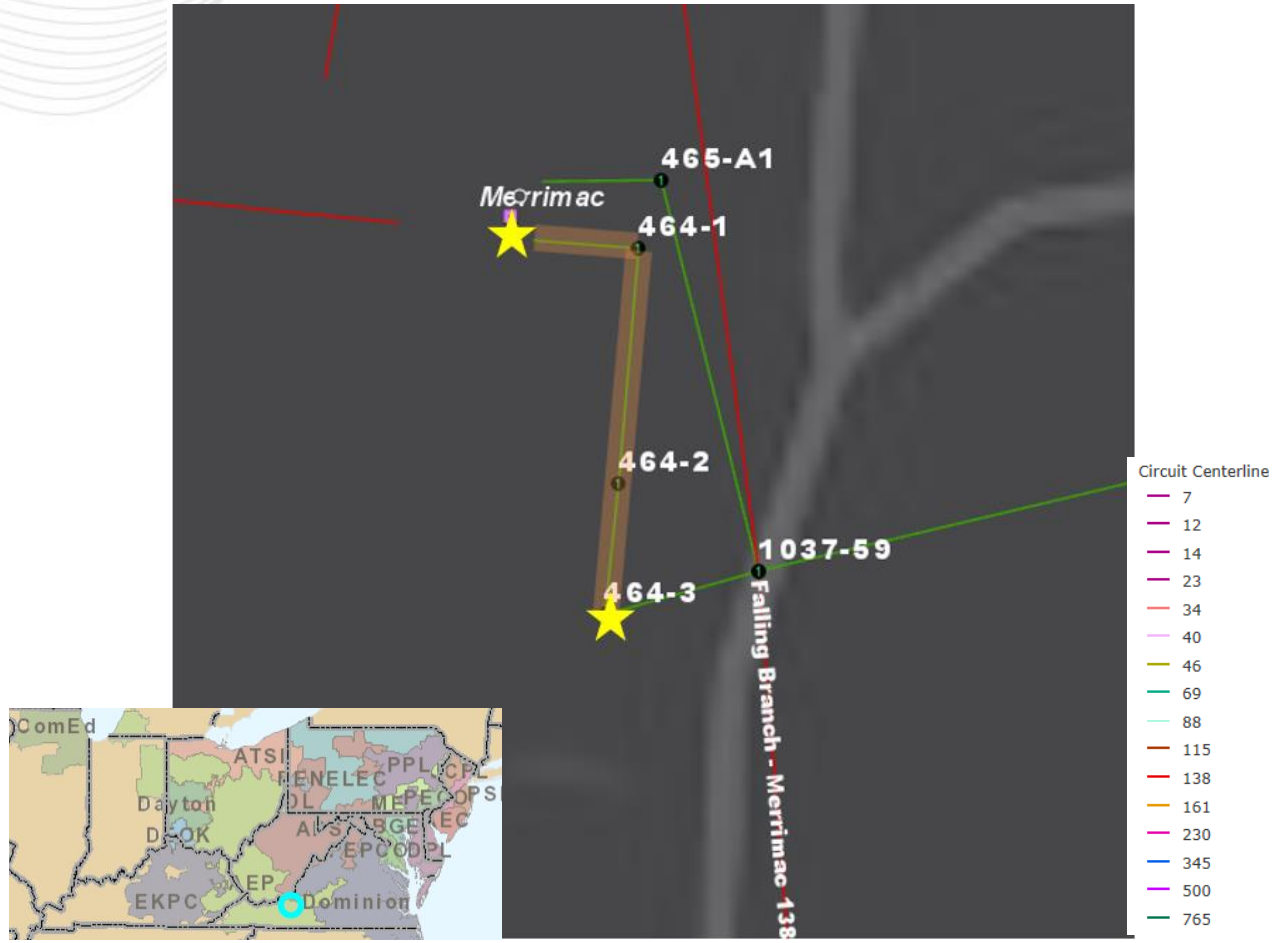
Problem Statement:

FG: AEP-T413, AEP-T414, AEP-T418, AEP-T423

In 2025 Summer and Winter RTEP cases, the Merrimac - Midway 69 kV branch is overloaded for the N-1-1 contingencies of the loss of the Matt Funk – Tech Drive 138kV line and the loss of the South Christiansburg – Claytor - Hazel Hollow 138kV line

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05MERRIMAC – 05MIDWAY 69KV	44/65/56/73



AEP Transmission Zone: Baseline Merrimac - Midway 69 kV Line

Recommended Solution:

Reconductor the first 3 spans from Merrimac station to Str. 464-3 of 3/0 ACSR conductor utilizing 336 ACSR on the existing Merrimac – Midway 69 kV circuit. (**B3286**)

Estimated Cost: $0.45M

Preliminary Ratings:

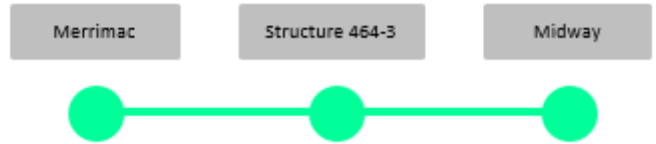
Branch	SN/SE/WN/WE (MVA)
05MERRIMAC – 05MIDWAY 69KV	75/110/94/121

Required In-Service: 6/1/2025

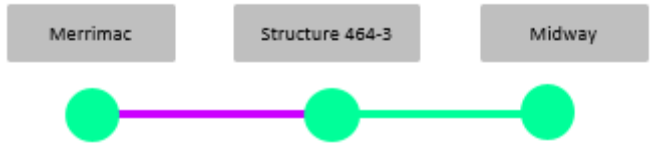
Projected In-Service: 6/1/2025

Previously Presented: 12/18/2020

Existing Configuration:



Future Configuration:



AEP Transmission Zone: Baseline Moundsville 69kV Riser Upgrade

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Substation equipment exclusion

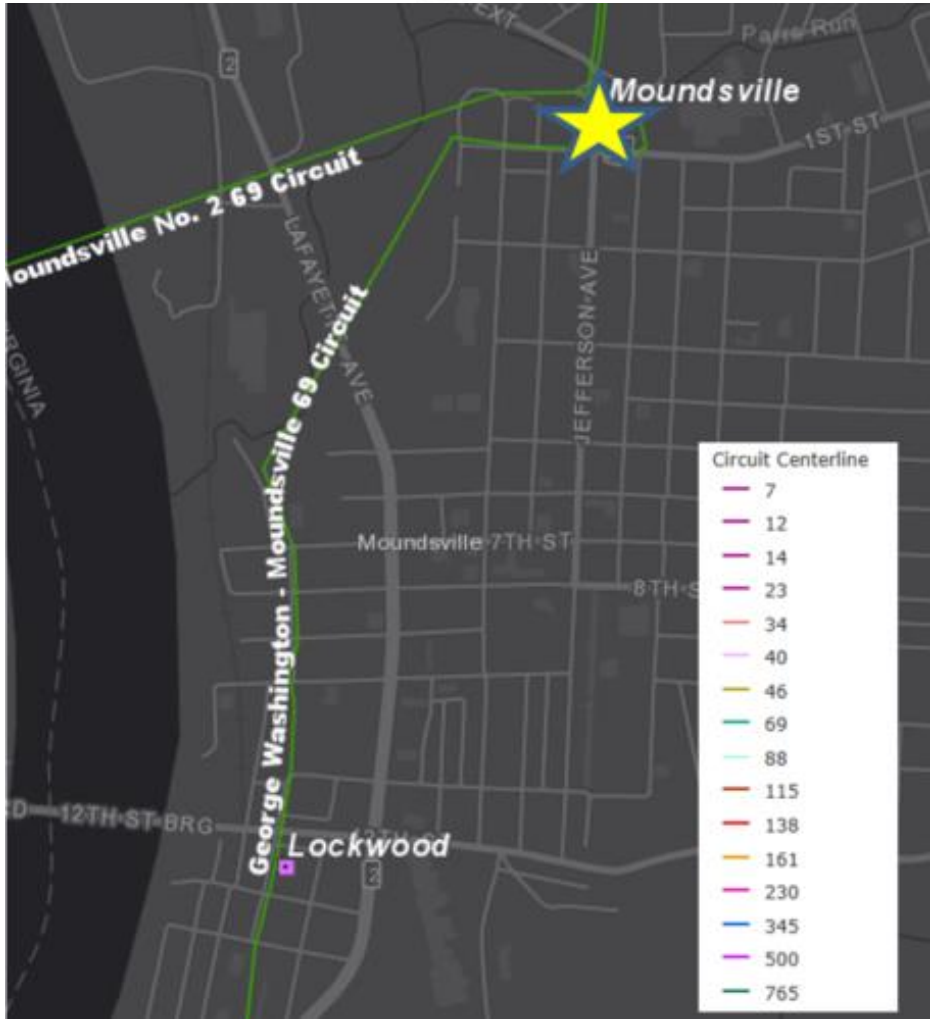
Problem Statement:

FG:AEP-T271, AEP-T272

In 2025 Summer RTEP case, risers at Moundsvile station are overloading for the N-1-1 contingency of the loss of the Kammer – West Bellaire 138kV line and the loss of the West Bellaire 345/138 transformer #3

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05LOCKWOODSS – 05MOUNVIL 69KV	68/86/90/103



AEP Transmission Zone: Baseline Moundsville 69kV Riser Upgrade

Recommended Solution:

Upgrade 69kV risers at Moundsville station towards George Washington. (**B3287**)

Estimated Cost: $0.05M

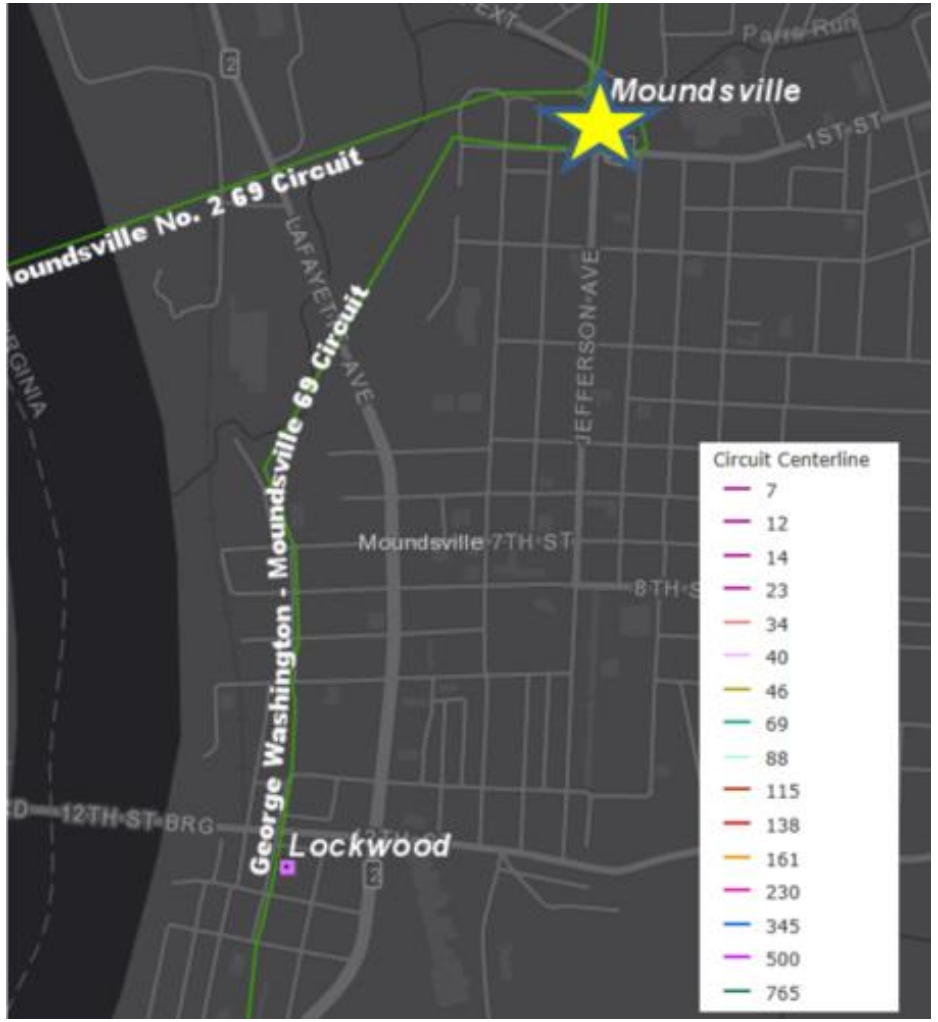
Preliminary Ratings:

Branch	SN/SE/WN/WE (MVA)
05LOCKWOODSS – 05MOUNVIL 69KV	110/127/139/152

Required In-Service: 6/1/2025

Projected In-Service: 9/1/2024

Previously Presented: 12/18/2020



AEP Transmission Zone: Baseline New Camp - Stone 69kV

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

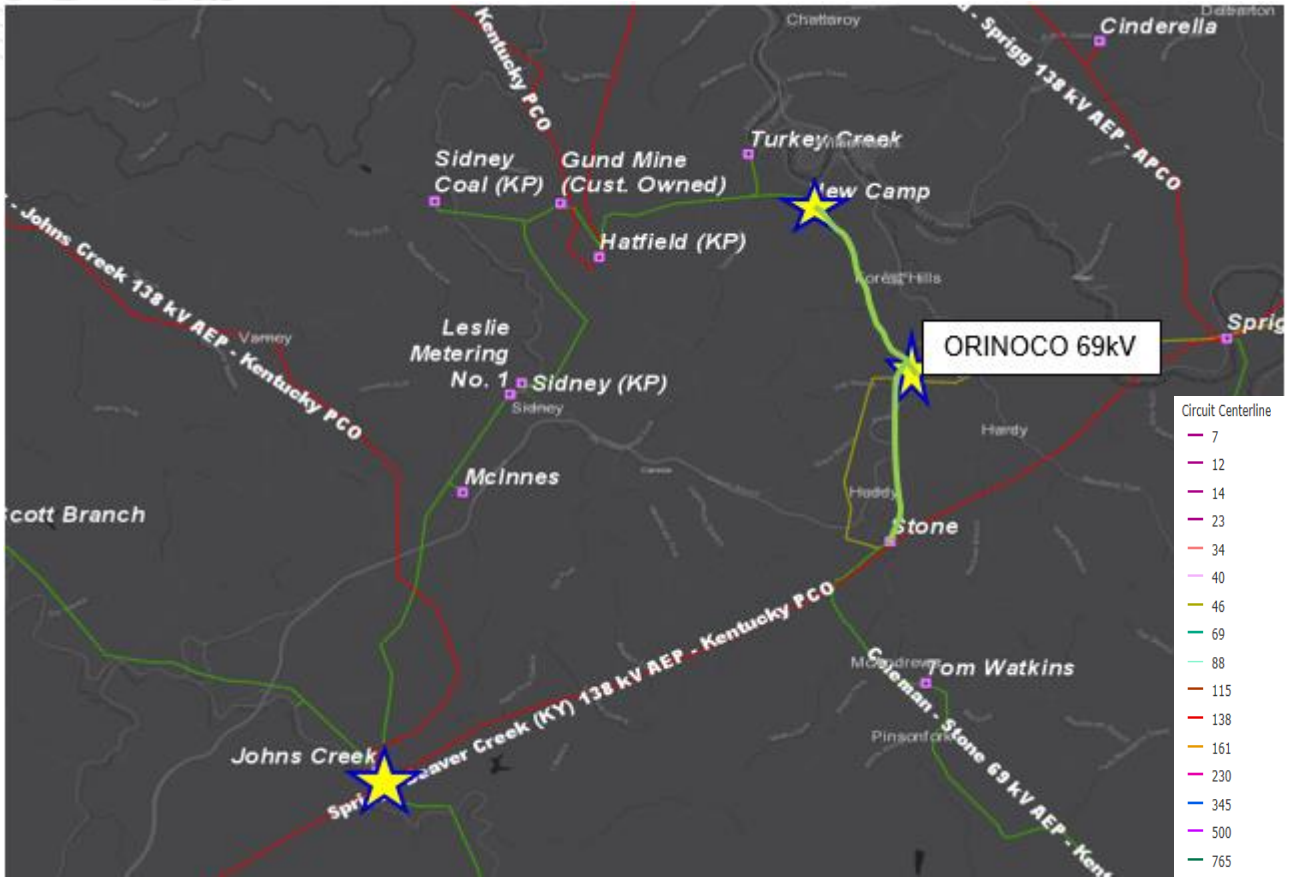
Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

Problem Statement:

AEP-VD1160, AEP-VD1161.

In the 2025 Winter RTEP case, voltage drop violations at New Camp 69kV in the event of an N-1-1 scenario that involves the loss 138/69 kV transformer at Johns Creek and loss of Inez - Sprigg 138kV line.



AEP Transmission Zone: Baseline New Camp - Stone 69kV

Recommended Solution:

Construct ~ 2.75 mi Orinoco - Stone 69kV transmission line in the clear between Orinoco station and Stone station. (**B3288.1**) **Estimated Transmission Cost: $9.23 M**

Construct ~ 3.25 mi Orinoco – New Camp 69kV transmission line in the clear between Orinoco station and New Camp station. (**B3288.2**) **Estimated Transmission Cost: $9.95 M**

At Stone substation, Circuit breaker A to remain in place and be utilized as T1 low side breaker, Circuit Breaker B to remain in place and be utilized as new Hatfield (via Orinoco and New Camp) 69KV line breaker. Add new 69KV Circuit Breaker E for Coleman Line exit. (**B3288.3**) **Estimated Transmission Cost: $0.66 M**

Reconfigure the New Camp tap which includes access road improvements/installation, temporary wire and permanent wire work along with dead end structures installation. (**B3288.4**) **Estimated Transmission Cost: $0.45 M**

At New Camp substation, rebuild the 69kV bus, add 69KV MOAB W and replace the 69KV Ground switch Z1 with a 69kV Circuit Switcher on the New Camp Transformer. (**B3288.5**) **Estimated Transmission Cost: $1.18 M**

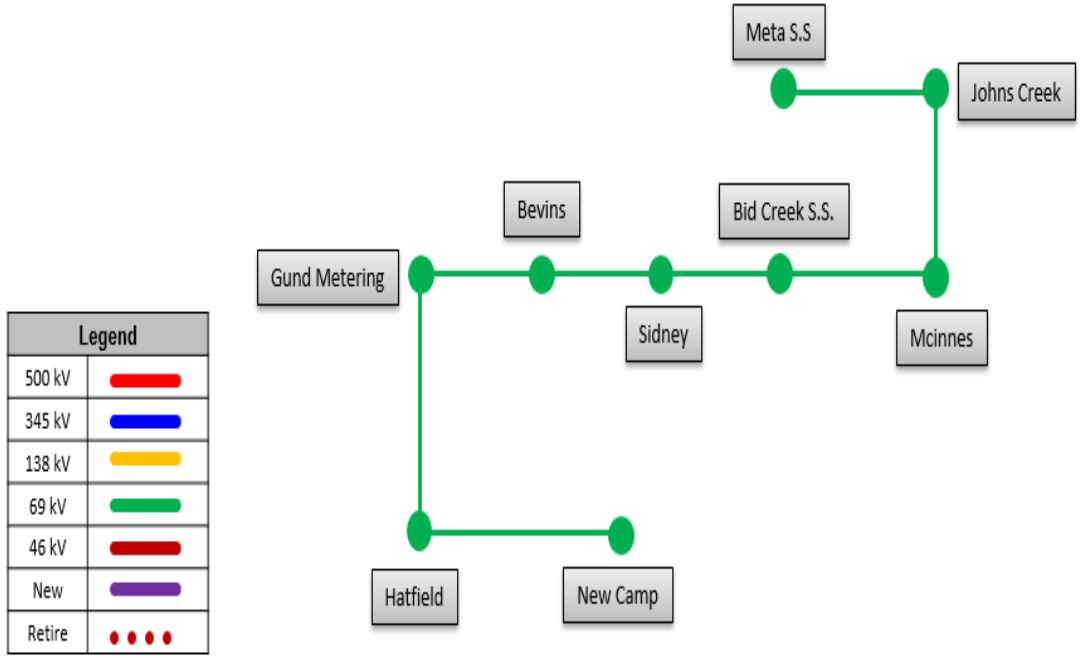
Total estimated baseline Cost: $21.47 M

Preliminary Facility Rating:

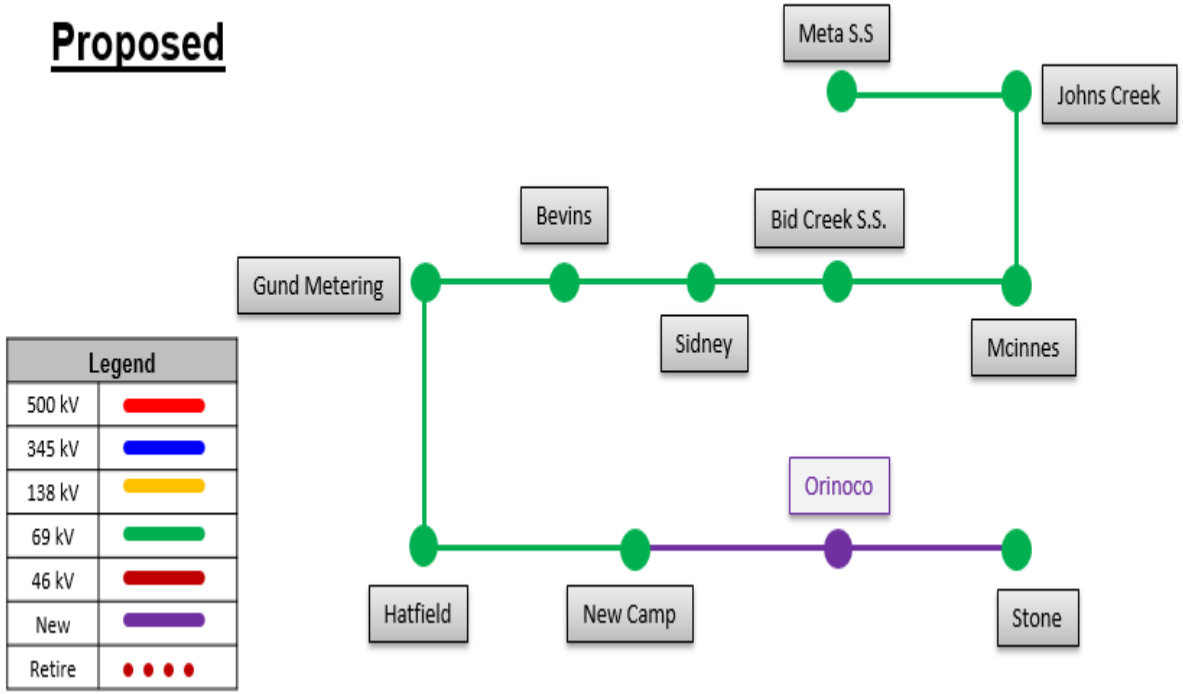
Branch	SN/SE/WN/WE (MVA)
05ORINOCO – 05STONE 69KV	102/142/129/160
05ORINOCO – 05NEWCAMP 69KV	102/142/129/150

AEP Transmission Zone: Baseline New Camp - Stone 69kV

Existing



Proposed



Ancillary Benefits:

This work addresses the needs identified in AEP-2020-AP028. Removal of obsolete ~8.23 mi of 46kV transmission line, Looped service to New Camp station which is served via a radial ~4.14 mile, 69 kV line from Hatfield Station and serves approximately 14.6 MVA of peak load..

Required In-Service: 12/1/2025

Projected In-Service: 12/1/2025

Previously Presented: 12/18/2020

AEP Transmission Zone: Baseline
Roanoke & Huntington Court Circuit Switchers

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Substation equipment exclusion

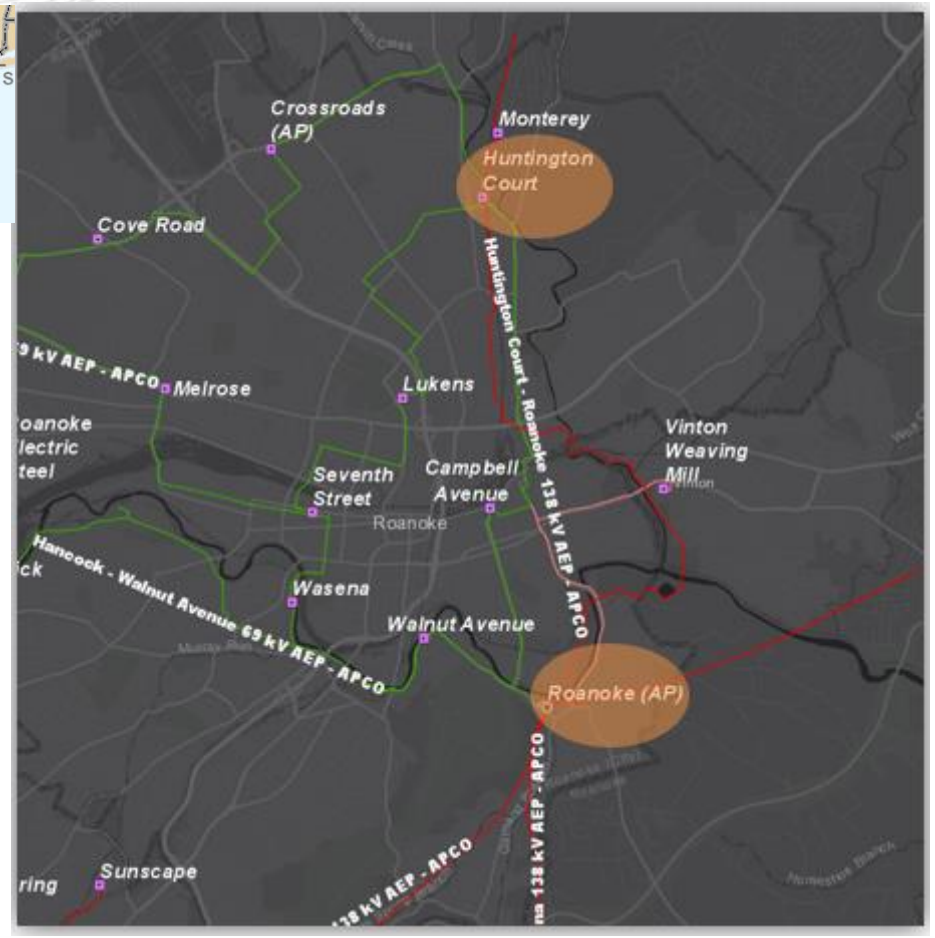
Problem Statement:

FG: AEP-T49, AEP-T50, AEP-T51, AEP-T52, AEP-T53, AEP-T54, AEP-T55, AEP-T56, AEP-T57, AEP-T58, AEP-T59, AEP-T60, AEP-T61

IN 2025 Summer RTEP case, the Cloverdale- Ingersol – Monterey - Huntington Court 69 kV Circuits are overload for multiple N-1-1 contingency pairs.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05CLOV 1 – 05ING RAND 69KV	82/90107/113
ONMONTERAV – 05ING RAND 69KV	79/90/100/109
ONMONTERAV – 05HUNTCRT2 69KV	82/90/107/113



AEP Transmission Zone: Baseline
Roanoke & Huntington Court Circuit Switchers

Recommended Solution:

Roanoke Station: Install high-side circuit switcher on 138/69-12 kV T5 (**B3289.1**) **Estimated Cost:** $1.102 M

Huntington Court Station: Install high-side circuit switcher on 138/69-34.5 kV T1 (**B3289.2**) **Estimated Cost:** $1.415 M

Total Estimated Cost: $2.517 M

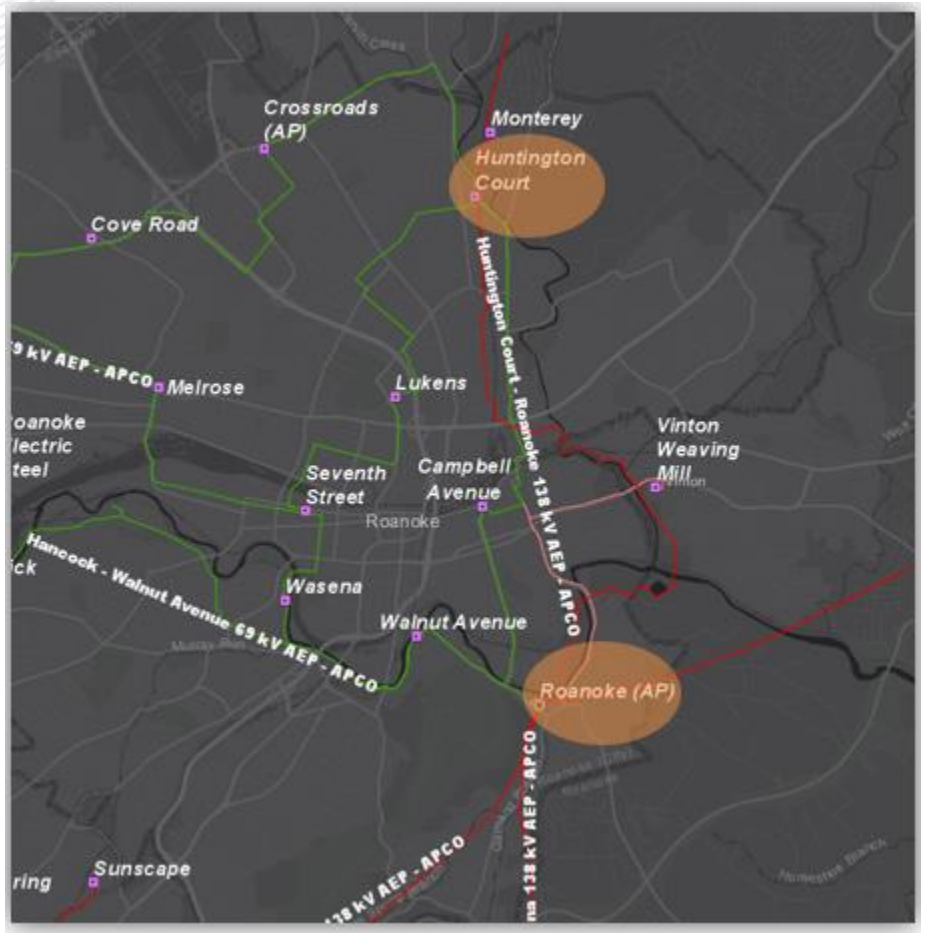
Preliminary Facility Rating: No change

Ancillary Benefits: Addresses part of AEP-2020-AP033 Need

Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 12/18/2020



AEP Transmission Zone: Baseline Roselms - Kalida 69 kV

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

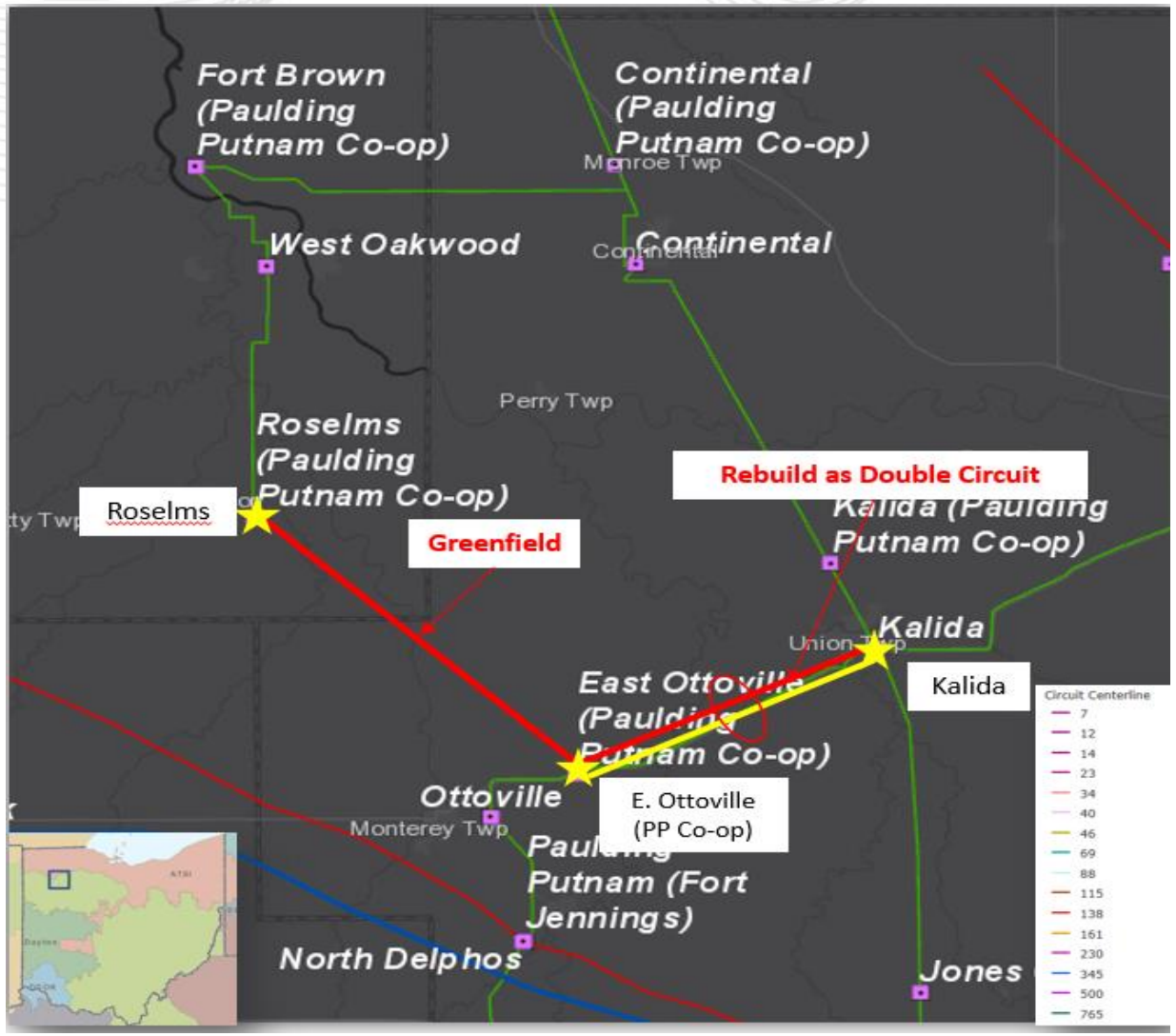
Problem Statement:

FG: AEP-T1 , AEP-T2 and AEP-VD502 through AEP-VD523

In 2025 Summer RTEP case, the Haviland - Paulding 69 kV circuit is overloaded for the N-1-1 contingency of the loss the South Hicksville- Mark Center 69kV line and the loss of the Continental – Kalida 69kV line. In 2025 Summer and Winter RTEP cases, the same N-1-1 contingency pair causes voltage drop violation at Roselms, West Oakwood, Fort Brown, Continental, Auglaize, Sherwood and Mark Center 69 kV buses.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05HAVILAND2 – 05PAULDING 69KV	49/50/54/60



AEP Transmission Zone: Baseline Roselms - Kalida 69 kV

Recommended Solution:

Convert S2215.2: Build 9.4 miles of single circuit 69 kV line from Roselms to near East Ottoville 69 kV Switch. (**B3290.1**) **Estimated Cost:** $13.7M

Convert S2215.3: Rebuild 7.5 miles of double circuit 69kV line between East Ottoville Switch and Kalida Station (combining with the new Roselms to Kalida 69 kV circuit). (**B3290.2**) **Estimated Cost:** $23.6M

Convert S2215.8: At Roselms Switch, install a new three way 69kV, 1200 A phase-over-phase switch, with sectionalizing capability. (**B3290.3**) **Estimated Cost:** $0.6M

Convert S2215.9: At Kalida station, terminate the new line from Roselms Switch. Move the CS XT2 from high side of T2 to the high side of T1. Remove existing T2 transformer. (**B3290.4**) **Estimated Cost:** $1.0M

Total Estimated Cost: $38.9M

Preliminary Facility Rating:

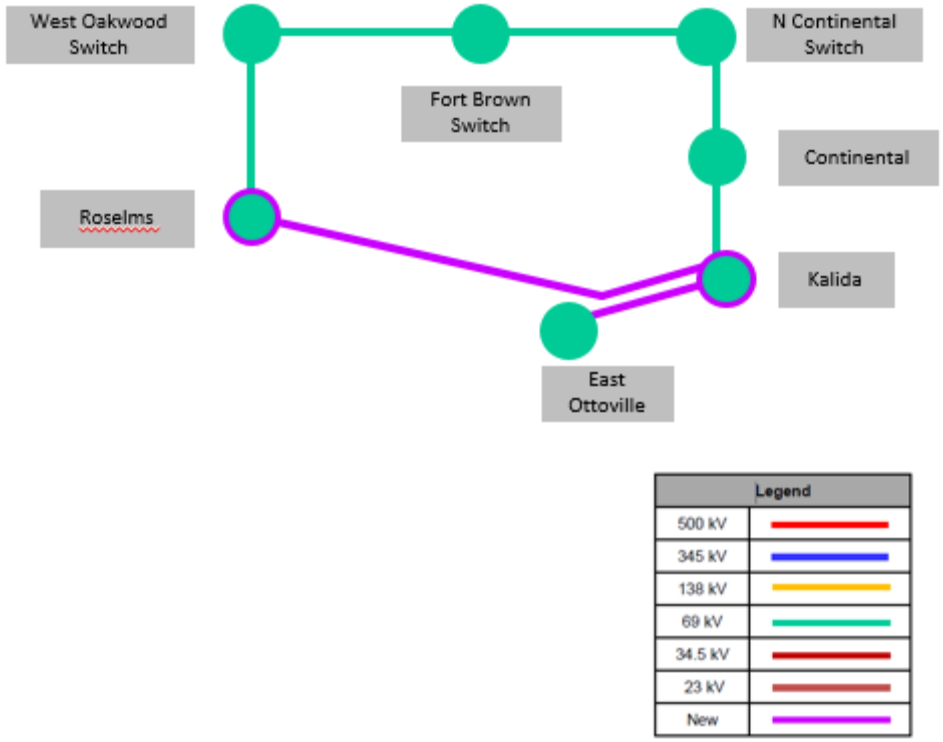
Branch	SN/SE/WN/WE (MVA)
05KALIDA – 05E.OTTOVLSS 69KV	79/92/100/109
05ROSELMS8 – 05KALIDA 69KV	102/142/129/160

Ancillary Benefits: Most of the Kalida - E. Ottoville line still has the original 4/0 copper 7 conductor from 1914. Proposal converts s2215.2, .3, .8, and .9 to baseline.

Required In-Service: 6/1/2025

Projected In-Service: 10/25/2024

Previously Presented: 12/18/2020



AEP Transmission Zone: Baseline Russ St. Switch

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Substation equipment exclusion

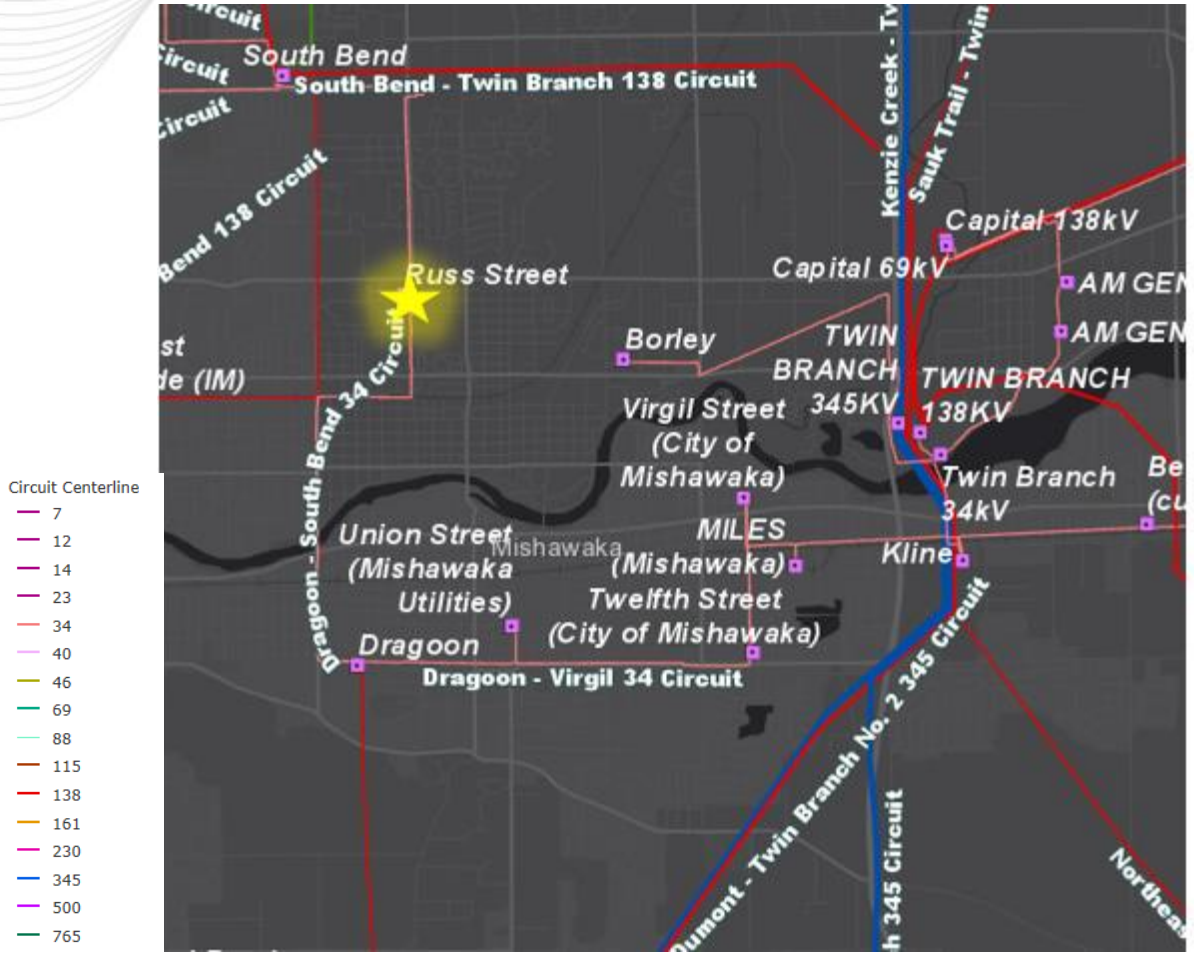
Problem Statement:

FG: AEP-T406, AEP-T425, AEP-T405, AEP-T426, AEP-T294

IN 2025 Summer RTEP case, the Russ St. 34.5KV Switch on the Russ St. – Liberty 34.5kV line is overloaded for multiple N-1-1 contingency pairs.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05RUSS ST – 05LIBERTYTSS 34.5KV	41/45/53/57



AEP Transmission Zone: Baseline Russ St. Switch

Recommended Solution:

To mitigate capacity issues on Russ St. – Liberty 34.5kV Branch, replace the Russ St. 34.5kV Switch. (**B3291**)

Estimated Cost: $1.5M

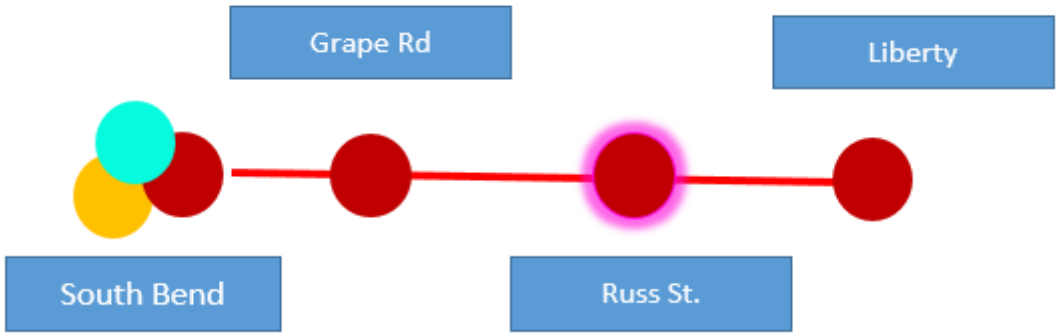
Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05RUSS ST – 05LIBERTYTSS 34.5KV	62/62/78/78

Required In-Service: 6/1/2025

Projected In-Service: 12/1/2022

Previously Presented: 12/18/2020



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

AEP Transmission Zone: Baseline Stuart Cap Bank

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

Problem Statement:

FG: AEP-VD431, AEP-VD432, AEP-VD433, AEP-VD434, AEP-VD435, AEP-VD437

In 2025 Winter RTEP case, The Stuart 69kV bus has voltage drop violations in multiple contingencies involving the loss of Fieldale – Stuart 69kV line .

AEP Transmission Zone: Baseline Stuart Cap Bank

Recommended Solution:

Replace existing 69 kV capacitor bank at Stuart Station with a 17.2 MVAr capacitor bank (**B3292**)

Estimated Cost: $0M ($0.856M Distribution cost)

Alternatives: N/A

Required In-Service: 12/1/2025

Projected In-Service: 12/1/2025

Previously Presented: 12/18/2020

AEP Transmission Zone: Baseline Upper Sandusky 69 kV Upgrades

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV & Substation equipment exclusion

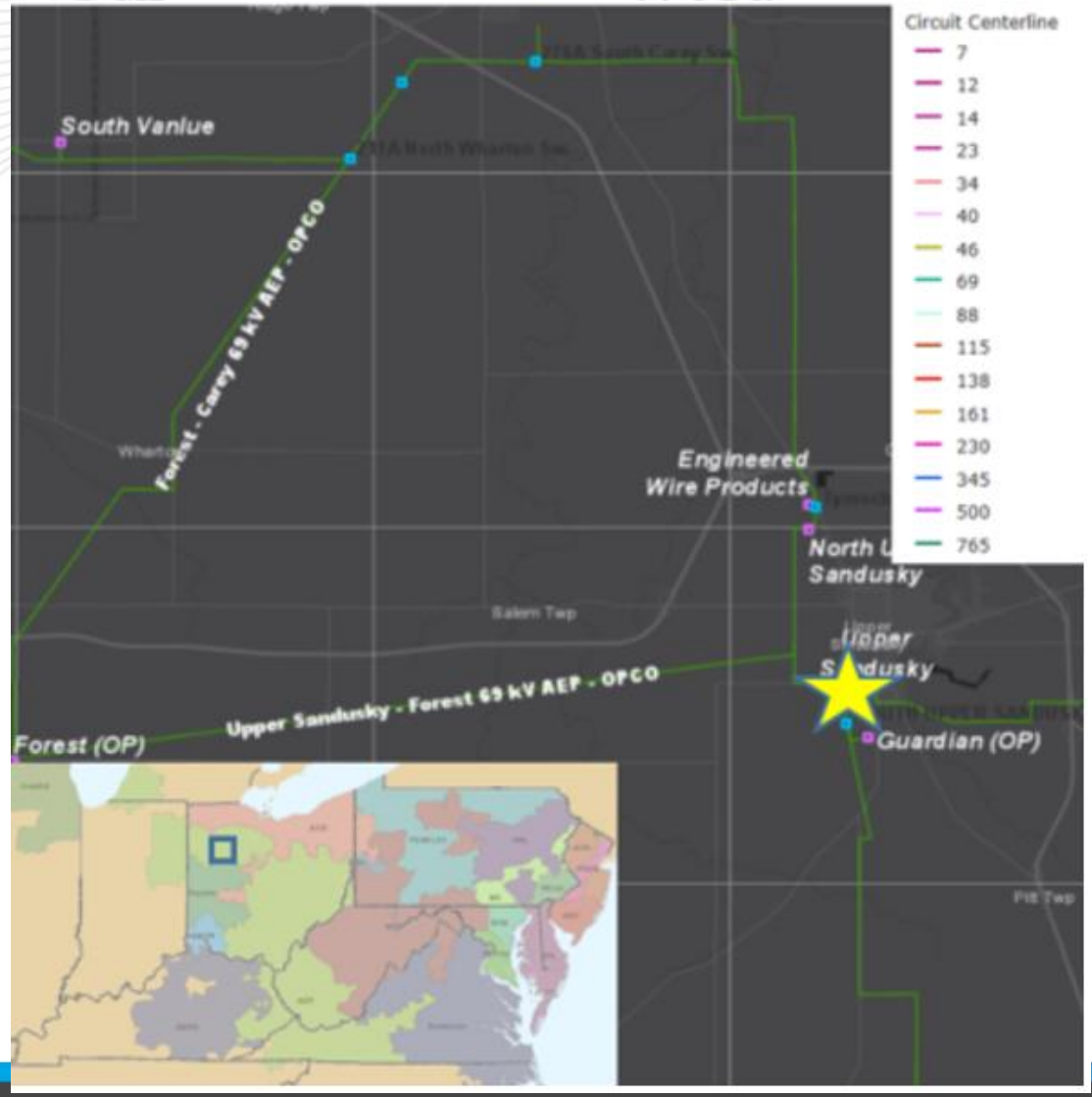
Problem Statement:

FG: AEP-T433, AEP-T438, and AEP-T468

In 2025 Summer RTEP case, the S. Upper Sandusky - Upper Sandusky 69 kV entrance span conductor to Upper Sandusky station and the 69 kV Riser/bus at Upper Sandusky towards Forest are overloaded for the N-1-1 contingency of the loss of and the loss of West Mount Vernon – Academia 138kV line, the HEDDSS- West Mount Vernon 138KV line, Sharp Road –West Mount Vernon 138kV line, the W Mount Vernon 138/69kV transformer and Pittsburgh Ave – West Mount Vernon 69kV line, and the loss of the Lynn – South Kenton 138kV line and South Kenton – Wild Creek 138kV line, South Kenton 138/69kV transformers 1&2 and the Fontaine – South Kenton 69kV line

Existing Facility Rating:

Branches	SN/SE/WN/WE (MVA)
05S.UPSDSS – 05U SANDSK 69KV	40/40/56/56
05FOREST – 05U SANDSK 69KV	55/69/72/82



AEP Transmission Zone: Baseline Upper Sandusky 69 kV Upgrades

Recommended Solution:

Replace 2/0 Cu entrance span conductor on the South Upper Sandusky 69kV line and 4/0 Cu Risers/Bus conductors on the Forest line at Upper Sandusky 69kV Station. (**B3293**)

Estimated Cost: $0.54M

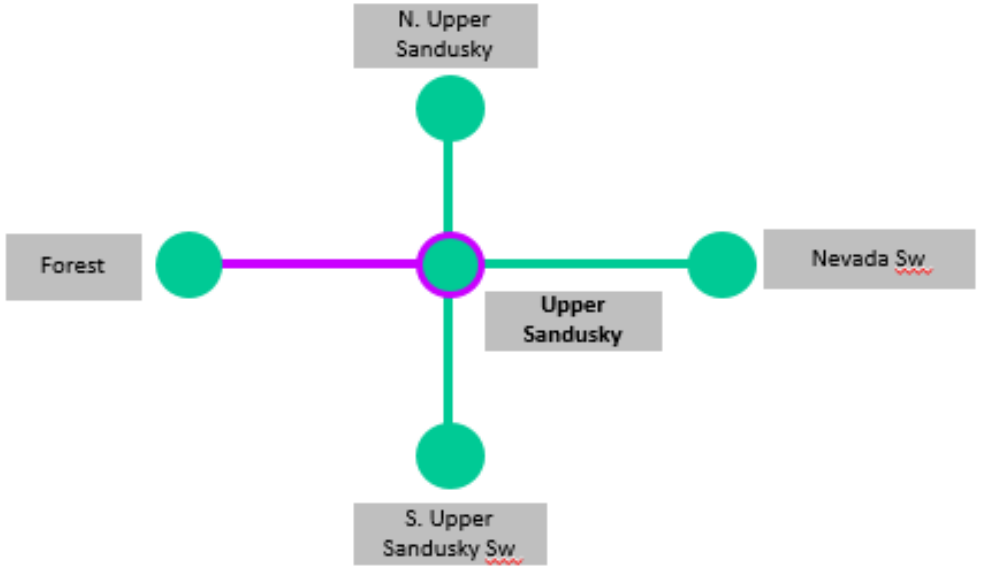
Preliminary Facility Rating:

Branches	SN/SE/WN/WE (MVA)
05S.UPSDSS – 05U SANDSK 69KV	50/50/63/63
05FOREST – 05U SANDSK 69KV	68/86/89/89

Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 12/18/2020



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

AEP Transmission Zone: Baseline Walnut Ave Switch Replacements

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Substation equipment exclusion

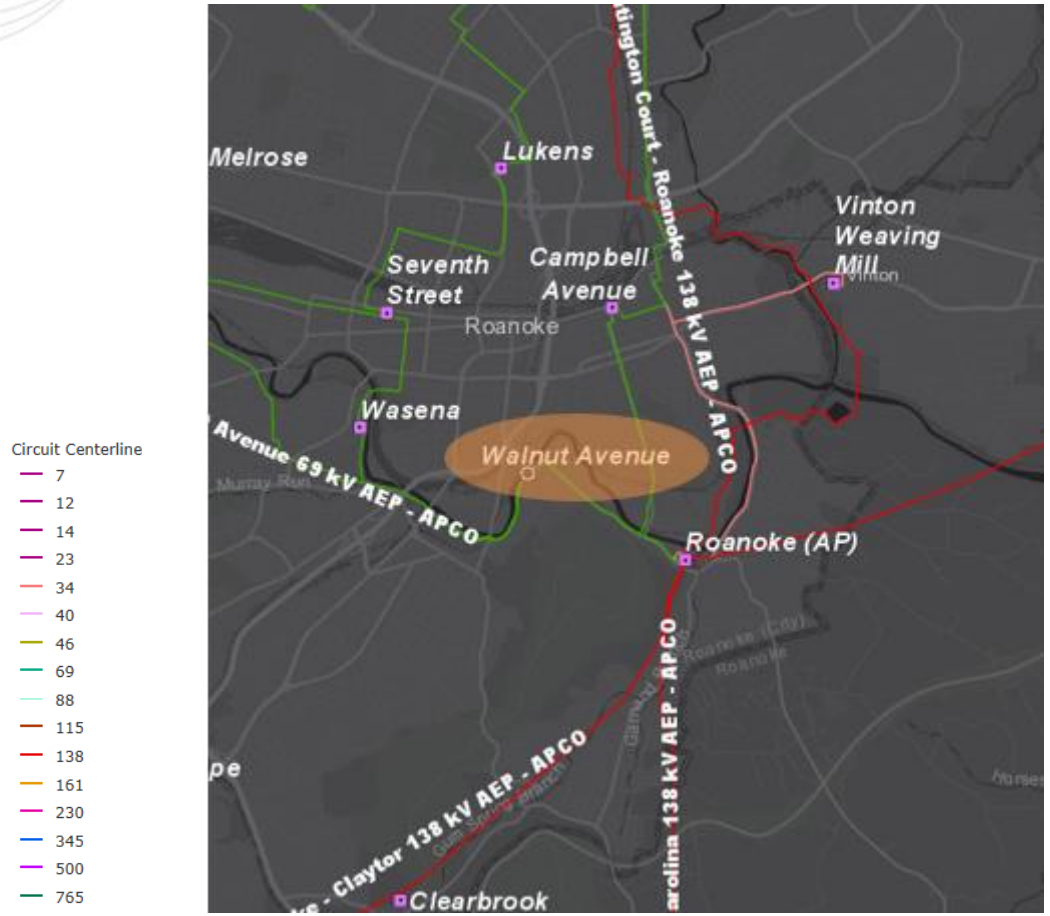
Problem Statement:

FG: AEP-T193, AEP-T194

In 2025 Summer RTEP case, the Roanoke-Walnut Ave 69 kV line is overloaded for the N-1-1 contingency of the loss of the Hancock 138/69/34.5kV transformer and the loss of the Catawba 138/69/34.5kV transformer, Catawba – Cleveland 69KV line, and Catawba – Mason Creek 69kV line

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05ROANOKE– 05WALNUTA2 69KV	82/90/107/113



AEP Transmission Zone: Baseline Walnut Ave Switch Replacements

Recommended Solution:

Replace existing 69 kV disconnect switches for circuit breaker "C" at Walnut Avenue Station (**B3294**)

Estimated Cost: $0M **(** $0.067M distribution cost)

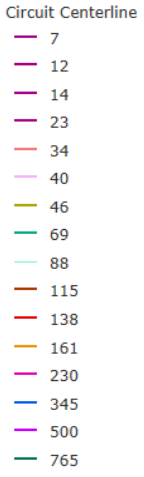
Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05ROANOKE– 05WALNUTA2 69KV	99/99/125/125

Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 12/18/2020



AEP Transmission Zone: Baseline Concord-Whitaker 34.5kV Line Rebuild

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

Problem Statement:

FG: AEP-T83, AEP-T85, AEP-T86, AEP-T87, AEP-VM742, AEP-VM743, AEP-VM744

In 2025 Summer RTEP case, the Concord-Whitaker 34.5kV line is overloaded for the loss of Kline-Bercado 34.5kV line

Existing Facility Rating:

Branches	SN/SE/WN/WE (MVA)
05CONCORD– 05WHITAKER 34.5KV	37/37/47/47
05CONCORD– 05WASTEWAT 34.5KV	37/37/47/47

AEP Transmission Zone: Baseline Concord-Whitaker 34.5kV Line Rebuild

Recommended Solution:

Rebuild the overloaded portion of the Concord-Whitaker 34.5kV line. Rebuild is double circuit and will utilize 795 ACSR conductor. The rebuild is 1.13 miles long. (**B3296**)

Estimated Cost: $2.8M

Preliminary Facility Rating:

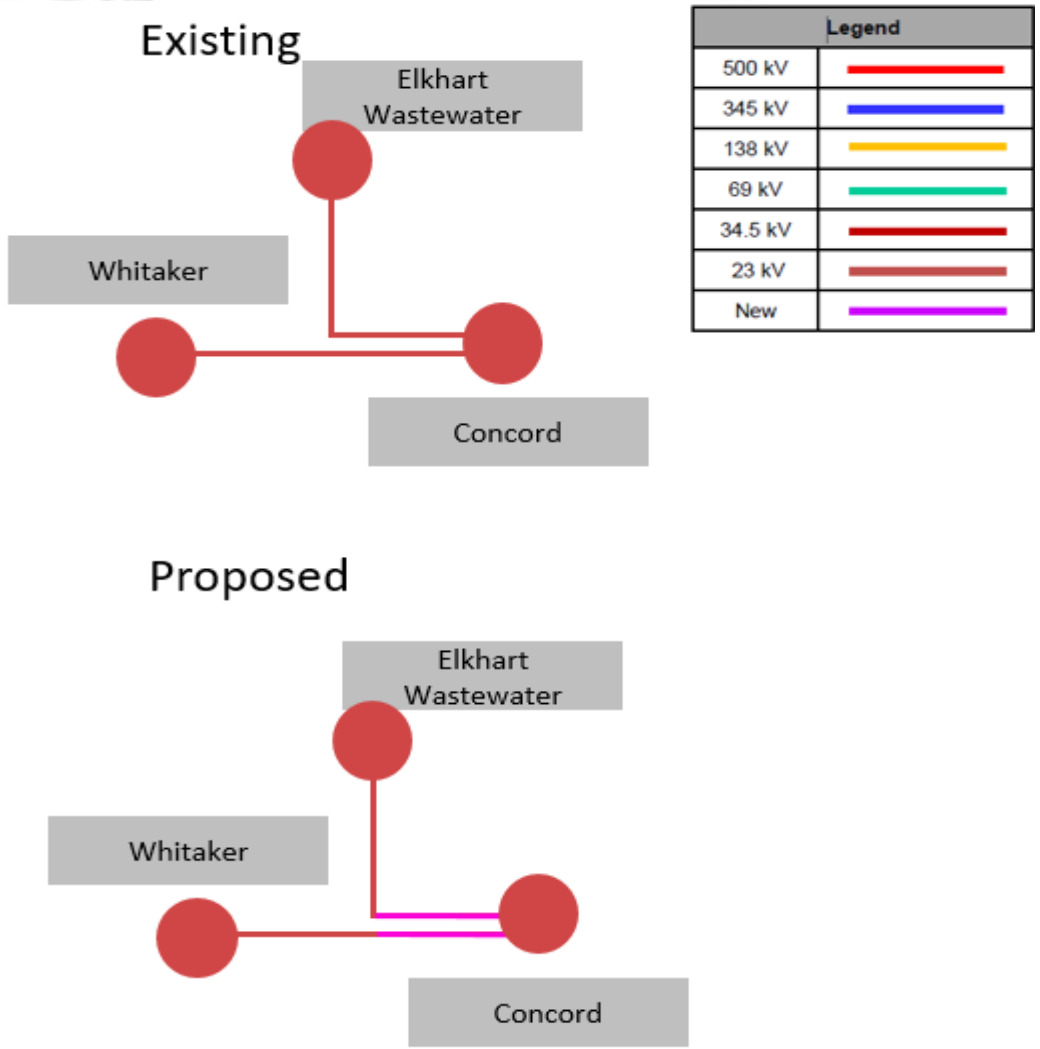
Branches	SN/SE/WN/WE (MVA)
05CONCORD– 05WHITAKER 34.5KV	62/62/78/78
05CONCORD– 05WASTEWAT 34.5KV	41/45/53/57

Ancillary Benefits: The existing wood H-Frames are very deteriorated and have cracks in the structures. The existing double circuit wood crossarm structures are also deteriorated, and a lot of these structures have decaying crossarms, woodpecker damage and shell rot. The portion of line to be rebuilt was originally installed in 1956.

Required In-Service: 6/1/2025

Projected In-Service: 3/17/2024

Previously Presented: 12/18/2020



AEP Transmission Zone: Baseline North Columbus 69 kV line Rebuilds

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV & Substation equipment exclusion

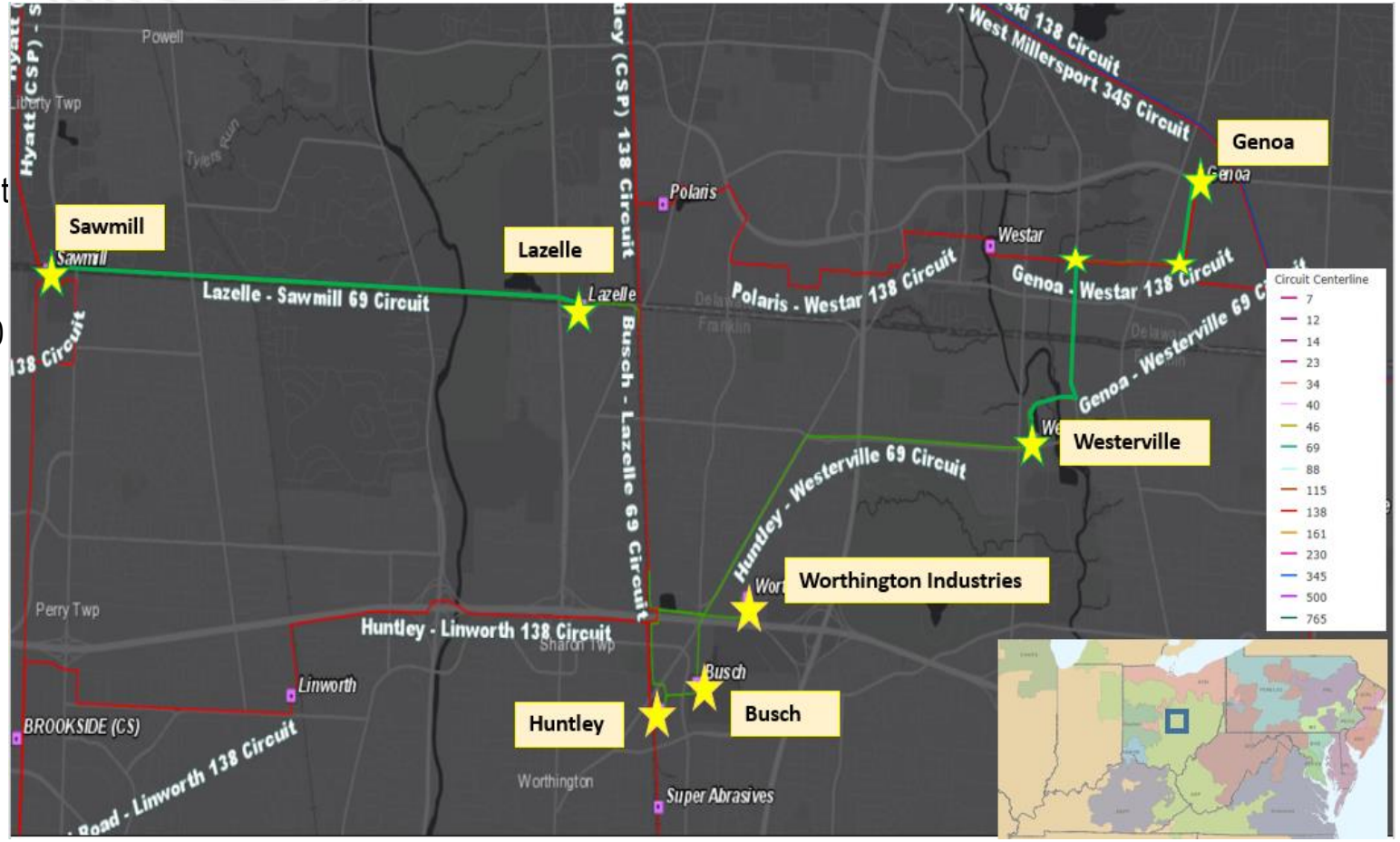
Problem Statement:

FG: AEP-T205 through AEP-T208, AEP-T213, AEP-T218, AEP-T260 through AEP-T262, AEP-T265, AEP-T369, AEP-T370, AEP-T371, AEP-T372

In 2025 Summer RTEP case, the Sawmill - Lazelle and Westerville - Genoa 69 kV lines along with station equipment at Lazelle, Westerville, and Genoa are overloading for N-1-1 contingency scenarios

Existing Facility Rating:

Branches	SN/SE/WN/WE (MVA)
05SAWMILL – 05LAZELLE N 69KV	55/69/72/82
05GENOA – 05WESTERVL 69KV	64/73/81/91
05LAZELLE S– 05LAZELLE N 69KV	55/69/72/82



AEP Transmission Zone: Baseline North Columbus 69 kV line Rebuilds

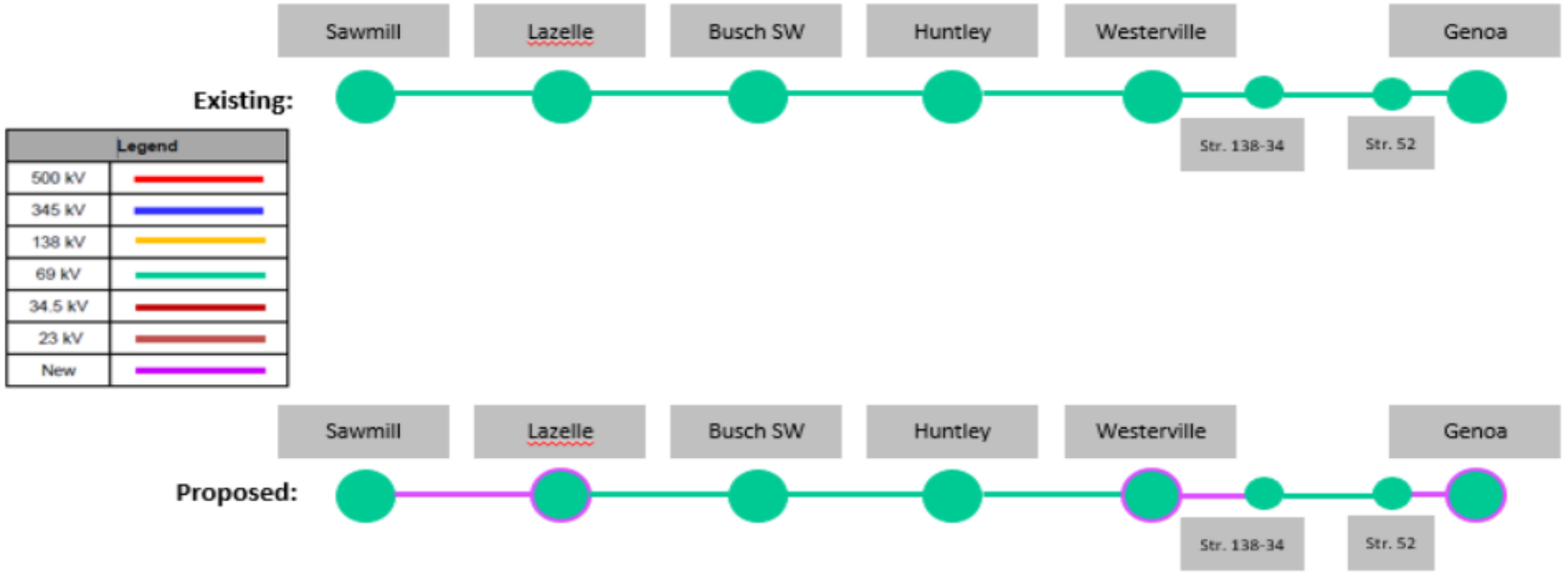
Recommended Solution:

Rebuild 4.23 miles of 69 kV line between Sawmill and Lazelle station, using 795 ACSR 26/7 conductor. (**B3297.1**) **Estimated Cost:** $12.0 M

Rebuild 1.94 miles of 69kV Line between Westerville and Genoa stations, using 795 ACSR 26/7 conductor. (**B3297.2**) **Estimated Cost:** $5.9 M

Replace risers and switchers at Lazelle, Westerville, and Genoa stations. Upgrade associated relaying accordingly. (**B3297.3**) **Estimated Cost:** $1.9 M

Total Estimated Cost: $19.8M



AEP Transmission Zone: Baseline North Columbus 69 kV line Rebuilds

Preliminary Facility Rating:

Branches	SN/SE/WN/WE (MVA)
05SAWMILL – 05LAZELLE N 69KV	121/151/163/185
05GENOA – 05WESTERVL 69KV	100/111/126/139
05LAZELLE S– 05LAZELLE N 69KV	121/149/162/192

Ancillary Benefits: The Recommended Solution will rebuild the Sawmill - Lazelle 69 kV line. The majority of the line is made up of wooden structures and conductor that date back to 1926. 25 of the 49 structures that make up the line have at least one open condition attributed to them.

Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 12/18/2020

AEP Transmission Zone: Baseline
West End Fostoria - Lumberjack Sw 69 kV Rebuild

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

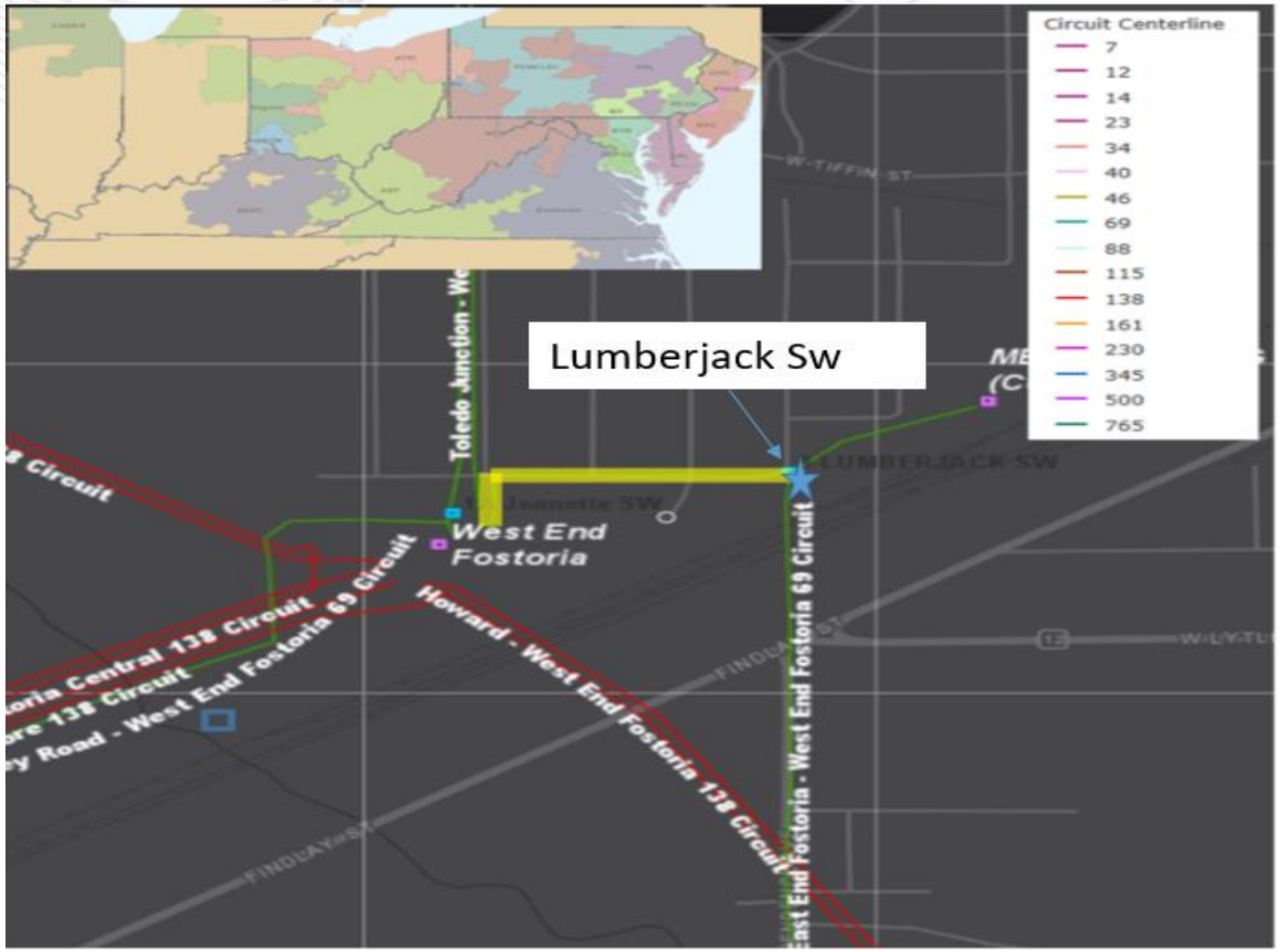
Problem Statement:

FG: AEP-T450, AEP-T451, AEP-T454, AEP-T455

In 2025 Summer RTEP case, the West End Fostoria - Lumberjack Switch 69 kV line is overloaded for multiple N-1-1 contingency pairs.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05W END – 05LUMBERJ SS 69KV	40/40/56/56



AEP Transmission Zone: Baseline
West End Fostoria - Lumberjack Sw 69 kV Rebuild

Recommended Solution:

Rebuild 0.2 mile of the West End Fostoria - Lumberjack Switch 69 kV line with 556 ACSR (Dove) conductors. Replace jumpers on West End Fostoria line at Lumberjack Switch. (**B3299**)

Estimated Cost: $0.47M

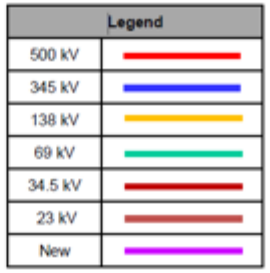
Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05W END – 05LUMBERJ SS 69KV	102/42/129/160

Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 12/18/2020



AEP Transmission Zone: Baseline Fleming station ring bus

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

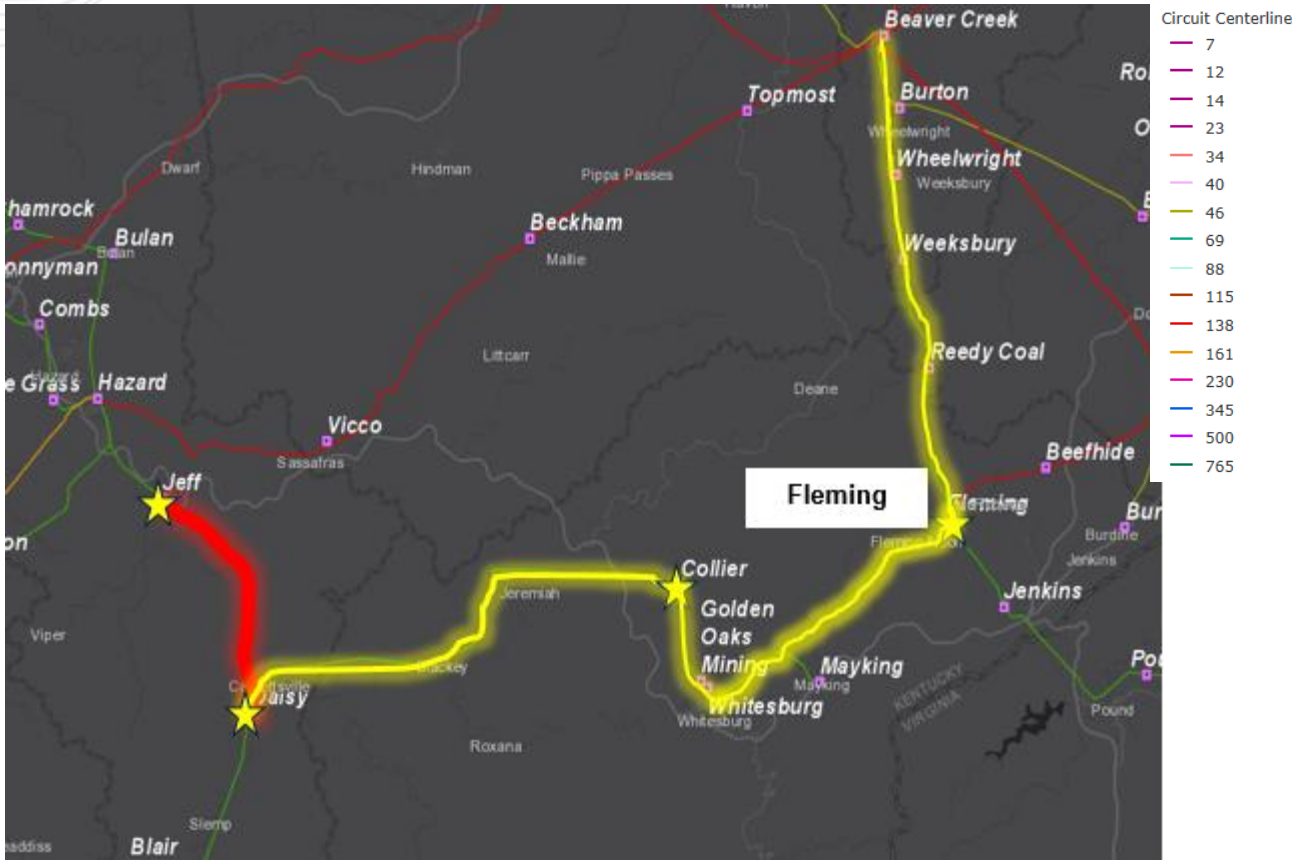
Problem Statement:

FG: AEP-T344, AEP-T345, AEP-T346, AEP-T347, AEP-T348, AEP-T349, AEP-T350, AEP-T351, AEP-VM545 AEP-VM546, AEP-VM547, AEP-VM548, AEP-VM549, AEP-VM550, AEP-VD552, AEP-VD553, AEP-VD554, AEP-VD555, AEP-VD566, AEP-VD567, AEP-VD570, AEP-VD571, AEP-VD556, AEP-VD557, AEP-VD558, AEP-VD559, AEP-VD572, AEP-VD573, AEP-VD574, AEP-VD575, AEP-VD576, AEP-VD577, AEP-VD578, AEP-VD579, AEP-VD526, AEP-VD527, AEP-VD529, AEP-VD531, AEP-VD532, AEP-VD534, AEP-VD536, AEP-VD538, AEP-VD548, AEP-VD549, AEP-VD550, AEP-VD551, AEP-VD560, AEP-VD561, AEP-VD568, AEP-VD569, AEP-VD542, AEP-VD543, AEP-VD546, AEP-VD547, AEP-VD562, AEP-VD563, AEP-VD564, AEP-VD565, AEP-VD540, AEP-VD541, AEP-VD544, AEP-VD545, AEP-VD524, AEP-VD525, AEP-VD528, AEP-VD530, AEP-VD533, AEP-VD535, AEP-VD537, AEP-VD539

In the 2025 Winter RTEP case, the Jeff – Daisy 69KV line overload and voltage violations at Weeksbury, Reedy Coal, Mayking, Daisy, Fleming, Collier, Golden Oaks, Slemp, and Whitesburg 69kV buses are identified for various N-1-1 outages.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05DAISY – 05JEFF 69KV	44/44/56/56



AEP Transmission Zone: Baseline Fleming station ring bus

Recommended Solution:

Convert s2219 to baseline:

Rebuild Fleming station in the clear; Replace 138/69kV Fleming Transformer #1 with 138/69kV 130 MVA transformer with high side 138 kV CB; Install a 5 breaker 69 kV ring bus on the low side of the transformer, replace 69 kV circuit switcher AA, replace 69/12kV transformer #3 with 69/12kV 30 MVA transformer, Replace 12 kV CB A and D. Retire existing Fleming substation. (**B3307**)

Estimated Cost: $21.1M

Preliminary Facility Rating:

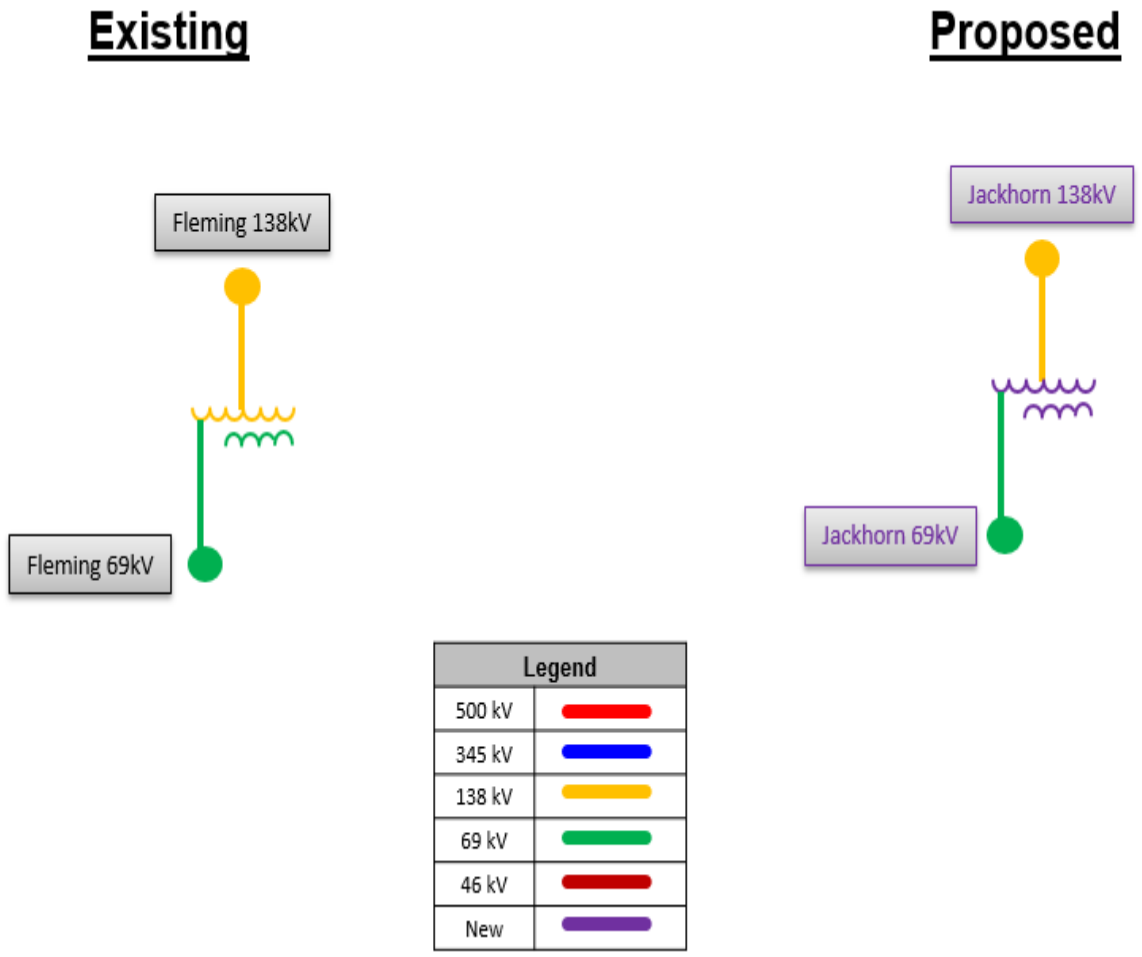
Branches	SN/SE/WN/WE (MVA)
05JACKHORN 138/69kV	130/130/130/130
05JACKHORN – 05BEEFHI 138kV	221/278/279/322
05JACKHORN – 05JENKINS 69V	87/101/110/120

Ancillary Benefits: This project is a conversion of s2219, and no additional costs are incurred to implement a separate baseline solution.

Required In-Service: 12/1/2025

Projected In-Service: 12/1/2025

Previously Presented: 12/18/2020



AEP Transmission Zone: Baseline
Fort Steuben - Sunset Blvd 69kV T-Line Upgrade

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

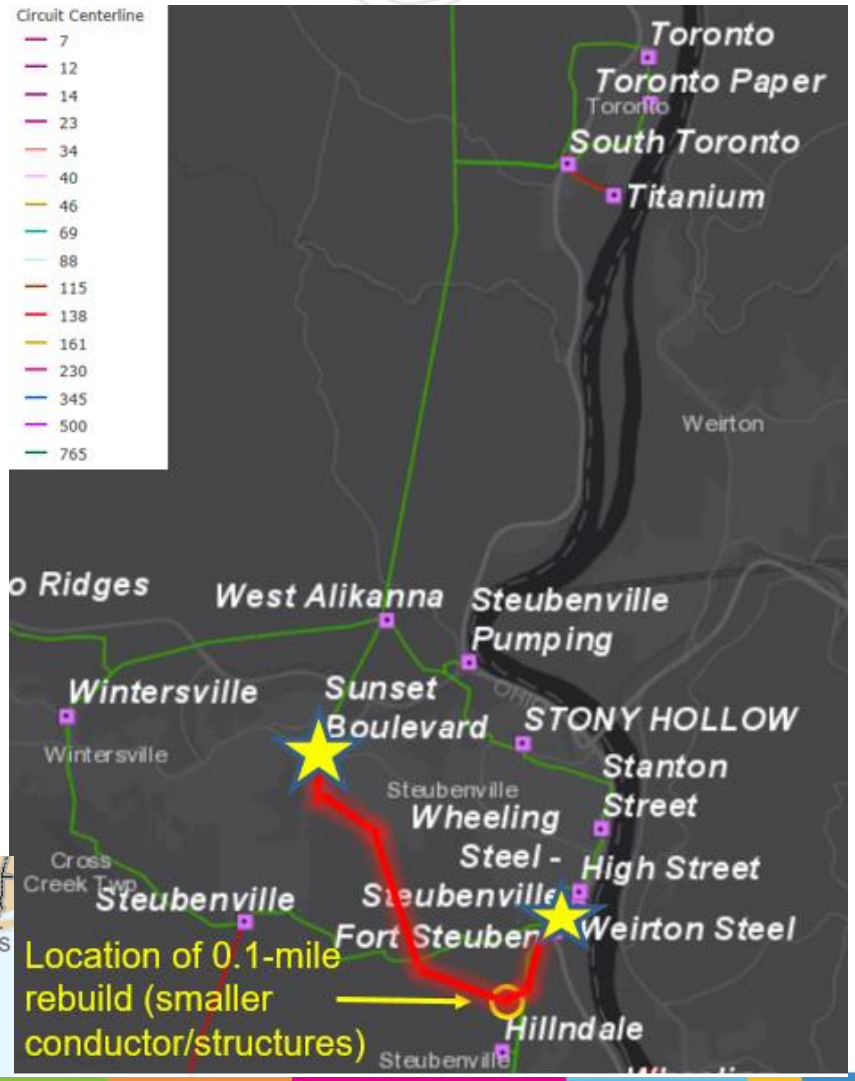
Problem Statement:

AEP-T488; AEP-T491; AEP-T494; AEP-T495

In the 2025 Summer RTEP case, the Fort Steuben-Sunset Blvd 69kV branch is overloaded for various N-1-1 outages.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05FT STB 2 – 05SUNST BL 69KV	54/54/76/76



AEP Transmission Zone: Baseline
Fort Steuben - Sunset Blvd 69kV T-Line Upgrade

Recommended Solution:

Reconductor and rebuild 1 span of T-line on the Fort Steuben-Sunset Blvd 69kV branch with 556 ACSR. (**B3308**)

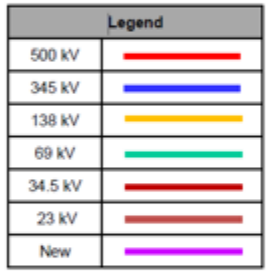
Estimated Cost: $0.73M

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05FT STB 2 – 05SUNST BL 69KV	64/64/90/96

Required In-Service: 6/1/2025

Existing:



Proposed:

AEP Transmission Zone: Baseline Greenlawn - East Tiffin

Process Stage: Recommended Solution

Criteria: AEP 715 criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV & Substation equipment exclusion

Problem Statement:

AEP-T21 through AEP-T30, AEP-T398, AEP-T399, AEP-T403

In the 2025 Summer and Winter RTEP cases, the Greenlawn – East Tiffin 69KV line overload for various N-1-1 outages and line with stuck breaker contingencies.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05GREENLAW– 05E.TIFF2 69KV	39/39/42/42

AEP Transmission Zone: Baseline Greenlawn - East Tiffin

Recommended Solution:

Rebuild 1.75 miles of the Greenlawn - East Tiffin line section of the Carrothers - Greenlawn 69kV circuit containing 133 ACSR conductor with 556 ACSR conductor. Upgrade relaying as required (**B3309**)

Estimated Cost: $3.45M

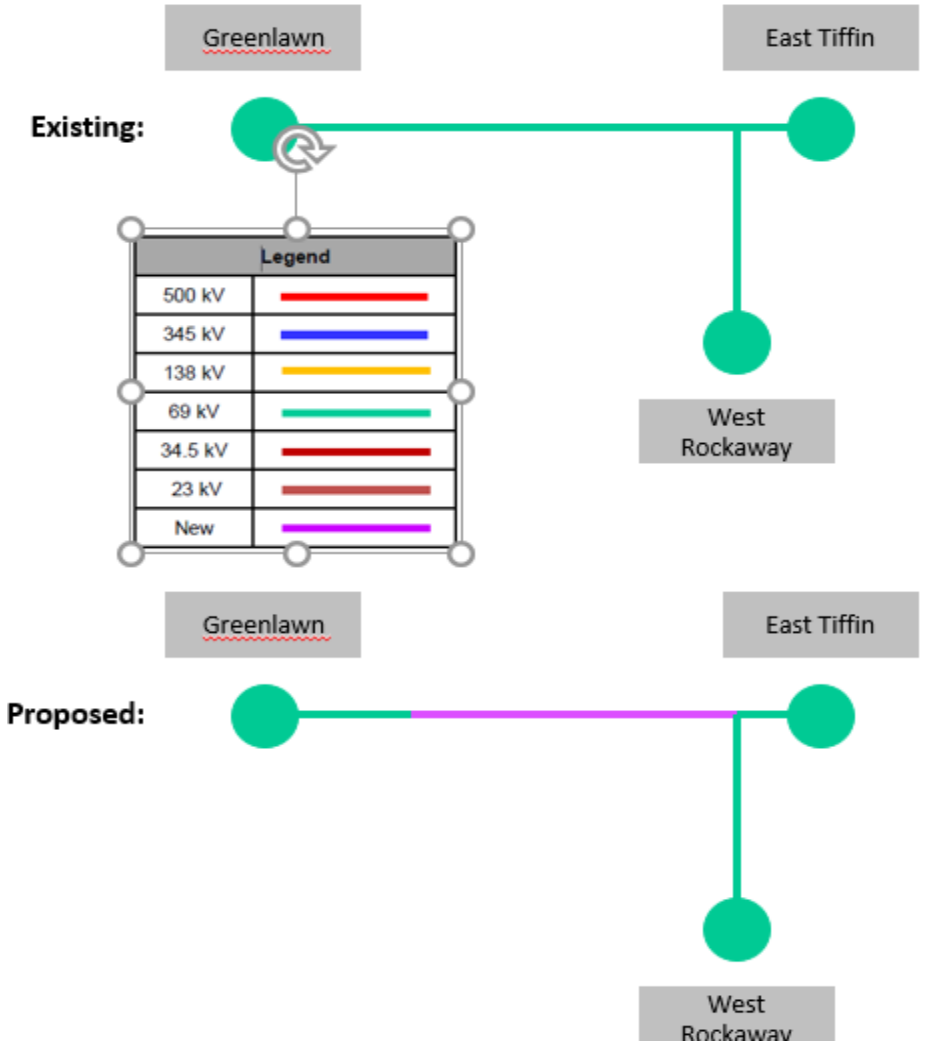
Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05GREENLAW– 05E.TIFF2 69KV	73/73/91/91

Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 12/18/2020



Questions?

Revision History

- V1 – 1/12/2021 – Original slides posted
- V2 – 2/4/2021 – Slide #38, Added additional FG #s
- V3 – 3/29/2021 – Slide #40 and #42, Corrected typo in the facility rating table
- V4 – 3/31/2021 – Slide #13, Corrected contingency definition