PJM Identified Issues and Planned Solutions Near the MISO Seam

4th Quarter Review - 2019

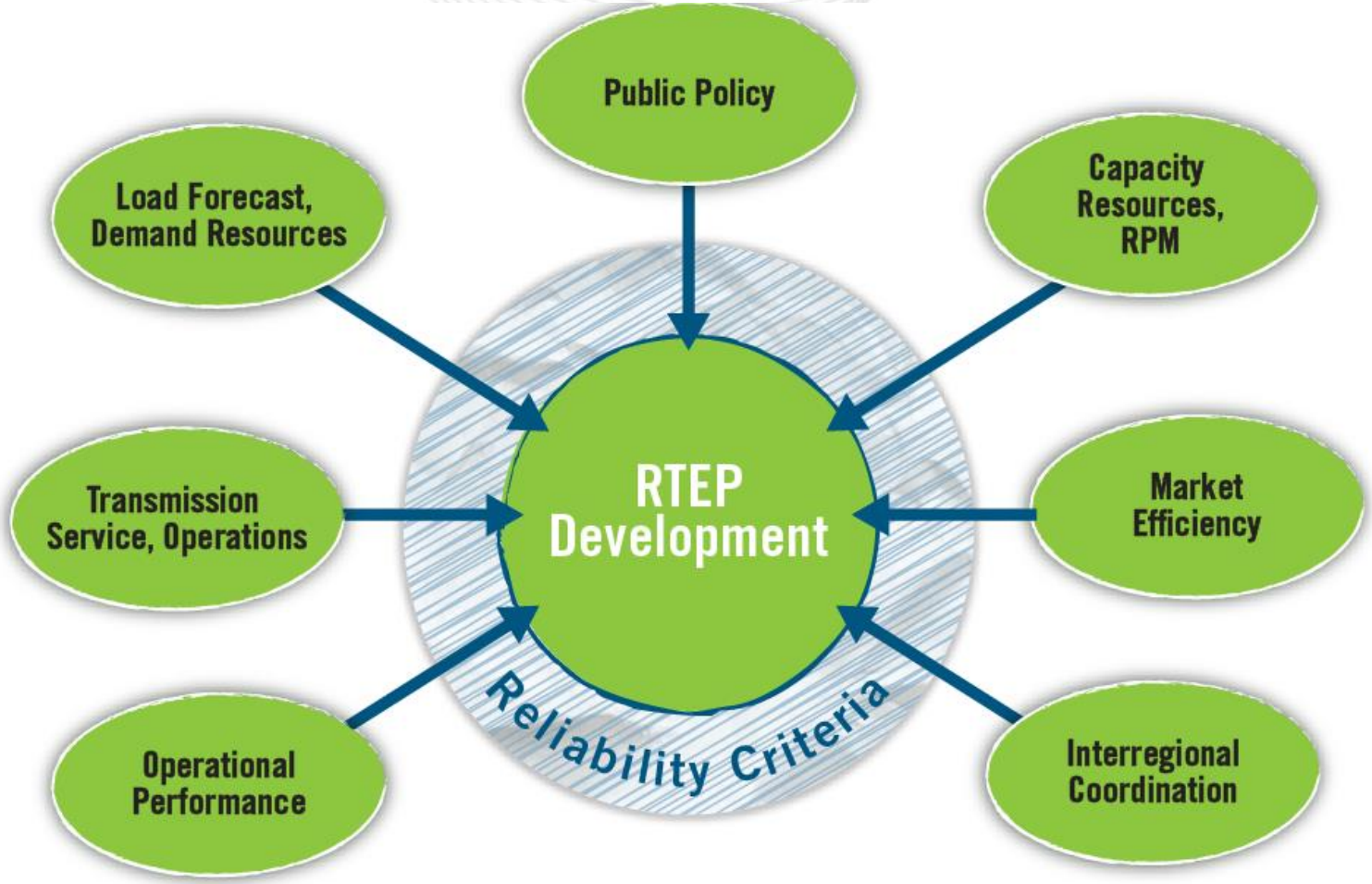
Notes

- This slide deck provides a summary of significant transmission projects near the PJM – MISO seam which have been added or modified in 2019
  - **It is not a comprehensive review of all planned projects**
- Where projects were presented on multiple occasions, efforts were made to only include the latest information
- For additional information:
  - TEAC: http://pjm.com/committees-and-groups/committees/teac.aspx
  - Subregional RTEP Committee – Western: http://pjm.com/committees-and-groups/committees/srrtep-w.aspx

Links for Various Information related to PJM Planning

- Transmission Expansion Advisory Committee (TEAC)/PJM RTEP Windows
  - http://www.pjm.com/committees-and-groups/committees/teac.aspx
- Interregional Planning
  - http://www.pjm.com/planning/interregional-planning.aspx
- Queue (future) Generation
  - http://pjm.com/planning/generation-interconnection.aspx
- Generation Deactivation
  - http://www.pjm.com/planning/generation-deactivation.aspx
- Proposal Windows
  - http://www.pjm.com/planning/rtep-development/expansion-plan-process/ferc-order-1000/rtep-proposal-windows.aspx

System Expansion Drivers for RTEP



Open Issues

Open Issues

PJM currently has no open issues for which potential solutions have not been identified

- New reliability issues will be identified in Q2, 2020
- New market efficiency issues will be identified in Q4, 2020 (24 month cycle)
- New operational performance or public policy issues will be identified on an ad-hoc basis

Identified Issues: Market Efficiency

Issues identified in November 1 window, per 24 month market efficiency cycle

2018-2019 24-Month Market Efficiency Cycle

- Long term proposal window: Nov 2nd 2018 – March 1st 2019
- Mid-cycle update of major assumptions: Jan 2019 – Apr 2019
  - Demand forecast, Fuel prices, Generation expansion, Network topology, etc.
  - Only updating the most significant changes, not full update
- Analysis of proposed solutions: May 2019 - Oct 2019
  - Independent consultant review of cost and ability to build
  - Review of analysis with TEAC: Jun 2019 - Nov 2019
- Determination of final projects: Dec 2019
  - Final review with TEAC and Board approval
  - Projects may be approved earlier if analysis and review complete

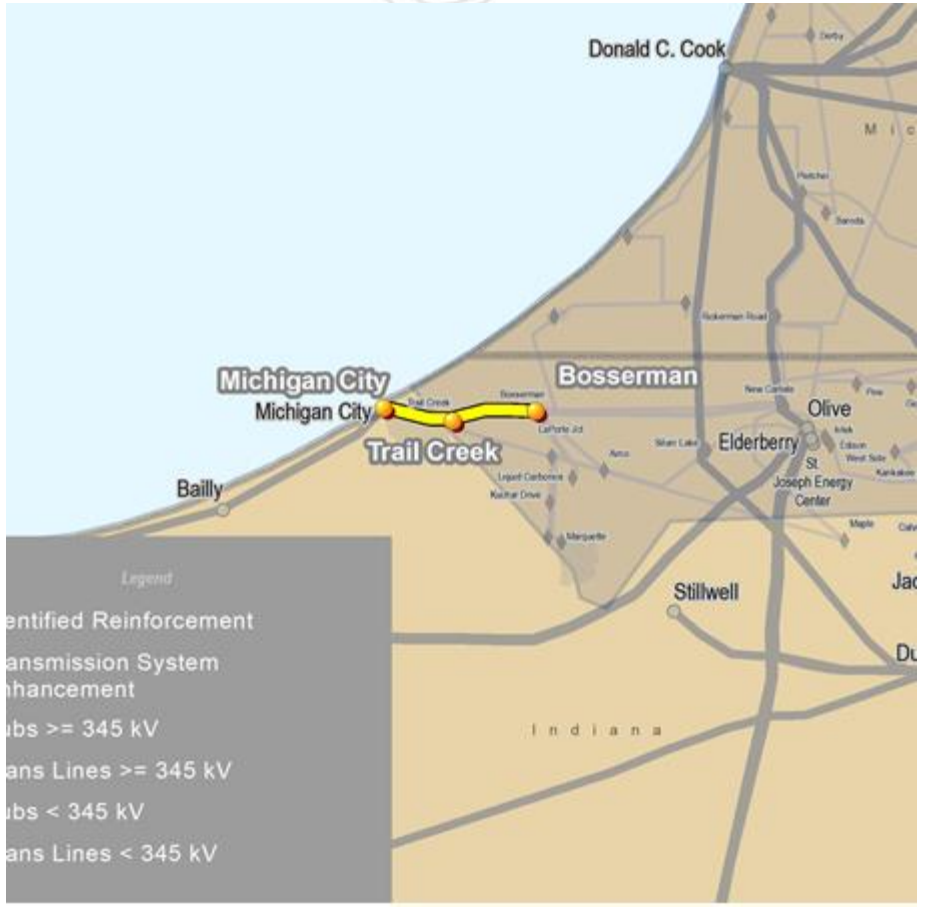
Recommended Congestion Drivers

2018/19 RTEP Market Efficiency Window Eligible Congestion Drivers			ME Base Case with FSA units (Annual Congestion $million)		ME Base Case with FSA units (Hours Binding)			
Constraint	**FROM AREA**	**TO AREA**	**2023 Simulated Year**	**2026 Simulated Year**	**2023 Simulated Year**	**2026 Simulated Year**	**Comment**	**Potential Upgrades**
Hunterstown to Lincoln 115 kV	METED	METED	$ 7.45	$ 10.56	865	1010	Internal Flowgate	
Monroe 1&2 to Wayne 345 kV	MISOE	MISOE	$ 4.38	$ 9.51	148	271	M2M	
He Hubbell to Sunman Weisburg 138 kV	MISOC	MISOC	$ 3.19	$ 3.20	122	110	M2M	
E Frankfort (R) to Goodings (R) 345 kV	COMED	COMED	$ 0.56	$ 1.46	58	145	M2M	
Cumberland TR2 to Juniata Bus 1 230 kV	PLGRP	PLGRP	$ 8.99	$ 13.10	357	316	Internal Flowgate	
Marblehead North Bus 1 138/161	MISOC	MISOC	$ 0.95	$ 0.60	160	118	M2M	A PJM/MISO TMEP has been proposed for this facility
Bosserman to Trail Creek 138 kV	AEP	MISOE	$ 7.04	$ 9.79	265	340	M2M	

Planned Projects: Baseline Market Efficiency

Bosserman –Trail Creek 138 kV

- PJM selected BT_481, rebuilding Michigan City to Trail Creek to Bosserman 138 kV lines
- Results presented at Oct 2019 TEAC:
  - Highest B/C ratio
  - Robustly addresses congestion on identified issue
  - Passed reliability no-harm test
  - Passed all PROMOD sensitivity scenarios
- Recommended as Interregional Market Efficiency project in both PJM and MISO regional processes
- Interregional Cost allocation
  - PJM 89.10% MISO 10.1%



Bosserman-Trail Creek Proposal Final Results

Proposal ID	BT_481
Proposal Description	**Rebuild Michigan City-Trail Creek-Bosserman 138 kV (10.7mi)**
Project Type	Upgrade
B/C Ratio Metric	Lower Voltage
In-Service Cost ($MM)*	$24.69
Cost Containment	No
In-Service Month	Jan 2023
% Cong Driver Mitigated	100%
2023 Shifted Cong ($MM)	$0.04
PJM Benefit Metric ($MM)	69.16
PJM Base Case B/C Ratio	2.63
PJM Interregional Cost Allocation %**	89.1 %

** Costs based on PJM's Independent Cost/Constructability Review*

*** Cost split based on September 20 IPSAC Presentation :*

https://www.pjm.com/-/media/committees-groups/stakeholder-meetings/ipsac/20190920/20190920-ipsac-presentation.ashx

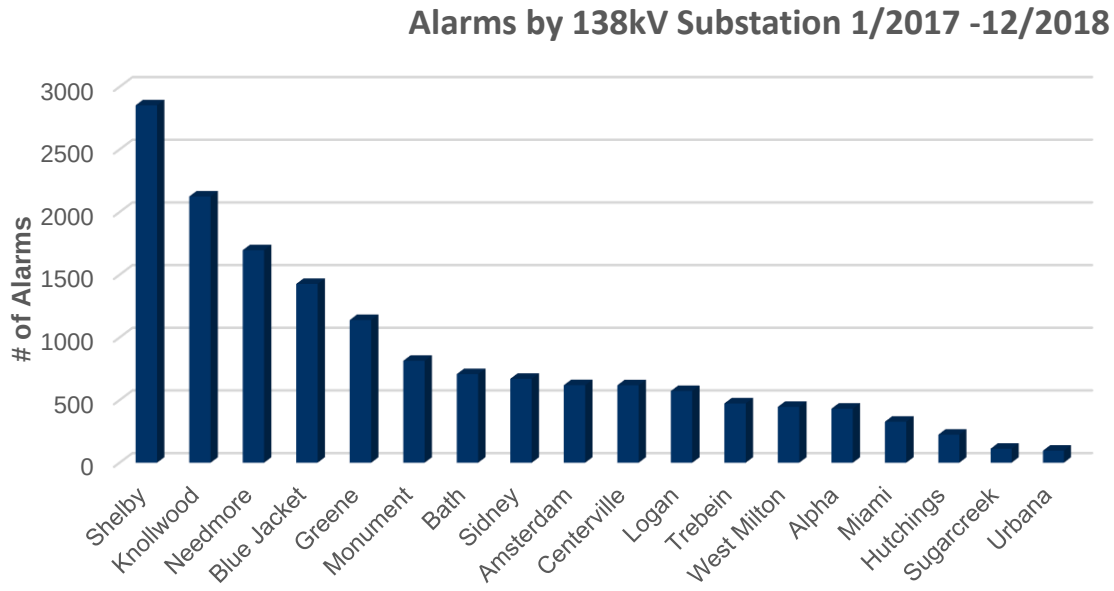
Identified Issues: Operational Performance

All identified issues have planned solutions

Dayton Operation Performance

- **Excessive Amount of High Voltage Alarms for Dayton**
  - Approximately 19,000 operational alarms logged in 2017-2018 (including 327 alarms at 345kV buses).
  - Logged more High Voltage Alarms in 2018 with fewer Minimum Load Hours in comparison to 2017.
    - High Voltage Alarm to Minimum Load Hour Ratio Almost Doubled from 2017 to 2018.
- **Limited Means to Control High Voltage**
  - Total loss of ~ 600MVAR of reactive absorption capability in the Dayton Zone

    Killen & Stuart Retirements (2018) + Hutchings Retirements (2015)
  - After exhausting all typical operating procedures, Dayton is frequently forced to switch out equipment to avoid long-term damage from high voltage exposure. This practice of switching out equipment is not a sustainable operating practice and does not effectively solve the high voltage issues.
  - As a result of retirements, there are only Peaking Plants Left in Zone
  - No existing or planned SVC's, Statcoms, Reactors, etc.



Planned Projects: Baseline Operational Performance

Dayton Operation Performance

- PJM planners worked closely with Dayton planners to determine what operational and planning changes area available
  - Reviewed EMS snapshots of high voltage conditions to confirm issues
  - Examined impact of planned, approved reactive upgrades

- Outcome of the investigation resulted in the proposed addition of three new 100 MVAR 138 kV reactors on the Dayton system with a 12/31/2021 projected in-service date

- Immediate Need exclusion

- Recommended Solution:
  - **B3108.1**: Install 100 MVAR reactor at Miami 138 kV substation ($5M)
  - **B3108.2**: Install 100 MVAR reactor at Sugarcreek 138 kV substation ($5M)
  - **B3108.3**: Install 100 MVAR reactor at Hutchings 138 kV substation ($5M)

Identified Issues: Reliability

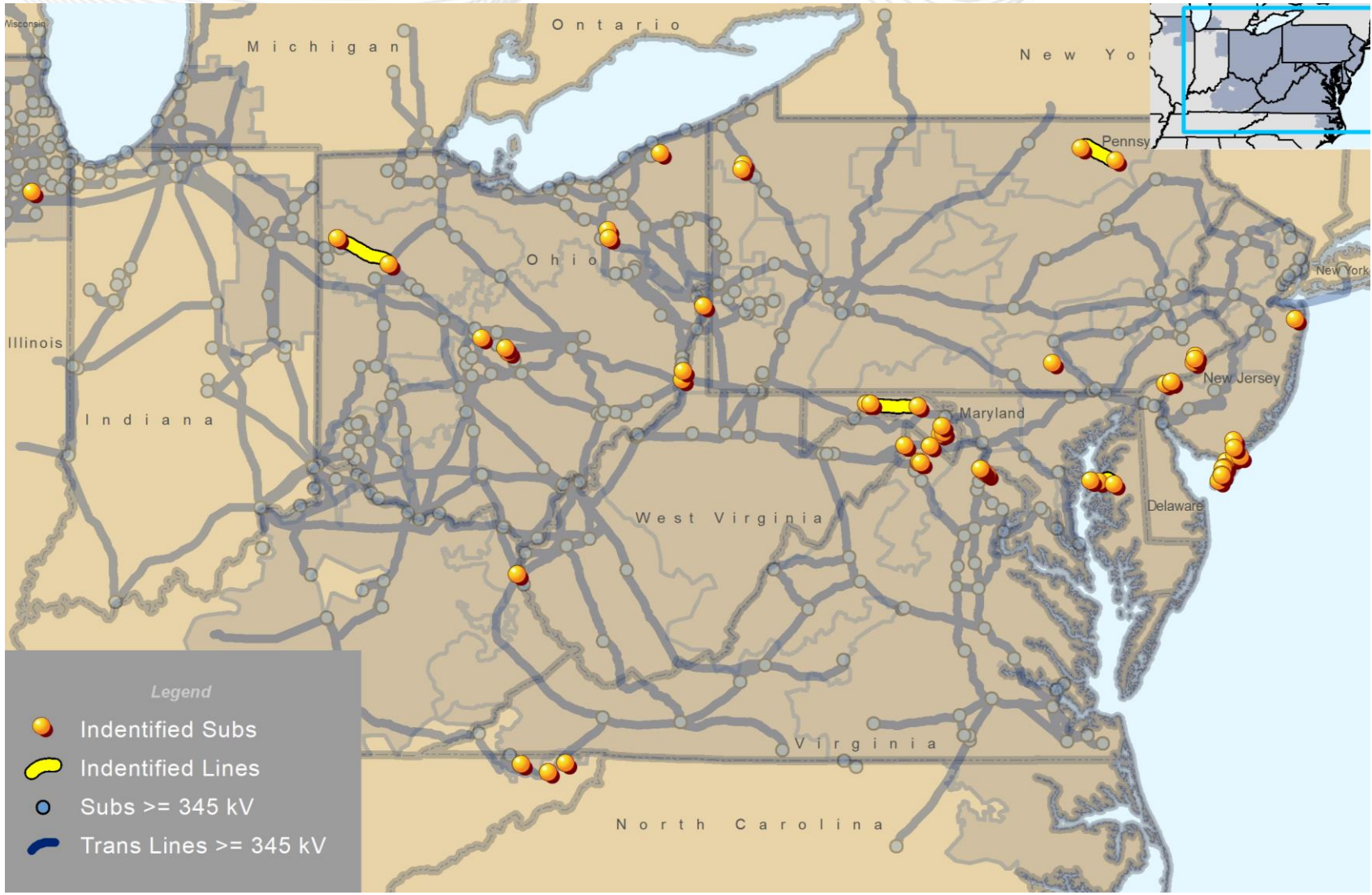
Issues identified in July 1 window

All identified issues have proposed/planned solutions

Analysis of 2024 - Violations

Overview of 2024 Results
Total of 136 flowgates identified

- 102 to be included in the window
  - 63 in the PJM Mid-Atlantic Region
  - 33 in PJM West Region
  - 6 in the PJM South Region
- 34 flowgates excluded
  - 9 due to the below 200 kV exclusion
  - 25 due to the substation equipment exclusion
- 19 require additional review

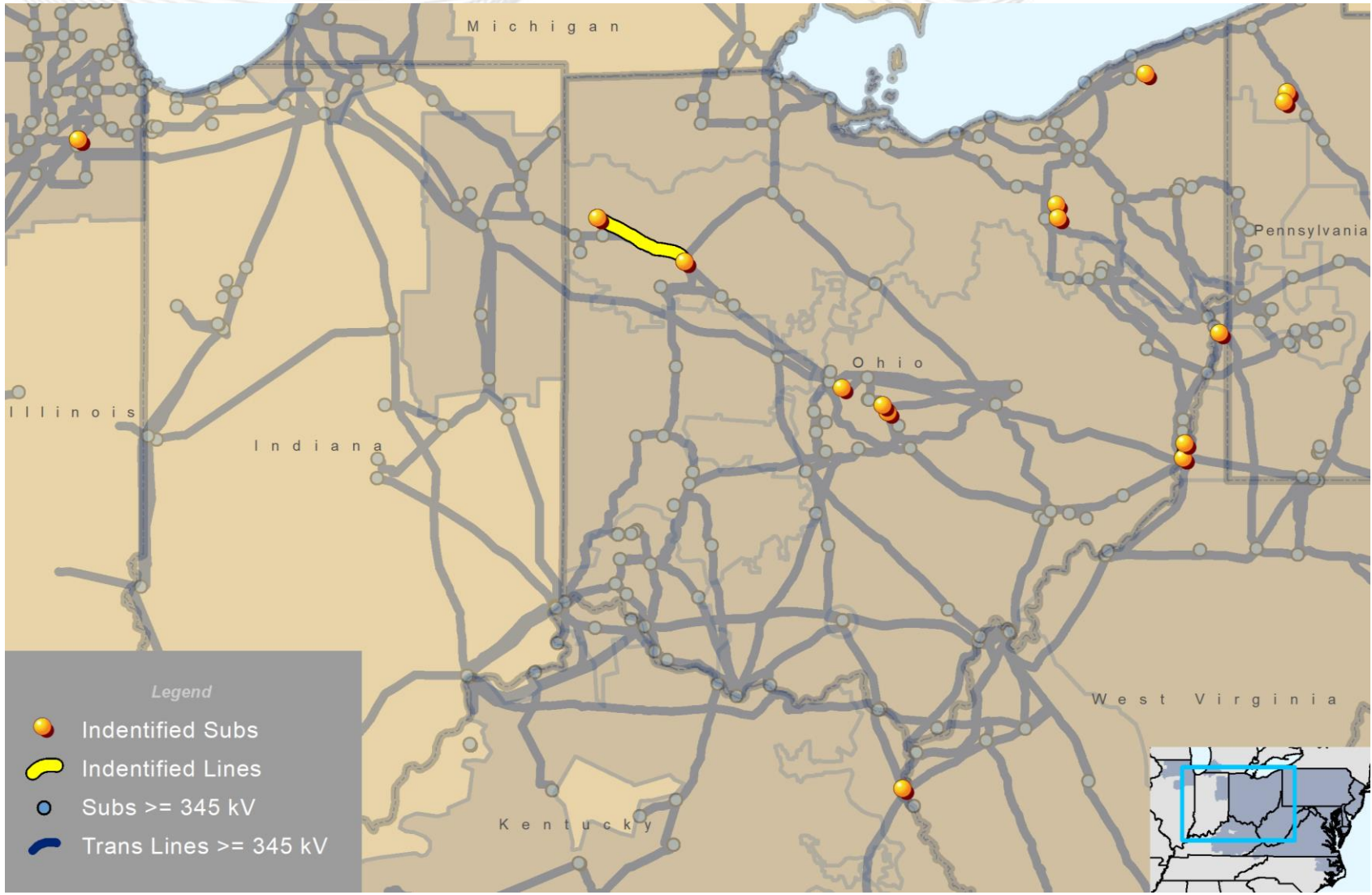


2019 RTEP Proposal Window 1 – West Results

33 Eligible Flowgates
- All on the 230 kV system
- All 4 Thermal

28 Excluded Flowgates
- 5 Below 200 kV
- 23 Substation Equipment

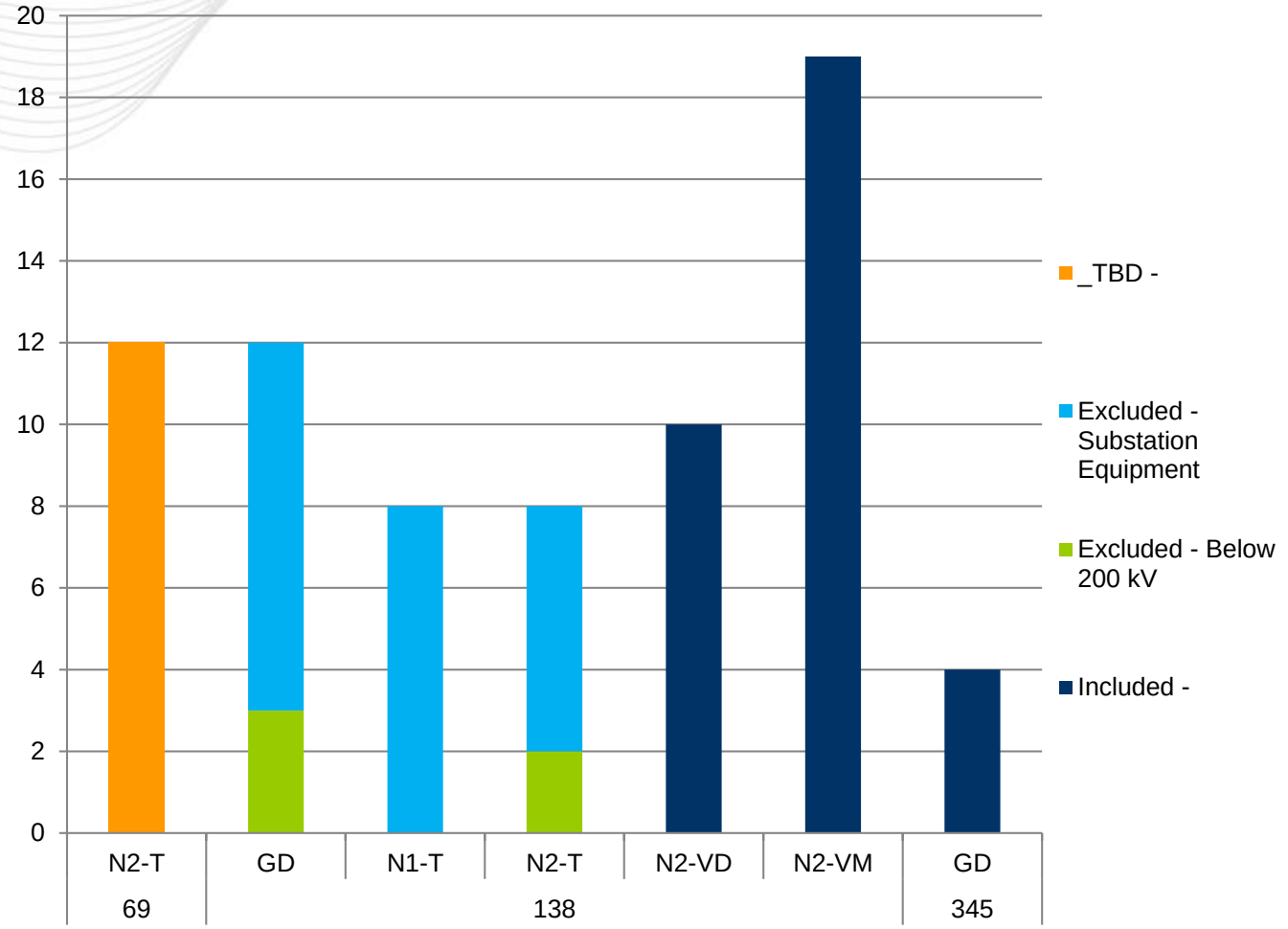
12 Flowgates Pending Review
- 6 Thermal
- 1 Generation Deliverability



2019 RTEP Proposal Window 1 – West Results

PJM West Region

Voltage Class / Criteria Test	Proposal Window Status: Included	Below 200 kV Exclusion	Substation Equipment Exclusion	TBD
69				**12**
N2-T				12
138	**29**	**5**	**23**	
GD		3	9	
N1-T			8	
N2-T		2	6	
N2-VD	10			
N2-VM	19			
345	**4**			
GD	4			
Grand Total	**33**	**5**	**23**	**12**



Planned Projects: Baseline Reliability

AEP Transmission Zone

Problem Statement: N-1-1 thermal

Hyatt - Maliszewski 138 kV line is overloaded for the following contingency scenarios:

- Loss of Hyatt 345/138 kV 1A & 1B transformers followed by the loss of Hyatt - Maliszewski #2 138 kV.

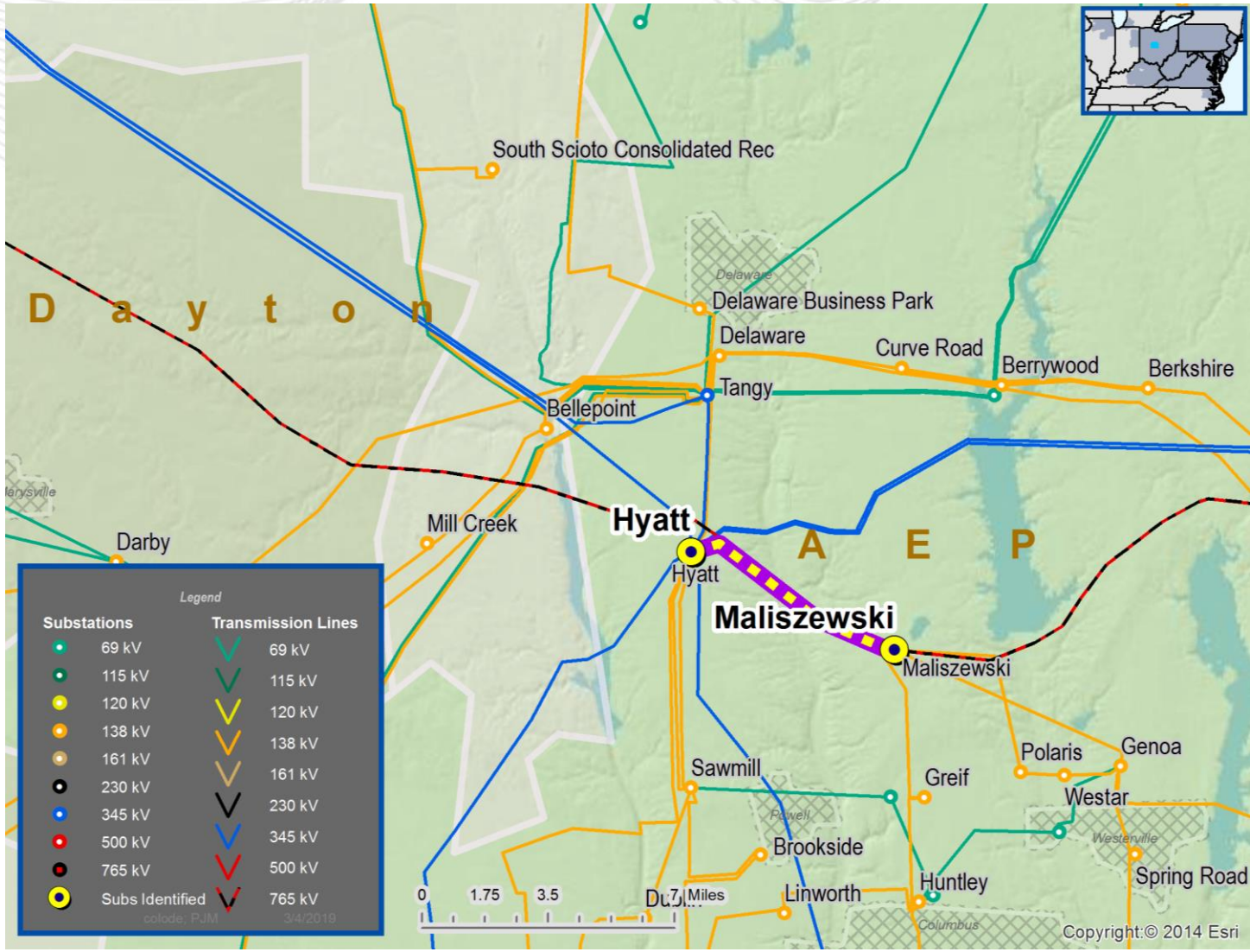
- Loss of Marysville 765/345 kV #2 transformer followed by Hyatt - Maliszewski #2 138 kV.

Recommended Solution:

- B3106: Perform a sag study (~ 6.8 miles) to increase the Summer Emergency rating.
- Current rating: SN 223 MVA / SE 226 MVA
- New rating: SN 257 MVA / SE 310 MVA

Estimated Project Cost: $ 0.5M

Required IS Date: 06/01/2020
Projected IS Date: 06/01/2020



AEP Transmission Zone

Problem Statement: N-1-1 thermal

Polaris - Westerville 138 kV line is overloaded for the following contingency scenarios:

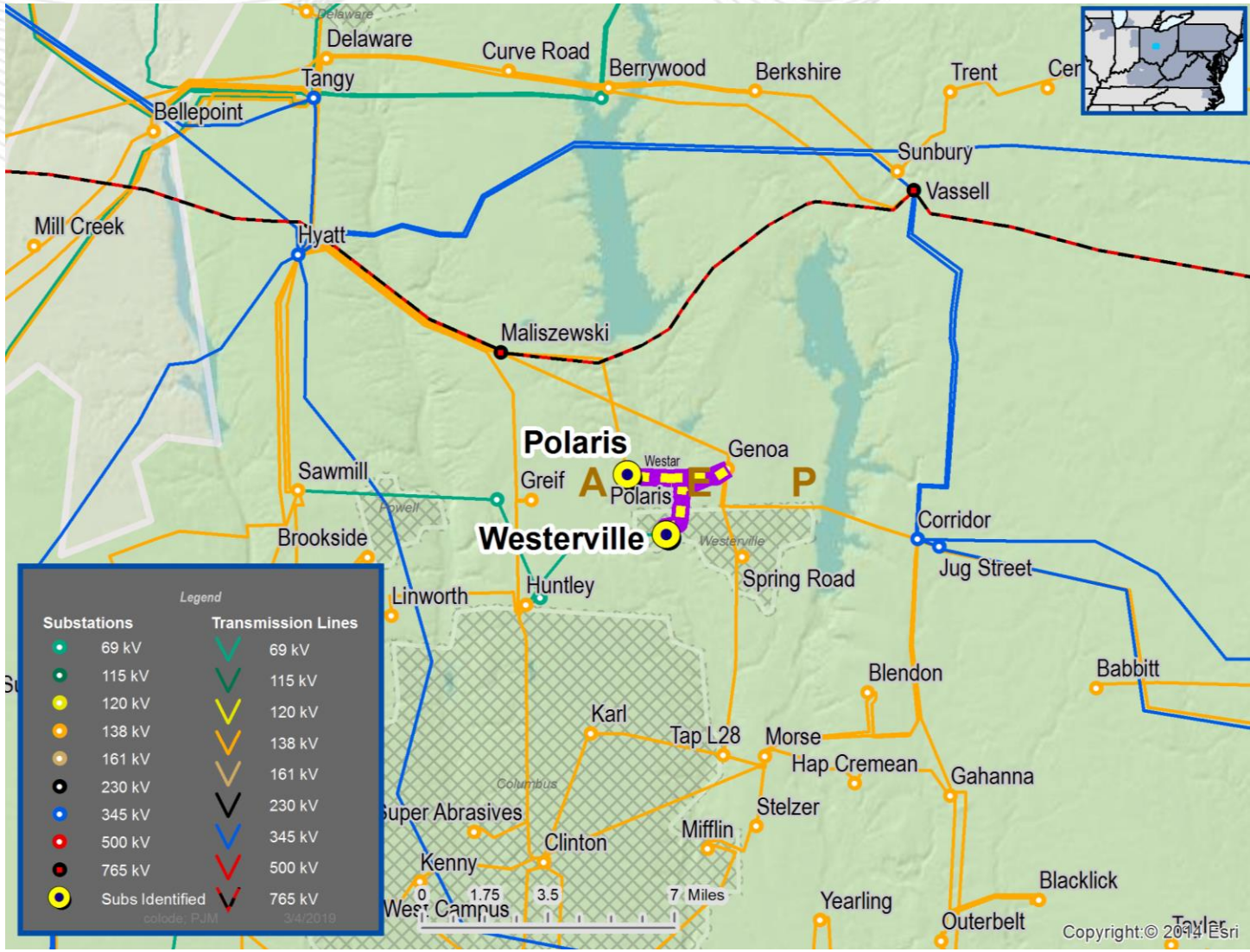
- Loss of Vassel - Vassel TR1 Lead 345 kV followed by the loss of Genoa - Maliszewski #2 138 kV.
- Loss of Vassel 765/345 kV transformer followed by the loss of Genoa - Maliszewski ckt 2 138 kV.
- Loss of Genoa - Maliszewski #2 138 kV followed by loss of Vassel - Vassel TR1 Lead 345 kV.
- Loss of Genoa - Maliszewski #2 138 kV followed by loss of Vassel 765/345 kV transformer.

Recommended Solution:

- B3104: Perform a sag study (~ 3.6 miles) to increase the Summer Emergency rating to 310 MVA.
- Current rating: SN 223 MVA / SE 226 MVA
- New rating: SN 223 MVA / SE 310 MVA

Estimated Project Cost: $ 0.5M

Required IS Date: 06/01/2020
Projected IS Date: 06/01/2020



AEP Transmission Zone

Problem Statement: N-1-1 thermal

Delaware - Hyatt 138 kV line is overloaded for the following contingency scenarios:

– Loss of Delaware - Vassel 138 kV (N-1-0)

– Loss of Vassel 345/138 kV transformer (N-1-0)

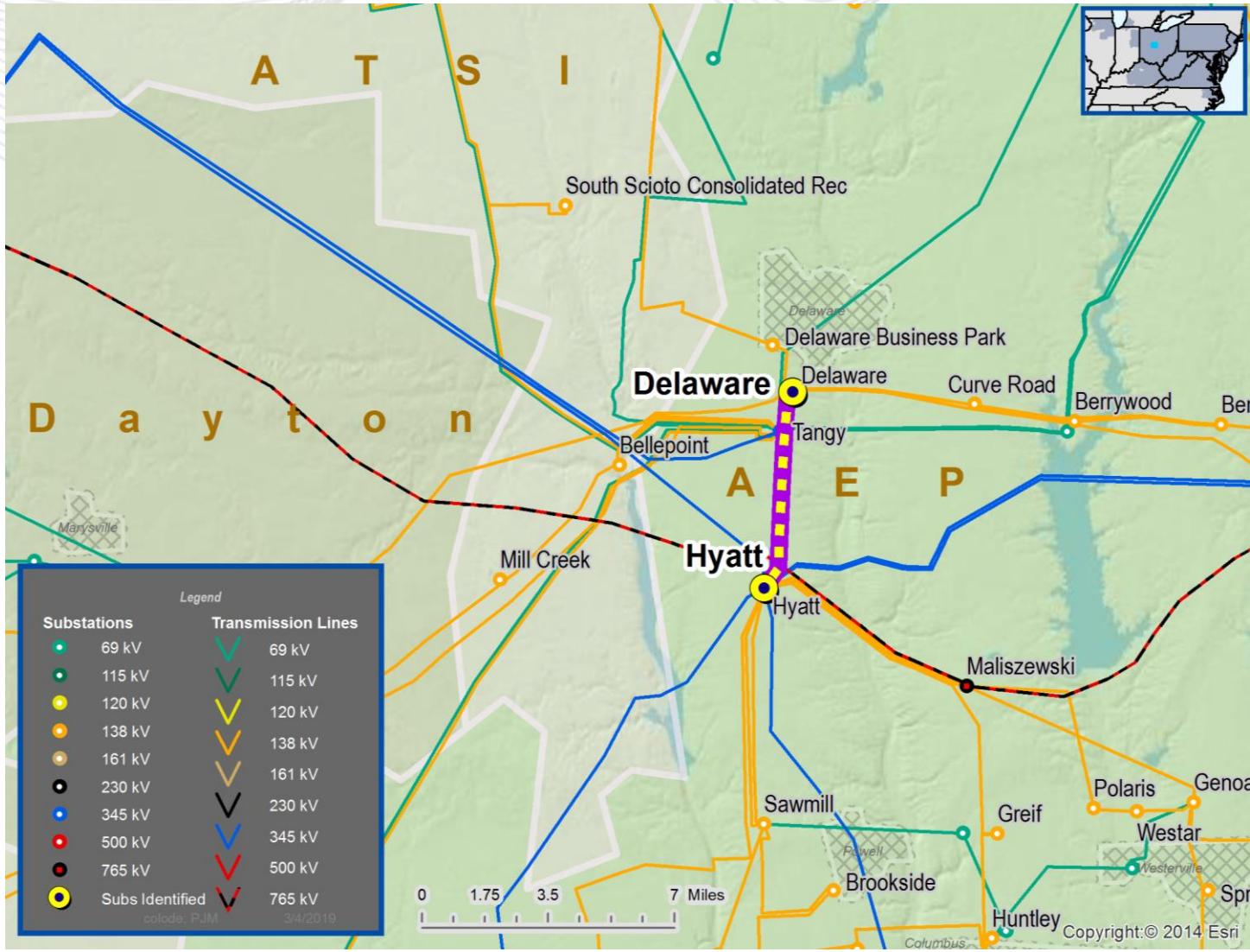
Recommended Solution:

- B3105: Rebuild the Delaware – Hyatt 138 kV line (~ 4.3 miles) along with replacing conductors at both Hyatt and Delaware substations.
- Current rating: SN 223 MVA / SE 330 MVA
- New rating: SN 256 MVA / SE 360 MVA

Estimated Project Cost: $ 16M

Required IS Date: 06/01/2020
Projected IS Date: 06/01/2022

* Operating measures identified to mitigate reliability impacts in interim



TO Planning Criteria Violation (Previously Presented: 1/11/2019 SRRTEP)

Problem Statement

The following overloads were identified in the 2022 and 2023 RTEP Summer case with corrected Armstrong Cork load model (about 10MW more).

For loss of the Jay and Deer Creek 138/69/34.5kV banks, the following overloads occur.

- Delaware – Bosman 34.5kV: 147% overload of the 23MVA 3/0 CU conductor and 125% overload of the 27MVA 4/0 CU conductor
- Bosman – Hartford 34.5kV: 105% overload of the 23MVA 3/0 CU conductor.

- Upon loss of Deer Creek 138/69/34.5kV transformer and Bosman – Delaware 34.5kV line, the following overloads occur:
  - Armstrong Cork – Fulkerson 69kV line overloads 113% past it's 46MVA 3/0 CU and 103% past its 50MVA 4/0 ACSR ratings.
  - Fulkerson – 3M 104% past its 46MVA 3/0 CU rating

- This issue has been verified by the high amount of PCLLRW's in the area. This area has received PCLLRW's on 2/26/2018 (2 different instances this day due to Deer Creek 138/69/34.5kV transformer being out.), 2/6/2018, 1/9/2018, 7/24/17, 7/14/17 for loss of Jay transformer with several of these PCLLRW's lasting multiple days.

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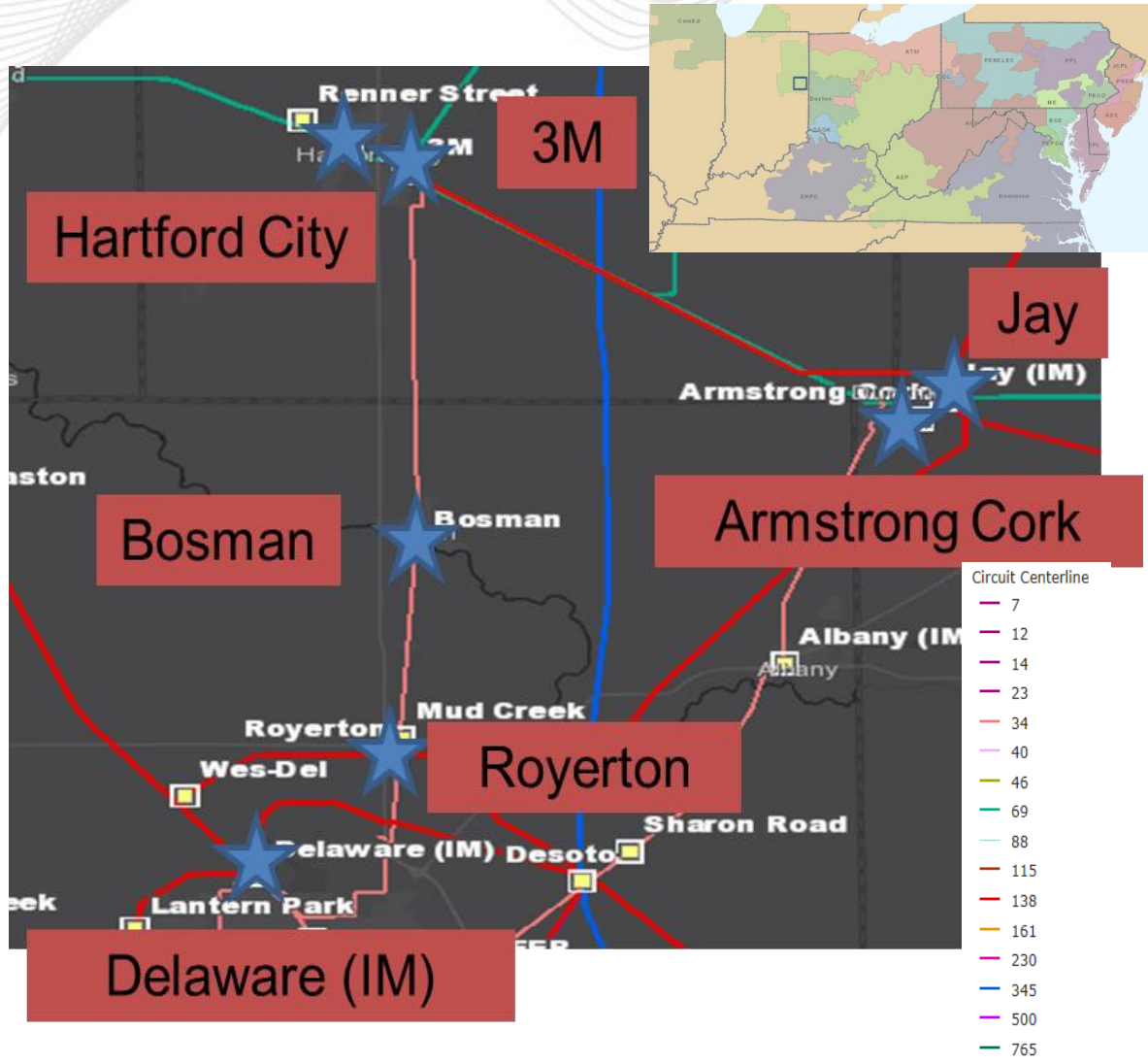


Selected Solution :

Royerton : Install a 138/69kV transformer. Install a 69kV bus with one 69kV breaker toward Bosman station. Rebuild the 138kV portion into a ring bus configuration built for future breaker and a half with 4 138kV breakers (**B3103.1**) **Estimated Trans Cost: $10.251M**

Bosman/Strawboard: Rebuild this station in the clear across the road to move it out of the flood plain and bring it up to 69kV standards. (**B3103.2**) **Estimated Trans Cost: $4.474M**

Delaware: Retire Breaker L and re-purpose M for the Jay line. (**B3103.3**) Estimated Trans Cost: $0.176M

Hartford City: Retire all 34.5kV equipment. Re-purpose breaker M for the Bosman line 69kV exit. (**B3103.4**) **Estimated Trans Cost: $0.875 M**

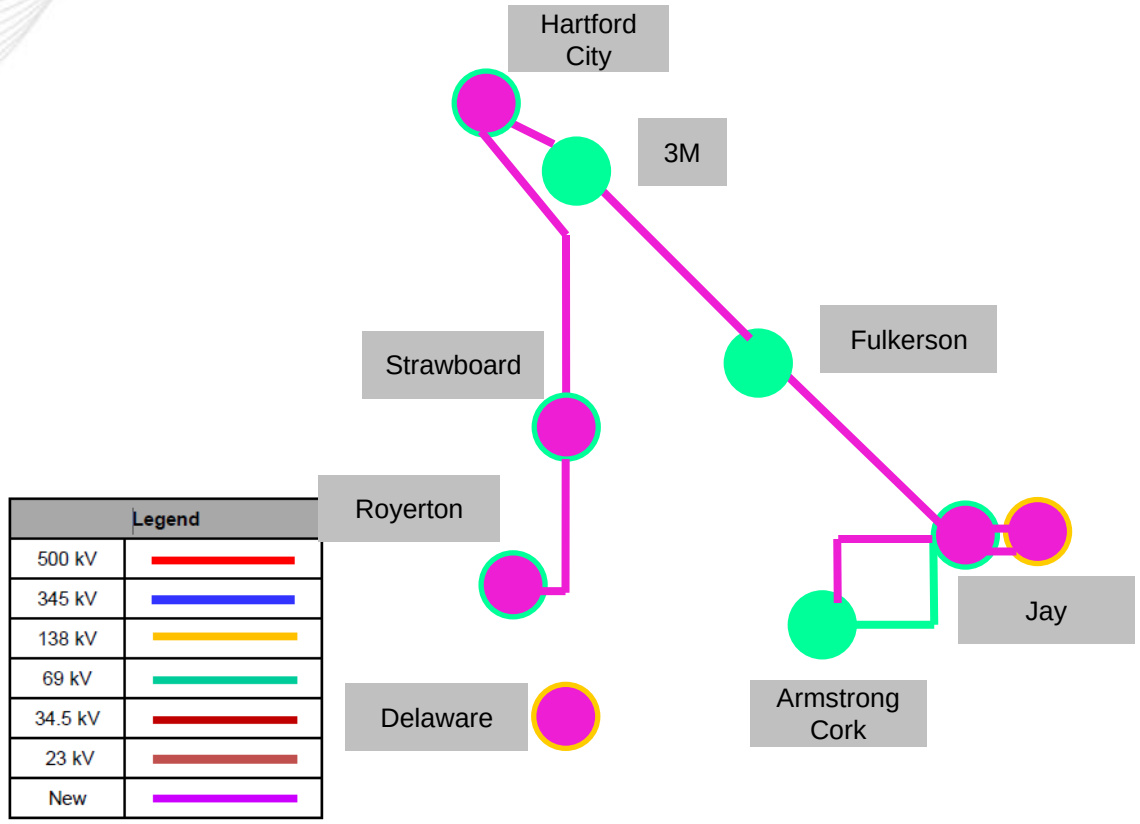
Jay: Rebuild the 138kV portion of this station as a 6 breaker, breaker and a half station re-using the existing breakers “A”, “B” and “G”. Rebuild the 69kV portion of this station as a 6 breaker ring bus re-using the 2 existing 69kV breakers. Install a new 138/69kV transformer. (**B3103.5**) **Estimated Trans Cost: $18.732 M**

Hartford City – Jay: Rebuild the 69kV Hartford City – Armstrong Cork line but instead of terminating it into Armstrong Cork, terminate it into Jay station. (**B3103.6**) **Estimated Trans Cost: $21.12M**

Armstrong Cork – Jay #2: Build a new 69kV line from Armstrong Cork – Jay station. (**B3103.7**) **Estimated Trans Cost: $2.347M**

Delaware – Bosman:Rebuild the 34.5kV Delaware – Bosman line as the 69kV Royerton – Strawboard line. Retire from Royerton – Delaware station. (**B3103.8**) **Estimated Trans Cost: $12.78 M**

Total Estimated Transmission Cost: $70.75M
Required IS Date: 6/1/2022
Projected IS Date: 6/1/2022
Project Status: Scoping



AEP Transmission Zone: Baseline [illegible]tur, Indiana

Previously Presented on 4/23/2019 SRRTEP

TO Criteria Violation (FERC 715 (TO Criteria) Exclusion)

Problem Statement:
In 2022 and 2023 RTEP cases, the following issues were observed:
Upon loss of Magley – Decatur 69 kV and Lincoln 138/69/34.5 kV XF, Berne – Monroe 69 kV circuit overloads to 154% of the 50 MVA 4/0 ACSR; Monroe – South Decatur 69 kV circuit overloads to 137% of the 50 MVA 4/0 ACSR. Additionally, Decatur – Berne 69 kV line is 1966 vintage wood pole line.

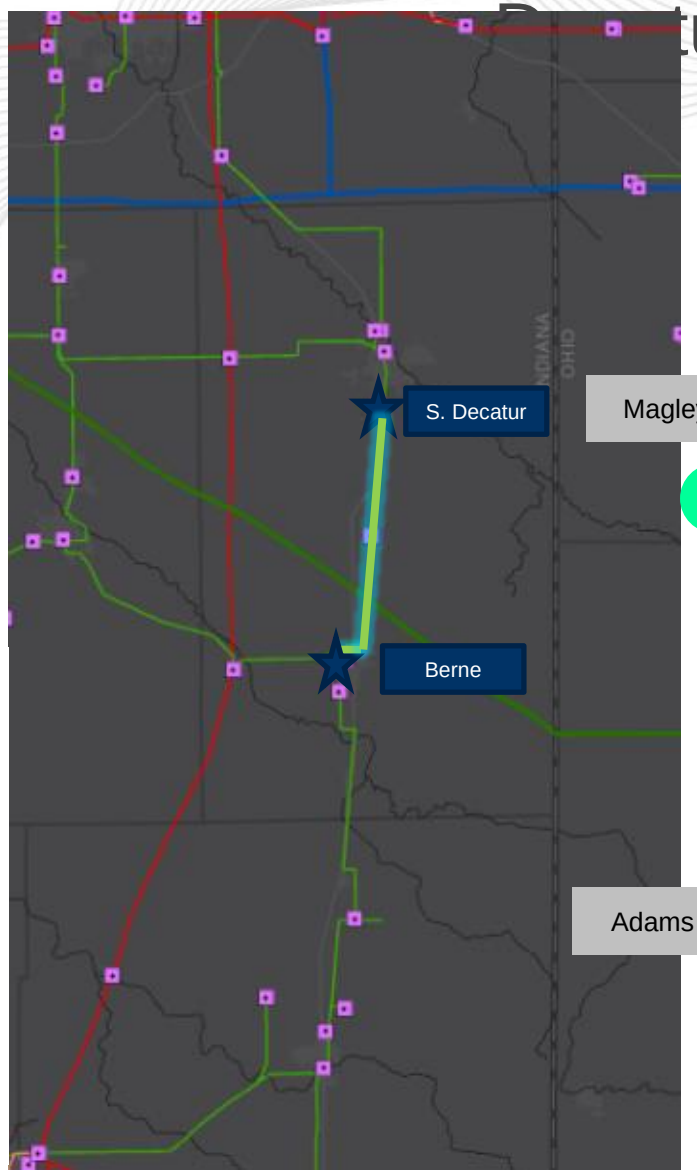
Selected Solution:
Rebuild the 10.5 mile Berne – South Decatur 69 kV line using 556 ACSR in order to alleviate the overload and address a deteriorating asset. (**b3209**)

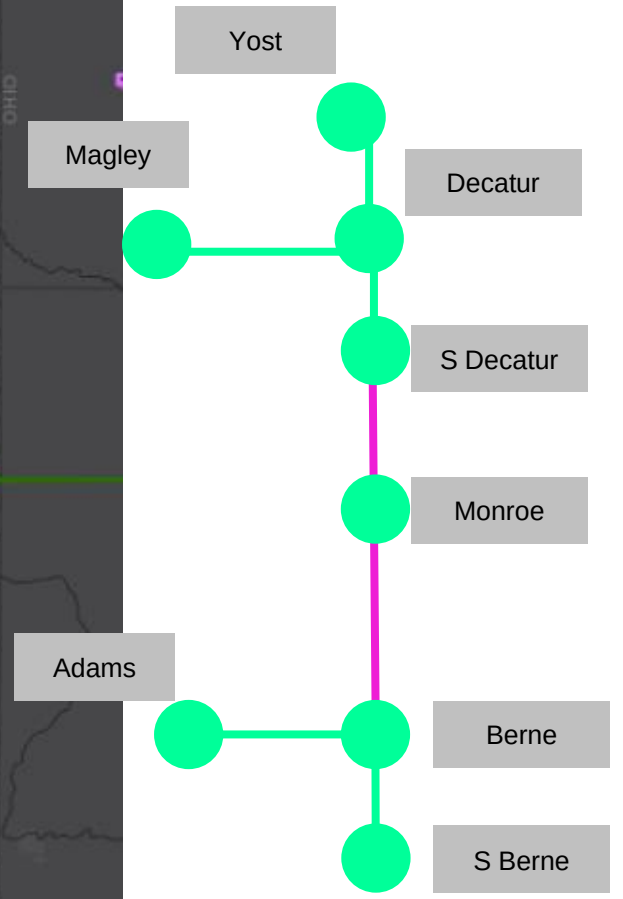
Estimated Transmission Cost: $16.6 M

Required IS Date: 6/1/2022

Projected IS Date: 6/1/2022

Project Status: Scoping





AEP Transmission Zone: Baseline Jay – Portland

Previously Presented on 5/20/2019 SRRTEP
Process Stage: Second Review
Criteria: TO Criteria violation
Assumption Reference: FERC 715
Model Used for Analysis: 2022 RTEP Summer
Proposal Window Exclusion: FERC 715

Problem Statement:
For loss of Bluff Point – Portland 69kV and Adams – Berne 69kV lines, the following violation occurs in the 2022 RTEP case:

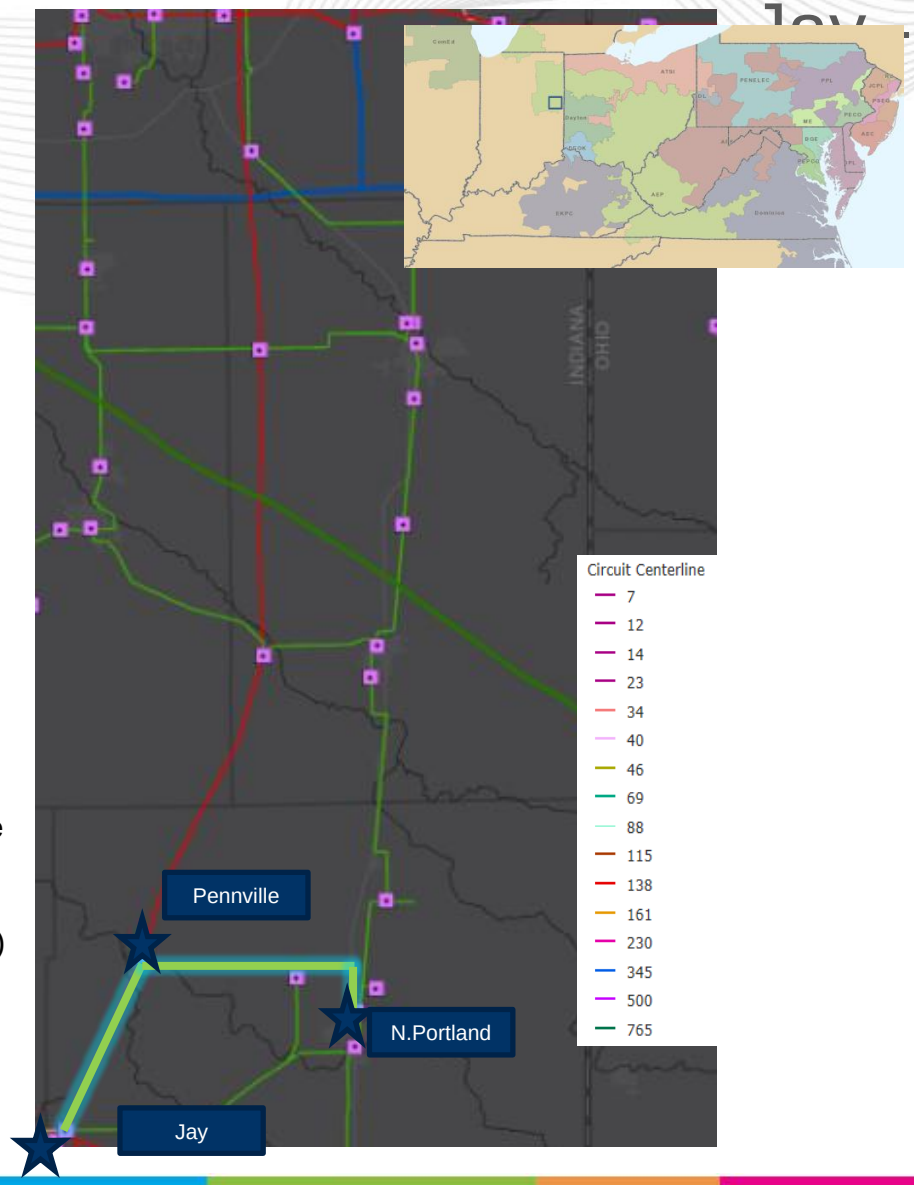
North Portland, Trinity, Berne, South Berne, Monroe and S. Decatur drop below .92 PU with North Portland reaching .8229 PU. The Bockoven load addition (need number AEP-2018-IM005) makes these violations slightly worse.

Proposed Solution:
Jay – North Portland 138/69kV line.
Rebuild the 138kV Jay – Pennville line as double circuit 138/69kV.
Build a new 9.8 mile single circuit 69 kV line from near Pennville station to North Portland station (**B3119.1**) Cost: $38.1M
Jay 138/69/34.5kV station
Install 3 69kV breakers to create the "U" string and add a low side breaker on the Jay transformer 2. (**B3119.2**) Cost: $3.4M
North Portland 69kV station
Install 2 69kV breakers to complete the ring and allow for the new line. (**B3119.3**)
Cost: $1.9M

Total Estimated Transmission Baseline Cost: $43.4M

Required IS Date: 6/1/2022

Project Status: Scoping



AEP Transmission Zone: Baseline New Buffalo Area Improvements

Previously Presented: 6/17/2019 SRRTEP

Process Stage: Recommended Solution
Criteria: Thermal N-1-1 violation (TO Criteria)
Assumption Reference: FERC 715
Model Used for Analysis: 2022 RTEP Summer
Proposal Window Exclusion: Below 200KV
Problem Statement:
For the N-1-1 loss of

- Derby – Cook Thornton 69kV and Bridgman – Pletcher 69kV
- Bridgman – Cook Thoronton 69kV and Bridgman – Pletcher 69kV
- Derby – Cook Thornton 69kV and Pletcher 138/69kV TR#1
- Bridgman – Cook Thoronton 69kV and Pletcher 138/69kV TR#1

the following violation occurs in the 2022 RTEP case:

- LaPorte Junction – New Buffalo 69 kV line gets loaded to 128%, 124%, 103%, 102% of its SE ratings (4/0 ACSR, 50MVA rating)

Existing Facility Rating:

246335 05LAPORTE – 246472 05N.BUFFAL 50/50/63/63 for SN/SE/WN/WE

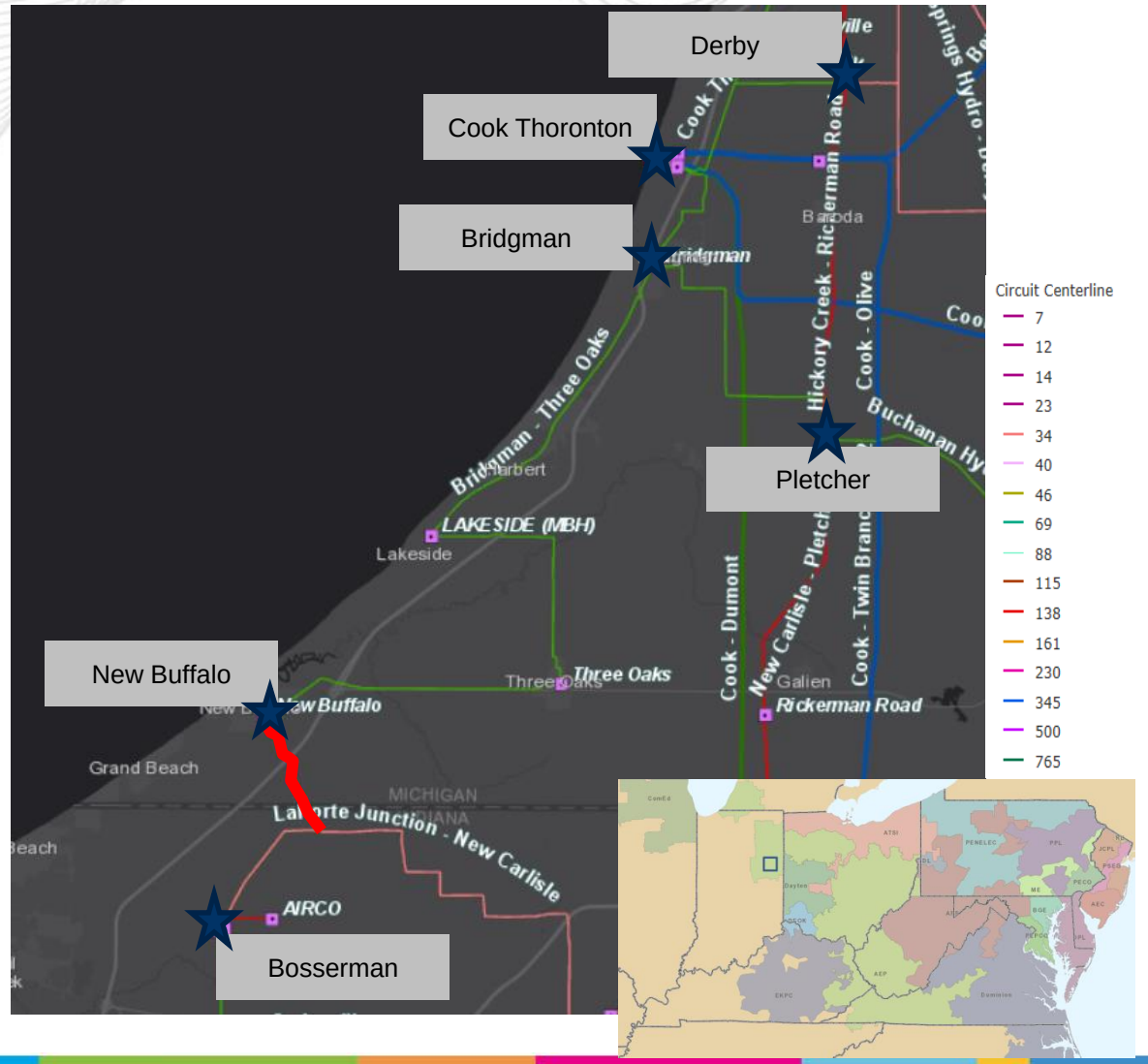
Preliminary Facility Rating:

246335 05LAPORTE – 246472 05N.BUFFAL 64/73/80/87 for SN/SE/WN/WE

Proposed Solution:

Rebuild 3.11 miles of the LaPorte Junction – New Buffalo 69 kV line with 795 ACSR (**B3132**)

Estimated Cost: $12.3M
Required IS Date: 06/01/2022
Project IS Date: 12/15/2020



Planned Projects: Supplemental

AEP Transmission Zone M-3 Process
Tanners Creek, IN

Need Number: AEP-2019-IM003

Process Stage: Solutions Meeting 5/16/2019

Previously Presented:

Needs Meeting 2/20/2019

Solutions Meeting 4/23/2019

Supplemental Project Driver:
Operational Efficiency & Flexibility

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

Problem Statement:
Tanners Creek 345 kV

- Currently a line fault on the Dearborn circuit causes 5 EHV breakers to open. This is above the AEP max of 4 and must be addressed.
- According to the DEDSTFMRS PJM document, 200 kV+ facilities with 7+ elements are required to be in a complete breaker and a half setup at a minimum. This facility has 9 elements and is currently in an incomplete breaker and a half setup.

ComEd Transmission Zone M-3 Process
Kendall - Lockport

Need Number: ComEd-2019-007

Process Stage: Solutions Meeting 11/14/2019

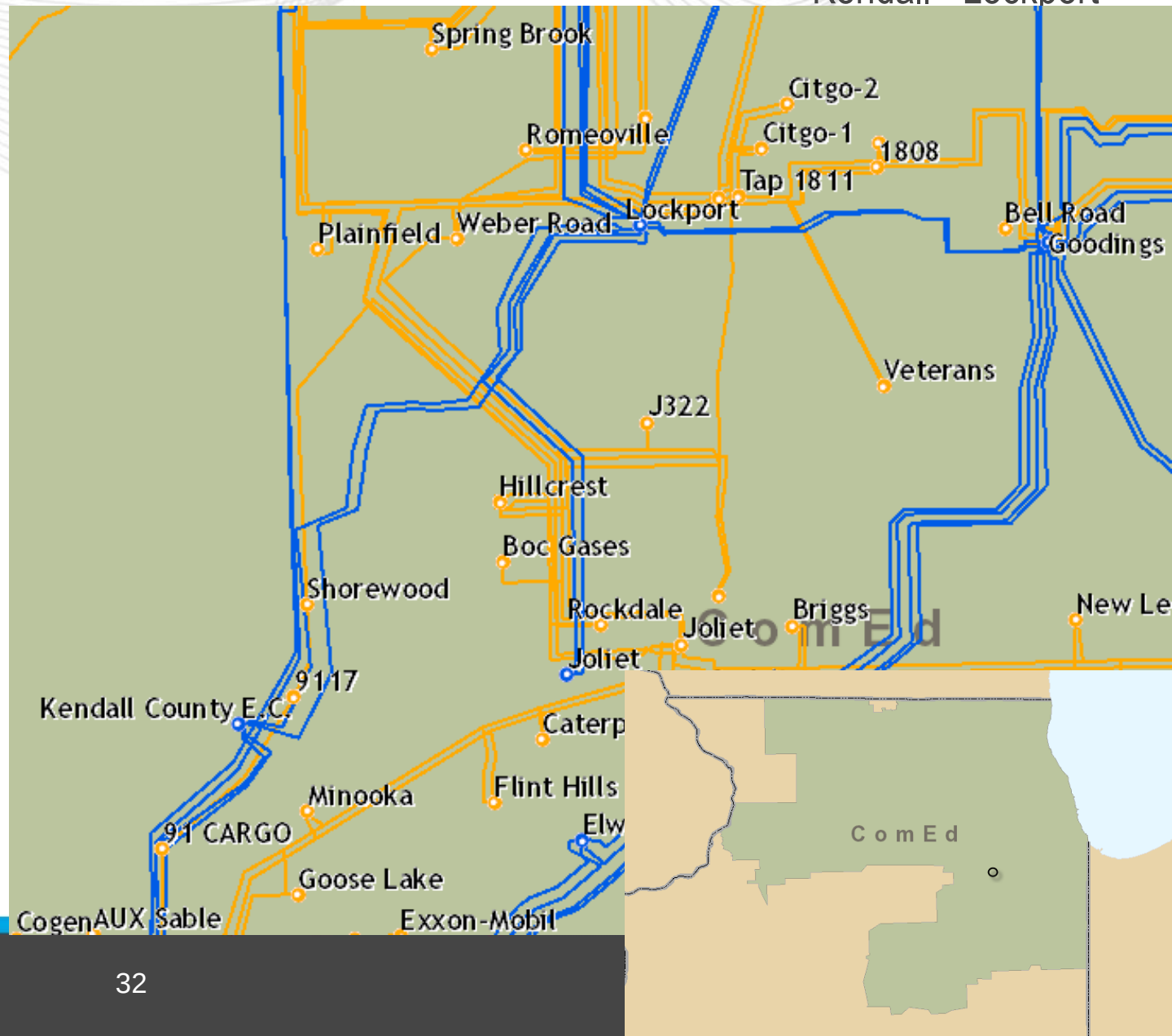
Previously Presented:
Need Meeting 10/17/2019

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

Specific Assumption References:
Increasing system capacity
Programmatic replacement of breakers, relays, wood poles, cables, etc.
Supply strategy guidance resulting in standard conductor sizes and other standard equipment

Problem Statement:
Network project n5144 is rebuilding 345 kV Kendall – Lockport double circuit towers for 16 miles in 2022 to increase line 10805 rating. New conductor will be T2-1113 (1448 MVA SN/1863 MVA SE).

- 345 kV Line 10806 runs in parallel on the same towers. Existing conductor is 2156 kcm (1334 MVA SN/1726 MVA SE). The disconnect switch at Lockport is a non-standard 1600A switch.
- 138 kV lines 0908 (Joliet – Shorewood) and 9117 (Shorewood – Cargo Court) run along the same ROW for 10.5 miles on wood poles.
    - The wood poles are 59-60 years old
    - ComEd intends to eliminate wood poles on the transmission system.



Need Number: ComEd-2019-007

Process Stage: Solutions Meeting 11/14/2019

Proposed Solution:

- Install quad circuit towers for 10.5 miles between Kendall and Lockport. String 138 kV conductor and cut line 0908 and part of line 9117 over to new towers. Incremental cost $12M
- Install T2-1113 conductor on line 10806 and OPGW static wire. Replace 10806 disconnect at Lockport. Incremental cost $1.1M

Ancillary Benefits:

Risk to Shorewood and Cargo Court will be significantly reduced during construction due to shorter outage required.

Increased reliability of steel poles over wood

Alternatives Considered:

- Install quad circuit towers but string and move 138 kV lines over at a future date. Estimated cost: $20M
- Install double circuit towers for n5144. Rebuild 138 kV wood pole line with steel in future. $20M

Projected In-Service: 6/1/2022

Project Status: Conceptual

Model: PJM 2019 RTEP

AEP Transmission Zone M-3 Process
Tanners Creek, IN

Need Number: AEP-2019-IM003

Process Stage: Solutions Meeting 5/16/2019

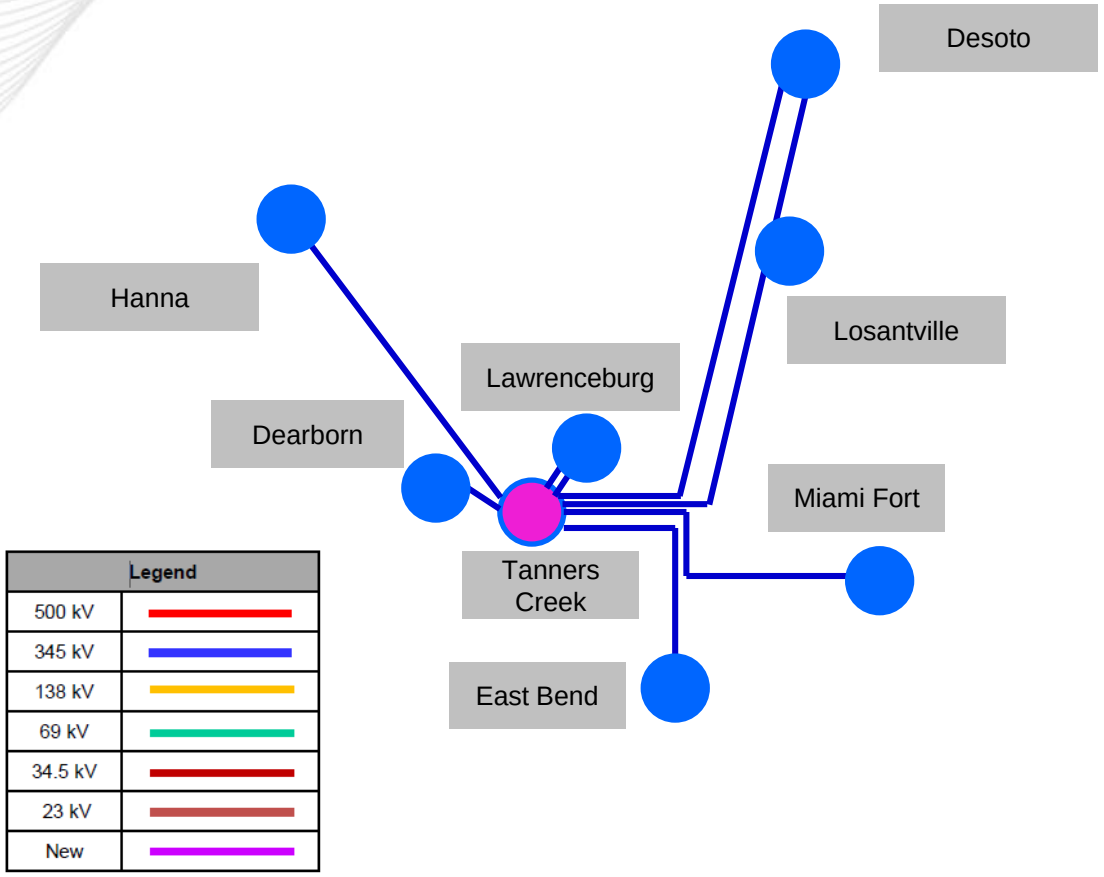
Proposed Solution:
Install 2 new 345 kV breakers and move the existing M2 breaker into the new N string. Terminate the Dearborn line and the transformer into the new N string. Install a new 345 kV breaker "T" to complete the T string.

Alternatives:
Reterminate the 345/138 kV transformer and 345 kV Dearborn line into existing breaker spots. Due to the way the station is laid out, this would require reconfiguring multiple 345 kV lines and would cost more.

Total Estimated Transmission Cost: $5.93 M

Projected IS Date: 6/1/2021

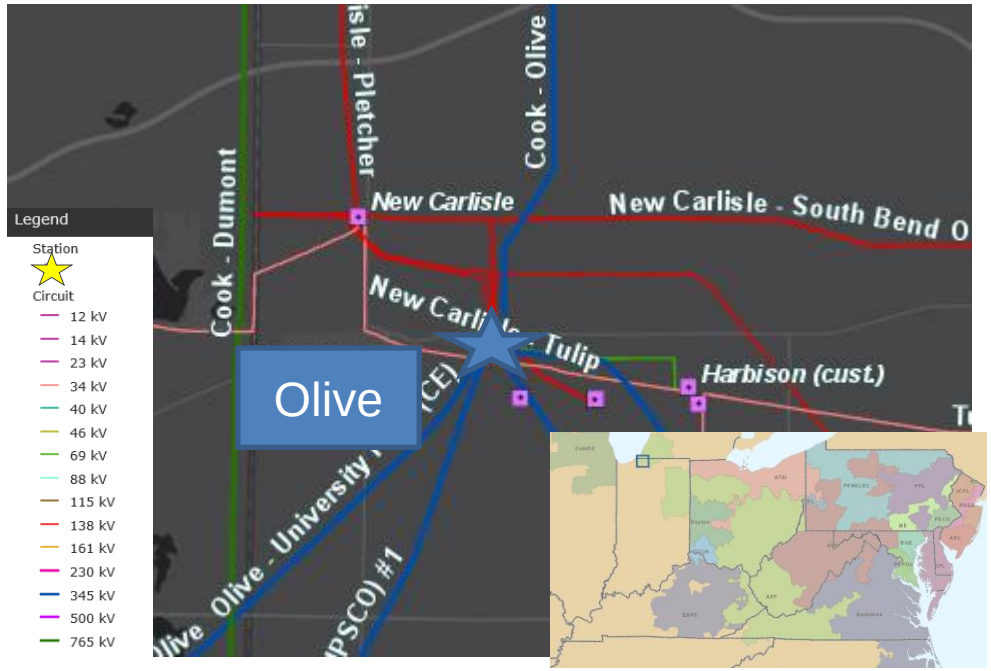
Project Status: Scoping



AEP Transmission Zone: Supplemental
NIPSCO Olive Solution

Need Number: AEP-2019-IM028
Process Stage: Solutions Meeting 10/25/2019
Process Chronology: Needs Meeting 08/29/2019
Supplemental Project Driver: Customer Service
Specific Assumptions Reference: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)
Model: 2024 RTEP

Problem Statement:
Olive 345/138/69kV station
NIPSCo has requested a new 69kv delivery point at Olive station for a ~1.5MW load.



AEP Transmission Zone: Supplemental NIPSCO Olive Solution

Need Number: AEP-2019-IM028
Process Stage: Solutions Meeting 10/25/2019

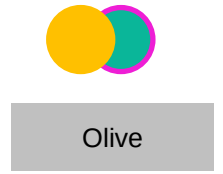
Proposed Solution

Connect NIPSCO line to 69kV Olive Station by installing the first span and the structure from Olive and a 69kV breaker for the line.

Total Estimated Transmission Cost: $0M (Customer reimbursable)

Alternatives Considered:
No viable alternatives.

Projected In-Service: 09/14/2020
Project Status: Scoping

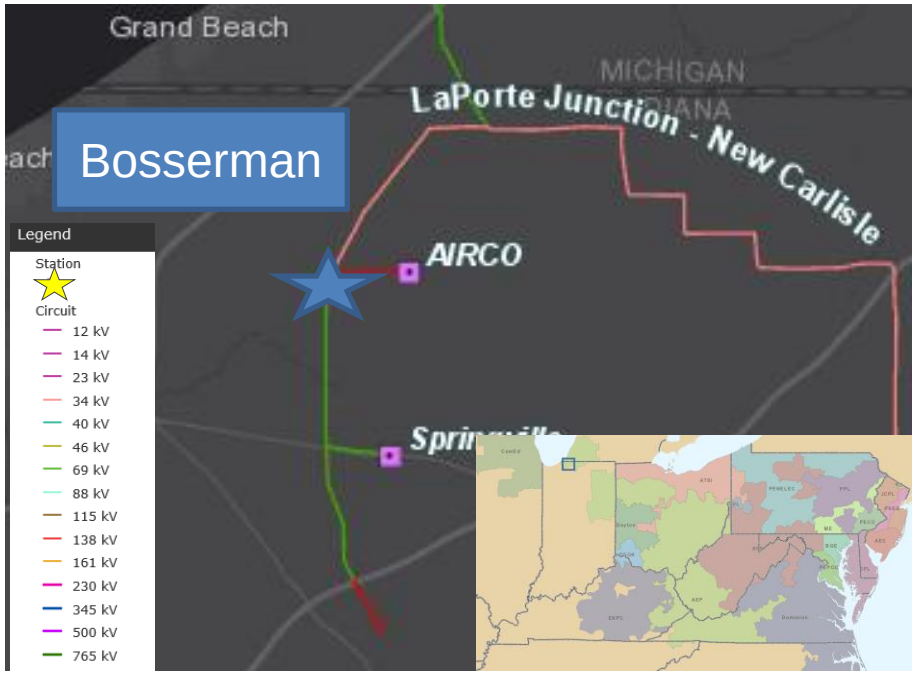


Legend	
500 kV	
345 kV	
138 kV	
69 kV	
34.5 kV	
23 kV	
New	

AEP Transmission Zone: Supplemental NIPSCO Bosserman Solution

Need Number: AEP-2019-IM029
Process Stage: Solutions Meeting 10/25/2019
Process Chronology: Needs Meeting 08/29/2019
Supplemental Project Driver: Customer Service
Specific Assumptions Reference: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:
Bosserman 138/69kV station:
NIPSCo has requested a new 69kV delivery point at Bosserman station for a ~1.5MW load.



AEP Transmission Zone: Supplemental NIPSCO Bosserman Solution

Need Number: AEP-2019-IM029
Process Stage: Solutions Meeting 10/25/2019

Proposed Solution

Connect NIPSCO line to 69kV Bosserman Station by installing the first span and the structure from Bosserman and a 69kV breaker for the line.

Total Estimated Transmission Cost: $0M (Customer reimbursable)

Alternatives Considered:
No viable alternatives.

Projected In-Service: 09/14/2020
Project Status: Scoping

Bosserman

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

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Need Number: AEP-2019-IM032
Process Stage: Solutions Meeting 10/25/2019
Process Chronology: Needs Meeting 08/29/2019
Supplemental Project Driver: Customer Service
Specific Assumptions Reference: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:
Bendix – West Side 34.5kV line
NIPSCo is modifying their Grandview feed on the Bendix – West Side 34.5kV line to become their main feed. This feed is currently normally open and is served off of a hard tap.

AEP Transmission Zone: Supplemental Nipsco Bendix Solution

Need Number: AEP-2019-IM032
Process Stage: Solutions Meeting 10/25/2019

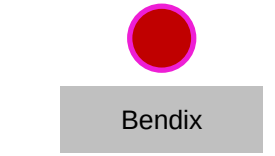
Proposed Solution

Install a three way phase-over-phase switch at Bendix station and associated line work to connect the new switch.

Total Estimated Transmission Cost: $0M (Reimbursable)

Alternatives Considered:
No viable alternatives.

Projected In-Service: 09/27/2020
Project Status: Scoping



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