



MISO identified regional issues and planned solutions near the MISO-PJM Seam

Supplemental material for *Annual Issues Review*
IPSAC meeting

February 26, 2021

Notes



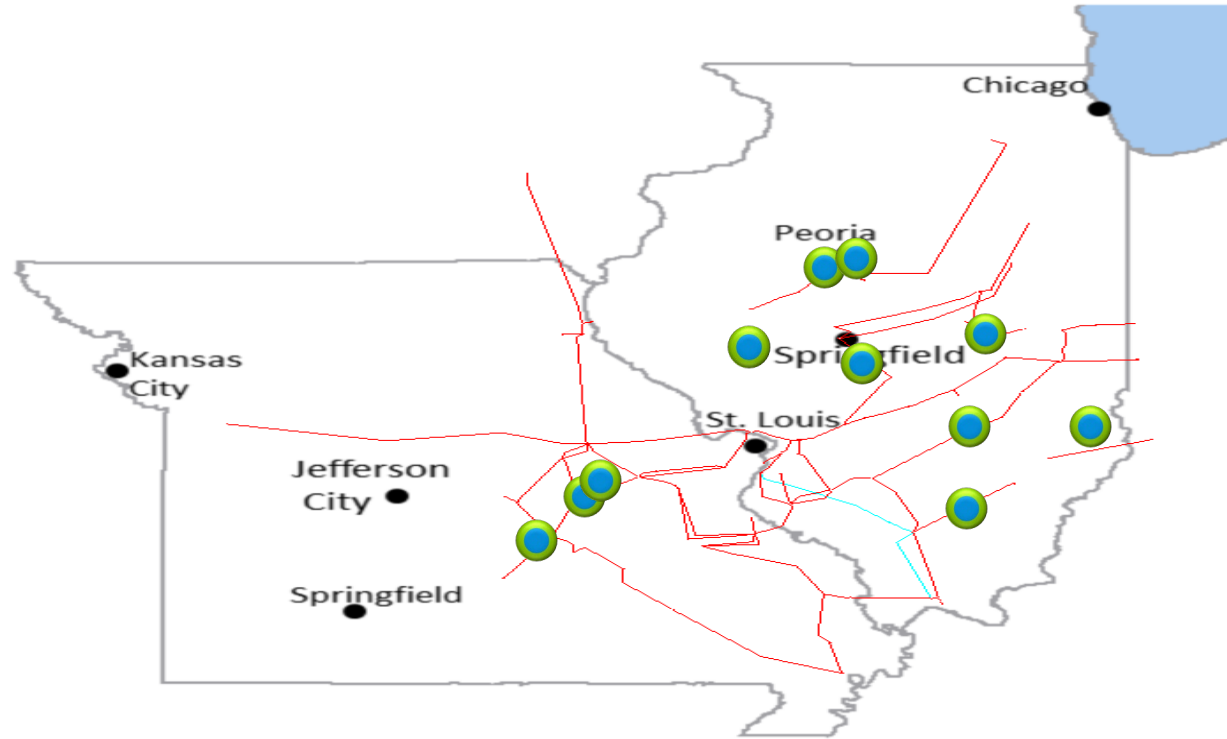
- This presentation provides an overview/highlight of significant MISO MTEP transmission projects near the MISO-PJM seam which have been either approved in MTEP20 Appendix A or proposed for MTEP21
- It is not a comprehensive review of all planned projects in MISO. For the complete list of information see the following public documents:
 - MTEP20 Report (notably, *Appendix A*)
<https://www.misoenergy.org/planning/planning/mtep20/>
 - *MTEP Projects Under Evaluation* status report:
<https://www.misoenergy.org/planning/planning/mtep-quarterly-status-reports/#nt=%2Fyear%3A2020&t=10&p=0&s=&sd=>
 - Planning Advisory Committee (PAC) Materials
<https://www.misoenergy.org/stakeholder-engagement/committees/planning-advisory-committee/>
 - Subregional Planning Meeting (SPM) Materials
<https://www.misoenergy.org/stakeholder-engagement/committees/subregional-planning-meeting/>

MISO Central and East
Subregions -

MTEP20 Approved Project
Highlights

Ameren: Eleven (11) BRPs proposed to address reliability issues on bulk energy system

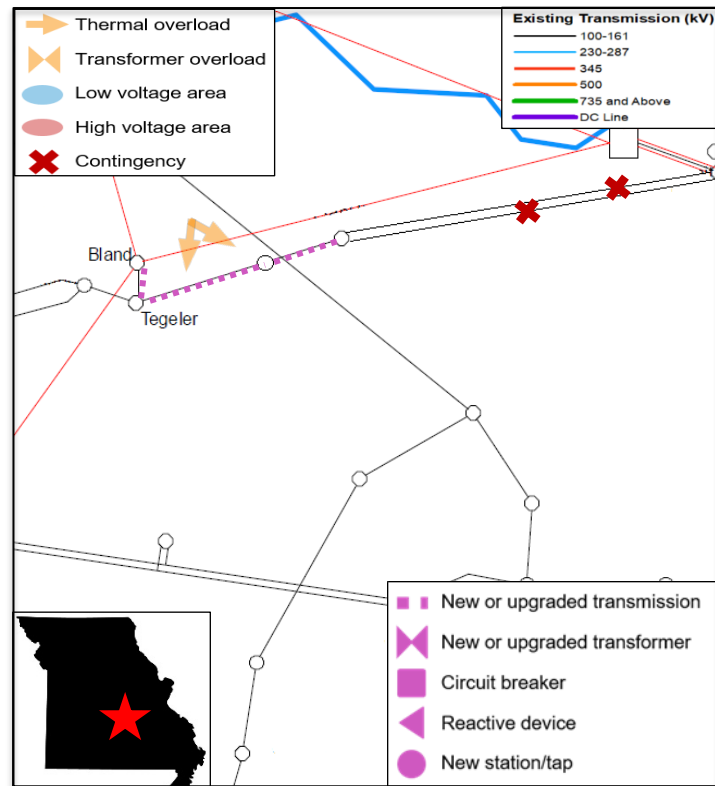
- TO proposed project
- MISO identified reliability need
- Need + Project



Reconductor [AMMO] Bland—[AMMO] Tegeler 138 kV line solve(s) *P6-1-1* event

- **Baseline Reliability Project**
- **MISO-identified issue addressed by MTEP Project P9721**
 - Contingency: P6-1-1 contingency event
 - Thermal violation: [AMMO] Bland—[AMMO] Tegeler 138 kV line
 - Low voltage: *n/a*
- **Project description**

Reconductor line to 1200 A summer emergency capability.
- **Estimated Cost:** \$27.0M
- **Expected ISD:** December 2, 2022
- **Target Appendix:** A in MTEP20



New W. Frankfort East & Norris City 345 kV reactors solve(s) P6-1-1 event

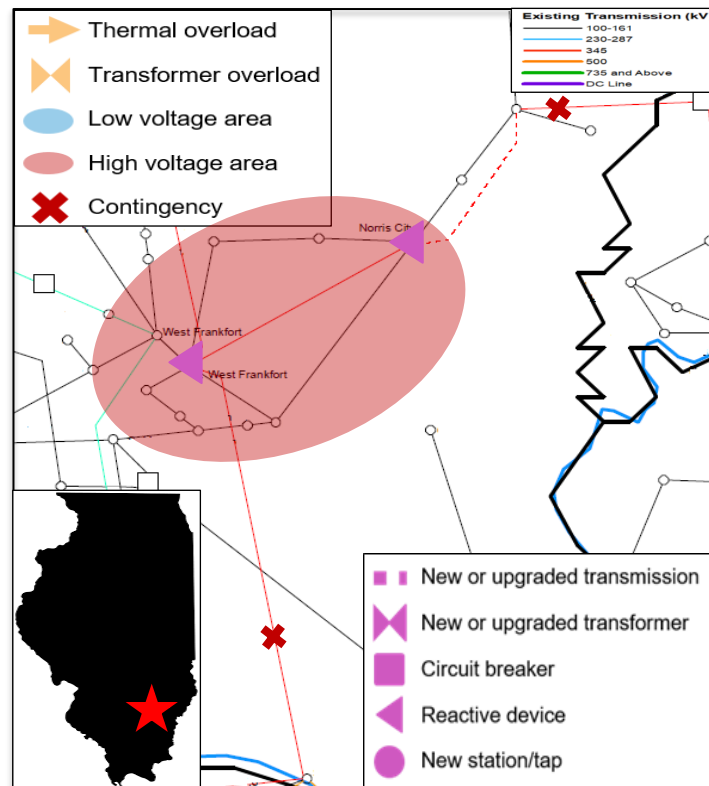
- **Baseline Reliability Project**
- **Ameren-identified issue addressed by MTEP Project P12176**

- Contingency: P6-1-1 contingency event
- Thermal violation: *n/a*
- High voltage(s): half dozen 138 kV buses with HV issues

- **Project description**

Install 345 kV reactors (50 Mvar) to control voltages at Norris City 345 kV and W. Frankfort East 345 kV. Utilizing Ameren's 90/10 2023 SLL model

- **Estimated Cost:** \$20.0M
- **Expected ISD:** December 1, 2023
- **Target Appendix:** A in MTEP20



New [AMIL] Woodhall—[AMIL] Hallock 138 kV line No. 2 solve(s) P6-1-1 event

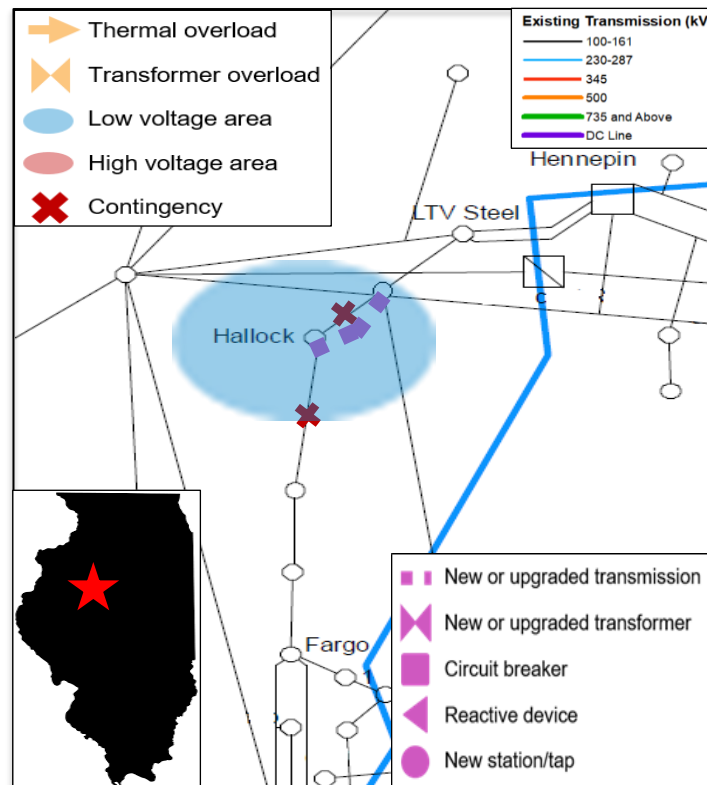
- **Baseline Reliability Project**
- **MISO-identified issue addressed by MTEP Project P17284**

- Contingency: P6-1-1 contingency event
- Thermal violation: *n/a*
- Low voltage(s): [AMIL] Hallock 138 kV Bus

- **Project description**

Install a second [AMIL] Woodhall—[AMIL] Hallock 138 kV line on the vacant position on the existing 1570 circuit towers. Install 3 position initial, 6 position ultimate ring bus at [AMIL] Hallock 138 kV Substation. **Estimated Cost: \$14.0M**

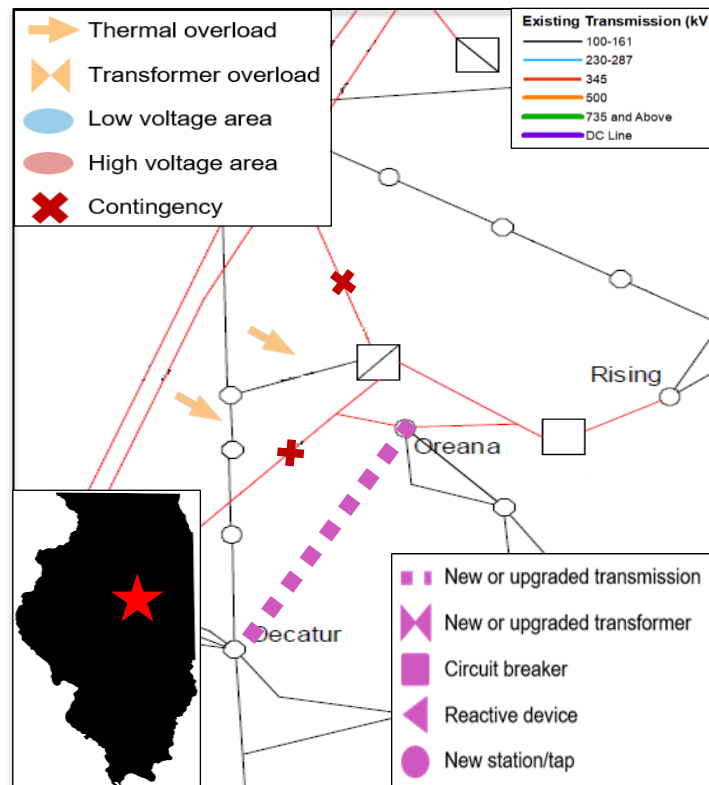
- **Expected ISD:** December 1, 2021
- **Target Appendix:** A in MTEP20



New [AMIL] Oreana—[AMIL] Decatur N 27th St 138 kV line solve(s) P6-1-1 event

- **Baseline Reliability Project**
- **Ameren-identified issue addressed by MTEP Project P17565**
 - Contingency: P6-1-1 contingency event
 - Thermal violation: [AMIL] ADM North—[AMIL] Caterpillar 138 kV
 - Low voltage(s): *n/a*
- **Project description**

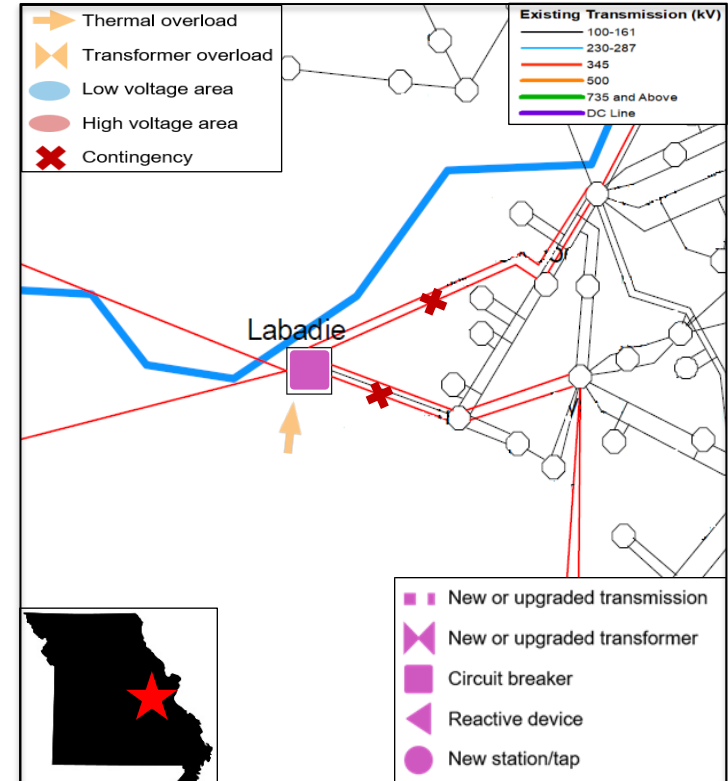
Install new 138 kV line between [AMIL] Oreana—[AMIL] Decatur N 27th Street.
- **Estimated Cost:** \$17.0M
- **Expected ISD:** June 1, 2025
- **Target Appendix:** A in MTEP20



Upgrade [AMMO] Labadie 345 kV substation solve(s) *P6-1-1* event

- **Baseline Reliability Project**
- **MISO-identified issue addressed by MTEP Project P18139**
 - Contingency: P6-1-1 contingency event
 - Thermal violation: [AMMO] Labadie2—[AMMO] Labadie3 345 kV bus tie
 - Low voltage: *n/a*
- **Project description**

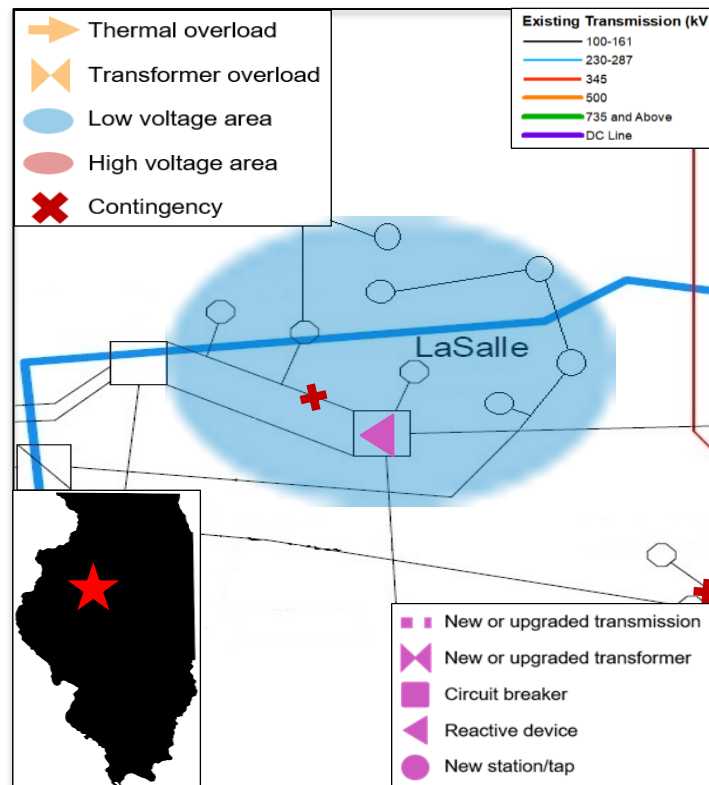
Upgrade switches and CTs to 3000A.
- **Estimated Cost: \$1.1M**
- **Expected ISD: December 1, 2022**
- **Target Appendix: A in MTEP20**



New [AMIL] North Utica Statcom (100 Mvar) solve(s) *P6-1-1 event*

- **Baseline Reliability Project**
- **Ameren-identified issue addressed by MTEP Project P18249 (*P18269*)**
 - Contingency: P6-1-1 contingency event
 - Thermal violation: *n/a*
 - Low voltage(s): Eight (8) [AMIL] 138 kV Buses
- **Project description**

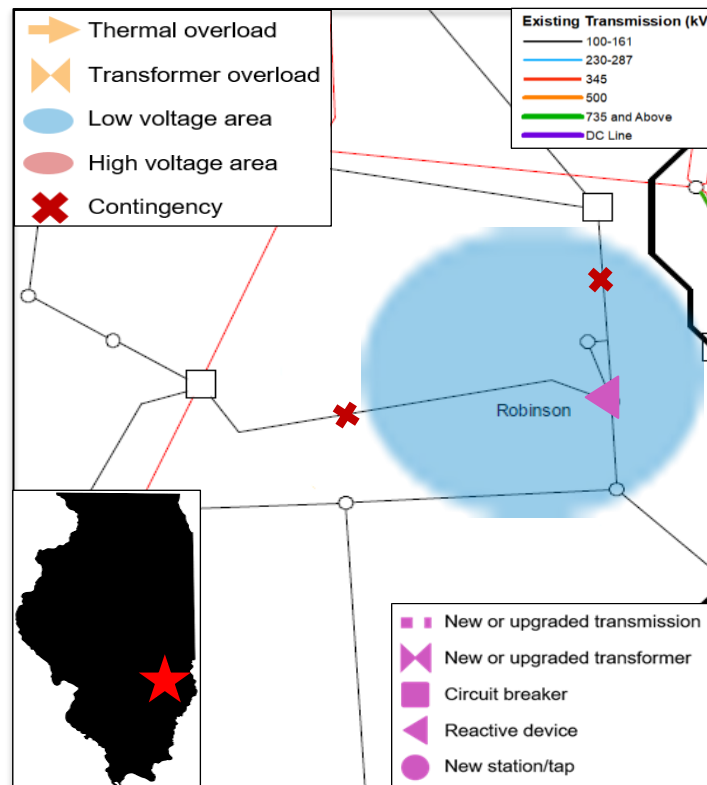
Install a [AMIL] N. Utica 138 kV Statcom (100 Mvar).
- **Estimated Cost: \$91.0M**
- **Expected ISD: December 1, 2023**
- **Target Appendix: A in MTEP20**



New [AMIL] Robinson 138 kV Statcom (70 Mvar) solve(s) *P6-1-1* event

- **Baseline Reliability Project**
- **MISO-identified issue addressed by MTEP Project P18250**
 - Contingency: P6-1-1 contingency event
 - Thermal violation: *n/a*
 - Low voltage(s): Three (3) [AMIL] 138 kV Buses
- **Project description**

Install a [AMIL] Robinson 138 kV Statcom (70 Mvar).
- **Estimated Cost: \$78.0M**
- **Expected ISD: June 1, 2023**
- **Target Appendix: A in MTEP20**



New [AMIL] Fargo–[AMIL] Hines 138 kV line solve(s) P6-1-1 event

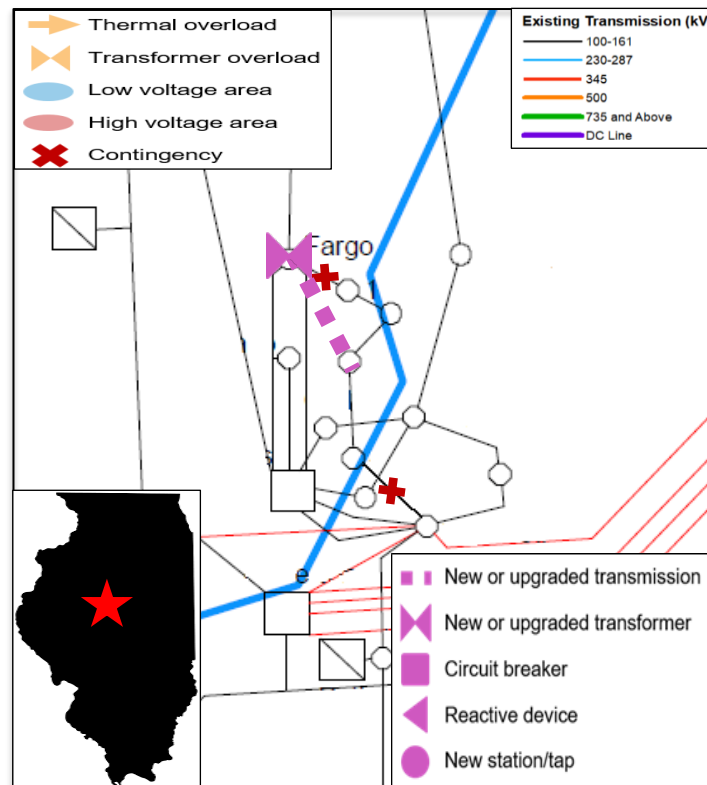
- **Baseline Reliability Project**
- **Ameren-identified issue addressed by MTEP Project P18263**

- Contingency: P6-1-1 contingency event
- Thermal violation: [AMIL] Fargo 138/69 kV transformer
- Low voltage(s): low voltages on 69 kV system

- **Project description**

New [AMIL] Fargo—[AMIL] Hines 138 kV line.

- **Estimated Cost: \$18.7M**
- **Expected ISD: June 1, 2025**
- **Target Appendix: A in MTEP20**



New [AMMO] Wright City 345 kV substation solve(s) *P6-1-1 event*

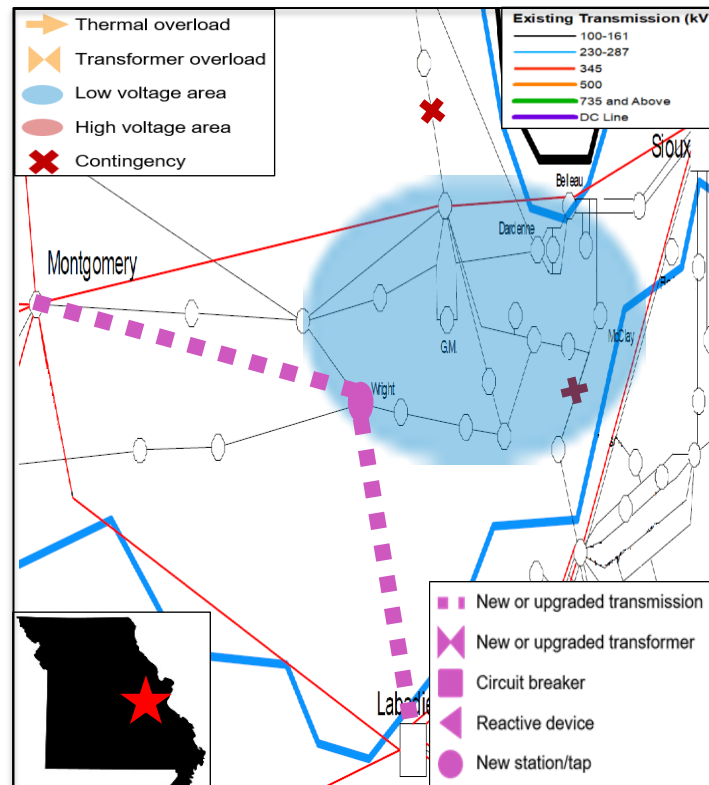
- **Baseline Reliability Project**
- **MISO-identified issue addressed by MTEP Project P18267**

- Contingency: P6-1-1 contingency event
- Thermal violation: AECI multiple BES overloads
- Low voltage: Three (3) [AMMO] 161 kV buses
- >600 MW of load is exposed to low voltages
- Ameren Transient Voltage Recovery

- **Project description**

Joint project between Ameren and AECI. Tap the [AMMO] Labadie—[AMMO] Montgomery 345 kV line via a new 3-breaker, 345 kV ring bus near the intersection of the line and the AECI 161 kV line west of Charrette. Rebuild the existing 161 kV line between the tap point and the AECI Wright City Substation as double-circuit 345/161 kV. Install new 345/161 kV step down transformer at Wright City.

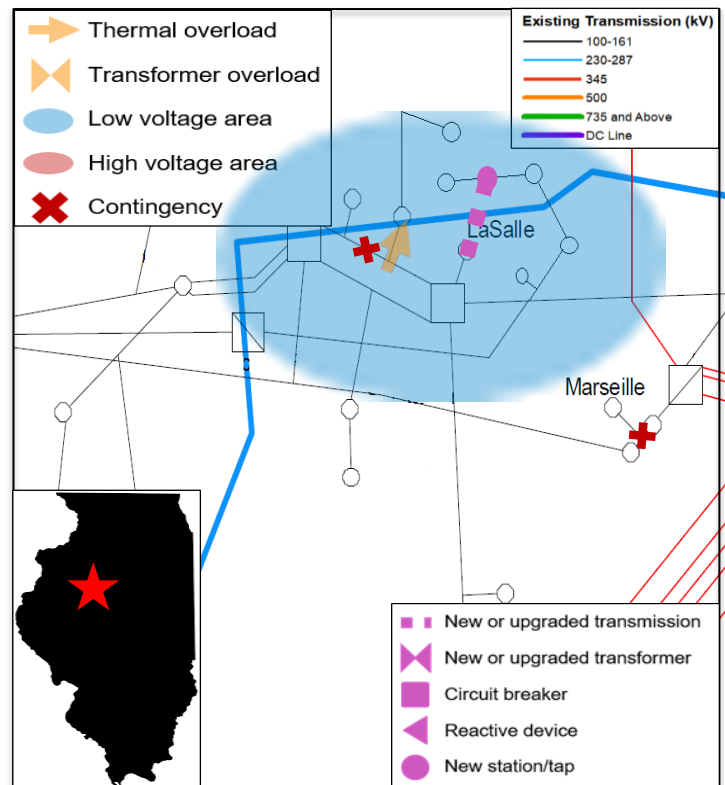
- **Estimated Cost:** \$39.0M
- **Expected ISD:** December 3, 2023
- **Target Appendix:** A in MTEP20



New [AMIL] LaSalle–[AMIL] N. Utica 138 kV line solve(s) P6-1-1 event

- **Baseline Reliability Project**
- **MISO-identified issue addressed by MTEP Project P18269 (P18249)**
 - Contingency: P6-1-1 contingency event
 - Thermal violation: [AMIL] Hickock—[AMIL] N. LaSalle 138 kV line
 - Low voltage(s): Ten (10) [AMIL] 138 kV Buses
- **Project description**

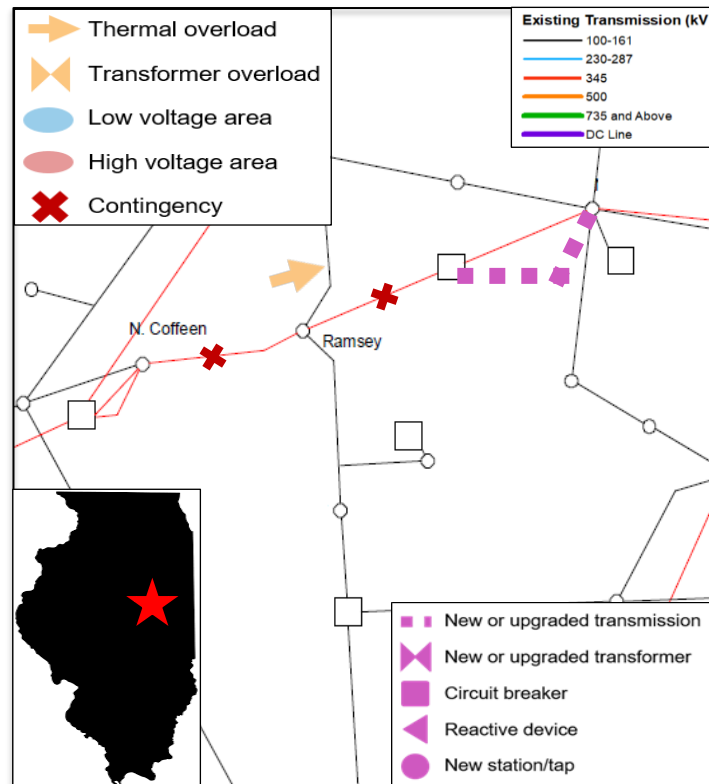
Construct a new 138 kV ring bus breaking the [AMIL] N. LaSalle–[AMIL] Fox River 138 kV line. Construct a new line between [AMIL] N. LaSalle–[AMIL] N. Utica 138 kV line. Add two line breaker at the LaSalle 138 kV substation.
- **Estimated Cost: \$27.0M**
- **Expected ISD: June 1, 2025**
- **Target Appendix: A in MTEP20**



New [AMIL] Holland NW—[AMIL] Neoga South 345 kV line solve(s) *P6-1-1* event

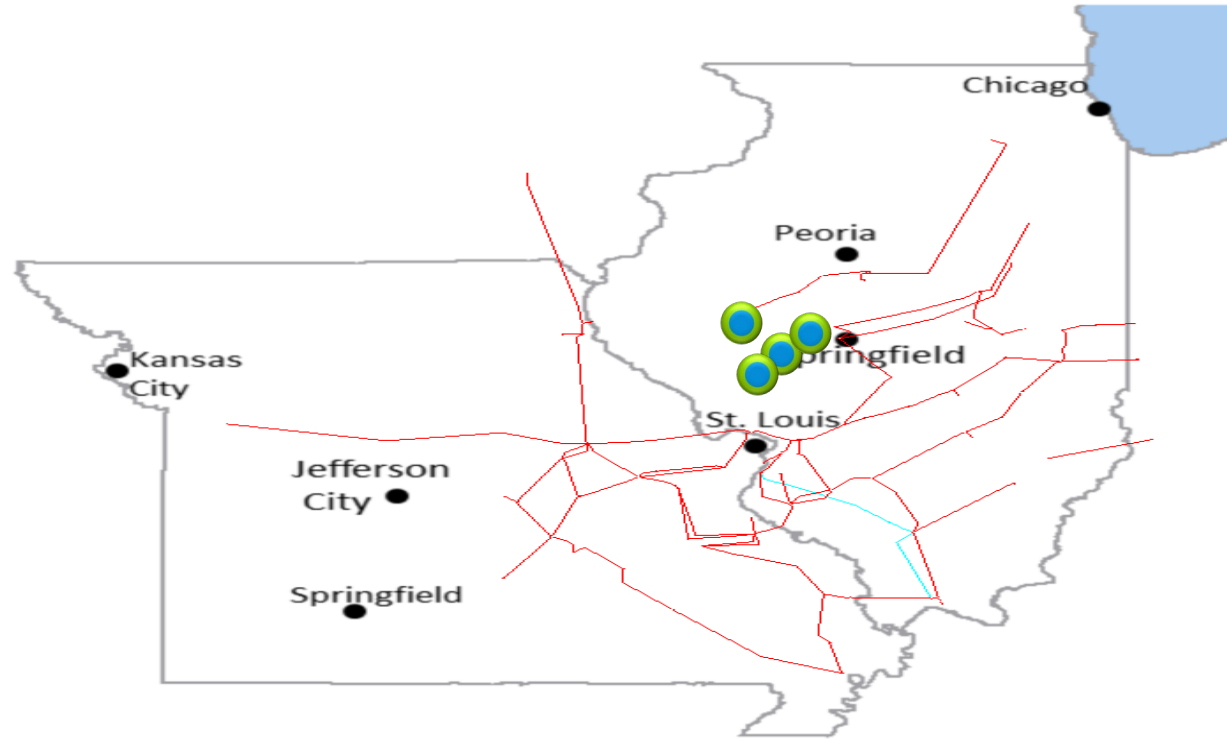
- **Baseline Reliability Project**
- **MISO-identified issue addressed by MTEP Project P18275**
 - Contingency: P6-1-1 contingency event
 - Thermal violation: [AMIL] Pana—[AMIL] Ramsey 138 kV line
 - Low voltage(s): *n/a*
- **Project description**

Construct a 345 kV double circuit on the existing [AMIL] Holland NW—[AMIL] Neoga South 345 kV line (4509) R.O.W. replacing structures. Target rating: 3000 A summer emergency.
- **Estimated Cost: \$32.0M**
- **Expected ISD: December 1, 2023**
- **Target Appendix: A in MTEP20**



CWLP: Four (4) BRPs proposed to address reliability issues on bulk energy system

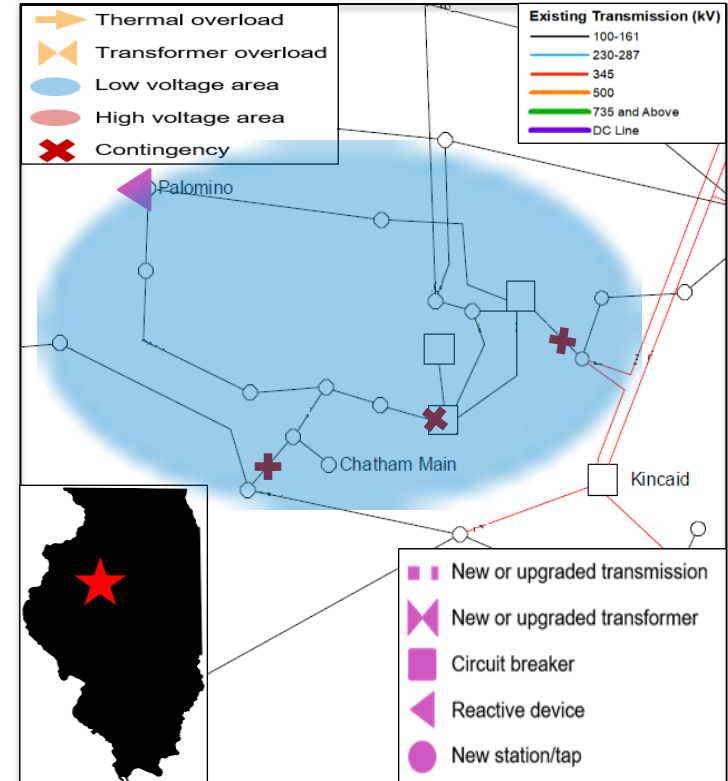
- TO proposed project
- MISO identified reliability need
- Need + Project



New [CWLP] Palomino 69 kV capacitor banks solve(s) P3-1 & P6-1-1 events

- **Baseline Reliability Project**
- **CWLP-identified issue addressed by MTEP Project P18134**
 - Contingency: P3-1 & P6-1-1 contingency events
 - Thermal violation: *n/a*
 - Low voltage(s): Eight (8) [CWLP] 138 kV Buses
- **Project description**

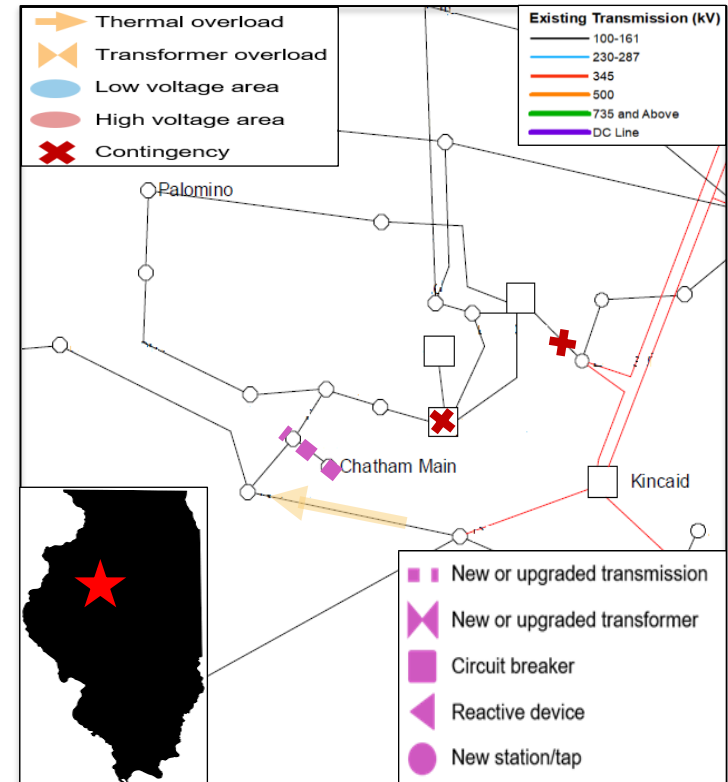
Add two (2) [CWLP] Palomino 69 kV capacitor banks (20 Mvar). In adding two capacitor banks to the Palomino substation, we will also be retiring the existing cap bank at [CWLP] Palomino 69 kV substation.
- **Estimated Cost:** \$0.25M
- **Expected ISD:** March 1, 2021
- **Target Appendix:** A in MTEP20



Reconductor [CWLP] Chatham Main—[AMIL] Chatham Ind. 138 kV line solve(s) P3-1 event

- **Baseline Reliability Project**
- **CWLP-identified issue addressed by MTEP Project P18140**
 - Contingency: P3-1 contingency event
 - Thermal violation: [CWLP] Chatham Main—[AMIL] Chatham Ind. 138 kV line
 - Low voltage(s): *n/a*
- **Project description**

Reconductor [CWLP] Chatham Main—[AMIL] Chatham Independence 138 kV line with 795 ACSS.
- **Estimated Cost:** \$0.25M
- **Expected ISD:** March 1, 2021
- **Target Appendix:** A in MTEP20



Upgrade [CWLP] Interstate 138 kV substation solve(s) P3-1 event

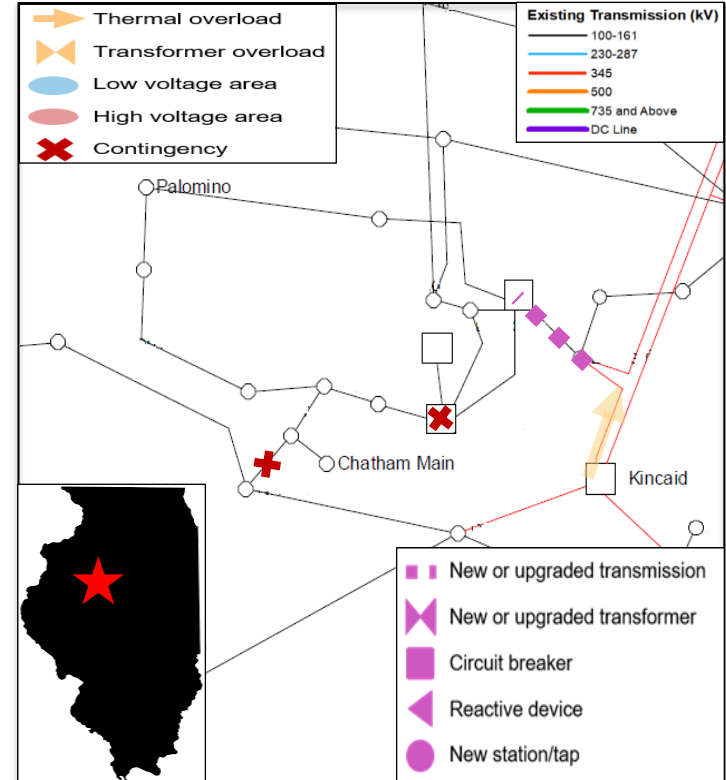
- **Baseline Reliability Project**
- **CWLP-identified issue addressed by MTEP Project P18141**

- Contingency: P3-1 contingency event
- Thermal violation: [CWLP] Interstate—[AMIL] E. Lanesville 138 kV tie line
- Low voltage(s): *n/a*

- **Project description**

Replace the wave trap on the [CWLP] Interstate—[AMIL] Lanesville 138 kV tie line (at Interstate Sub) with a 2000A wave trap. This will increase the rating of the line.

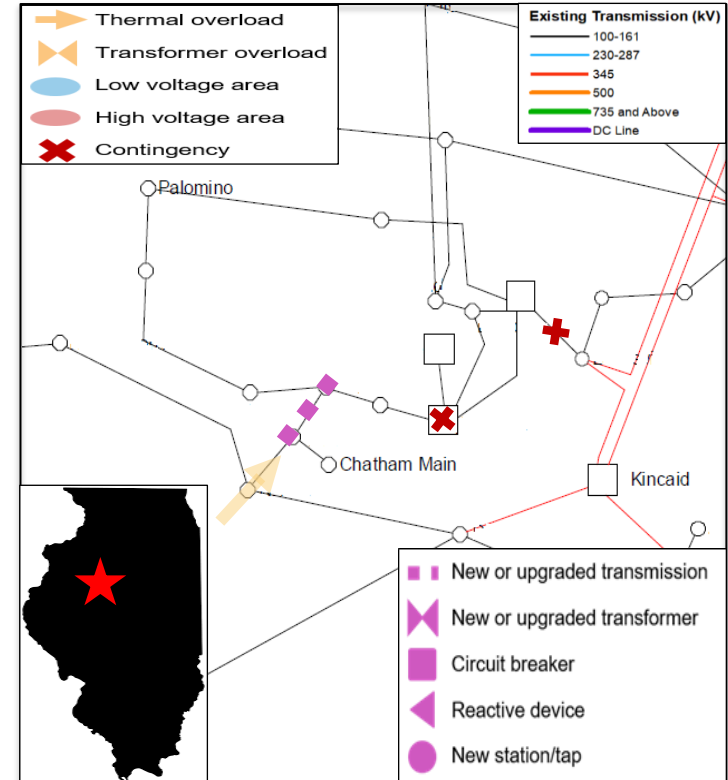
- **Estimated Cost:** \$0.02M
- **Expected ISD:** March 1, 2021
- **Target Appendix:** A in MTEP20



Reconductor [CWLP] Chatham Ind.—[CWLP] Spaulding 138 kV line solve(s) P3-1 event

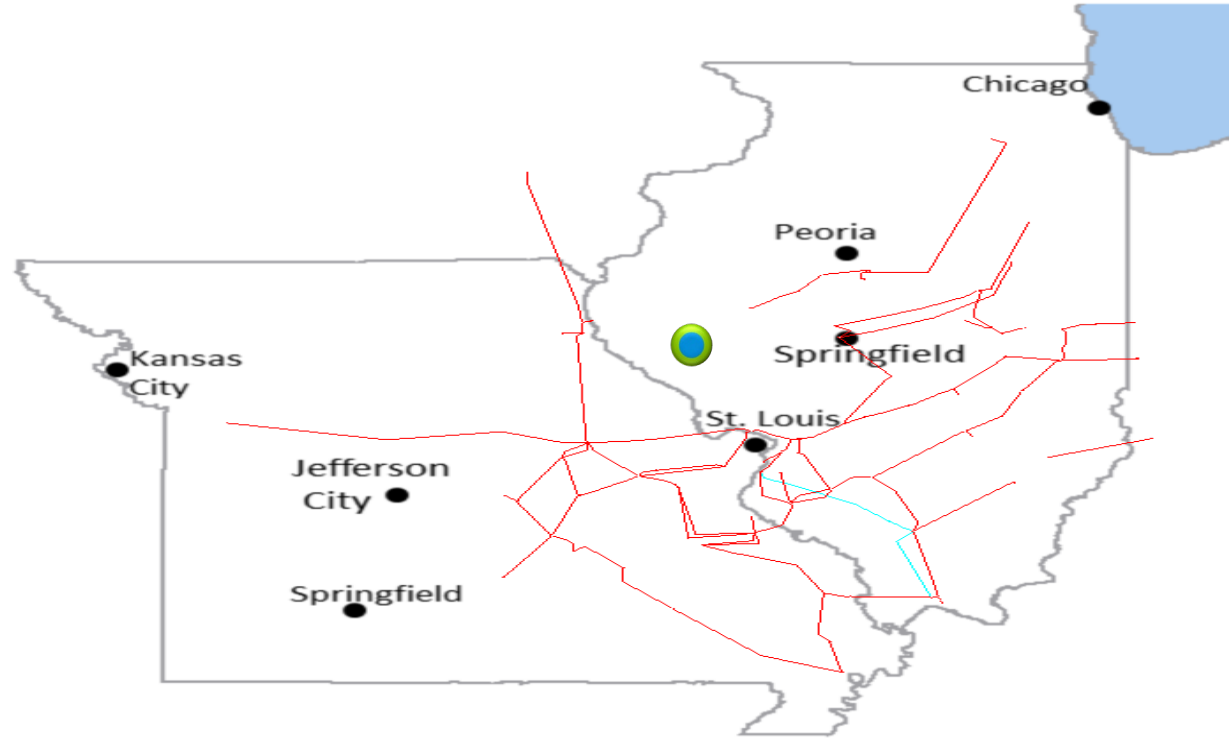
- **Baseline Reliability Project**
- **CWLP-identified issue addressed by MTEP Project P18171**
 - Contingency: P3-1 contingency event
 - Thermal violation: [CWLP] Chatham Ind.—[CWLP] Spaulding 138 kV line
 - Low voltage(s): *n/a*
- **Project description**

Reconductor [CWLP] Chatham Ind.—[CWLP] Spaulding 138 kV line with 795 ACSS.
- **Estimated Cost:** \$0.15M
- **Expected ISD:** March 1, 2021
- **Target Appendix:** A in MTEP20



PPI: One (1) BRPs proposed to address reliability issues on bulk energy system

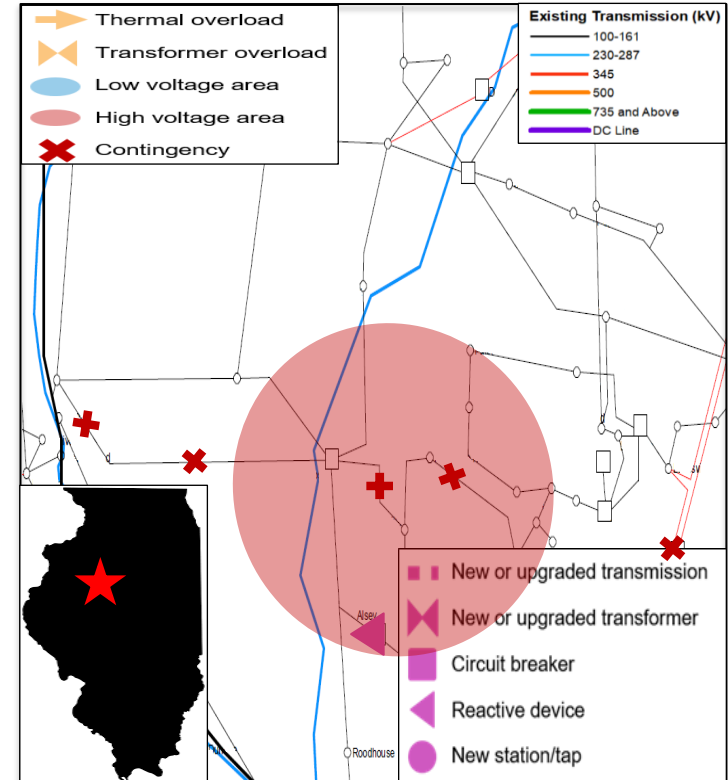
- TO proposed project
- MISO identified reliability need
- Need + Project



New [PPI] Aley 138 kV shunt reactor device solve(s) P6-1-1 events

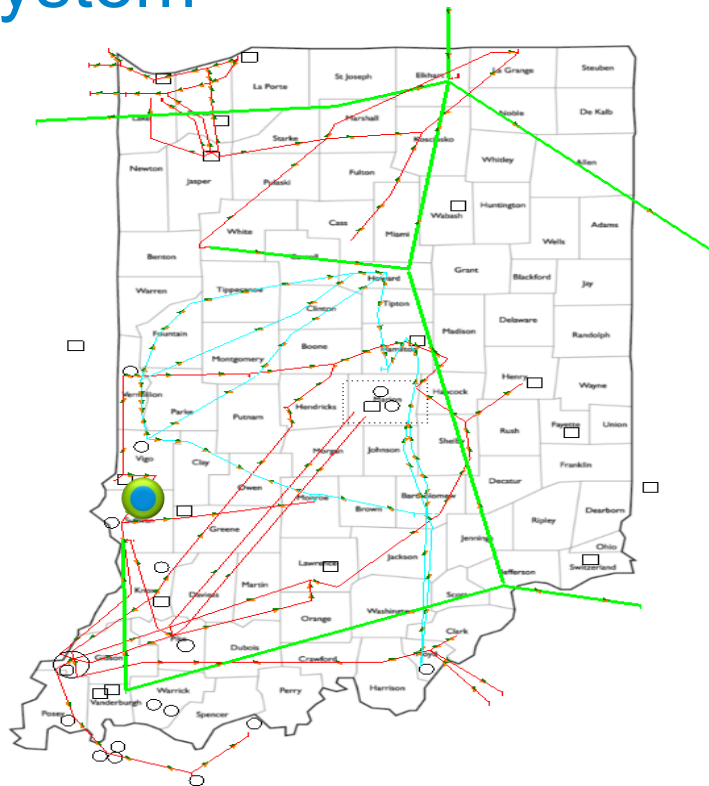
- **Baseline Reliability Project**
- **MISO-identified issue addressed by MTEP Project P18154**
 - Contingency: P6-1-1 contingency events from any combination of these single events on the map
 - Thermal violation: *n/a*
 - High voltage(s): Four (4) [PPI] 138 kV Buses
- **Project description**

New [PPI] Aley 138 kV reactor (40 Mvar).
- **Estimated Cost: \$3.2M**
- **Expected ISD: December 31, 2022**
- **Target Appendix: A in MTEP20**



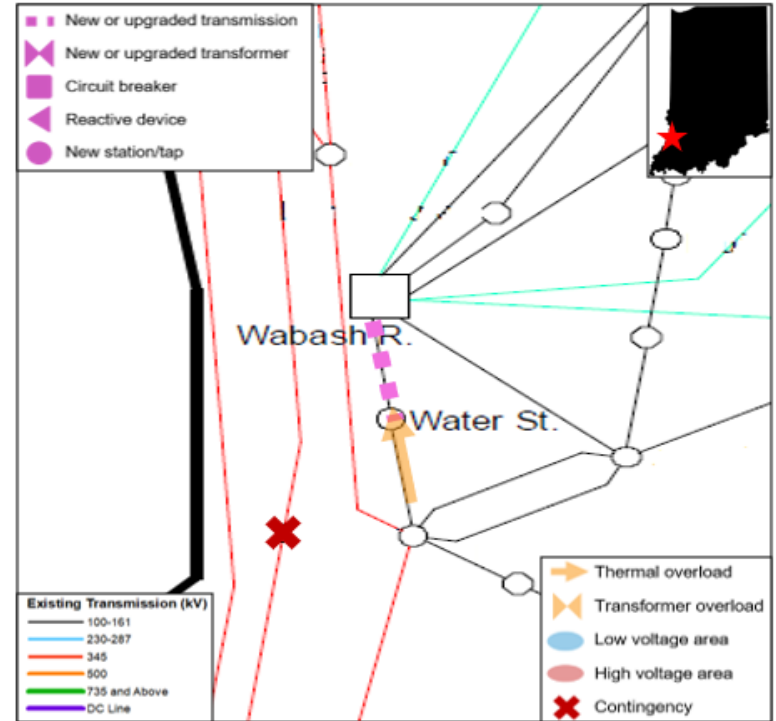
DEI: One (1) BRPs proposed to address reliability issues on bulk energy system

- TO proposed project
- MISO identified reliability need
- Need + Project



Rebuild [DEI] Wabash River—[DEI] Water St. 138 kV line solves P2-4 event

- **Baseline Reliability Project**
- **Identified issue addressed by MTEP Project P17484**
 - Contingency: P2-4 contingency event
 - Thermal violation: [DEI] Wabash River—[DEI] Water St. 138 kV line
- **Project description**
 - Upgrade existing [DEI] Wabash River—[DEI] Water St. 138 kV line conductor's maximum operating temperature from 100C to 120C.
- **Estimated Cost:** \$3.95M
- **Expected ISD:** June 1, 2024
- **Target Appendix:** A in MTEP20

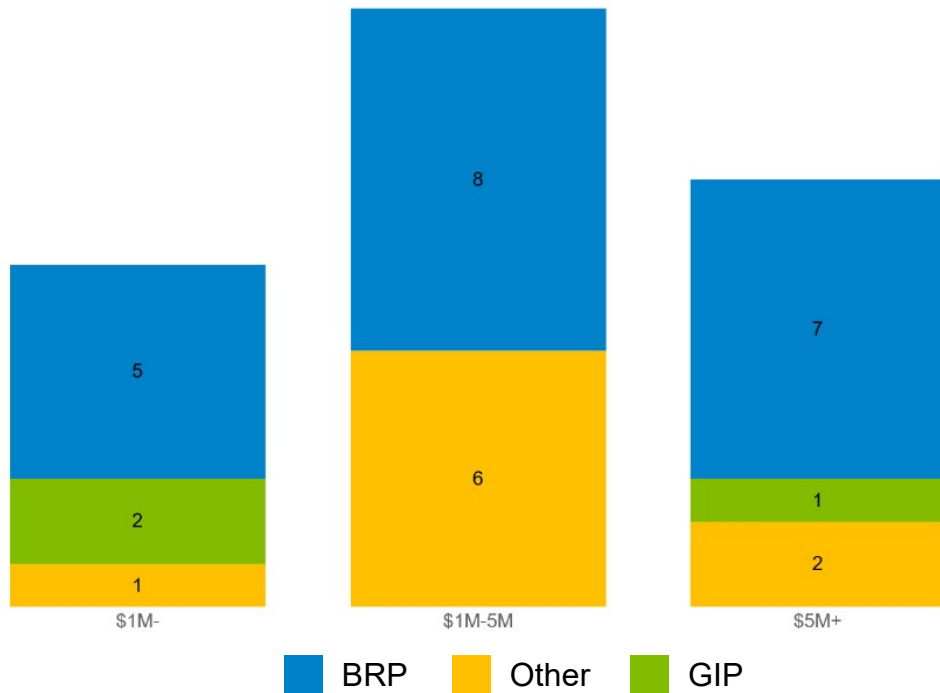


MTEP20: ITCT and METC area projects

- For space considerations in this presentation, see August 26, 2020 East SPM3 materials for project details:

<https://www.misoenergy.org/events/east-subregional-planning-meeting-spm3---august-26-2020/>

ITCT: 32 Projects at an Estimated Cost of \$158M Recommended for MTEP20 Appendix A

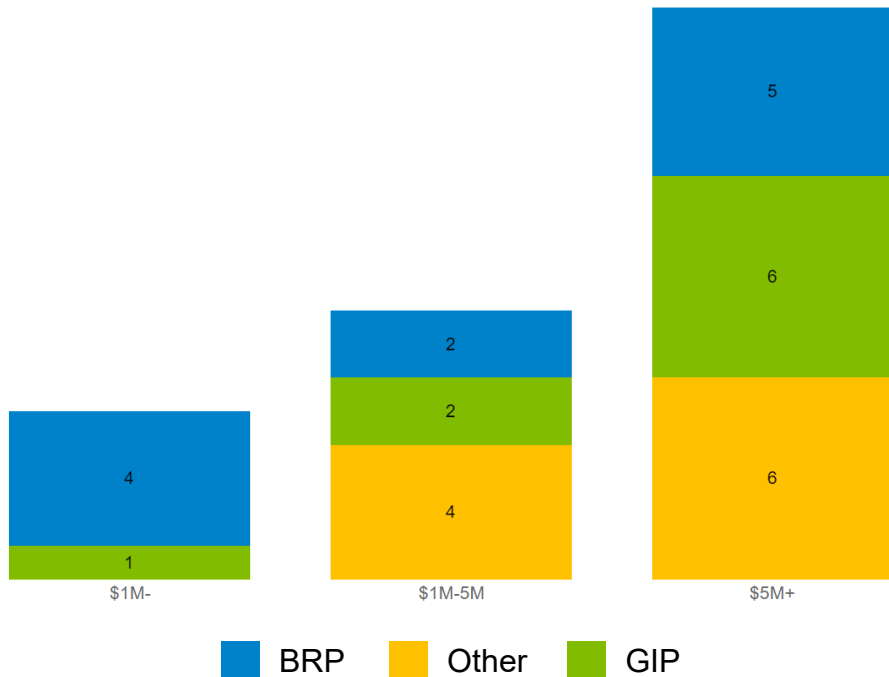


32 projects are recommended for Appendix A in MTEP20

- Of these 32 projects:
 - 10 have an estimated cost greater than \$5M
 - 14 have an estimated cost between \$1M-\$5M
 - 8 have an estimated cost less than \$1M
- Of these 32 projects:
 - 20 Baseline Reliability
 - 9 Other Projects
 - 3 Generation Interconnection Projects

18 projects Recommended for Appendix B

METC: 30 Projects at an estimated cost of \$278M recommended for MTEP20 Appendix A



30 projects are recommended for Appendix A in MTEP20

- Of these 30 projects:
 - 17 have an estimated cost greater than \$5M
 - 9 have an estimated cost between \$1M-\$5M
 - 5 have an estimated cost less than \$1M
- Of these 30 projects:
 - 11 Baseline Reliability
 - 10 Other
 - 9 Generation Interconnection Project

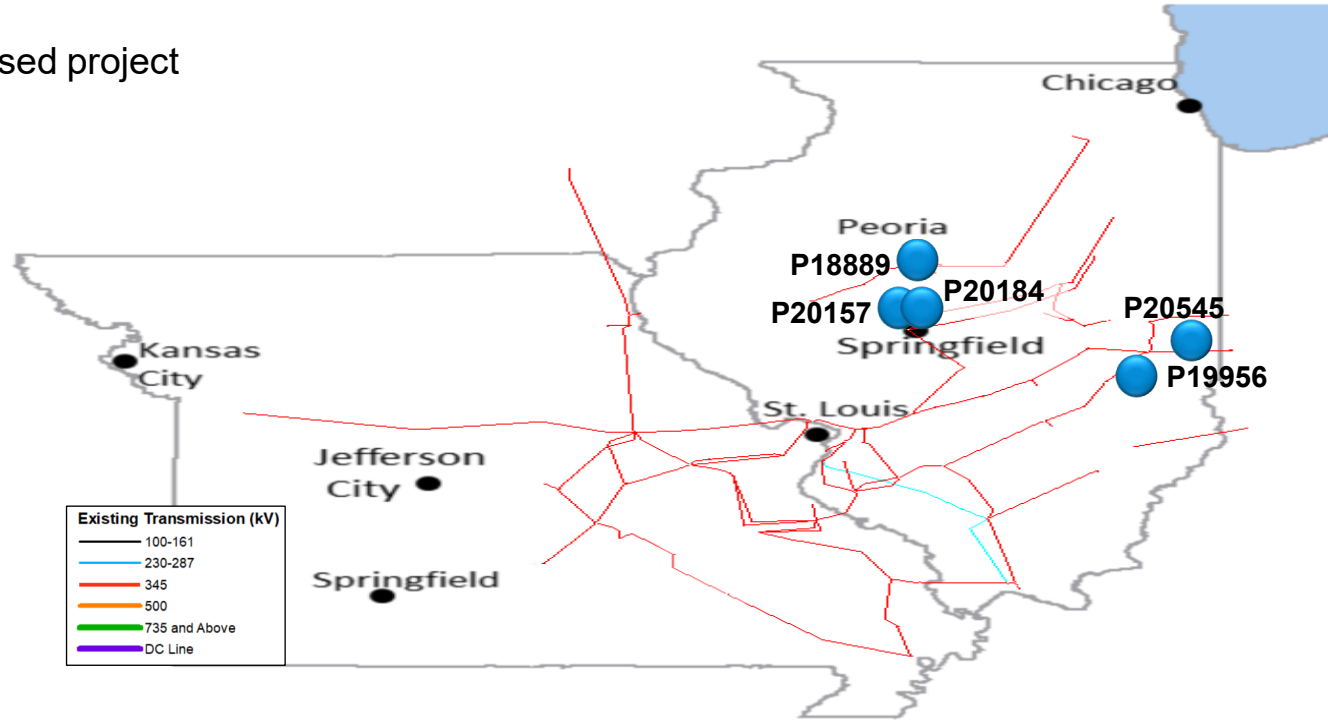
MISO Central and East Subregions -

Select MTEP21 Proposed Projects and Needs

AmerenIL

AmerenIL: Five (5) BRPs proposed to address reliability issues on bulk energy system

● TO proposed project



Rebuild Hickok—North LaSalle 138 kV line solves P6-1-1 thermal overload

- **P18889 - Baseline Reliability Project**

- **Project description**

- Address an overload on the Hickok—North LaSalle 138 kV line (1659) upon completion of the N. Utica Statcom.

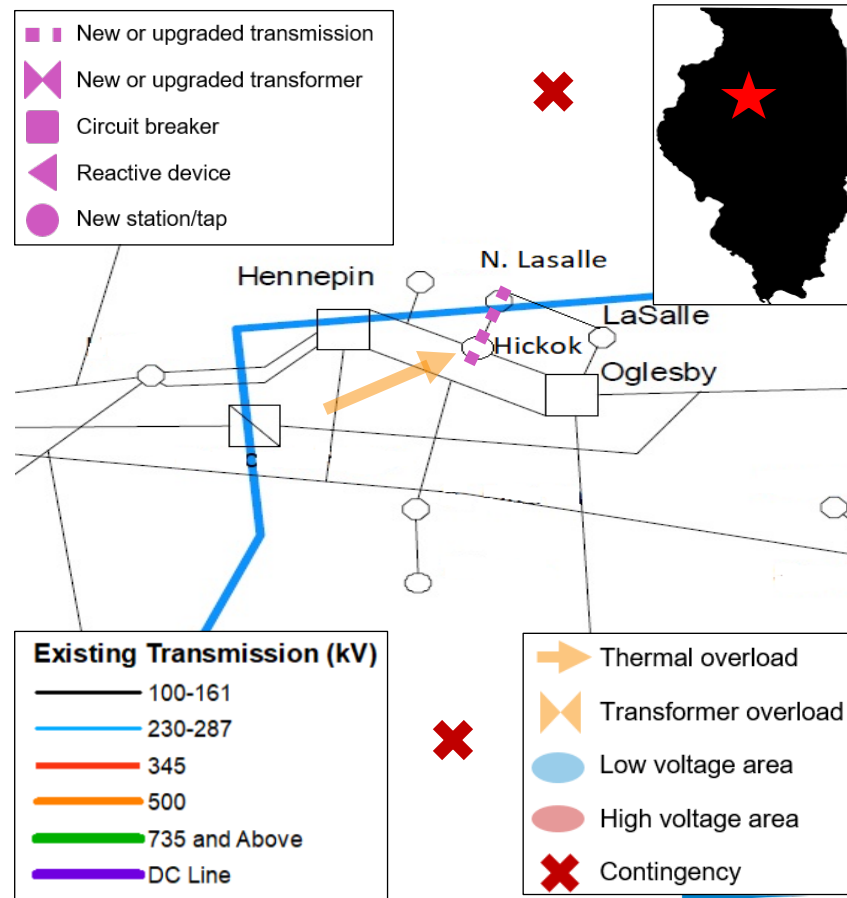
- **System Need**

- P6-1-1 event, 102% loading based on 2019 analysis.

- **Estimated Cost: \$TBD M**

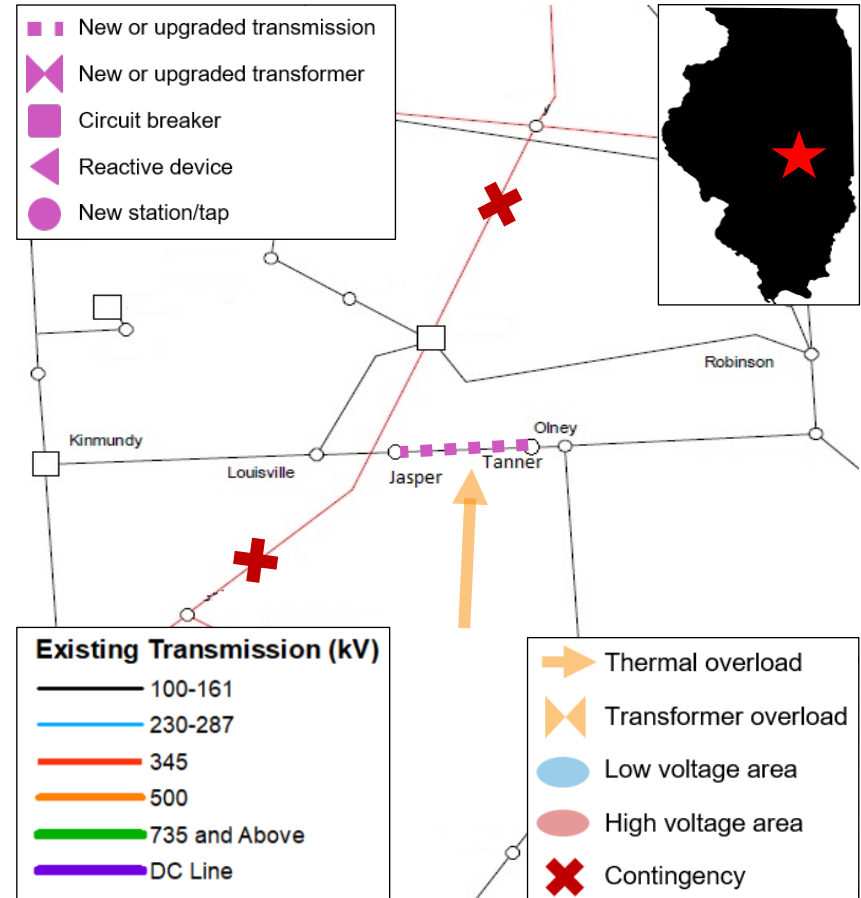
- **Expected ISD: December 1, 2023**

- **Target Appendix: A in MTEP21**



Upgrade Tanner—Jasper 138 kV line solves P6-1-1 thermal overload

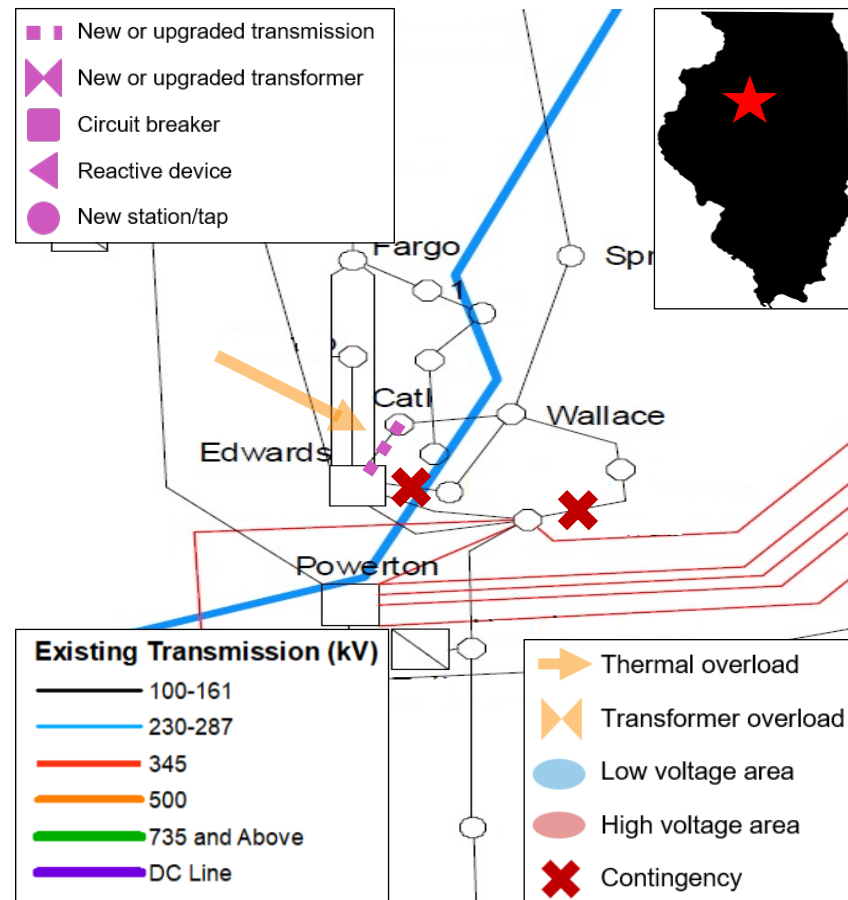
- **P19956 - Baseline Reliability Project**
- **Project description**
 - Rebuild 23 miles to 2000 A.
- **System Need**
 - P6-1-1 Event: 104% loading 2024 Summer peak based on MTEP19 analysis.
- **Estimated Cost: \$TBD M**
- **Expected ISD: June 1, 2024**
- **Target Appendix: A in MTEP21**



Reconductor Edwards—CAT1 138 kV line solves P6-1-1 thermal overload

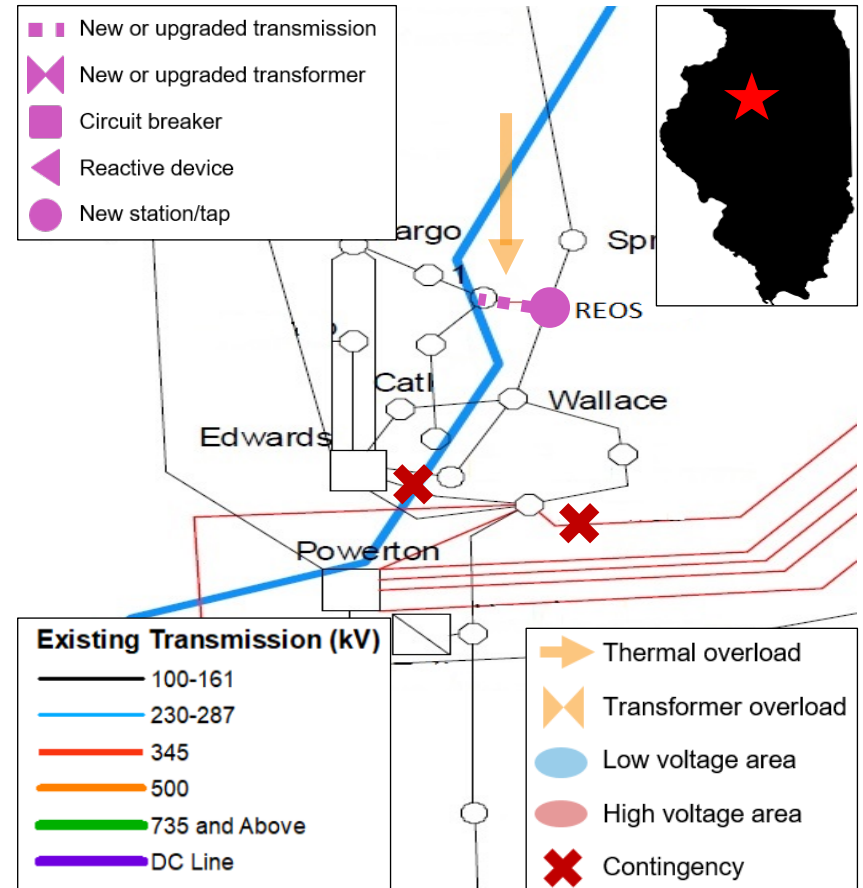
- **P20157 - Baseline Reliability Project ***
- **Project description**
 - Reconductor Edwards-CAT 138 kV. 1.57 miles of line conductor.
- **System Need**
 - Baseline reliability (P6-1-1) event for the loss of two 138 kV lines.
- **Estimated Cost: \$TBD M**
- **Expected ISD: December 1, 2024**
- **Target Appendix: B** in MTEP21

* This is an alternate to P20187



New REOS 138 kV substation solves P6-1-1 thermal overload

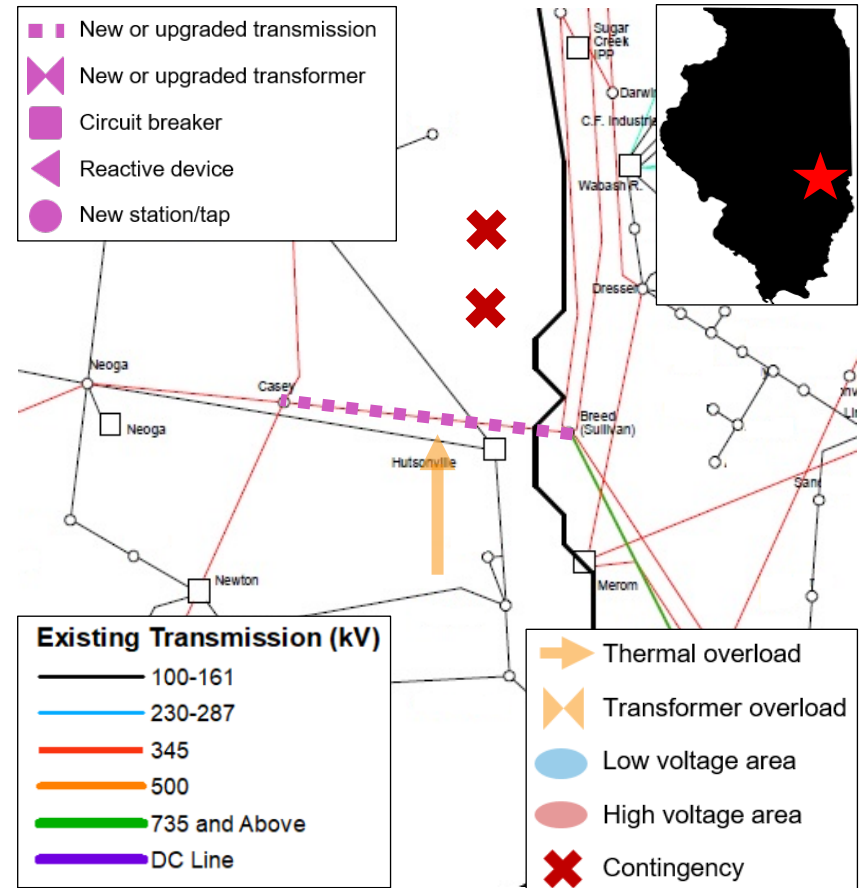
- **P20184 - Baseline Reliability Project ***
- **Project description**
 - Ring bus North of RS Wallace that ties together RS Wallace—Spring Bay and CAT2—Hines 138 kV lines.
- **System Need**
 - Baseline reliability (P6-1-1) event loss of two 138 kV lines.
- **Estimated Cost: \$TBD M**
- **Expected ISD: December 1, 2024**
- **Target Appendix: A in MTEP21**



*** This is an alternate to P20157**

Upgrade Casey West—Sullivan 345 kV tie line solves P6-1-1 thermal overload

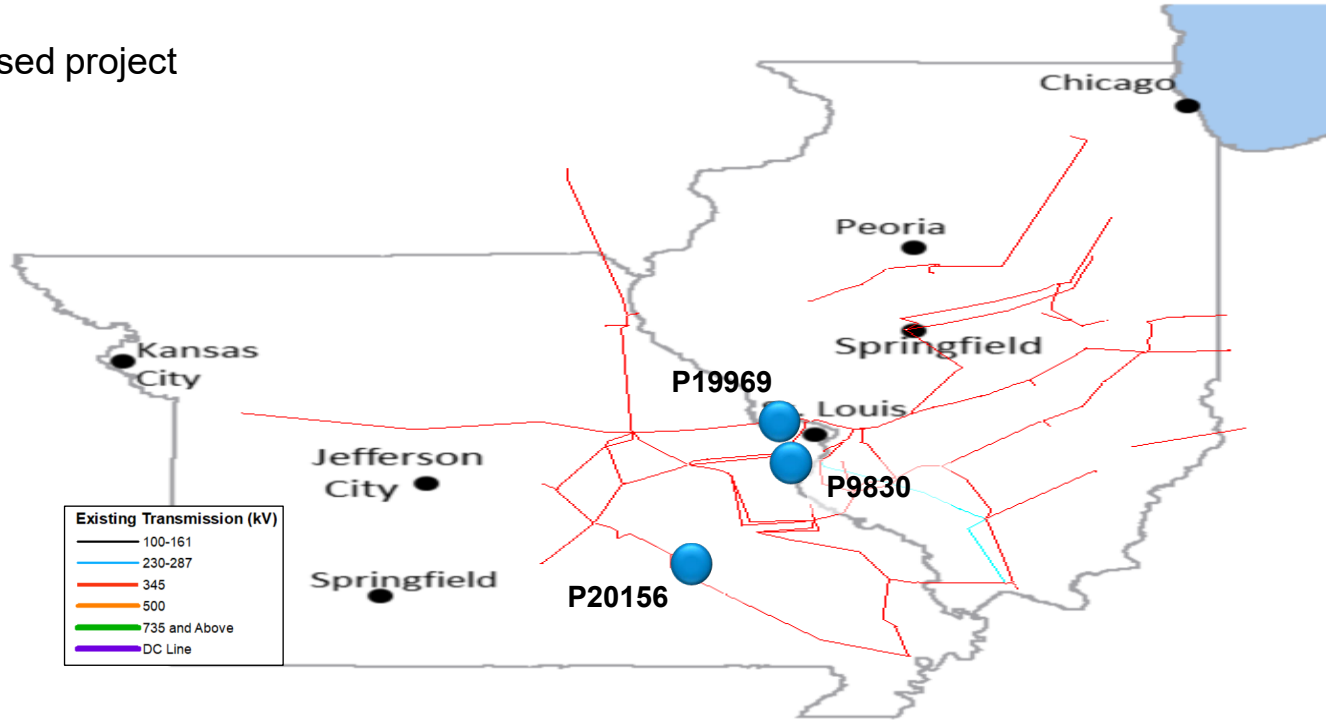
- **P20545 - Baseline Reliability Project**
- **Project description**
 - install splice and dead-end shunts as needed to allow an increase in conductor operating temperature from 100° to 120°.
- **System Need**
 - The PJM Affected SIS for projects in the MISO 2017-August-Central study group has determined that GIPs will overload the Casey West—Sullivan 345 kV transmission line to as much as 106% of its summer emergency rating of 1466 MVA under P6-1-1 contingency conditions.
- **Estimated Cost: \$600k (to GI Customer)**
- **Expected ISD: December 1, 2021**
- **Target Appendix: A in MTEP21**



AmerenMO

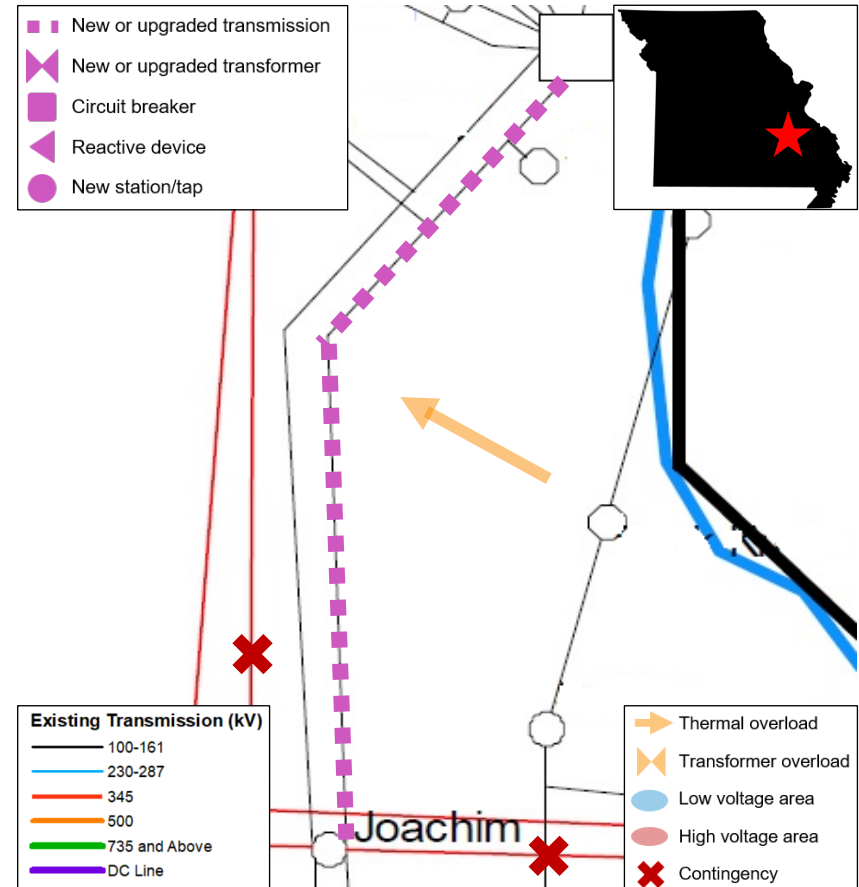
AmerenMO: Three (3) BRPs proposed to address reliability issues on bulk energy system

● TO proposed project



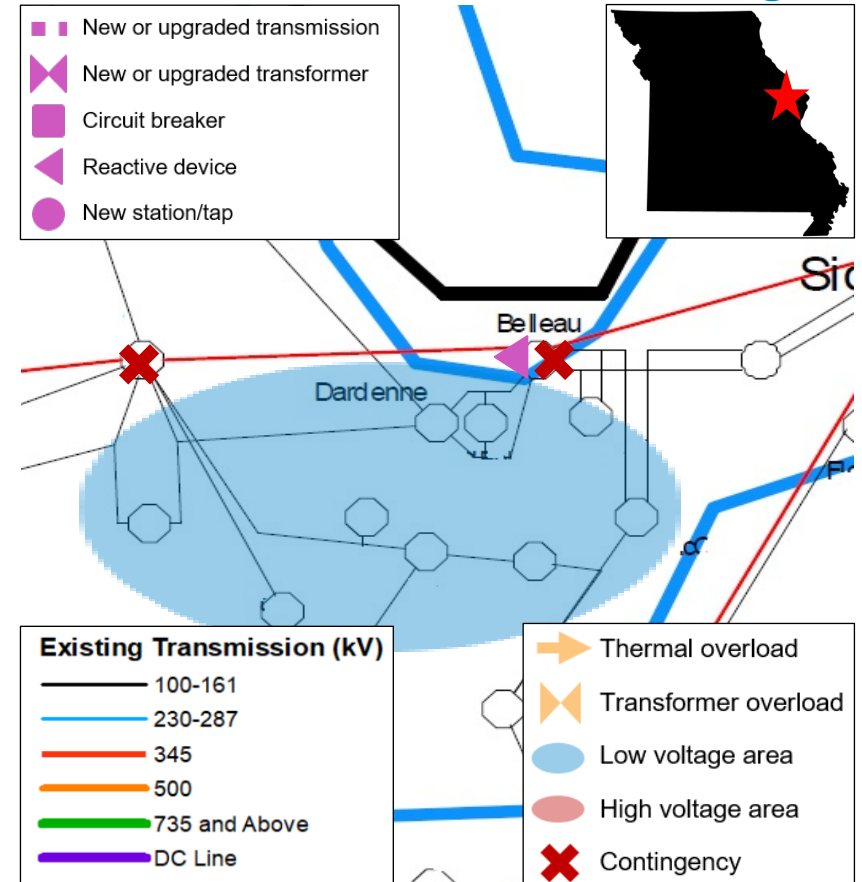
Reconductor Meramec—Joachim 138 kV line 2 solves P6-1-1 thermal overload

- **P9830 Baseline Reliability Project**
- **Project description**
 - Reconductor to 1600 A summer emergency capability.
- **System Need**
 - P6-1-1 Event, conductor loading projected to exceed rating following outage of two 345 kV lines.
- **Estimated Cost: \$440k**
- **Expected ISD: June 1, 2022**
- **Target Appendix: A in MTEP21**



New Belleau 138 kV Capacitor Bank solves low voltage issue

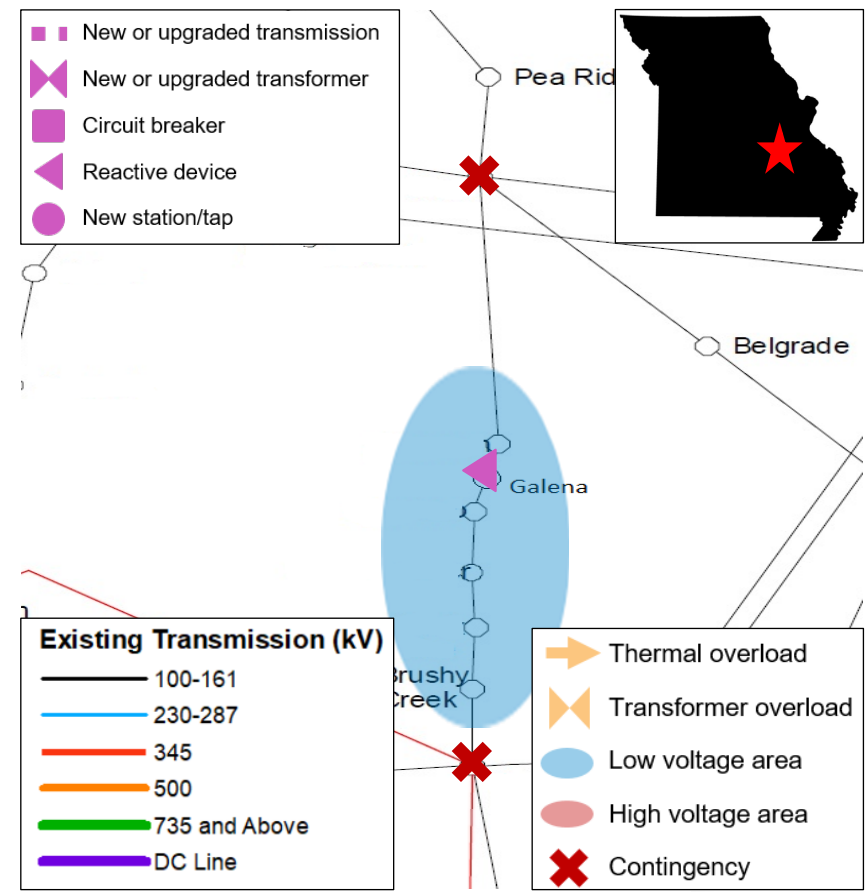
- **P19969 - Baseline Reliability Project**
- **Project description**
 - Install 120 Mvar capacitor bank at Belleau 138 kV substation.
- **System Need**
 - P6-1-1 Event, BES stability issue w/ the loss of two BES elements.
- **Estimated Cost: \$TBD**
- **Expected ISD: June 1, 2027**
- **Target Appendix: A in MTEP21**





New Galena 161 kV Capacitor Bank solves P6-2-2 low voltage

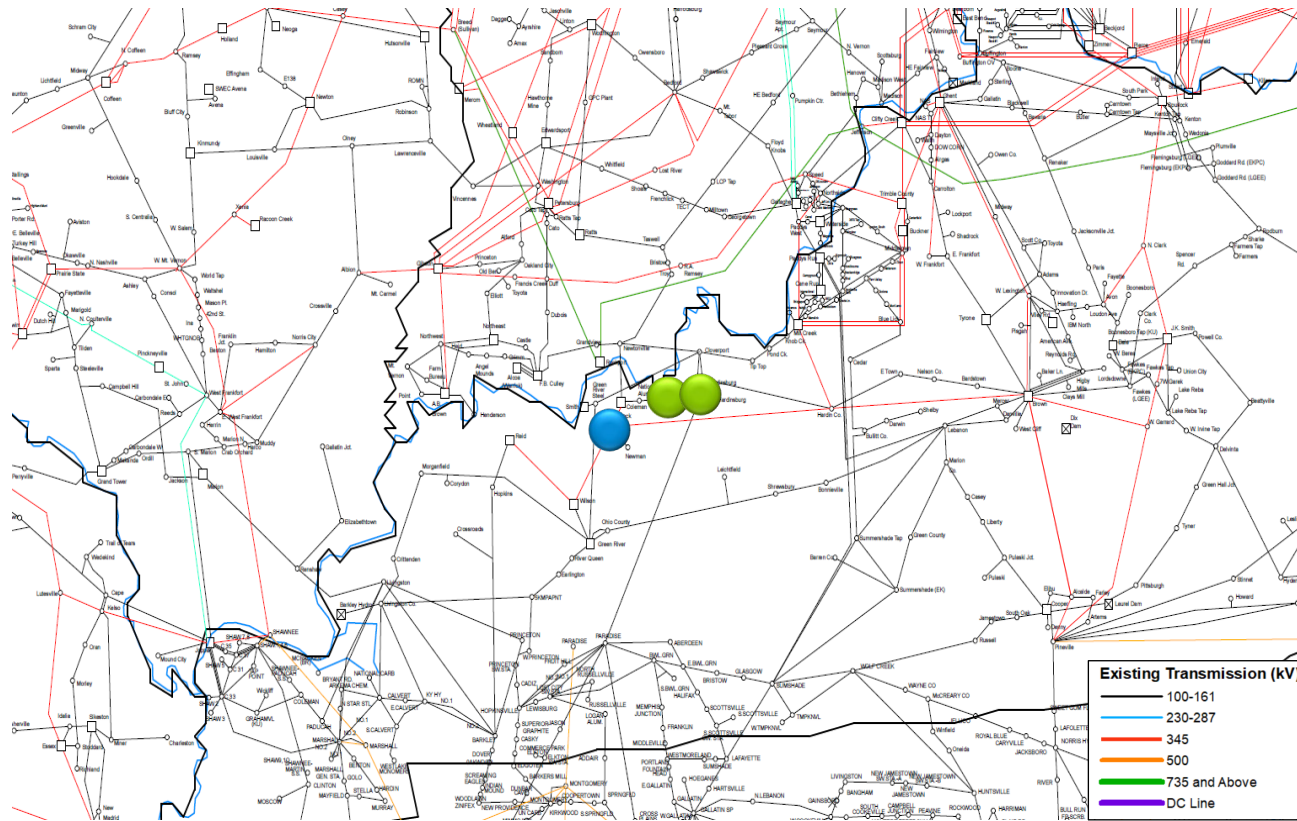
- **P20156 - Baseline Reliability Project**
- **Project description**
 - Install 28.8 Mvar capacitor bank at Galena 161 kV substation.
- **System Need**
 - P6-2-2 Event, BES low voltage event w/ the loss of two BES transformers.
- **Estimated Cost: \$TBD**
- **Expected ISD: December 1, 2022**
- **Target Appendix: A in MTEP21**



Big Rivers Electric Corporation (BREC)

BREC: One (1) BRP project, Two (2) GIP projects

- TO proposed project
- GIP project w/ signed GIAs



New Ensor 161/69 kV Substation solve low voltage and thermal overloads

- **P3439 - Baseline Reliability Project**

- **Project description**

- Construct new 161/69 kV substation with 56 MVA transformer. Include a 30 Mvar 69 kV capacitor.

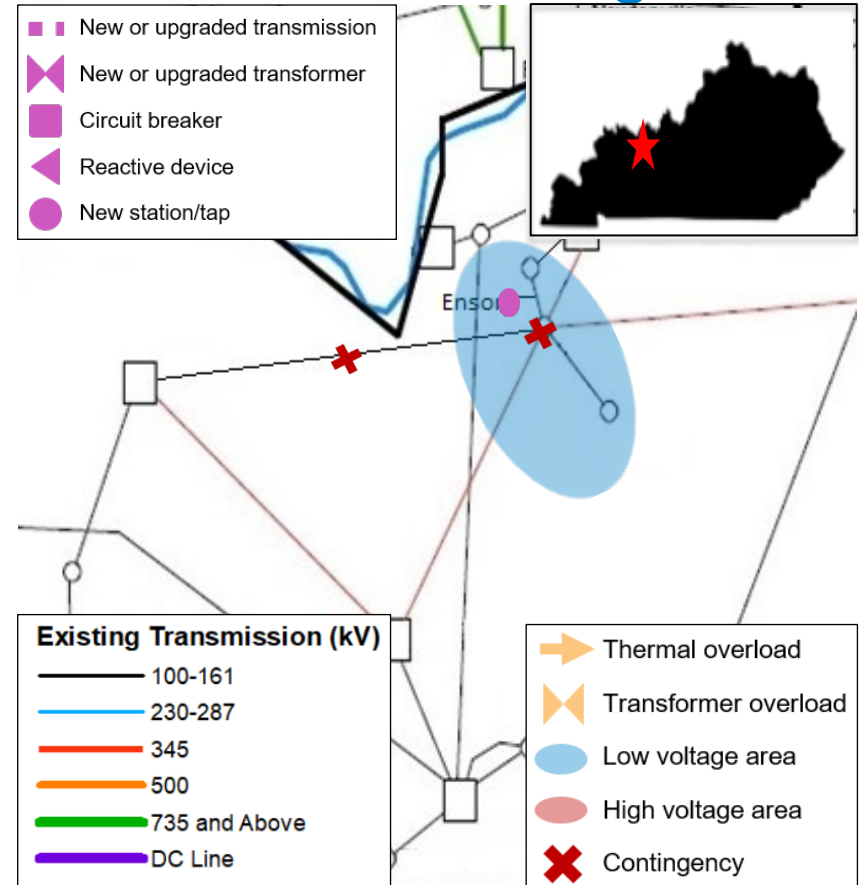
- **System Need**

- P1-3 Non-BES event, base case voltage issues and overloads.
- P1-2 event, capacitor needed to mitigate low voltages during loss of 161 kV circuit.

- **Estimated Cost: \$5.8M**

- **Expected ISD: December 31, 2024**

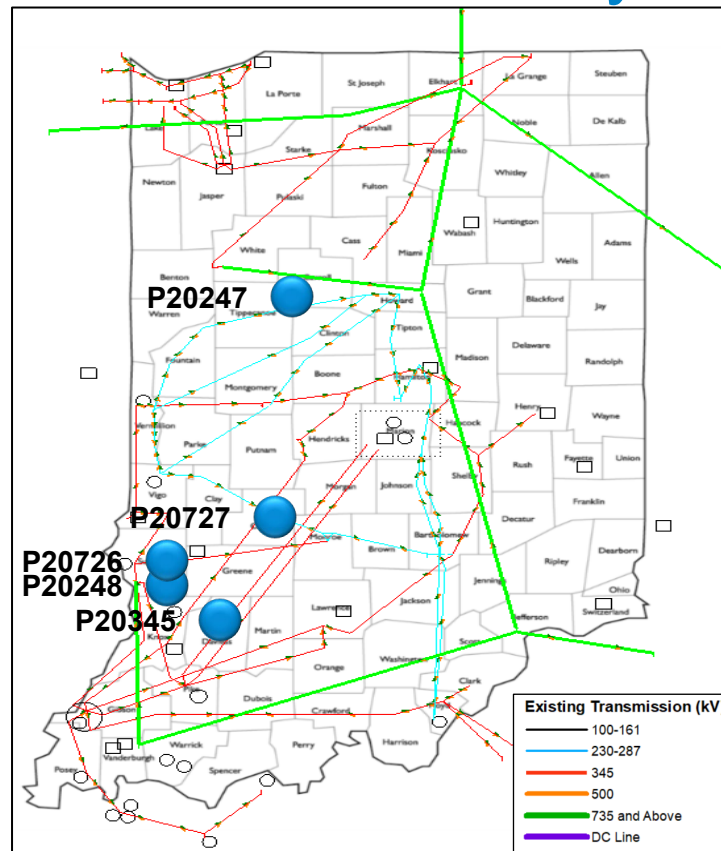
- **Target Appendix: A in MTEP21**



Duke Energy (DEI)

DEI: Five (5) BRPs proposed to address reliability issues on bulk energy system

● TO proposed project



Rebuild Lafayette S.—Shadeland 138 kV line solves P7 thermal overload

- **P20247 - Baseline Reliability Project**

- **Project description**

- Rebuild Lafayette South—Shadeland 138 kV line (13808) with 954ACSR@120C (~3.2 miles)

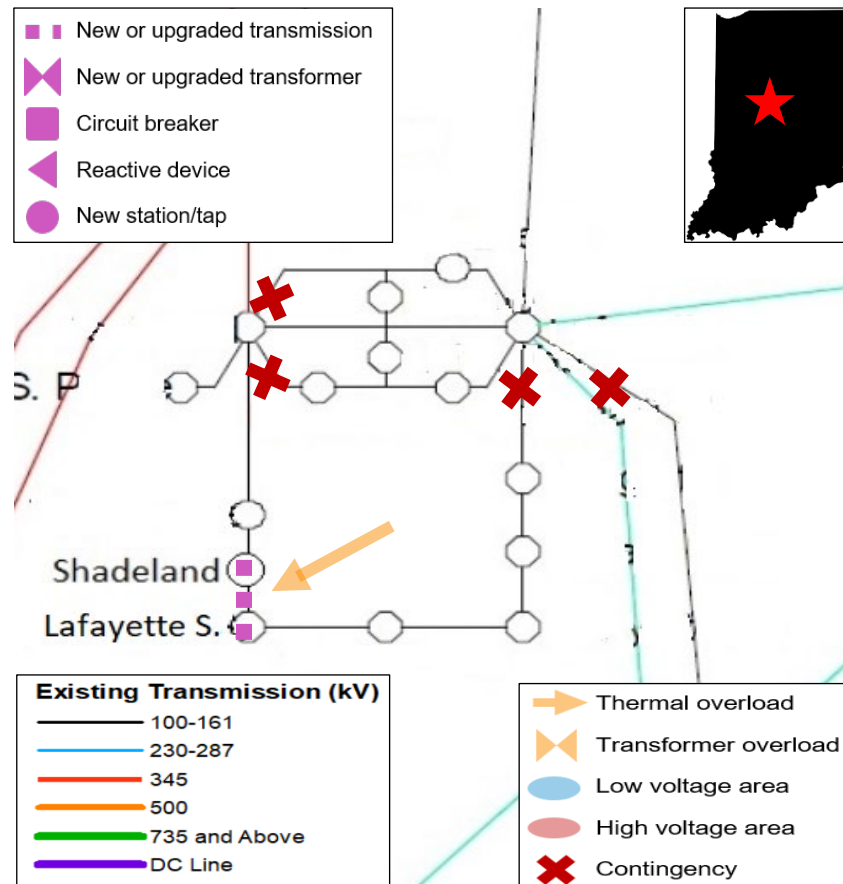
- **System Need**

- P7 events, BES line overload identified in MTEP20 analysis for common tower outage.

- **Estimated Cost: \$6.4 M**

- **Expected ISD: June 1, 2023**

- **Target Appendix: A in MTEP21**



New Dresser 345 kV Redundant breaker solves P5 breaker misoperation/failure

- **P20248 - Baseline Reliability Project**

- **Project description**

- Addition of Dresser 345kV Redundant ckt breaker between Bk1 and Bk2 with fully redundant protection scheme definition.

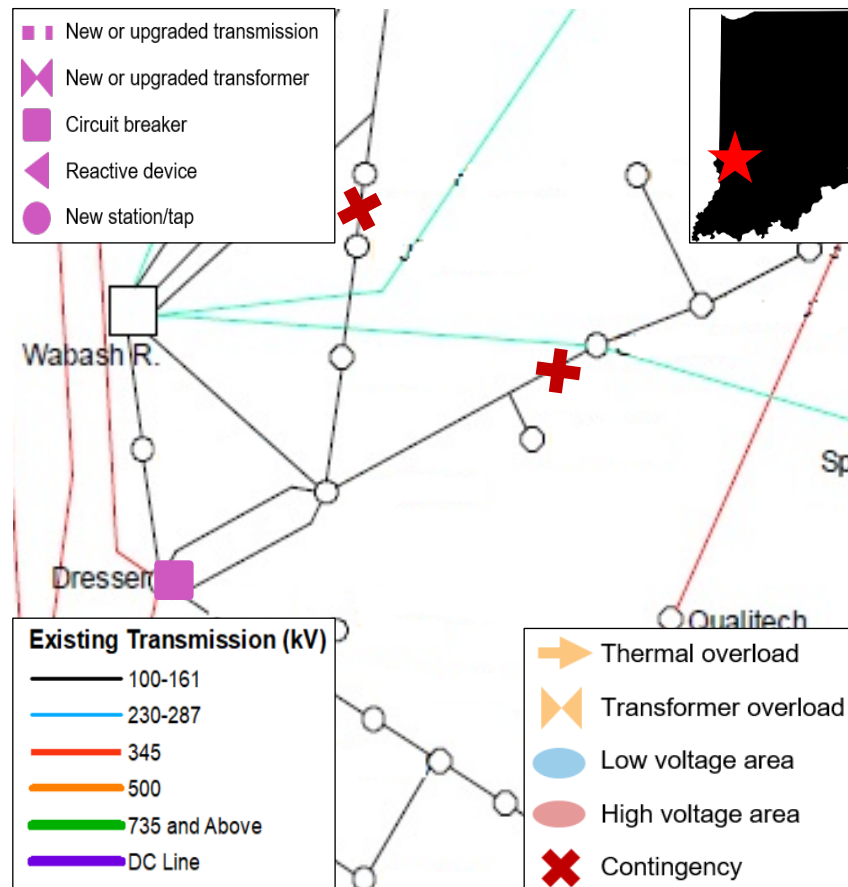
- **System Need**

- P5 event, breaker overload violations are caused by the coincidental loss of breakers at Dresser substation in MTEP20 analysis.

- **Estimated Cost: \$8 M**

- **Expected ISD: June 1, 2023**

- **Target Appendix: A in MTEP21**



Upgrade Gibson—Francisco—Duff 345 kV path solves P6-1-1 thermal overloads

- **P20345 - Baseline Reliability Project**

- **Project description**

- Upgrade 345 kV line and terminals from Gibson—Francisco—Duff.

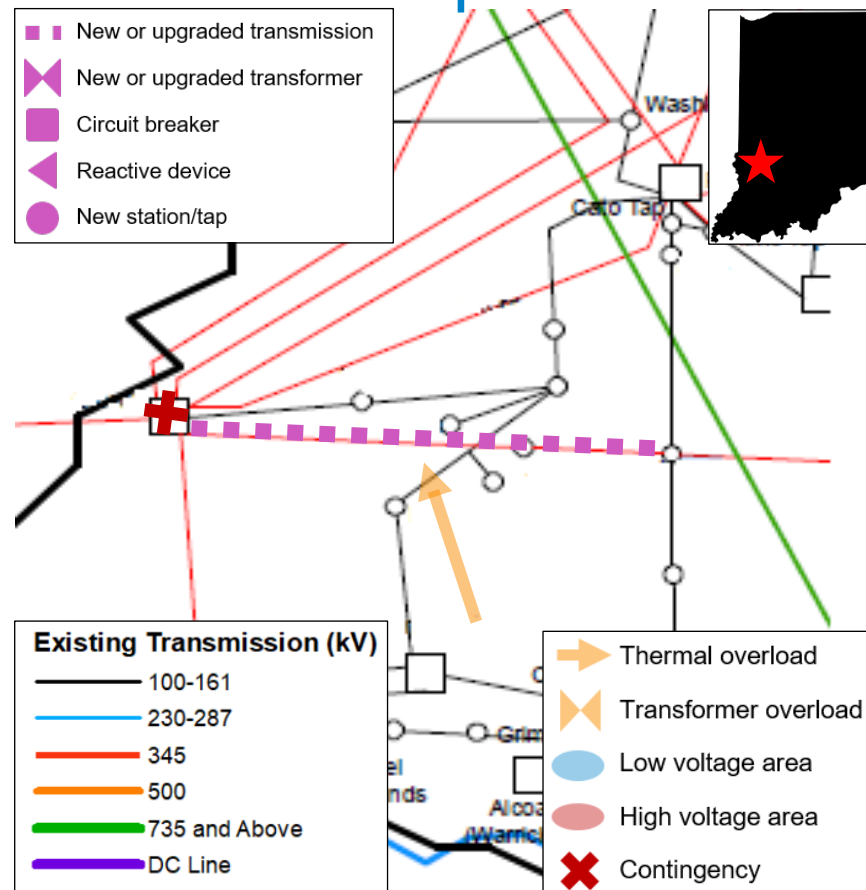
- **System Need**

- P6 event, 345 kV line pairing outage of BES elements from MTEP20 analysis.
- Violations caused by recent new Duff—Coleman 345 kV line addition.

- **Estimated Cost: \$32 M**

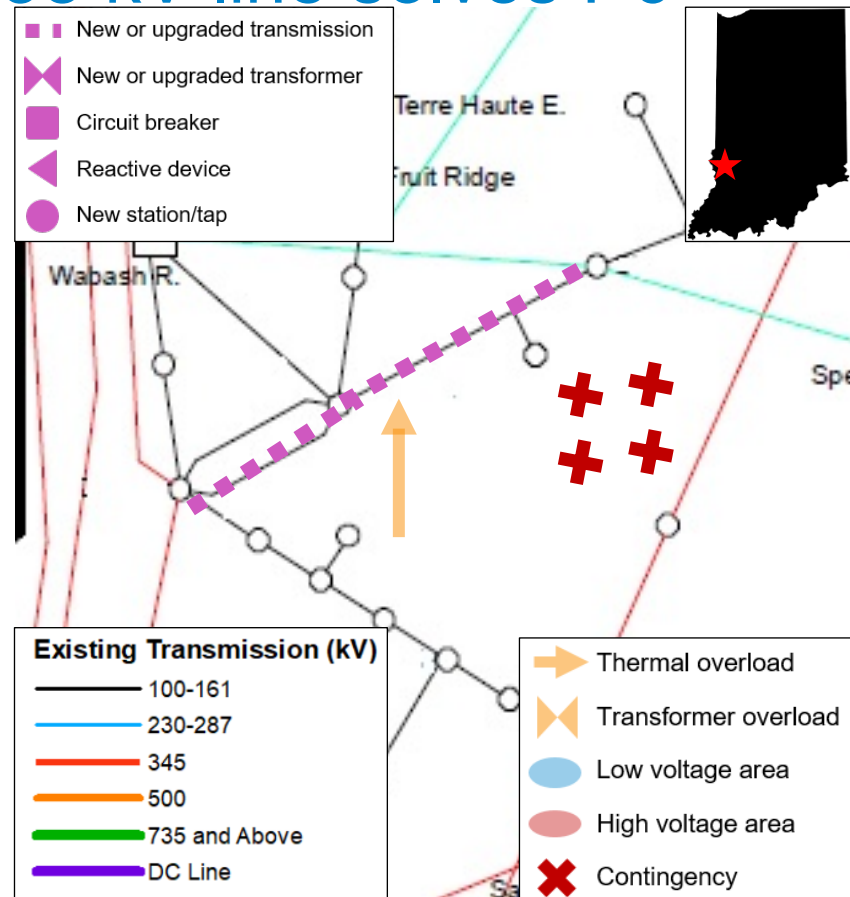
- **Expected ISD: June 1, 2022**

- **Target Appendix: A in MTEP21**



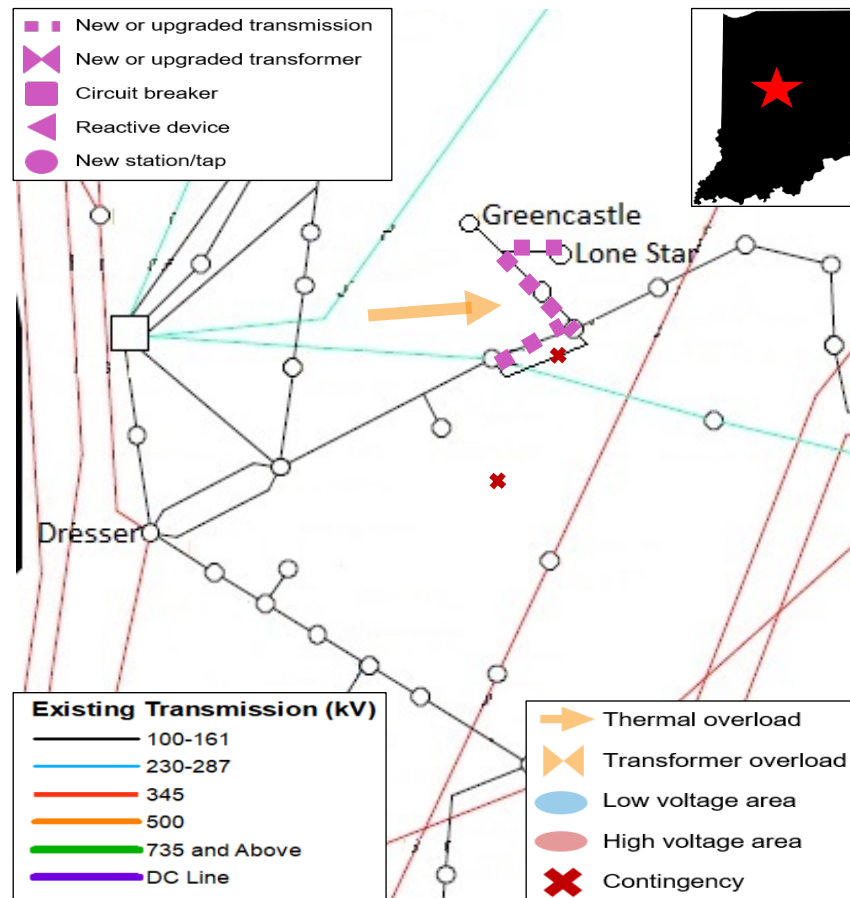
Rebuild Dresser—Staunton 138 kV line solves P6 thermal overload

- **P20726 - Baseline Reliability Project**
- **Project description**
 - Rebuild dresser to Allendale Jct—Staunton with either 954ACSS@200C or (2)954ACSR@120C.
- **System Need**
 - P6 event, BES line overload violations for outages of BES element pairs from MTEP20 analysis.
 - Multiple (63+/-) cat. P6 line overload violations.
- **Estimated Cost: \$41M**
- **Expected ISD: June 1, 2022**
- **Target Appendix: A in MTEP21**



Rebuild Staunton—Lone Star Jct 138 kV line solves P6 thermal overload

- **P20727 - Baseline Reliability Project**
- **Project description**
 - Rebuild Staunton—Greencastle Jct.—Manhattan—Lone Star Jct. with either (1) 954ACSR@120C or (2) 954ACSR@200C
- **System Need**
 - P6 events, overloads increased from worst case 110% in MTEP19 to 126% from MTEP20 analysis.
 - Multiple 345 kV and 138 kV BES element pairs
- **Estimated Cost: \$40.28M**
- **Expected ISD: June 1, 2022**
- **Target Appendix: A in MTEP21**



ITCT



- The following projects are listed in a tabulated format for space considerations
- For more detail see the January 29, 2021 East SPM meeting materials:

<https://www.misoenergy.org/events/east-subregional-planning-meeting-spm1---january-29-2021/>

ITCT: 12 Baseline Reliability Projects (BRP) proposed

Project ID	Project Name	Project Description	System Need	Expected ISD	Estimated Cost
15874	Custer 120 kV – Upgrade GA Station Equipment	Upgrade station equipment at Custer 120 kV position GA.	The Custer 120 kV position GA station equipment is projected to overload for P6 and P7 contingencies under light-load conditions.	December 31, 2022	\$0.15M
20105	Atlanta 120 kV Reactors	Install two 120 kV, 15 MVAR shunt reactors along with a 3000 A synchronizing breaker and disconnect switches at Atlanta (buses 101 and 102).	The Atlanta 120 kV buses are projected to have high voltages driven by a P1 event. Additional outages (P6) cause high voltage violations during light load conditions.	December 31, 2024	\$2.80M
20109	Sterling - Mustang 1 Tap 120 kV Rebuild	Rebuild approximately 350 ft of 795 ACSR conductor to 1431 ACSR of Sterling – Mustang Tap1 120 kV and reconductor ~0.5 miles of 795 ACSR to 1431 ACSR and upgrade equipment at Sterling 120 kV position "HC".	The Sterling – Mustang Tap1 120 kV section of Sterling – Gendy – Chesnut is marginally overloaded for shutdown plus contingency scenario (P6) during peak conditions.	December 31, 2024	\$0.52M
20110	Pontiac - Sunbird 120 kV Rebuild	Rebuild approximately 2.7 miles of 954 ACSR conductor to 1431 ACSR of Pontiac – Colorado Tap 1 – Sunbird 120 kV. Upgrade equipment and relaying at Pontiac 120 kV position "GW" and Sunbird 120 kV position "HD".	The Pontiac - Colorado Tap1 - Sunbird 120 kV sections are projected to overload for shutdown-plus-contingency scenarios (P6) in peak conditions.	December 31, 2024	\$7.00M

Project justification documents can be downloaded from the following MTEP Sharefile location:
MTEP > mtep21 > Michigan > Project_Justification_Documents > ITCT

Please contact MISO Client Relations directly for the necessary CEII NDA and to request access to this Sharefile location.



ITCT: 12 Baseline Reliability Projects (BRP) proposed

Project ID	Project Name	Project Description	System Need	Expected ISD	Estimated Cost
20111	Superior - Wayne #1 and #2 120 kV Rebuild	Rebuild the structures from Superior 120 kV to Wayne 120 kV. Rebuild approximately 10.5 miles of the Wayne – Superior 120 kV circuit replacing the 477 ACSR conductor with 954 ACSR utilizing 120 kV double circuit structures with OPGW. Reconductor 6.952 miles between the Superior 120 kV and W-Wr-S Tap utilizing 1431 ACSR conductor. Upgrade terminal equipment at ..	The Wayne – Hatch Tap – Superior 120 kV and the Superior – W-Wr-S Tap 120 kV lines are projected to overload for P6 contingencies under peak and shoulder-peak load conditions. These two lines share the same structures.	December 31, 2024	\$18.43M
20115	Bloomfield 120 kV HG Upgrades	Upgrade the station equipment at Bloomfield 120 kV positions "HG".	Bloomfield station equipment is marginally overloaded for P7 and P6 contingencies during peak conditions. The overloaded equipment is at Bloomfield 120 kV positions HG.	December 31, 2022	\$0.06M
20116	Monroe - Lallendorf 345 kV Rebuild (ITCT)	Rebuild 16.63 miles of the 2-954 ACSR conductor on the Monroe – Lallendorf 345 kV circuit to double bundled 1431 ACSR conductor on double circuit steel towers built to 345 kV construction with OPGW.	The Monroe – Lallendorf 345 kV circuit is project to overload for P3 and P6 contingencies under light load conditions.	December 31, 2024	\$7.80M
20150	Monroe – Lulu 345 kV Sag Remediation (ITCT)	Remediate the sag on the 2-954 ACSR conductor on the Monroe – Lulu segment of the Milan – Monroe – Morocco 345 kV circuit up to the conductor limit.	The Monroe – Lulu segment of the Milan – Monroe – Morocco 345 kV circuit is project to marginally overload in the base case under light load conditions. This segment is also projected to overload for P12, P21, P23, P24, P3, P6, and P7 contingencies under light load and shoulder peak conditions.	December 31, 2024	\$0.72M

Project justification documents can be downloaded from the following MTEP Sharefile location:
MTEP > mtep21 > Michigan > Project_Justification_Documents > ITCT

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ITCT: 12 Baseline Reliability Projects (BRP) proposed

Project ID	Project Name	Project Description	System Need	Expected ISD	Estimated Cost
20182	Northeast 120kV 55 MVAR Reactor	Install a 120 kV, 55 MVAR shunt reactor along with a 3000 A synchronizing breaker and disconnect switches at Northeast 120 kV bus.	The Northeast and other 120 kV buses in the area are projected to have high voltages driven by a P0 and P1 events. Additional outages (P6) cause a high voltage violations during light load conditions.	December 31, 2024	\$1.32M
20183	Stephens 345kV 55 MVAR Reactor	Install a 345 kV, 55 MVAR shunt reactor along with a 3000 A synchronizing breaker and disconnect switches at Stephens 345kV bus.	The Stephens and other 120 kV buses in the area are projected to have high voltages driven by a P0 and P1 events. Additional outages (P6) cause high voltage violations during light load conditions.	December 31, 2024	\$3.50M
20185	Warren 120kV 55 MVAR Reactor	Install a 120 kV, 55 MVAR shunt reactor along with a 3000 A synchronizing breaker and disconnect switches at Warren 120kV bus.	The Warren and other 120 kV buses in the area are projected to have high voltages driven by a P0 and P1 events. Additional outages (P6) cause high voltage violations during light load conditions.	December 31, 2024	\$1.70M
20186	Mack 120kV 55 MVAR Reactor	Install a 120 kV, 55 MVAR shunt reactor along with a 3000 A synchronizing breaker and disconnect switches at Mack 120kV bus.	The Mack and other 120 kV buses in the area are projected to have high voltages driven by a P0 and P1 events. Additional outages (P6) cause high voltage violations during light load conditions.	December 31, 2024	\$1.70M

Project justification documents can be downloaded from the following MTEP Sharefile location:
MTEP > mtep21 > Michigan > Project_Justification_Documents > ITCT

Please contact MISO Client Relations directly for the necessary CEII NDA and to request access to this Sharefile location.



METC



- The following projects are listed in a tabulated format for space considerations
- For more detail see the January 29, 2021 East SPM meeting materials:

<https://www.misoenergy.org/events/east-subregional-planning-meeting-spm1---january-29-2021/>

METC: 29 Baseline Reliability Projects (BRP) proposed

Project ID	Project Name	Project Description	System Need	Expected ISD	Estimated Cost
15812	Rebuild Tallmadge - Wealthy #1 138 kV	The proposed solution is to rebuild 6.62 miles of the Tallmadge – Wealthy #1 138kV circuit using 2156 ACSR conductor with double circuit steel structures. Also replace station equipment at Tallmadge substation.	The Tallmadge – Wealthy #1 138kV circuit is projected to overload for the shutdown plus contingency. The identified overloaded equipment on this circuit is the conductor, sag, and terminal equipment and station equipment at Tallmadge and Wealthy stations. The thermal violations are only found on peak cases.	December 31, 2026	\$19.70M
19958	Whiting 2nd 138-120kV Transformer	Install a second 138/120kV transformer in parallel with existing transformer #8. Add 4 new 3000 Amps disconnect switches and a new 138kV, 3000 A breaker at Whiting	The Whiting 138/120kV Transformer is projected to be overloaded for P6 and P7 contingency. The thermal violations are found on the 40% off-peak model only.	December 31, 2024	\$6.70M
19960	Rebuild Dort (Calvary) - Garfield 138kV	Rebuild approximately 5.34 miles of the Calvary - Garfield 138kV circuit using 954 ACSR on new future double circuit structures constructed at 138kV Standards. Also install OPGW along the entire length of the line (~5.34 miles) from Calvary to Garfield.	Calvary - Garfield #1 138kV line is projected to be overloaded for P6 and P7 contingency during peak load conditions.. The identified overloaded equipment on this circuit is the conductor.	December 31, 2024	\$18.10M
19964	Sag Remediate Arthur Jct. - Tallmadge 138kV	Completely remediate the sag limit on the Arthur Jct. – Tallmadge 138kV section of the Cobb (Chopin) – Tallmadge #2 138kV line to increase its summer emergency rating to a minimum of 217 MVA/908 Amps.	The Arthur Jct. – Tallmadge 138kV section of the Cobb (Chopin) – Tallmadge #2 138kV line is projected to overload for shutdown plus contingency scenario (P6). The identified overloaded equipment on this circuit is the sag on the Arthur Jct. – Tallmadge 138kV section. The thermal violations are found on peak conditions.	December 31, 2023	\$0.66M
19970	Rebuild Alma - Vestaburg 138 kV 477 ACSR	Rebuild approximately 0.43 mile of the Alma - Vestaburg 138kV circuit using 954 ACSR on double circuit structures constructed at 138kV Standards with OPGW. Also replace terminal equipment at Alma.	Alma - Vestaburg 138kV line is projected to be overloaded for base case and P1-P7 contingency scenarios during Ludington Pumping and light load conditions. . The identified overloaded equipment on this circuit is the conductor and terminal equipment at Alma.	December 31, 2024	\$2.80M
20015	Rebuild Bingham - Cornell 138 kV	ITC is to rebuild the approximately 19.1 miles of the Bingham – Cornell 138kV with 954 ACSR 138kV double circuit standards and upgrade terminal station equipment at Cornell.	Bingham to Cornell 138 kV line is projected to be overloaded for category P2 and P6 contingencies in the light load 2025 case. The overloaded equipment identified on this circuit is the overhead conductor.	June 1, 2025	\$31.00M

Project justification documents can be downloaded from the following MTEP Sharefile location:
MTEP > mtep21 > Michigan > Project_Justification_Documents > METC

Please contact MISO Client Relations directly for the necessary CEII NDA and to request access to this Sharefile location.

METC: 29 Baseline Reliability Projects (BRP) proposed (contd.)

Project ID	Project Name	Project Description	System Need	Expected ISD	Estimated Cost
20016	Rebuild Eureka - Deja Jct 138 kV	ITC is to rebuild approximately 16.6 miles of the Eureka - Deja 138kV line with 954 ACSR 138kV double circuit standards. ITC to upgrade terminal equipment in the Eureka Substation.	Deja to Eureka 138 kV line is projected to be overloaded for category P2, P6, and P7 contingencies in the light load case and off-peak case. The overloaded equipment identified on this circuit is the overhead conductor and terminal station equipment at Eureka.	June 1, 2025	\$19.00M
20017	Rebuild Alma - Regal #1 138 kV	ITC is to rebuild approximately 6.0 miles of the Alma - Regal #1 138kV with 954 ACSR 138kV double circuit standards with OPGW and upgrade terminal station equipment at Alma and Regal	Alma to Regal #1 138 kV line is projected to be overloaded for category P1, P2, and P6 contingencies in light load and shoulder peak conditions. The overloaded equipment identified on this circuit is the overhead conductor.	June 1, 2025	\$11.00M
20018	Rebuild Bullock - Shale 138 kV	Rebuild the Bullock to Structure 006A6682 (approximately 5 miles) utilizing 954 ACSR conductor with 230 kV double circuit structure standards with OPGW. Rebuild from Structure 006A6682 to the future Shale Substation (approximately 15 miles) utilizing 954 ACSR conductor with 138 kV double circuit structures standards with OPGW. Upgrade Terminal equipment at.	Bullock to Shale 138 kV line is projected to be overloaded for categories P1, P2, P3, P6, and P7. The overloaded equipment identified on this circuit is the overhead conductor and terminal station equipment at Bullock.	June 1, 2025	\$33.00M
20019	Rebuild Bullock - Edenville Jct 138 kV	ITC to rebuild 7.3 miles of the Bullock to Edenville 138kV with 954 ACSR with 230kV double circuit standards with OPGW.	The Bullock to Edenville 138 kV line section is projected to be overloaded for category P6 contingencies in the light load and shoulder peak models. The overloaded equipment identified on this circuit is the overhead conductor.	June 1, 2025	\$21.10M
20020	Gaylord - Mio Dam 138kV Rebuild	The proposed solution is ITC is to rebuild the Gaylord - Mio Dam 138kV line with 954 ACSR overhead conductor capable of double circuit 230kV. OPGW will be installed on the rebuild. Terminal equipment at Gaylord and Mio Dam Substations will need to be upgraded.	Gaylord to Mio Dam 138 kV line is projected to be overloaded for category P2, P3, and P6 contingencies in the light load off peak and peak cases. The overloaded equipment identified on this circuit is the overhead conductor.	June 1, 2025	\$75.10M
20021	Rebuild Bullock - Salt River 138 kV	Rebuild approximately 14 miles of the 336 ACSR conductor utilizing 954 ACSR on standard 138 kV double circuit structures with OPGW. Upgrade station equipment at Bullock Position 288 to meet or exceed the summer emergency rating of the new conductor	The Bullock to Salt River 138 kV line is projected to be overloaded for category P6 contingencies in the 2025 light load and off-peak cases. The overloaded equipment identified on this circuit is the overhead conductor and terminal station equipment at Bullock.	December 31, 2024	\$0.31M

Project justification documents can be downloaded from the following MTEP Sharefile location:
MTEP > mtep21 > Michigan > Project_Justification_Documents > METC

METC: 29 Baseline Reliability Projects (BRP) proposed (contd.)

Project ID	Project Name	Project Description	System Need	Expected ISD	Estimated Cost
20022	Rebuild Salt River - Summerton 138 kV	Rebuild approximately 19 miles of the 336 ACSR conductor utilizing 954 ACSR on standard 138 kV double circuit structures with OPGW and upgrade terminal station equipment at Summerton Position 277 to meet or exceed the summer emergency rating of the new conductor	The Salt River to Summerton 138 kV line is projected to be overloaded for category P3 and P6 contingencies in the light load case and off-peak case. The overloaded equipment identified on this circuit is the overhead conductor and terminal station equipment at Summerton.	December 31, 2024	\$0.33M
20031	Sag Remediate Corwith - Rondo 138kV	The proposed solution is to remove sag limits on the Corwith to Rondo 138 kV line up to conductor's limit.	Corwith to Rondo 138 kV line is projected to be overloaded for P1, P2, P3, and P6 contingency scenarios during shoulder peak conditions	June 1, 2025	\$1.70M
20033	Sag Remediate Weadock - Carter Jct 138 kV	ITC is to remove the sag limit on the 336 ACSR and raise the sag limit on the 636 ACSR to 158F on the Carter - Weadock 138 kV Line.	Carter to Weadock 138 kV line is projected to be overloaded for category P6 contingencies in the peak and shoulder peak cases.	June 1, 2025	\$0.89M
20034	Sag Remediate Higgins - Mio Dam 138kV	The proposed solution is ITC is to remove the sag limit on the 266.8 ACSR on the Higgins – Mio Dam 138kV line up to the conductor's limit	Higgins to Mio Dam 138 kV line is projected to be overloaded for category P3 and P6 contingencies in the light load case.	June 1, 2025	\$1.01M
20041	Sag Remediate Bard Road - Higgins 138kV	The proposed solution is to remove sag limits on the Bard to Higgins 138 kV line up to the conductor's limit.	Bard Road to Higgins 138 kV line is projected to be overloaded for category P1, P2, P3, and P6 contingencies in all cases.	June 1, 2025	\$0.80M
20048	Sag Remediate Bard Rd - Grout Jct 138kV	Remediate sag limit on the 477 ACSR conductor on the Bard Rd – Grout Jct. 138kV line up to 195 MVA.	Bard Rd to Grout Jct 138 kV line is projected to be overloaded for category P6 contingencies the light load case	June 1, 2025	\$0.26M

Project justification documents can be downloaded from the following MTEP Sharefile location:
MTEP > mtep21 > Michigan > Project_Justification_Documents > METC

METC: 29 Baseline Reliability Projects (BRP) proposed (contd.)

Project ID	Project Name	Project Description	System Need	Expected ISD	Estimated Cost
20049	Rebuild and Sag Remediate Gallagher - Twining 138kV	The proposed solution is to raise the sag limit on the 336 ACSR between Gallagher and Withey Lake Jct. and replace the 1/0 Copper on the Withey Lake Jct. - Twining 138kV line with 477 ACSR utilizing standard 138 kV double circuit structures	Gallagher to Twining 138 kV line is projected to be overloaded for category P6 contingencies in the light load and off-peak cases.	June 1, 2025	\$0.97M
20050	Vanderbilt 138 kV Station Equipment Upgrades	The proposed solution is to upgrade terminal station equipment at Vanderbilt 138 kV Substation.	The Livingston - Vanderbilt 138 kV line is projected to become marginally overloaded for a P1 contingency during shoulder peak conditions.	June 1, 2025	\$0.12M
20051	Whittemore 138 kV Trainer Upgrade	The proposed solution is to replace terminal station equipment at Whittemore.	Equipment at Whittemore 138 kV is projected to be overloaded for category P3 and P6 contingencies. The overloaded equipment identified is terminal station equipment at Whittemore.	June 1, 2025	\$0.08M
20052	Summerton 138 kV 500 Bus Upgrade	Upgrade the bus to meet or exceed the rating of a 954 ACSR conductor.	Equipment at the Summerton section breaker is projected to be overloaded for category P3 and P6 contingencies in light load and several shoulder peak cases.	December 31, 2023	\$0.38M
20053	Warren 138 kV 188 Bus Upgrade	Upgrade Warren 188 terminal equipment to meet or exceed the rating of a 954 ACSR conductor.	The Warren – Salt River 138 kV line is projected to be overloaded for category P2, P3, P6, and P7 contingencies in light load and several shoulder peak cases. The overloaded equipment identified on this circuit is the overhead conductor.	December 31, 2023	\$0.16M
20054	Warren 138 kV 377 Equipment Upgrades	Upgrade terminal station equipment, including a 138 kV breaker, at Warren position 377 to meet or exceed the rating of a 954 ACSR conductor.	The Warren – Clare Jct. 138 kV line is projected to be overloaded for category P1, P2, P3, and P6 contingencies in light load and several shoulder peak cases.	December 31, 2023	\$1.05M
20117	Rebuild Monroe – Lallendorf 345 kV (METC)	The proposed solution is rebuild 16.63 miles of the 2-954 ACSR conductor on the Monroe – Lallendorf 345 kV circuit to double bundled 1431 ACSR conductor on double circuit steel towers built to 345 kV construction with OPGW.	The Monroe – Lallendorf 345 kV circuit is project to overload for P3 and P6 contingencies under light load conditions.	December 31, 2024	\$45.70M

Project justification documents can be downloaded from the following MTEP Sharefile location:
MTEP > mtep21 > Michigan > Project_Justification_Documents > METC

METC: 29 Baseline Reliability Projects (BRP) proposed (contd.)

Project ID	Project Name	Project Description	System Need	Expected ISD	Estimated Cost
20119	Sag Remediate Claremont - Cornell #2 138kV	ITC is to raise the sag limit on the 477 ACSR to 212F and 795 ACSR to 151F on the Claremont – Cornell #2 138 kV Line.	Claremont to Cornell #2 138 kV line is projected to be overloaded for category P6 contingencies in the light load, off-peak cases, and peak cases.	June 1, 2025	\$0.25M
20120	Wackerly 138 kV Station Equipment Upgrades	Replace station equipment in the Wackerly Substation meet or exceed rating of a 795 ACSR conductor.	Equipment at the Wackerly section breaker is projected to be overloaded for category P1, P2, P3, P6 and P7 contingencies in shoulder peak and peak cases.	December 31, 2023	\$0.14M
20131	Sag Remediate Lemoyne – Majestic 345 kV	The proposed solution is to remediate the sag on the 2-954 ACSR conductor on the Lemoyne - Majestic 345 kV circuit to a summer emergency rating of 1260 MVA (2109 Amps).	The Lemoyne – Majestic 345 kV circuit is project to overload for P6 and P7 contingencies under light load conditions.	December 31, 2023	\$0.51M
20160	Delaney 138 kV 177 Bus Upgrades	Replace Delaney 177 terminal station equipment.	The Delaney – Thetford 138 kV line is projected to be overloaded for category P6 contingencies in peak cases. The overloaded equipment identified on this circuit is the bus work.	June 1, 2025	\$0.17M

Project justification documents can be downloaded from the following MTEP Sharefile location:
MTEP > mtep21 > Michigan > Project_Justification_Documents > METC

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