

Appendix D1

East

2018

ITC Transmission Co. (ITCT)

Michigan Electric Transmission Co. (METC)

Consumers Energy (CETO)

Michigan Public Power Agency (MPPA)

Wolverine Power Supply Cooperative (WPSC)

Northern Indiana Public Service Co. (NIPSCO)

ITC Transmission Co. (ITCT)

Overview of ITCT Projects

For the MTEP18 cycle there were 17 ITCT projects targeted for Appendix A with a total estimated cost of \$89.3 million. Of these 17 projects: two have an estimated cost greater than \$10 million; two have an estimated cost between \$5 million and \$10 million; four have an estimated cost between \$1 million and \$5 million; and nine have an estimated cost lower than \$1 million (Figure P-1 through 4).

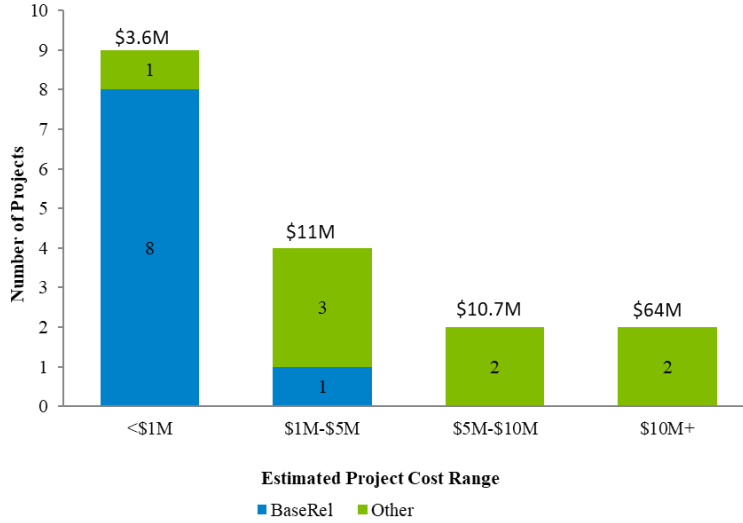


Figure P-1: Cost Range by Project Type

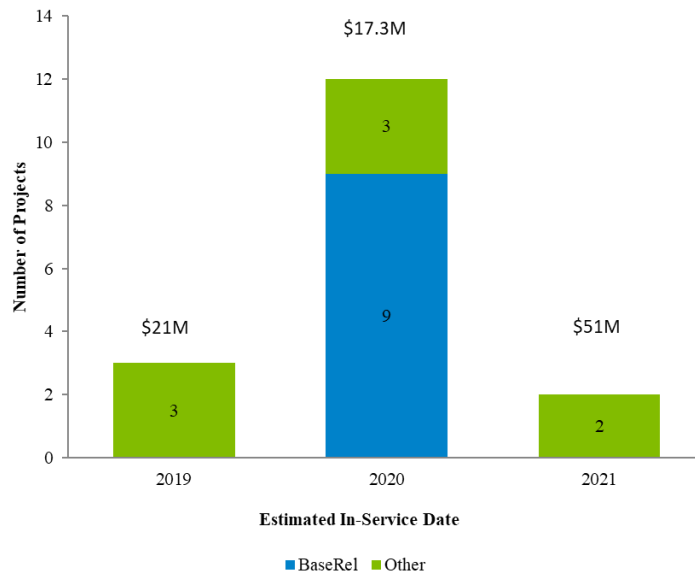


Figure P-2: Estimated In-Service Date by Project Type

Other Project Categories

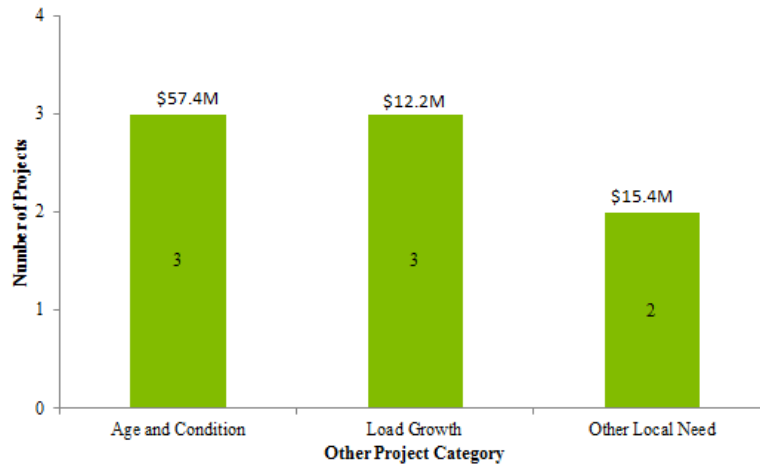


Figure P-3: Other Category Project Type

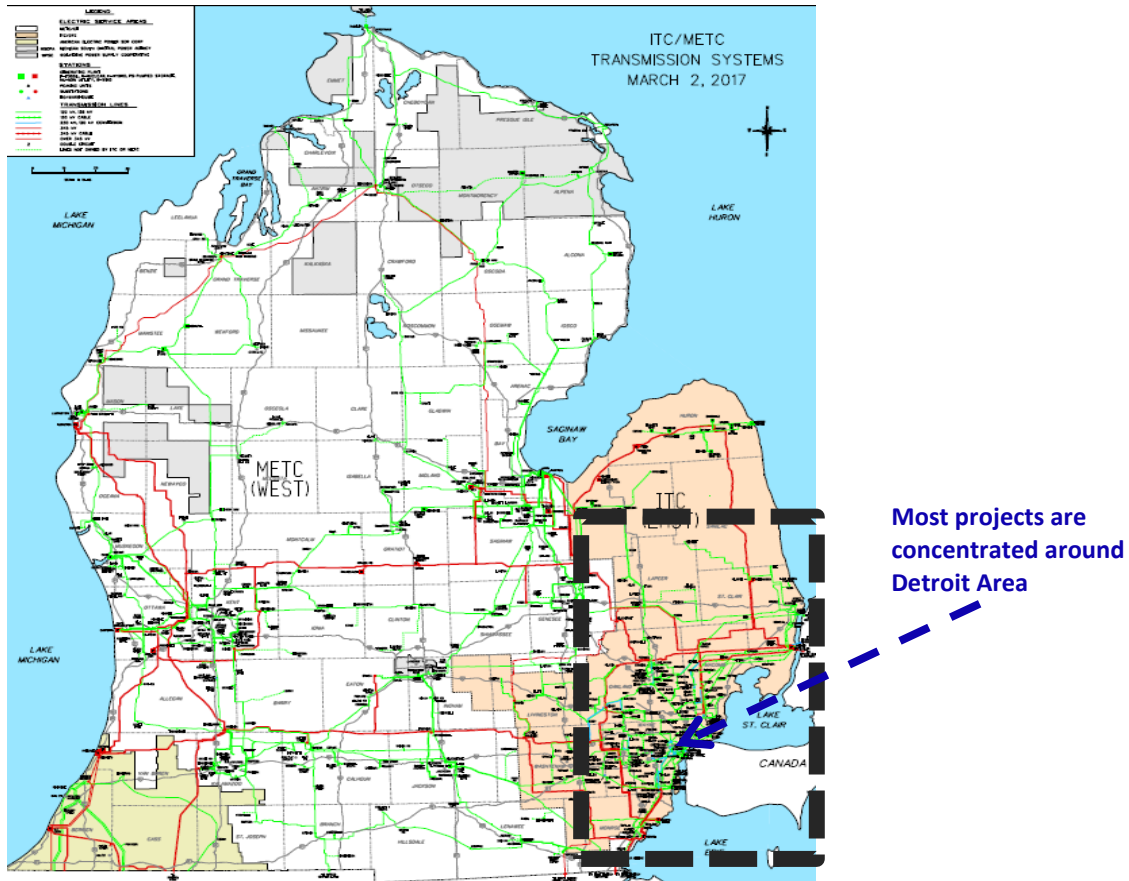


Figure P-4: Geographic Transmission Map of ITCT Projects

Baseline Reliability Projects

There are nine Baseline Reliability projects (“BRP”) moving to Appendix A for ITC Transmission Co. (ITCT) in the MTEP18 cycle.

Project 13806: Bismarck - Jewell 345 kV Sag Remediation

Transmission Owner: ITC Transmission Co.

Project Description

This project raises the sag limit on the Bismarck – Jewell 345 kV line to at least 1661 MVA (2780 Amp) summer emergency (Figure P13806-1). Project also upgrades the station equipment at Bismarck “BQ” position to at least 1661 MVA summer emergency.

The tentative expected in-service date is June 1, 2020. The total estimated cost is \$340,000.

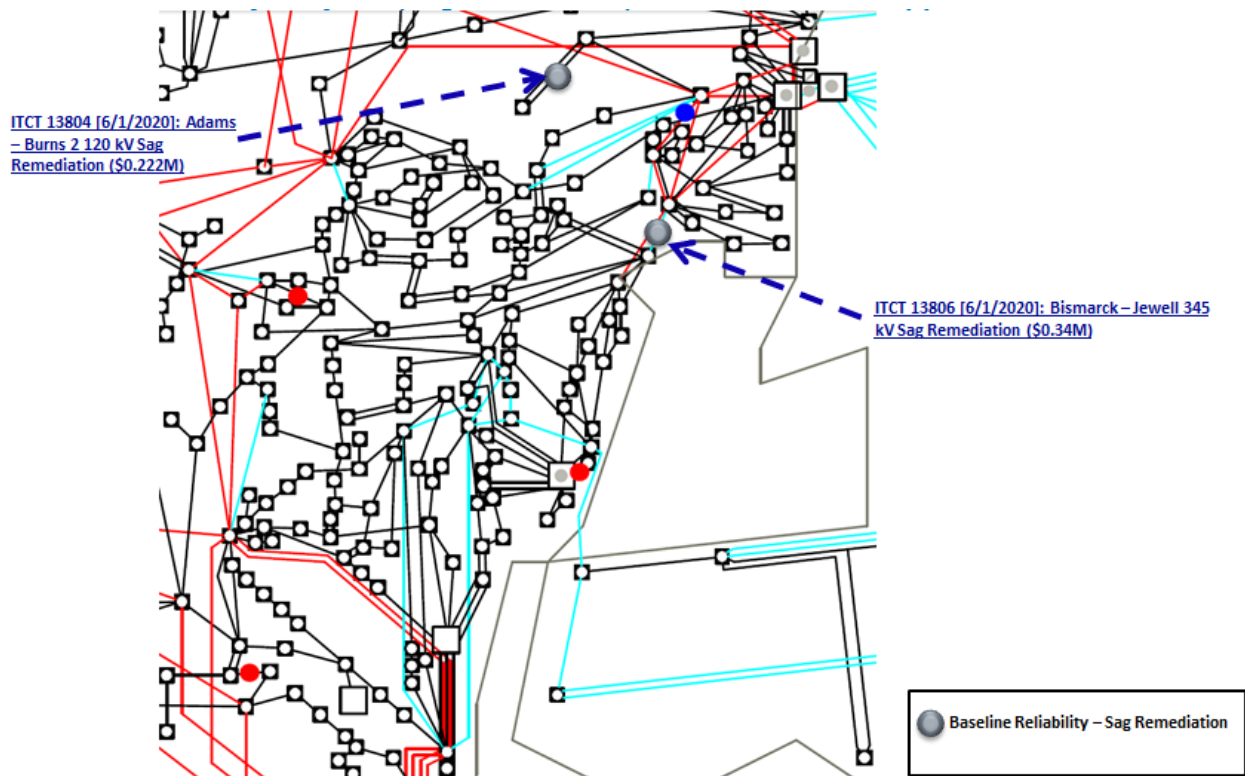


Figure P13806-1: Geographic Map of Project

Project Need

The Bismarck–Jewell 345 kV line is projected to be overloaded in the 2-, 5-, and 10-year cases (Table 13806). The thermal violation occurs in shutdown-plus-contingency (P6) and double-circuit tower contingency (P71). MISO analysis showed the line is overloaded at 101.3 percent and 103.7 percent in 2021 and 2023 Summer Peak due to category P71 contingency.

Limiting Element	Rating (MVA)	Cont Type	2020		2023		2023		2023	
			MISO18_2020_SUM_AA_AttY		MISO18_2023_SUM_AA_AttY		MISO18_2023_SUM_W15_1200_IN_LG6_51SN		MISO18_2023_85P_W40_1400_IN_LG6_51SN	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264580 19JEWEL 345 - 264722 19BISMK 345 (1)	1272	P71	1288	101.3%	1228.6	96.6%	1318.9	103.7%	1148.2	90.3%
264580 19JEWEL 345 - 264722 19BISMK 345 (1)	1272	P6	1288	101.3%	1228.6	96.6%	1318.9	103.7%	1148.2	90.3%

Table 13806: Project Contingency Drivers

Alternatives Considered

No other feasible alternatives have been identified.

Cost Allocation

This is a Baseline Reliability Project, which is not eligible for regional cost sharing.

Project 13804: Adams – Burns 2 120 kV Sag Remediation

Transmission Owner: ITC Transmission Co.

Project Description

This project remediates the sag limit on the Adams – Burns2 120 kV section to the conductor summer emergency rating of 314 MVA (1512 Amp).

The tentative expected in-service date is June 1, 2020. The total estimated cost is \$220,000.

Project Need

The 120 kV section between Adams to Burns2 tap is projected to be overloaded for several shutdown-plus-contingency (P6) scenarios (Table 13804). MISO analysis showed that the line is overloaded at 103.2 percent in 2023 Summer Peak due to a P6 event (P12 + P12).

Limiting Element	Rating (MVA)	Cont Type	2020		2023		2023		2023		2023	
			MISO18_2020_SUM_AA_AttY		MISO18_2023_SUM_AA_AttY		MISO18_2023_SUM_W15_1200_IN_LG6_51SN		MISO18_2023_85P_W40_0_IN_LG6_20SN		MISO18_2023_85P_W90_0_IN_LG5_20NS	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264520 19ADAMS 120 - 264556 19BURNS2 120 (1)	289	P6	262.5	90.8%	298.3	103.2%	271.4	93.9%	270.5	93.6%	262.9	91.0%

Table 13804: Project Contingency Drivers

Alternatives Considered

No other feasible alternatives have been identified.

Cost Allocation

This is a Baseline Reliability Project, which is not eligible for regional cost sharing.

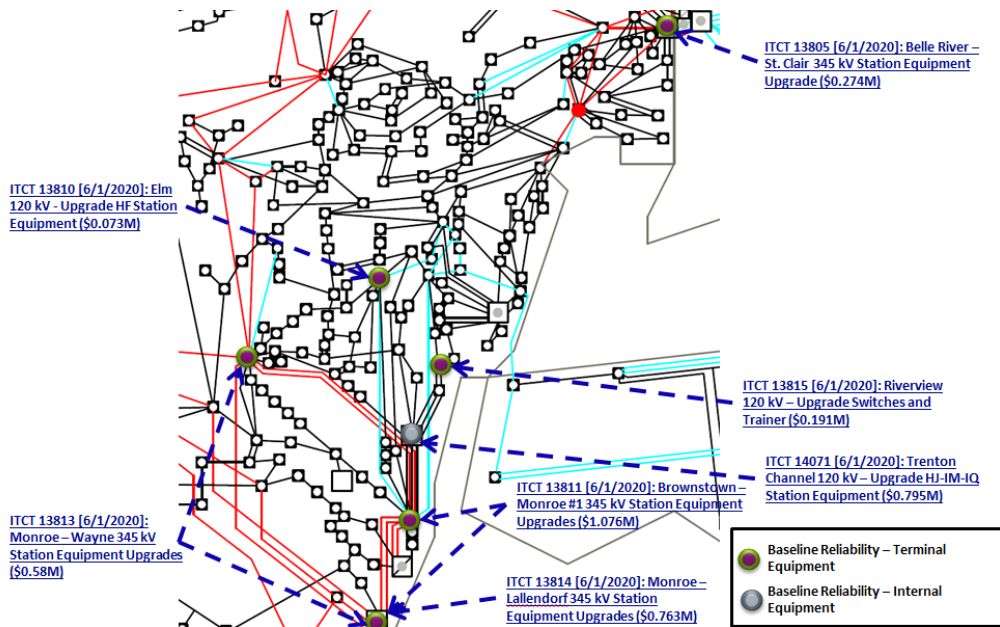


Figure P5: Geographic map of 7 Terminal Equipment BRP Projects

Project 13811: Brownstown – Monroe #1 345 kV Station Equipment Upgrades

Transmission Owner: ITC Transmission Co.

Project Description

This project upgrades 345 kV station equipment at Brownstown and Monroe so that the summer emergency rating meets or exceeds 2,000 MVA (3,347 Amp).

The tentative expected in-service date is June 1, 2020. The total estimated cost is \$1.076 million.

Project Need

The Brownstown – Monroe #1 345 kV line is projected to be overloaded in the 2-, 5- and 10-year cases. The thermal violation occurs in many generator-plus-line (P3) and shutdown-plus-contingencies (P6). MISO analysis showed that this equipment is overloaded by up to 125.3 percent in all 2020, 2023 and 2028 Summer Peak, Shoulder and Winter cases because of P3, P6 and shutdown plus contingency events.

Limiting Element	Rating (MVA)	Cont Type	2020		2023		2023		2023		2023		2023	
			MISO18_2020_SUM_AA_AtTY		MISO18_2023_SUM_AA_AtTY		MISO18_2023_SUM_W15_1200_IN_LG6_5_1SN		MISO18_2023_SH40_AA_AtTY		MISO18_2023_85P_W40_0_IN_LG6_20SN		MISO18_2023_85P_W40_1400_IN_LG6_51SN	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264612 19MON12 345 - 264707 19BNSTNS 345 (1)	1224	P3	1282.9	104.8%	1296	105.9%			1110	90.7%	1120.7	91.6%		
264612 19MON12 345 - 264707 19BNSTNS 345 (1)	1224	P3	1304.1	106.5%	1318.9	107.8%					1142.8	93.4%		
264612 19MON12 345 - 264707 19BNSTNS 345 (1)	1224	P6	1533.7	125.3%	1533.6	125.3%	1522	124.3%	1522	124.3%	1521.9	124.3%	1521.9	124.3%
264612 19MON12 345 - 264707 19BNSTNS 345 (1)	1281	P6												

Table 13811-1: Project Contingency Drivers

Limiting Element	Rating (MVA)	Cont Type	2023		2023		2023		2023		2023		2028	
			MISO18_2023_85P_W90_0_IN_LG5_20NS		MISO18_2023_85P_W90_1400_IN_LG5_5_1SN		MISO18_2023_70P_W40_0_IN_LP6_20NS		MISO18_2023_70P_W40_1400_IN_LP6_5_1SN		MISO18_2023_WIN_AA_AtTY		MISO18_2028_SU_M_AA	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264612 19MON12 345 - 264707 19BNSTNS 345 (1)	1224	P3	1143.6	93.4%									1266.5	103.5%
264612 19MON12 345 - 264707 19BNSTNS 345 (1)	1224	P3											1289.5	105.4%
264612 19MON12 345 - 264707 19BNSTNS 345 (1)	1224	P6	1521.9	124.3%	1521.9	124.3%	1522.9	124.4%	1522.9	124.4%			1519.4	124.1%
264612 19MON12 345 - 264707 19BNSTNS 345 (1)	1281	P6									1522.3	118.8%		

Table 13811-2: Project Contingency Drivers

Alternatives Considered

No acceptable generation redispatch. No other system adjustment was found.

Cost Allocation

This is a Baseline Reliability Project, which is not eligible for regional cost sharing.

Project 13814: Monroe 345 kV – Lallendorf 345 kV Station Equipment Upgrades

Transmission Owner: ITC Transmission Co.

Project Description

This project upgrades Monroe 345 kV station equipment so that the summer emergency rating meets or exceeds 2000 MVA (3347 Amp).

The tentative expected in-service date is June 1, 2020. The total estimated cost is \$763,000.

Project Need

The Monroe – Lallendorf 345 kV tie-line to First Energy is projected to be overloaded in the 2-, 5- and 10-year cases. The overload happens in a shutdown-plus-contingency (P6). MISO analysis showed this equipment is overloaded by up to 126.7 percent in all 2020, 2023, and 2028 Summer Peak, Shoulder, and Winter cases because of P3, P6 and shutdown plus contingency events.

Limiting Element	Rating (MVA)	Cont Type	2020		2023		2023		2023		2023		2023	
			MISO18_2020_SUM_AA_Atty		MISO18_2023_SUM_AA_Atty		MISO18_2023_SUM_W15_1200_IN_LG6_5_1SN		MISO18_2023_SH40_AA_Atty		MISO18_2023_85P_W40_0_IN_LG6_20SN		MISO18_2023_85P_W40_1400_IN_LG6_51SN	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264612 19MON12 345 - 241901 02LALLENDORF 345 (1)	1224	P3												
264612 19MON12 345 - 241901 02LALLENDORF 345 (1)	1224	P3												
264612 19MON12 345 - 241901 02LALLENDORF 345 (1)	1224	P6	1550.3	126.7%	1550.3	126.7%	1538.2	125.7%	1538.1	125.7%	1538.1	125.7%	1538	125.7%
264612 19MON12 345 - 241901 02LALLENDORF 345 (1)	1281	P6												

Table 13814-1: Project Contingency Drivers

Limiting Element	Rating (MVA)	Cont Type	2023		2023		2023		2023		2023		2028	
			MISO18_2023_85P_W90_0_IN_LG5_20NS		MISO18_2023_85P_W90_1400_IN_LG5_5_1SN		MISO18_2023_70P_W40_0_IN_LP6_20NS		MISO18_2023_70P_W40_1400_IN_LP6_5_1SN		MISO18_2023_WIN_AA_Atty		MISO18_2028_SUM_AA	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264612 19MON12 345 - 241901 02LALLENDORF 345 (1)	1224	P3							1409.6	115.2%				
264612 19MON12 345 - 241901 02LALLENDORF 345 (1)	1224	P3							1367.6	111.7%				
264612 19MON12 345 - 241901 02LALLENDORF 345 (1)	1224	P6	1538.1	125.7%	1538	125.7%	1538	125.7%	1538	125.7%			1535.7	125.5%
264612 19MON12 345 - 241901 02LALLENDORF 345 (1)	1281	P6									1538.1	120.1%		

Table 13814-2: Project Contingency Drivers

Alternatives Considered

No acceptable generation redispatch. No other system adjustment was found.

Cost Allocation

This is a Baseline Reliability Project, which is not eligible for regional cost sharing.

Project 13813: Monroe – Wayne 345 kV Station Equipment Upgrades

Transmission Owner: ITC Transmission Co.

Project Description

This project upgrades 345 kV station equipment at Monroe and Wayne so that the summer emergency rating meets or exceeds 1714 MVA (2868 Amp).

The tentative expected in-service date is June 1, 2020. The total estimated cost is \$580,000.

Project Need

The Monroe – Wayne 345 kV line is projected to be overloaded in the 2-, 5- and 10-year cases. The thermal violation occurs in many generator-plus-line and shutdown-plus-contingency (P6). This equipment is overloaded by up to 124.6 percent in all 2020, 2023, and 2028 Summer Peak, Shoulder, and Winter cases because of P3, P6 and shutdown plus contingency events.

Limiting Element	Rating (MVA)	Cont Type	2020		2023		2023		2023		2023		2023	
			MISO18_2020_SUM__AA_Atty		MISO18_2023_SUM__AA_Atty		MISO18_2023_SUM_W15_1200_IN_LG6_51SN		MISO18_2023_SH40__AA_Atty		MISO18_2023_85P_W40_0_IN_LG6_205N		MISO18_2023_85P_W40_1400_IN_L_G6_51SN	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264612 19MON12 345 - 264692 19WAYNE 345 (1)	1224	P3	1266.5	103.5%	1288.5	105.3%			1115.8	91.2%	1124.3	91.9%		
264612 19MON12 345 - 264692 19WAYNE 345 (1)	1224	P3	1288	105.2%	1312	107.2%					1147.1	93.7%		
264612 19MON12 345 - 264692 19WAYNE 345 (1)	1224	P6	1523.1	124.4%	1524.7	124.6%	1513.2	123.6%	1514.3	123.7%	1512.3	123.6%	1512	123.5%
264612 19MON12 345 - 264692 19WAYNE 345 (1)	1281	P6												

Table 13813-1: Project Contingency Drivers

Limiting Element	Rating (MVA)	Cont Type	2023		2023		2023		2023		2023		2028	
			MISO18_2023_85P_W90_0_IN_LG5_20NS		MISO18_2023_85P_W90_1400_IN_LG5_51SN		MISO18_2023_70P_W40_0_IN_LP6_20NS		MISO18_2023_70P_W40_1400_IN_LP6_51SN		MISO18_2023_WIN__AA_Atty		MISO18_2028_SUM__AA	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264612 19MON12 345 - 264692 19WAYNE 345 (1)	1224	P3	1140.6	93.2%									1254.1	102.5%
264612 19MON12 345 - 264692 19WAYNE 345 (1)	1224	P3											1277.3	104.4%
264612 19MON12 345 - 264692 19WAYNE 345 (1)	1224	P6	1512.2	123.5%	1511.5	123.5%	1542.4	126.0%	1542.7	126.0%			1509.5	123.3%
264612 19MON12 345 - 264692 19WAYNE 345 (1)	1281	P6									1543.8	120.5%		

Table 13813-2: Project Contingency Drivers

Alternatives Considered

No acceptable generation redispatch. No other system adjustment was found.

Cost Allocation

This is a Baseline Reliability Project, which is not eligible for regional cost sharing.

Project 14071: Trenton Channel 120 kV – Upgrade HJ-IM-IQ Station Equipment

Transmission Owner: ITC Transmission Co.

Project Description

This project upgrades station equipment at positions “HJ” and “IQ” to at least 747 MVA (3,594 Amp).

The tentative expected in-service date is June 1, 2020. The total estimated cost is \$795,000.

Project Need

Three 120 kV bus-tie branches at Trenton Channel are projected to be overloaded in the 2-, 5- and 10-year cases. The contingencies that cause these thermal violations are open-breaker and breaker failure.

MISO analysis showed that equipment at position IQ is overloaded in 2020, 2023, and 2028 Summer Peak cases by up to 106.7 percent because of open breaker (P21), breaker failure (P24, P23), and bus fault (P22) . This equipment is also loaded at 99.1 percent in 2023 Shoulder case. Also, equipment at position HJ is overloaded in 2020 Summer Peak case by 100.2 percent because of open breaker contingency (P21). Equipment at position IM is not overloaded (highest load 95.7 percent in 2020 Summer Peak).

Limiting Element	Rating (MVA)	Cont Type	2020		2023		2023		2023		2023		2023	
			MISO18_2020_SUM__AA_Atty		MISO18_2023_SUM__AA_Atty		MISO18_2023_SUM_W15_1200_IN_LG6_51SN		MISO18_2023_SH40__AA_Atty		MISO18_2023_85P_W40_0_IN_LG6_205_N		MISO18_2023_85P_W40_1400_IN_LG6_51SN	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264951 19TC14 120 - 264952 19TC9 120 (Z1)	586	P21	625.1	106.7%	603.9	103.1%	579.4	98.9%	580.6	99.1%	589.5	100.6%	570.3	97.3%
264951 19TC14 120 - 264952 19TC9 120 (Z1)	586	P22	617.4	105.4%	596.8	101.8%	573.9	97.9%	574.9	98.1%	583.3	99.5%	565.4	96.5%
264952 19TC9 120 - 264953 19TC1 120 (Z1)	586	P21	560.7	95.7%	543.8	92.8%	529.4	90.3%			534	91.1%		
264953 19TC1 120 - 264955 19TC2 120 (Z1)	624	P21	625.1	100.2%	603.9	96.8%	579.4	92.9%	580.6	93.0%	589.5	94.5%	570.3	91.4%

Table 14071-1: Project Contingency Drivers

Limiting Element	Rating (MVA)	Cont Type	2023		2023		2023		2023		2023		2028	
			MISO18_2023_85P_W90_0_IN_LG5_20NS		MISO18_2023_85P_W90_1400_IN_LG5_51SN		MISO18_2023_70P_W40_0_IN_LP6_20NS		MISO18_2023_70P_W40_1400_IN_LP6_51SN		MISO18_2023_WIN__AA_Atty		MISO18_2028_SUM__AA	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264951 19TC14 120 - 264952 19TC9 120 (Z1)	586	P21	597.2	101.9%	582.5	99.4%	560.4	95.6%	528.8	90.2%			605.8	103.4%
264951 19TC14 120 - 264952 19TC9 120 (Z1)	586	P22	590.5	100.8%	576.9	98.4%	555.7	94.8%					598.4	102.1%
264952 19TC9 120 - 264953 19TC1 120 (Z1)	586	P21	538.1	91.8%	530.5	90.5%							545.3	93.1%
264953 19TC1 120 - 264955 19TC2 120 (Z1)	624	P21	597.2	95.7%	582.5	93.3%					568.1	91.0%	605.8	97.1%

Table 14071-2: Project Contingency Drivers

Alternatives Considered

No acceptable generation redispatch. No other system adjustment was found.

Cost Allocation

This is a Baseline Reliability Project, which is not eligible for regional cost sharing.

Project 13805: Belle River – St. Clair 345 kV Station Equipment Upgrade

Transmission Owner: ITC Transmission Co.

Project Description

This project upgrades the station equipment at St. Clair to a minimum rating of 2200 MVA (3,682 Amp) summer emergency.

The tentative expected in-service date is June 1, 2020. The total estimated cost is \$274,000.

Project Need

The Belle River – St. Clair 345 kV line is projected to be overloaded in the 2-, 5- and 10-year cases. The thermal violation occurs in many different contingencies (P12, P23, P24, P71, P3, and P6). MISO analysis also showed many thermal violations in 2023 caused by P12, P23, P24, P71, P3, and P6.

Limiting Element	Rating (MVA)	Cont Type	2020		2023		2023		2023		2023		2023	
			MISO18_2020_SUM_AA_AttY		MISO18_2023_SUM_AA_AttY		MISO18_2023_70P_W40_0_IN_LP6_20NS		MISO18_2023_5H40_AA_AttY		MISO18_2023_85P_W40_0_IN_LG6_20SN		MISO18_2023_85P_W90_0_IN_LG5_20NS	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264604 19BLRPP 345 - 264656 19STCPP 345 (1)	1224	P12			1412.5	115.4%			1174.9	96.0%	1312.4	107.2%	1270.8	103.8%
264604 19BLRPP 345 - 264656 19STCPP 345 (1)	1224	P12			1198.2	97.9%								
264604 19BLRPP 345 - 264656 19STCPP 345 (1)	1224	P23			1389	113.5%			1153.2	94.2%	1288.1	105.2%	1247.2	101.9%
264604 19BLRPP 345 - 264656 19STCPP 345 (1)	1224	P23			1389.5	113.5%			1154.1	94.3%	1290.3	105.4%	1249.2	102.1%
264604 19BLRPP 345 - 264656 19STCPP 345 (1)	1224	P24			1393.8	113.9%			1168.7	95.5%	1292	105.6%	1257.1	102.7%
264604 19BLRPP 345 - 264656 19STCPP 345 (1)	1224	P24			1389.5	113.5%			1153.6	94.2%	1288.6	105.3%	1247.8	101.9%
264604 19BLRPP 345 - 264656 19STCPP 345 (1)	1224	P3			1466.8	119.8%			1228.7	100.4%	1358.4	111.0%	1319.6	107.8%
264604 19BLRPP 345 - 264656 19STCPP 345 (1)	1224	P6	1150.5	94.0%	1815.7	148.3%	1319.7	107.8%	1506.3	123.1%	1644.7	134.4%	1653.5	135.1%
264604 19BLRPP 345 - 264656 19STCPP 345 (1)	1224	P71			1431.6	117.0%			1175	96.0%	1339.9	109.5%	1289.8	105.4%
264604 19BLRPP 345 - 264656 19STCPP 345 (1)	1224	P71			1232.5	100.7%					1102.1	90.0%		

Table 13805-1: Project Contingency Drivers

Alternatives Considered

No system adjustment was found.

Cost Allocation

This is a Baseline Reliability Project, which is not eligible for regional cost sharing.

Project 13815: Riverview 120 kV – Upgrade Switches and Trainer

Transmission Owner: ITC Transmission Co.

Project Description

Upgrade 120 kV station equipment at Riverview position “HB” to meet or exceed 424 MVA (2040 Amp) summer emergency.

The tentative expected in-service date is June 1, 2020. The total estimated cost is \$191,000.

Project Need

The Riverview – Adelaide 120 kV line is projected to be overloaded in the 2-, 5- and 10-year cases. The overload happens in a shutdown-plus-contingency (P6). This equipment is overloaded by up to 114.4 percent in all 2020, 2023, and 2028 Summer Peak, Shoulder, and Winter cases because of P6 and shutdown plus contingency events.

Limiting Element	Rating (MVA)	Cont Type	2020		2023		2023		2023		2023		2023	
			MISO18_2020_SUM__AA_AtTY		MISO18_2023_SUM__AA_AtTY		MISO18_2023_SUM_W15_1200_IN_LG6_5_1SN		MISO18_2023_SH40__AA_AtTY		MISO18_2023_85P_W40_0_IN_LG6_20SN		MISO18_2023_85P_W40_1400_IN_LG6_51SN	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264643 19RVRVW1 120 - 265201 19ADELAIDE1 120 (1)	319	P6	313.3	98.2%					294.9	92.4%	301.7	94.6%		
264643 19RVRVW1 120 - 265201 19ADELAIDE1 120 (1)	319	P6	364.9	114.4%	349.1	109.4%	337.4	105.8%	345.3	106.3%	348.5	109.2%	324.1	101.6%
264643 19RVRVW1 120 - 265201 19ADELAIDE1 120 (1)	319	P6	313.2	98.2%	294.8	92.4%			298.2	93.5%	301.6	94.5%		
264643 19RVRVW1 120 - 265201 19ADELAIDE1 120 (1)	334	P6												

Table 13815-1: Project Contingency Drivers

Limiting Element	Rating (MVA)	Cont Type	2023		2023		2023		2023		2023		2028	
			MISO18_2023_85P_W90_0_IN_LG5_20NS		MISO18_2023_85P_W90_1400_IN_LG5_5_1SN		MISO18_2023_70P_W40_0_IN_LP6_20NS		MISO18_2023_70P_W40_1400_IN_LP6_5_1SN		MISO18_2023_WIN__AA_AtTY		MISO18_2028_SUM__AA	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264643 19RVRVW1 120 - 265201 19ADELAIDE1 120 (1)	319	P6	318.2	99.7%										
264643 19RVRVW1 120 - 265201 19ADELAIDE1 120 (1)	319	P6	351.6	110.2%	342.3	107.3%	332.1	104.1%	316.4	99.2%			347.8	109.0%
264643 19RVRVW1 120 - 265201 19ADELAIDE1 120 (1)	319	P6	318	99.7%										
264643 19RVRVW1 120 - 265201 19ADELAIDE1 120 (1)	334	P6									334	101.9%		

Table 13815-2: Project Contingency Drivers

Alternatives Considered

No acceptable generation redispatch. No other system adjustment was found.

Cost Allocation

This is a Baseline Reliability Project, which is not eligible for regional cost sharing.

Project 13810: Elm 120 kV - Upgrade HF Station Equipment

Transmission Owner: ITC Transmission Co.

Project Description

This project upgrades station equipment at Elm’s position “HF” to at least 314 MVA (1511 Amp) summer emergency.

The tentative expected in-service date is June 1, 2020. The total estimated cost is \$73,000.

Project Need

The Brock – Elm 120 kV line is projected to be marginally overloaded in the 2 and 5 year cases. The thermal violation occurs in a shutdown-plus-contingency (P6). MISO analysis showed the overload in 2020 by 100.5 percent and loaded by 99.7 percent in 2023 because of P6 events.

Limiting Element	Rating (MVA)	Cont Type	2020		2023		2023		2028	
			MISO18_2020_SUM__AA_Atty		MISO18_2023_SUM__AA_Atty		MISO18_2023_SUM_W15_1200_IN_LG6_5_1SN		MISO18_2028_SUM__AA	
			Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)	Flow (MVA)	Loading (%)
264531 19BROCK1 120 - 265141 19ELM12 120 (1)	265	P6	266.4	100.5%	264.1	99.7%	263.1	99.3%	258.9	97.7%

Table 13810-1: Project Contingency Drivers

Alternatives Considered

No system adjustment was found.

Cost Allocation

This is a Baseline Reliability Project, which is not eligible for regional cost sharing.

Other Projects

Projects that are not defined as Baseline Reliability, Generation Interconnection or Transmission Delivery Service Planning projects per Attachment FF, but are still needed for system reliability for various reasons, are categorized as Other projects. There are eight Other projects moving to Appendix A in this MTEP cycle for ITC Transmission Co. (ITCT).

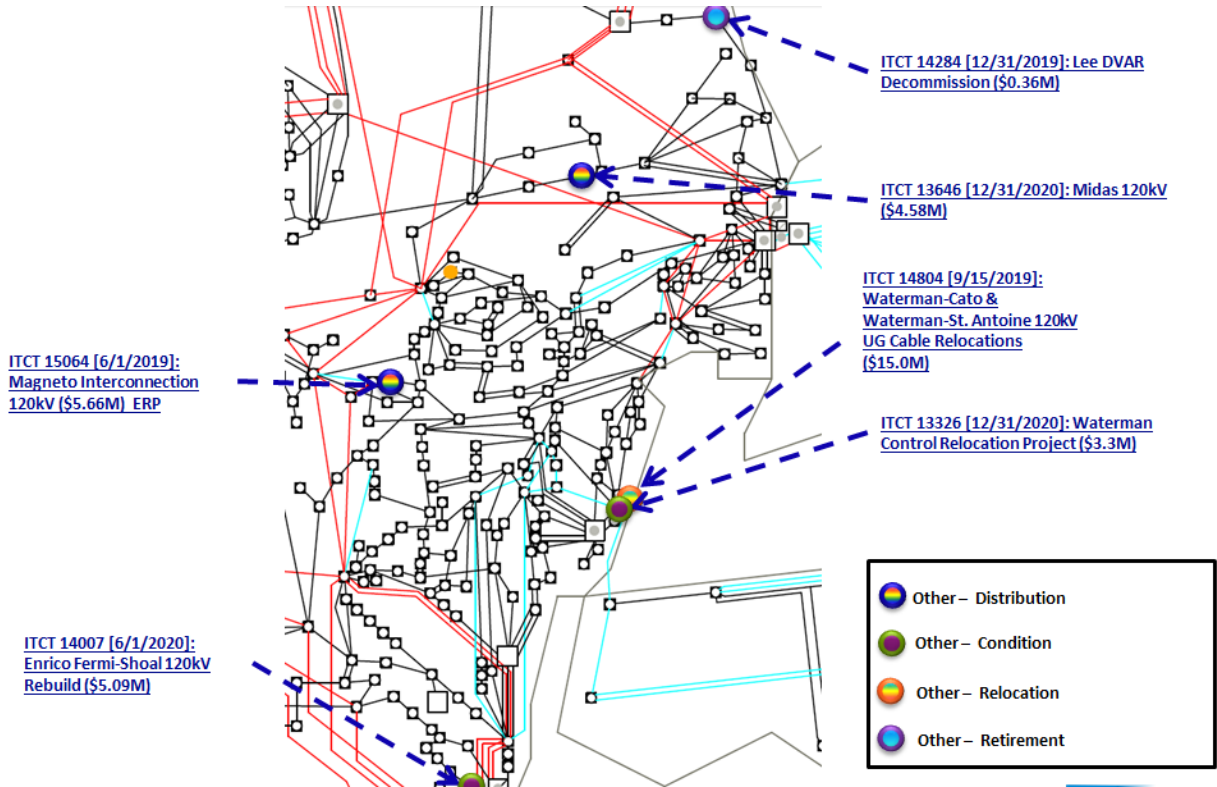


Figure P8: Eight Other Category Projects

Other – Interconnection Project

There are two interconnection projects moving to Appendix A for ITC Transmission Co. (ITCT) in the MTEP18 cycle. This project was evaluated through Expedited Project Review request.

Project 15064: Magneto Interconnection

Transmission Owner: ITC Transmission Co.

Project Description

This projects constructs a new 120 kV three breaker station named Magneto and cut in the ITCT Quaker - Southfield 120 kV circuit. Install fiber for relay communication between Quaker and Magneto and between Magneto and Southfield.

The proposed in-service date is June 1, 2019. The total estimated cost is \$5.66 million.

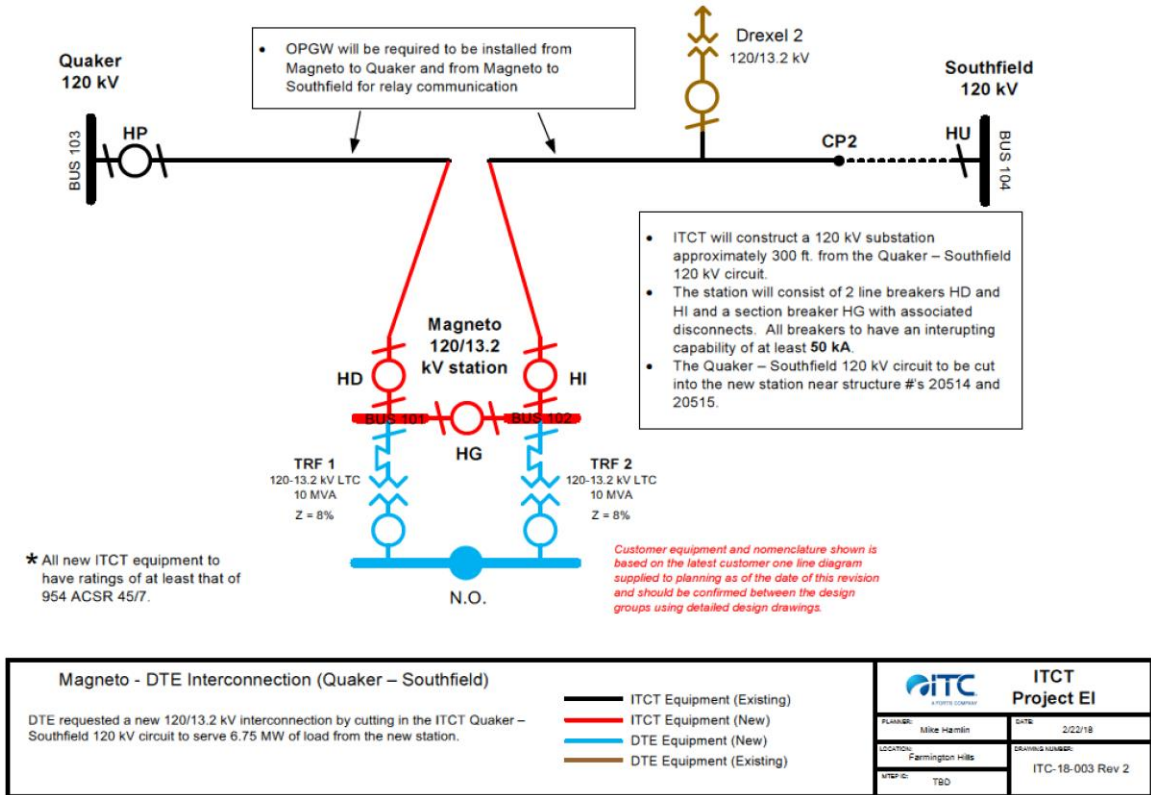


Figure P15064: System Diagram of the Project

Project Need

DTE requested a new Interconnection to serve 6.75 MW of load. Additionally, MISO performed a no-harm test and no thermal or voltage issues were identified as a result of this project.

Alternatives Considered

Not Required

Cost Allocation

This is an Other project type, which is not eligible for regional cost sharing.

Project 13646: Midas 120 kV

Transmission Owner: ITC Transmission Co.

Project Description

ITC will construct a new station with a single section breaker, and two-line breaker. Station will be fed by looping in the Robin - Wabash 120kV line.

The proposed in-service date is December 31, 2020. The total estimated cost is \$4.58 million.

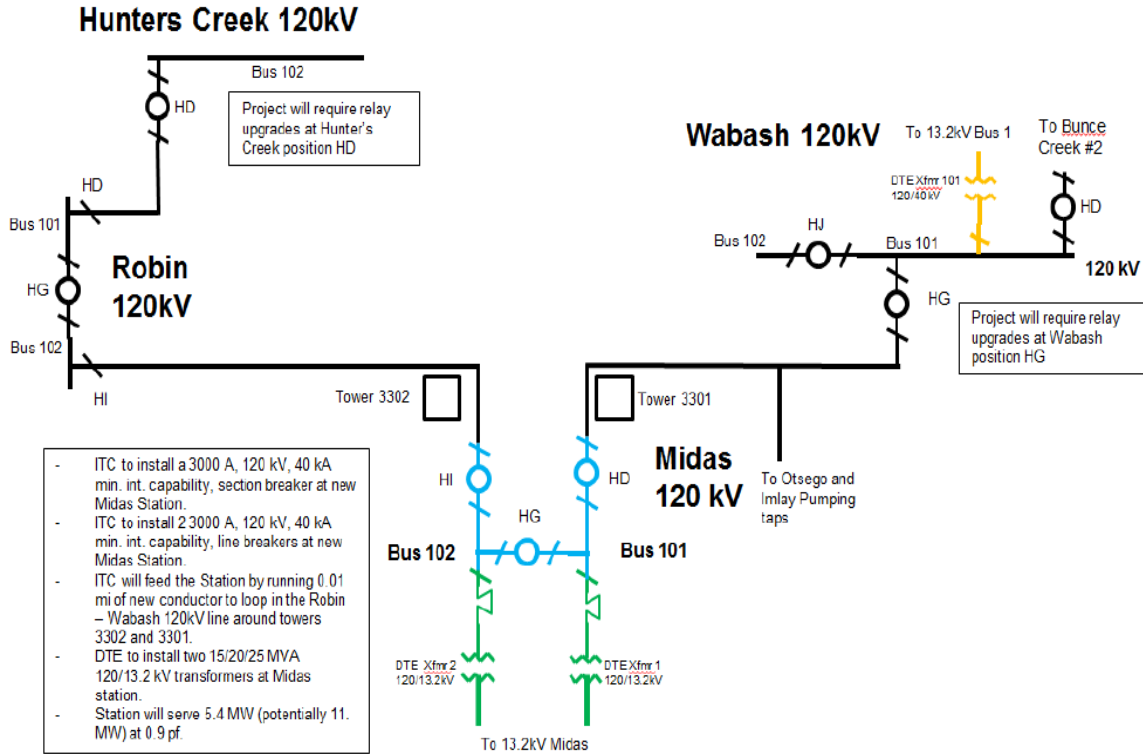


Figure P13646: System Diagram of the Project

Project Need

DTE load interconnection request. The new station will solve potential overloads on the lower voltage system (11.1 MW at 0.9 pf including 5.4 MW transferred from Almont). MISO did not identify any thermal or voltage issues identified as a result of this project.

Alternatives Considered

Not Required.

Cost Allocation

This is an Other project type, which is not eligible for regional cost sharing.

Other – Age and Condition, Load Growth, and Local Needs

Project ID	Project Name	Project Description	In-Service Date	Estimated Cost
13326	ITCT Waterman Control Relocation Project	Replace ITCT relaying and controls at Waterman Substation. Locate the new relaying and controls in a new dedicated ITCT control center. Install dedicated ITCT AC and DC systems.	Dec 2020	\$3.3M
14007	Enrico Fermi-Shoal 120kV Rebuild	Rebuild 1.3 miles wood pole circuit from Enrico Fermi to Toll Road 120kV and 3.7 miles wood pole section of the Toll Road - Shoal 120kV circuit utilizing 120kV single circuit steel poles and 954 ACSR conductor. Also install OPGW on both circuits and replace line entrance at Enrico Fermi.	Jun 2020	\$5.09M
14804	Waterman-Cato & Waterman-St. Antoine 120kV UG Cable Relocations	Relocate ~0.5 mile portions of the Waterman-Cato & Waterman St. Antoine underground 120kV cables to allow for MDOT installation of sewer drains under I-75.	Sept 2019	\$15.0M
14284	Lee DVAR Decommission	Decommission and remove DVAR capacitor and all related equipment at Lee 120 kV position HJ	Dec 2019	\$0.36M
14064	2021 ITCT Asset Replacement Program	Replace aging and outdated equipment on a cycle that will ensure each piece of equipment is replaced near its expected end of life.	Dec 2021	\$49M
14027	ITCT Customer Interconnections - Year 2021	Customer interconnection requests and retirements less than \$1 million with in-service date in year 2021.	Dec 2021	\$2M

Michigan Electric Transmission Co. (METC)

Overview of METC Projects

For the MTEP18 cycle there are 32 projects targeted for Appendix A with a total cost of \$220 million. Of these 32 projects: eight have an estimated cost greater than \$5 million; eleven have an estimated cost between \$1 million and \$5 million; the remaining 14 have an estimated cost lower than \$1 million (Figure P-1). Projects which are categorized as other as further categorized Most of the project goes in-service on 2020 (Figure P-2).

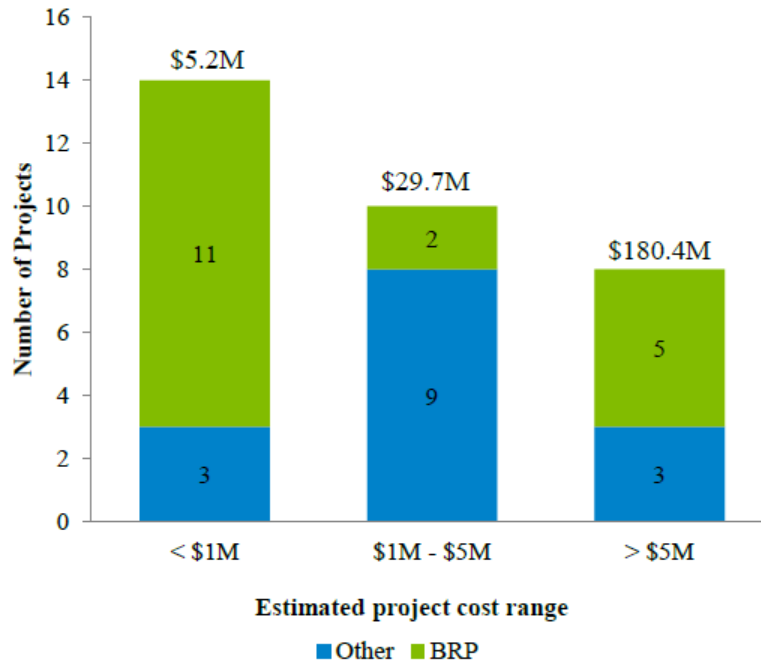


Figure P-1: Graph of Cost Range by Project Type

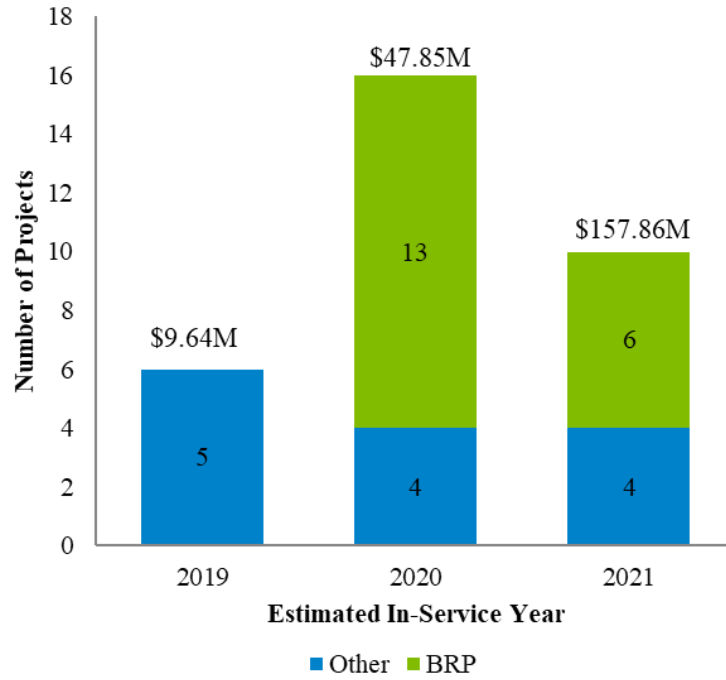


Figure P-2: Graph of Estimated In-Service Date by Project Type

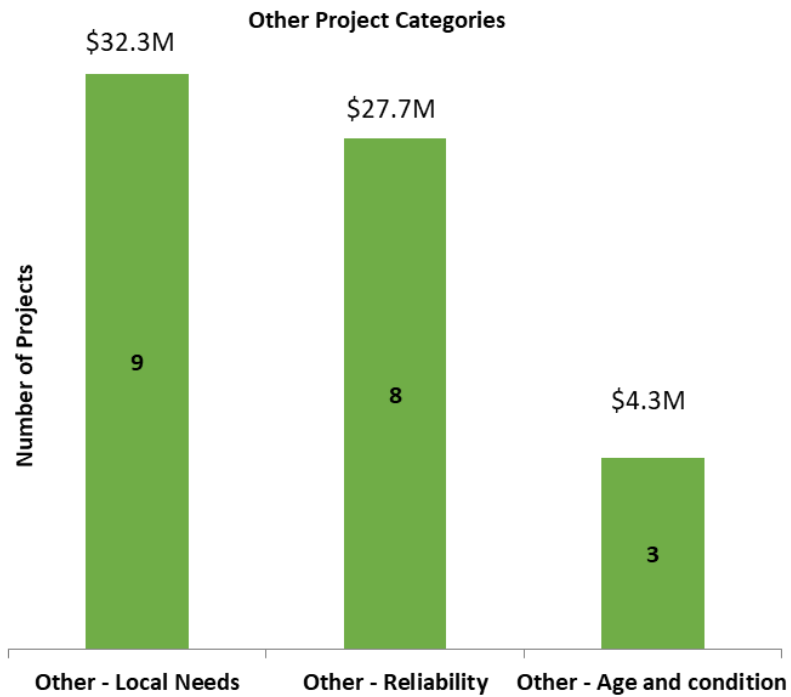


Figure P-3: Other Project Category Types

Baseline Reliability Projects (BRP)

There are 11 projects moving to Appendix A for Michigan Electric Transmission Co. (METC) in the MTEP18 cycle which are categorized as BRP. Of these eleven projects, two have an estimated cost greater than \$5 million; nine have an estimated cost lower than \$1 million.

Project 9864: Whiting - Custer 120 kV Rebuild

Transmission Owner: Michigan Electric Transmission Co.

Project Description

The project will rebuild approximately 4 miles of 345kV line from Campbell to Tyler, as well as install a 345/138 kV transformer at Tyler. The project will also add new line terminating equipment and protection devices at both stations. The estimated total cost is \$22.5 million. The expected in-service date is December 31, 2021.

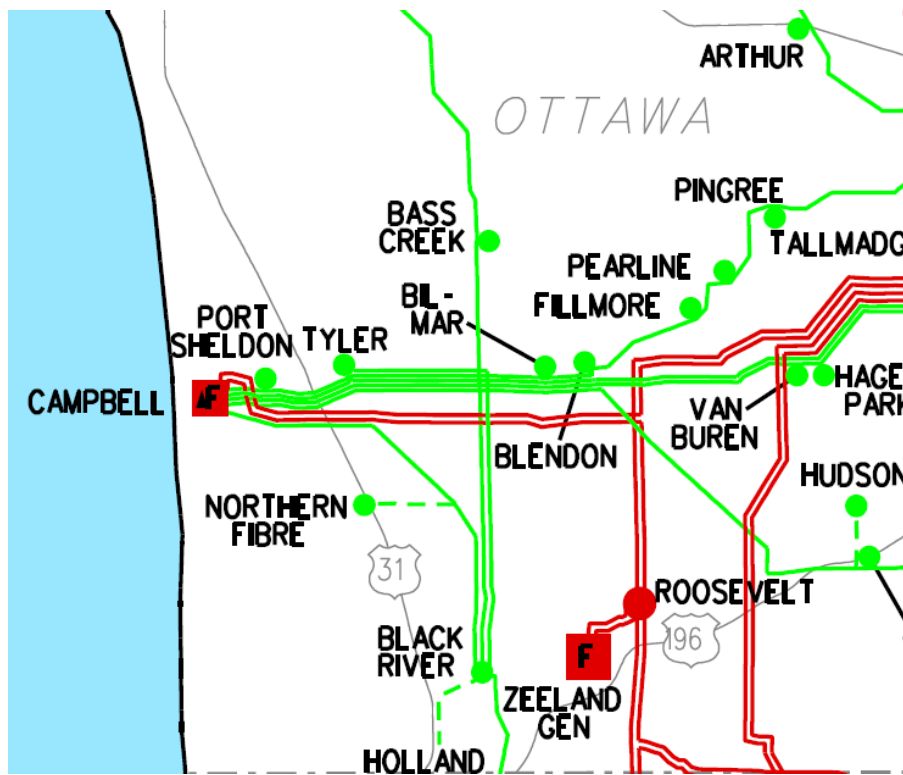


Figure P3921-1: Geographic Map of the Project

Project Need

The Campbell 345/138 kV transformer #5 is projected to be overloaded in multiple sensitivity cases for multiple P6 double event contingencies.

The worst thermal overload of 128.9 percent is seen on Transformer (5) when two 345 kV lines are lost. Issues exist for all 2020, 2023 and 2028 sensitivity cases.

Applicable ratings will be exceeded before the generator run-back scheme activates.

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Limiting Element	Rating (MVA)	Cont Type	Contingency	Year											
				2020	2023	2023	2023	2023	2023						
				MISO18_2020_SUM_AA_AttY	MISO18_2023_70P_W40_0_I_N_LP6_20NS	MISO18_2023_70P_W40_140_0_IN_LP6_515_N_v1	MISO18_2023_85P_W40_0_I_N_LG6_20SN	MISO18_2023_85P_W40_140_0_IN_LG6_515_N_v1	MISO18_2023_85P_W90_0_I_N_LG5_20NS						
256095 18CAMPBELLB 138 - 999999 (5)	668	P6	P12 + P12	843.5	126.3%	852.9	127.7%	853.1	127.7%	843.0	126.2%	842.7	126.2%	842.8	126.2%
256213 18CAMPBELLW 138 - 256517 18TYLER 138 (1)	404	P6	P12 + P12			390.6	96.7%	396.7	98.2%						
256652 18CMPB5_HS 345 - 999999 (5)	668	P6	P12 + P12	855.7	128.1%	861.3	128.9%	860.5	128.8%	858.2	128.5%	857.7	128.4%	857.5	128.4%

Limiting Element	Rating (MVA)	Cont Type	Contingency	Year											
				2020	2023	2023	2023	2023	2028						
				MISO18_2023_85P_W90_140_0_IN_LG5_515_N_v1	MISO18_2023_SH40_AA_AttY	MISO18_2023_SUM_AA_AttY	MISO18_2023_SUM_W15_1200_IN_LG6_51SN_v1	MISO18_2023_WIN_AA_AttY	MISO18_2028_SUM_AA						
256095 18CAMPBELLB 138 - 999999 (5)	668	P6	P12 + P12	842.8	126.2%	843.7	126.3%	843.6	126.3%	843.6				840.4	125.8%
256095 18CAMPBELLB 138 - 999999 (5)	751	P6	P12 + P12									843.6	112.3%		
256652 18CMPB5_HS 345 - 999999 (5)	668	P6	P12 + P12	857.0	128.3%	858.1	128.5%	856.5	128.2%	856.2	128.2%			856.1	128.2%
256652 18CMPB5_HS 345 - 999999 (5)	751	P6	P12 + P12									855.0	113.8%		

Table P3921-1: Project Contingency Drivers

Alternatives Considered

METC performed the cost analysis of other alternatives and this option has the least cost option to resolve the issue.

Cost Allocation

This is a Baseline Reliability project, which is not eligible for regional cost sharing.

Project 3135: Airport – Long Rapids 2 138 kV line

Transmission Owner: Michigan Electric Transmission Co.

Project Description

This project constructs a second 138 kV line from WPSC's new Airport station to METC's proposed Long Rapids station. This plan also rebuilds the Airport – Long Rapids 138 kV line. The rating of all new 138 kV equipment will be no less than the summer emergency rating of 477 ACSR conductor (260/1088 Amps). The estimated cost is \$17.5 million. The expected in-service date is December 31, 2021.

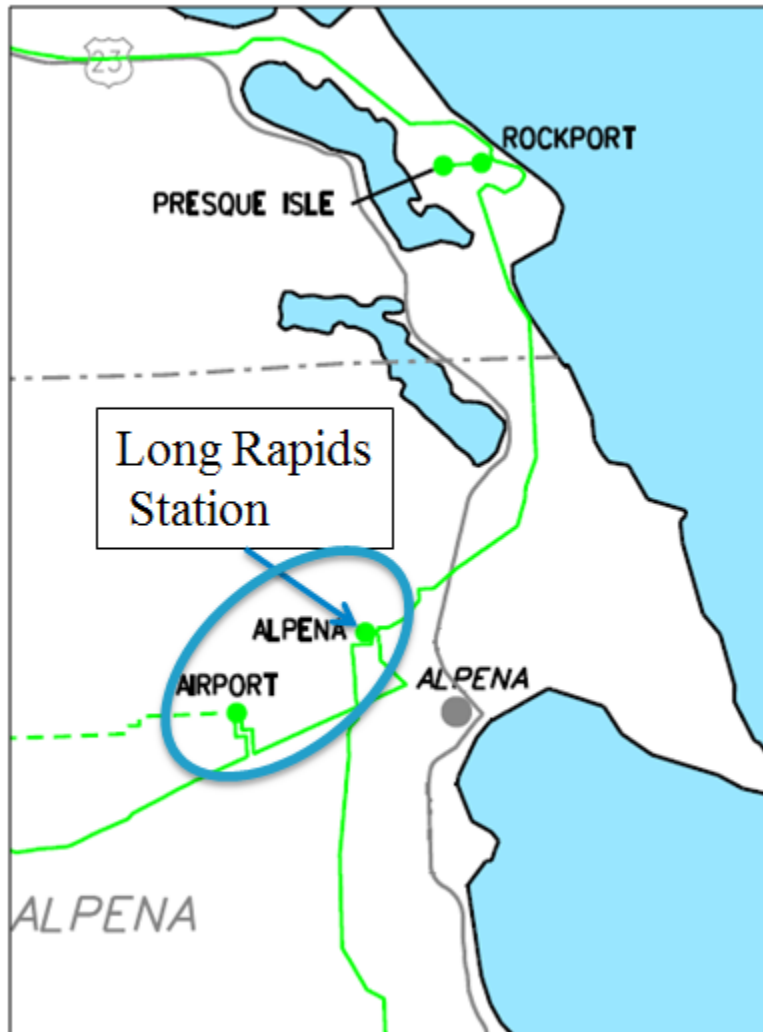


Figure P3135-1: Geographic Map of the Project

Project Need

Low voltage is projected to occur in the northeastern region of the lower peninsula of Michigan for shutdown plus contingency scenarios involving the Airport – Alpena 138 kV line and another transmission facility along a ~200 mile-long 138 kV path from Karn to Riggsville.

The Alpena to Airport West line is projected to be overloaded at 100.5 percent in 5-year-out winter case. Also, there are multiple voltage violations at the northeastern region of Lower Peninsula for shutdown plus contingency scenarios for 2020, 2023, and 2028 cases.

Limiting Element	Rating (MVA)	Cont Type	Contingency	Flow (Mw)	Loading
256042 18ALPENA 138 - 263650 18AIRPORTW 138 (1)	125	P6	P12 + P12	113.1	90.5%
256042 18ALPENA 138 - 263650 18AIRPORTW 138 (1)	125	P6	P12 + P12	125.6	100.5%
256042 18ALPENA 138 - 263650 18AIRPORTW 138 (1)	125	P6	P12 + P12	124.5	99.6%

Bus	Contingency	Year												
		2020	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2028	
256601 18ALPENA1	P12 + P12										0.9047	0.9043		0.9108
256601 18ALPENA1	P12 + P12		0.9023	0.9006	0.5676	0.5647	0.5681	0.5647	0.6071	0.5254	0.5141	0.839	0.5271	
256602 18ALPENA2	P12 + P12	0.8985			0.8924	0.8858	0.8947	0.8873	0.9075	0.8978	0.8908	0.9085	0.904	
256602 18ALPENA2	P12 + P12								0.8831			0.9032		
256602 18ALPENA2	P12 + P12									0.9047	0.9043		0.9108	
256602 18ALPENA2	P12 + P12		0.9023	0.9006	0.5676	0.5647	0.5681	0.5647	0.6071	0.5254	0.5141	0.839	0.5271	
257500 18ALPNA4	P12 + P12	0.8968			0.8906	0.8841	0.8929	0.8855	0.9058	0.896	0.889	0.9068	0.9023	
257500 18ALPNA4	P12 + P12								0.8814			0.9015		
257500 18ALPNA4	P12 + P12					0.9198		0.9197		0.903	0.9025		0.9091	
257500 18ALPNA4	P12 + P12		0.9009	0.8992	0.565	0.5621	0.5655	0.5621	0.6046	0.5228	0.5115	0.8372	0.5245	
257501 18ALPNA5	P12 + P12	0.8923			0.886	0.8794	0.8883	0.8808	0.9013	0.8915	0.8844	0.9023	0.8977	
257501 18ALPNA5	P12 + P12								0.8767			0.897		
257501 18ALPNA5	P12 + P12				0.9157	0.9153	0.9157	0.9152		0.8985	0.898		0.9046	
257501 18ALPNA5	P12 + P12		0.8971	0.8954	0.5583	0.5554	0.5588	0.5553	0.5982	0.5161	0.5048	0.8322	0.5179	
259343 HUBBRD LK	P12 + P12								0.9161					
259343 HUBBRD LK	P12 + P12				0.6862	0.684	0.6866	0.6839	0.7173	0.648	0.6374	0.8976	0.6492	
259415 IOSCO 1	P12 + P12				0.7869	0.7852	0.7872	0.7852	0.8102	0.7528	0.7429		0.7535	

Table P3135-1: Project Contingency Drivers

Alternatives Considered

No alternatives found to alleviate all of the voltage and thermal issues. Generation re-dispatch was not sufficient.

Cost Allocation

This is a Baseline Reliability project, which is not eligible for regional cost sharing.

Project 13878: MCV - Tittabawassee 2 345 kV Sag Remediation

Transmission Owner: Michigan Electric Transmission Co.

Project Description

Remediate the sag limit on the entire ~2.4 mile-long length of 2156 ACSR conductor of the MCV – Tittabawassee 2 345 kV line and replace station equipment at both ends to achieve summer emergency rating of 1687 MVA.

The estimated cost is \$900,000. The expected in-service date is June 1, 2020.

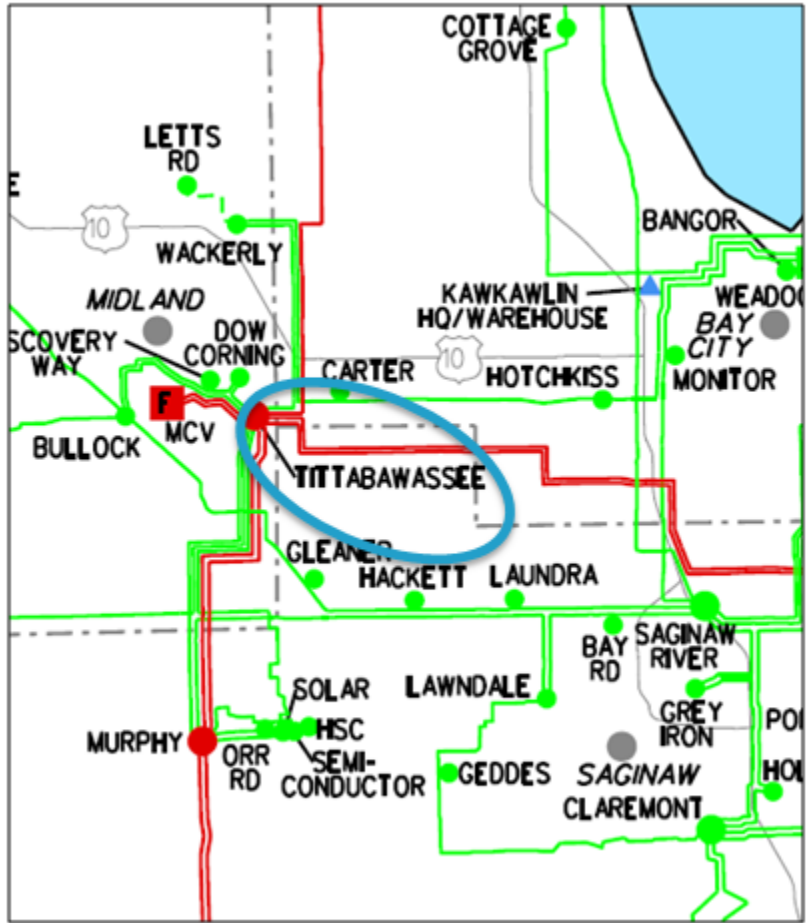


Figure P13878-1: Geographic Map of the Project

Project Need

The Gaines 345/138 kV Transformers 1 and 2 are projected to become overloaded for P13 event in peak cases. There are a total of 89 different contingency events that load the line more than 99 percent on all sensitivity cases. The line loads 99.3 percent for the loss of a line (P1 event). Based on the analysis this project is needed to resolve the thermal issues.

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Limiting Element	Rating (MVA)	Cont Type	MISO18_2020_SU M_AA_AttY		MISO18_2023_70P _W40_O_IN_LP6_2 ONS		MISO18_2023_70P W40_1400_IN_LP6_5 1SN_v1		MISO18_2023_85P_ W40_O_IN_LG6_20S N	
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P1	1481.1	99.1%	1484.0	99.3%	1483.5	99.3%	1483.2	99.3%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1484.0	99.3%	1483.5	99.3%	1483.2	99.3%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1484.0	99.3%	1483.5	99.3%	1483.2	99.3%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%						
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%					1481.1	99.1%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1484.0	99.3%	1483.5	99.3%	1483.2	99.3%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1484.0	99.3%	1483.6	99.3%	1481.1	99.1%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%						
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1484.0	99.3%	1483.5	99.3%	1483.2	99.3%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1484.0	99.3%	1483.4	99.3%	1483.2	99.3%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1483.9	99.3%	1483.4	99.3%	1483.2	99.3%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1484.0	99.3%	1483.5	99.3%	1483.2	99.3%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1484.0	99.3%	1483.5	99.3%	1483.2	99.3%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1484.0	99.3%	1483.5	99.3%	1483.2	99.3%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1483.9	99.3%	1483.4	99.3%	1481.1	99.1%
256016 18MCV 345 - 256027 18TITBAW 345 (2)	1494	P3	1481.1	99.1%	1483.9	99.3%	1483.4	99.3%	1481.1	99.1%

Table P13878-1: Project Contingency Drivers

Alternatives Considered

N/A

Cost Allocation

This is a Baseline Reliability project, which is not eligible for regional cost sharing.

Baseline Reliability – Low cost Sag Remediation projects below \$1M

ID	Project Name	Description	Expected ISD	Cost \$
14344	Airport - Hillman Tap 138 kV Sag	Remediate the sag limit on ~17.0 miles of 266 ACSR conductor of the ~21.3 mile-long Airport - Hillman Tap 138 kV section of the Airport - Mio 138 kV line to summer emergency rating of 133 MVA	12/31/2021	\$400,000
13871	Alpena - Rockport 138 kV Sag Remediation	Remediate the sag limit on the Alpena - Rockport 138 kV line to a minimum of 145 MVA/607 Amps.	12/31/2021	\$ 250,000
13870	Bauer - Hampton 1 345 kV Sag Remediation	Remediate the sag limit on the Bauer - Hampton 1 345 kV line to a minimum of 1179 MVA/1973 Amps.	12/31/2020	\$ 365,000

Baseline Reliability – Terminal and Substation Equipment Upgrade Projects

There are two terminal equipment upgrade and three substation equipment upgrade BRP projects targeted as Appendix A in MTEP18.

Project ID	Project Name	Project Description	In-Service Date	Estimated Cost
13687	Morrow 138kV – Station Equipment Upgrade	The proposed solution is to upgrade the station equipment at Morrow position "500" to meet or exceed 338 MVA/1413 Amps (summer emergency).	6/1/2020	\$31,000
13997	Argenta 138kV – Terminal Equipment Upgrade	Upgrade relaying at Argenta 138kV to meet or exceed summer emergency rating of 602 MVA/2520 Amps.	6/1/2020	\$ 126,000
14041	Keystone 138 kV Station Equipment Upgrades	Upgrade station equipment on the low-side of the Keystone 345/138 kV Transformer #1 to achieve the transformer's summer emergency rating of 441 MVA/1843 Amps.	12/31/2020	\$12,000
14042	Goss 138 kV Station Equipment Upgrades	Upgrade station equipment at Positions 11W8 and 13W8 at Goss to increase the open breaker summer emergency rating to 585 MVA/2447 Amps and account for open breaker scenarios at each position.	12/31/2020	\$475,000
14464	Battle Creek 138kV - Terminal Equipment Upgrade	Upgrade relaying at Battle Creek Positions 9MB and 9M9 to meet or exceed 574 MVA/2400 Amps.	6/1/2020	\$32,000

Transmission Delivery Service Planning Projects

There are no projects moving to Appendix A in this MTEP cycle for Michigan Electric Transmission Co. (METC) with network upgrades for transmission service, directly assigned to customer per Energy Markets Tariff (EMT).

Other Projects

Projects that are not defined as Baseline Reliability, Generation Interconnection or Transmission Delivery Service Planning projects per Attachment FF, but are still needed for system reliability for various reasons, are categorized as Other projects.

There are nineteen Other projects moving to Appendix A in this MTEP cycle for Michigan Electric Transmission Co. (METC).

Other - Control relocation projects and Other retirement project targeted as Appendix A in MTEP18

There are five control relation projects and one Other retirement project targeted as Appendix A in MTEP18.

Project ID	Project Name	Project Description	Preliminary System Need	In-Service Date	Estimated Cost
13324	METC Claremont Control Relocation Project	Replace METC relaying and controls at the Substation. Locate the new relaying and controls in a new dedicated METC control center. Install dedicated METC AC and DC systems.	The many small control buildings have maintenance, safety, and human performance concerns due to the buildings' age and space constraints. Most of METC's relaying and controls require high operations and maintenance expenses due to their age. The protection panels being dispersed into many small control buildings create human performance issues with small workspace and difficult lighting. Additionally, lack of available panel space creates difficulty replacing relaying without extended shutdowns.	12/31/2019	\$3,300,000
13325	METC Dort Control Relocation Project			12/31/2019	\$3,300,000
13327	METC Beecher Control Relocation Project			12/31/2020	\$ 3,300,000
13329	METC Wealthy Control Relocation Project			12/31/2021	\$3,300,000
14244	Orr Road Capacitor Decommission			Decommission and remove 75 MVAR capacitor with adjacent breaker and switch at Orr Road 138 kV station.	The 75 MVAR capacitor at Orr Rd was determined to no longer be useful at its current location.

Other – Reconfiguration projects

Project ID	Project Name	Project Description	Preliminary System Need	In-Service Date	Estimated Cost
14031	Ransom Ring Bus	The proposed solution is to install two 138 kV breakers and create a ring bus at Ransom station. This will increase reliability and operability of the Ransom 138 kV station and surrounding area.	Ransom station is presently designed as a single bus, single breaker station. Ransom breaker and motor-operated switch maintenance causes interruption of the transmission network and reduces reliability to distribution customers. A ring bus will improve reliability, allowing for maintenance without interruption of the transmission network.	12/31/2020	\$2,500,000
14107	Weeds Lake Wave Traps for Hiple	NIPSCO is construction a new station to be called Hiple, which will connect to METC's Weeds lake station. METC needs to install wave traps at Weeds Lake on the Weeds Lake to Robinson Park (future Hiple) 345kV line and modify relaying.	Existing relaying will need to be modified to accommodate the change.	12/31/2019	\$150,000

Other – Interconnection Project

Project 13949: MCV - Long Rapids Station

Transmission Owner: Michigan Electric Transmission Co.

Project Description

This project builds a new breaker and half scheme station in a less flood prone location and moves all METC Alpena lines into the new station. The project also builds three tie lines between the new station and Alpena's station and utilizes existing line sections where possible. The plan is to remove all METC equipment at the existing Alpena station. Estimated cost of this project is \$13.6 million and this project is expected to be in service on 06/01/2020.

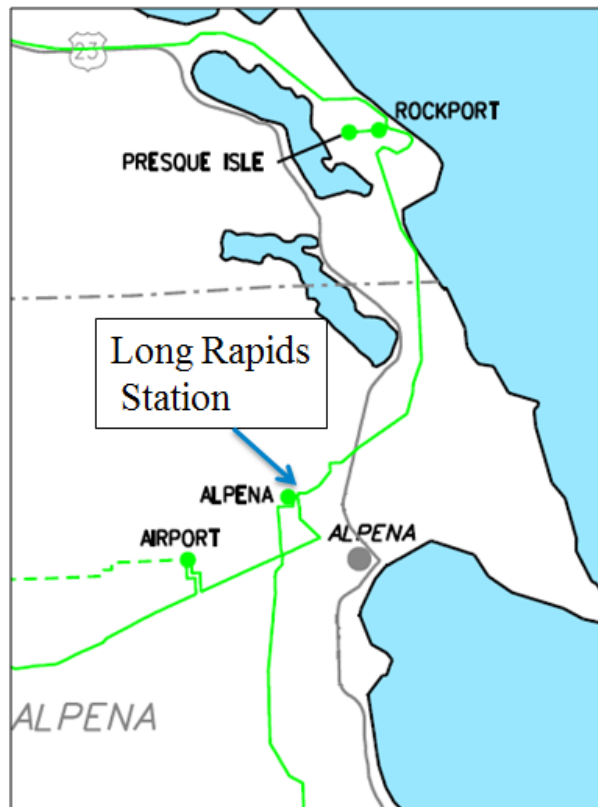


Figure P13949-1: Geographic Map of the Project



Figure P13949-2: Google Earth View of the Project

Project Need

Existing system doesn't allow required maintenance and repairs to occur without the risk of a full station outage. The station is in a flood zone and is susceptible to a full outage under NERC P2 and P4 contingency conditions.

Project 13948: Stronach Breaker and a Half Station Rebuild

Transmission Owner: Michigan Electric Transmission Co.

Project Description

This project rebuilds Stronach 138KV station, creating a three row breaker and a half station and connects a new Stronach-Boxboard (CE) 138kV circuit. This project also re-terminates the Pere Marquette, Tippy and Filer City lines into the new station. Also, it reconnects the CE Transformer 1 to the new station. Estimated cost of this project is \$12.6 million and this project is expected to be in service on 06/01/2020.

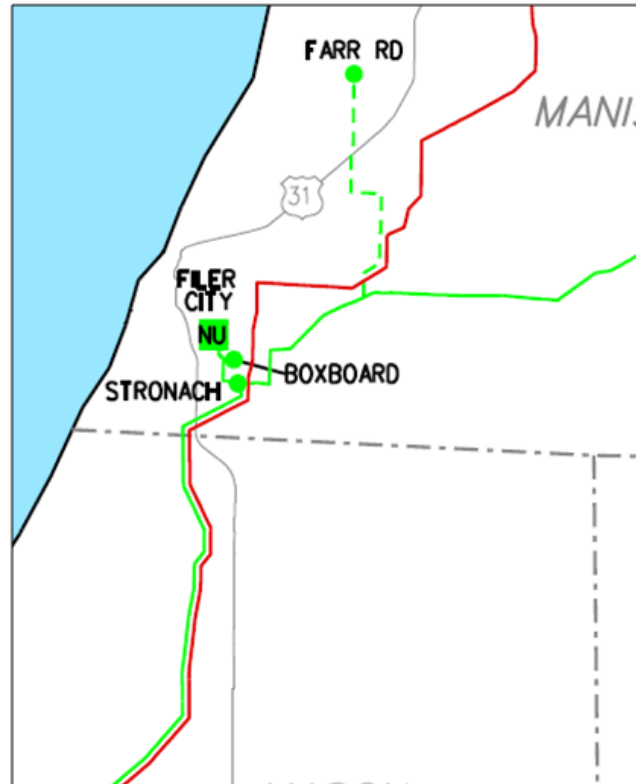


Figure P13948-1: Geographic Map of the Project

Project Need

There is a radial 138kV circuit that connects both the Filer City generation and Boxboard industrial load to Stronach. Scheduling an outage to one or the other of them to perform maintenance on METC equipment is difficult. Finding a window where they both can be shut down is near impossible. This has created a situation where METC equipment at Stronach or on the line itself cannot be taken out for maintenance. A second line to feed the load/generation will resolve this issue and allow future maintenance to move forward. It also eliminates the current situation where a single transmission outage interrupts both customers.

Project 13953: Donaldson Creek WPSC Connection

Project ID	Project Name	Project Description	Preliminary System Need	In-Service Date	Estimated Cost
13953	Donaldson Creek WPSC Connections	Expand METC's Donaldson Creek 138kV station to connect two WPSC 138kV circuits (to Rodgers and Plains Jct.).	WPSC MTEP17 Appendix A project 12203, 138kV Voltage Conversion, requires two new connections to Donaldson Creek. METC will need to add a third 138kV row to its Donaldson Creek station to terminate these two new circuits.	12/31/2020	\$2,000,000

Other – Interconnection Projects less than \$1 million

Project ID	Project Name	Project Description	Preliminary System Need	In-Service Date	Estimated Cost
14065	2021 METC Assets Replacement Program	Replace aging and outdated equipment on a cycle that will ensure each piece of equipment is replaced near its expected end of life.	Equipment that is past its expected design life, utilizes outdated functionality or whose failure rates and maintenance requirements have increased the potential for miss operations and higher maintenance costs associated with their ongoing use. Modern equipment can improve reliability, use state of the art technology, and typically will allow for longer maintenance intervals. New equipment is also commonly equipped with better monitoring and alarming functionality giving improved remote supervision. All of this will help to reduce overall maintenance costs.	12/31/2021	\$ 43,500,000
14072	METC Customer Interconnections -Year 2021	Customer interconnection requests and retirements less than \$1 million with in-service dates in the year 2021.	Customer Requests are often in need of interconnection on an expedited basis. This blanket allows interconnection requests of a smaller nature to be quickly studied and connected by METC.	12/31/2021	\$ 2,500,000

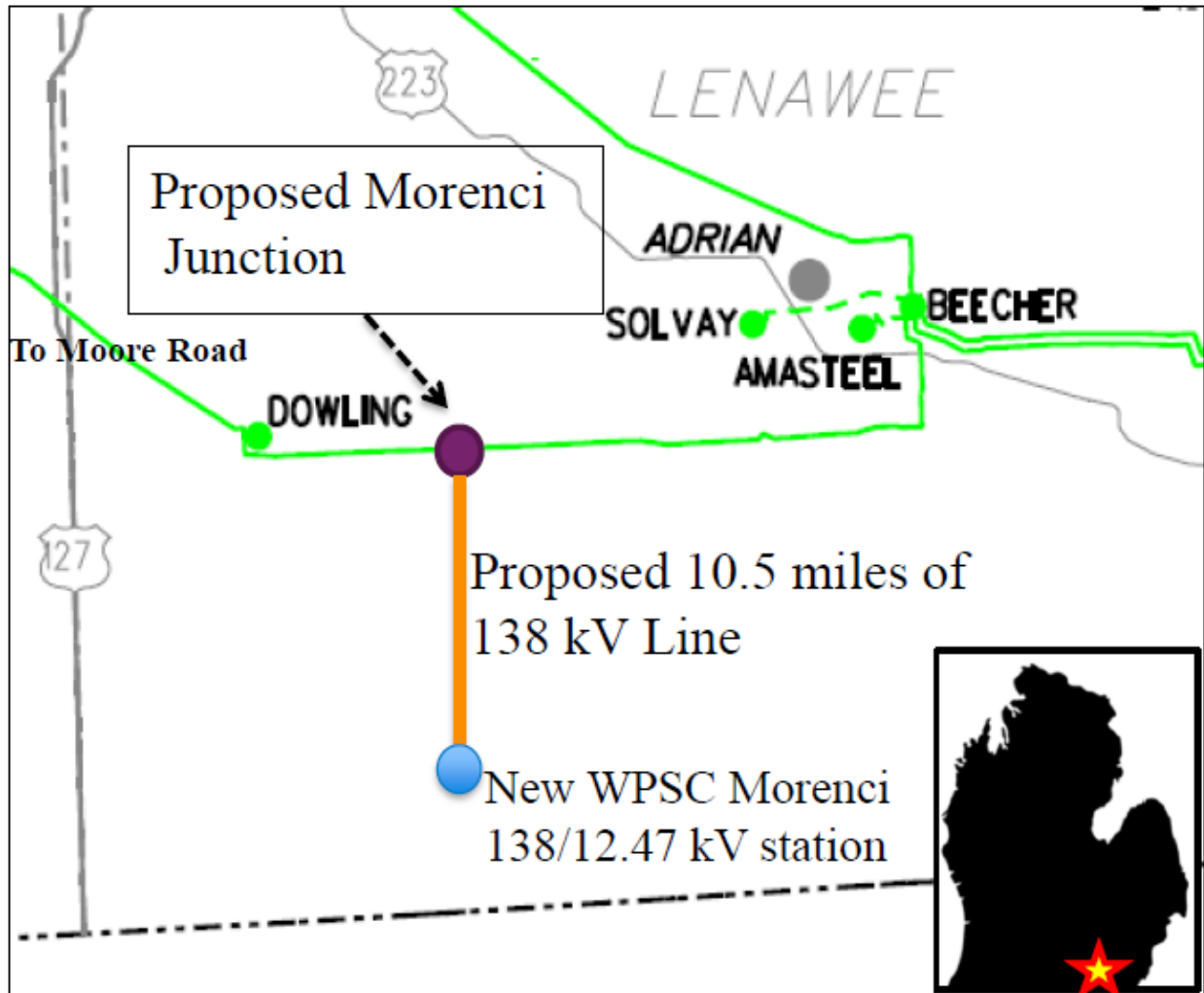
Expedited Review Project

Project 15464: Morenci Interconnection Request

Transmission Owner: Michigan Electric Transmission Co.

Project Description

This project taps the Moore Road- Beecher 138kV circuit and build approximately 12 miles of new 138kV transmission circuit from the tap to a new substation, tentatively named Morenci. The estimated cost of this project is \$20.7 Million and the project is expected to go in-service by November 01, 2020.



System Need

WPSC has requested new Interconnection to serve 1 MW of new load and 9 MW of relocated load from the MEC 46kV Seneca Substation.

The customer (MEC) is experiencing load growth around the area of Morenci from existing and new customers. The existing MEC's Seneca 46/12.47 kV distribution, as well as the upstream high voltage distribution system is unable to meet the demand from the existing system.

Consumers Energy (CETO)

Overview of CETO Projects

For the MTEP18 cycle there were eight CETO projects targeted for Appendix A with a total cost of \$5.63 million. Of these eight projects: two have an estimated cost between \$1 million and \$5 million; and six have an estimated cost lower than \$1 million.

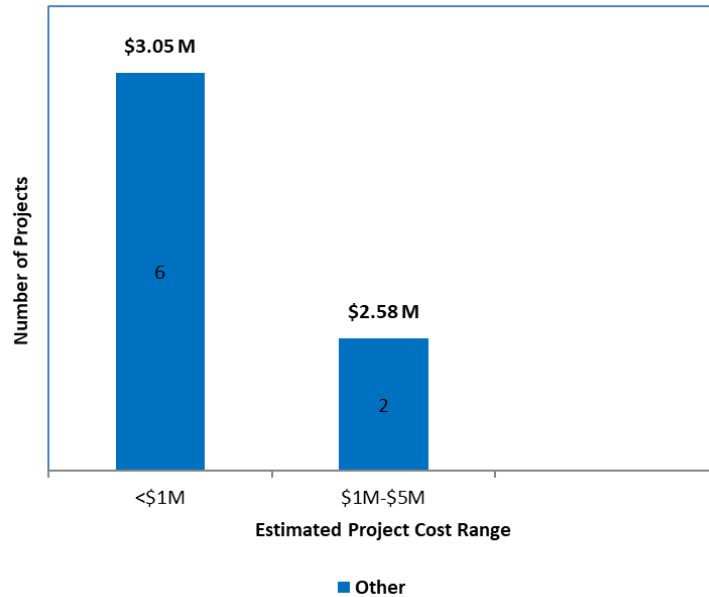


Figure P-1: Cost Range by Project Type

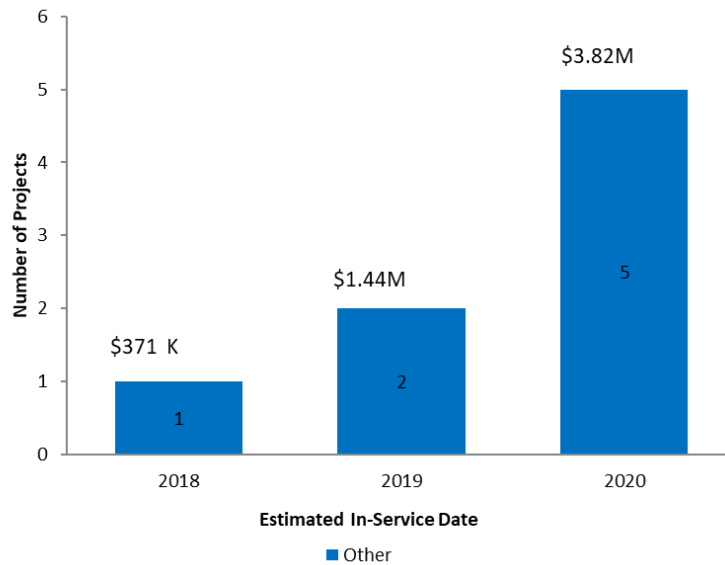


Figure P-2: Estimated In-Service Date by Project Type

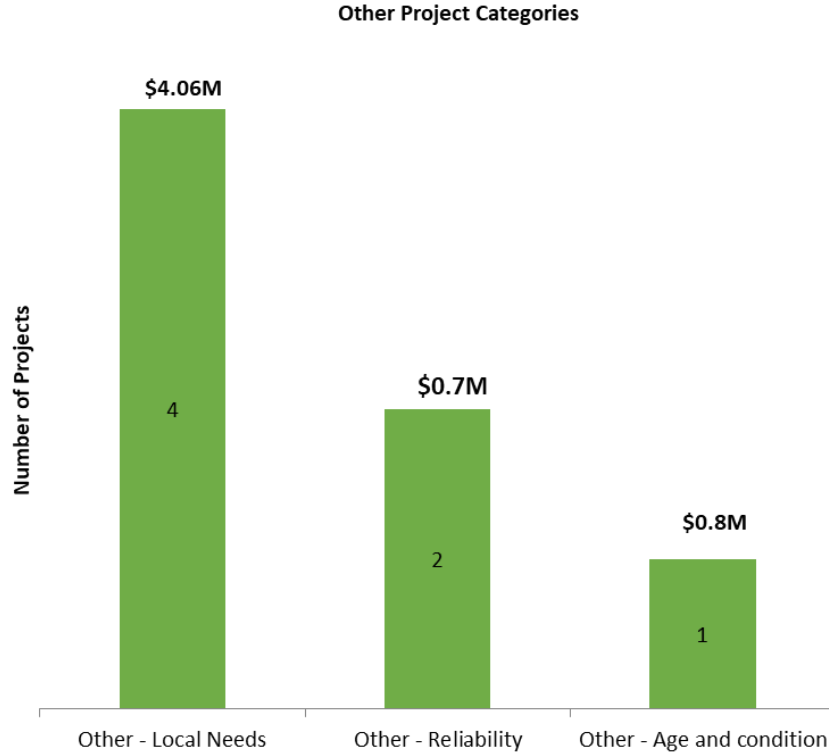


Figure P-3: Cost of Different Other Project Categories

Baseline Reliability Projects

There are no Baseline Reliability Projects moving to Appendix A for Consumers Energy in the MTEP18 cycle.

Generation Interconnection Projects

There are no Generation Interconnection projects moving to Appendix A for Consumers Energy in the MTEP18 cycle.

Transmission Delivery Service Planning Projects

There are no projects moving to Appendix A in this MTEP cycle for Consumers Energy with network upgrades for transmission service, directly assigned to customer per Energy Markets Tariff (EMT).

Other Projects

Projects that are not defined as Baseline Reliability, Generation Interconnection or Transmission Delivery Service Planning projects per Attachment FF, but are still needed for system reliability for various reasons are categorized as Other projects. There are eight Other projects moving to Appendix A in this MTEP cycle for Consumers Energy.

Project: 14864 Polkton Spur 138 kV New Line

Transmission Owner: Consumers Energy

Project Description

The project will construct a new 138 kV line from the Cobb-Tallmadge #1 138 kV Line to the new Polkton Substation. The Estimated cost is \$3,870,000. The expected in-service date is December 31 2021.

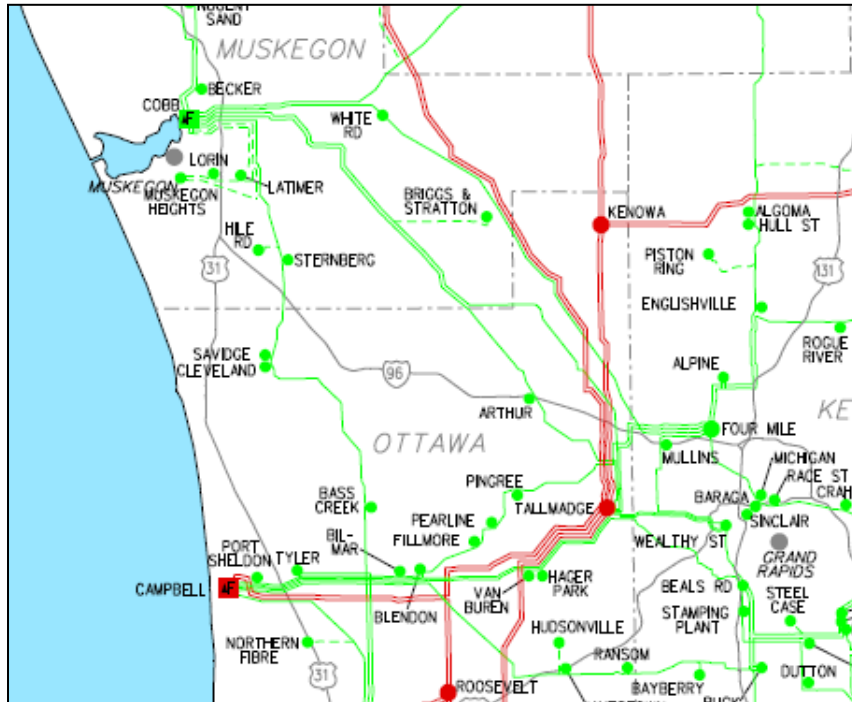


Figure P14864-1: Geographic Map of Project

Project Need

The Consumers Energy has identified a need to reinforce the area 46 kV system. A new 138/46 kV substation, called Polkton, along with a new 138 kV line to the substation is the identified solution. MISO identified Low voltage on multiple buses. Also, Consumers' distribution team identified a low voltage concerns for bus outage.

Alternatives Considered

N/A

Cost Allocation

This is an Other project type, which is not eligible for regional cost sharing.

Other – Condition based projects

Project ID	Project Name	Project Description	Preliminary System Need	In-Service Date	Estimated Cost
13967	Muskegon Heights #2 Line Rebuild	Rebuild a portion of the Muskegon Heights #2 138 kV Line, approximately 2 miles, utilizing 138 kV single circuit construction	This portion of the line is constructed with KK71 towers that date to the early 1910's. Experience with this style and vintage of tower has shown significant ground level rusting which will lead to tower failure and line outages.	12/31/2019	\$800,000
14164	Boardman Line Upgrade	Add optical fiber to the Boardman #1 and Boardman #2 138 kV Lines to coordinate with WPSC's Grand Traverse Station Upgrade project	Project Need defined by WPSC in MTEP#12199. Coordination by Consumers Energy is required to maintain system protection.	6/1/2020	\$200,000

Other – Condition based projects

Project ID	Project Name	Project Description	Preliminary System Need	In-Service Date	Estimated Cost
13965	CE Substation Equipment Replacement Program - 2020	Replace damaged or defective substation equipment, not including breakers, with new equipment	Replace substation equipment that is defective, damaged, or fails testing parameters to improve system reliability and address safety concerns	12/31/2020	\$1,410,000
13963	CE Breaker Replacement Program - 2020	Replace damaged or defective circuit breakers with new circuit breakers	Replace breakers that are defective, damaged, or fail testing parameters to improve system reliability and address safety concerns	12/31/2020	\$1,170,000
13966	CE Pole & Line Equipment Replacement Program - 2020	Replace damaged or defective poles, towers, cross arms, insulators, guying, and switches, as needed, to maintain the lines' condition	Replace structures and line equipment that are defective or damaged to maintain line performance, reduce outages, address code clearance, and/or address safety concerns	12/31/2020	\$840,000
13962	CE Relay Replacement Program - 2019	Replace protective relays as needed to coordinate with adjacent Transmission Owners	Protective system changes by adjacent Transmission Owners often requires relay replacement by Consumers Energy in order to maintain transmission system protection and coordination.	12/31/2019	\$640,000

Other – Condition based projects

Project ID	Project Name	Project Description	Preliminary System Need	In-Service Date	Estimated Cost
14725	Summerton Station Upgrade (J589)	Replace existing relaying at Summerton Substation on the Luce (J589) line exit with dual pilot schemes	Need identified in studies, GIA, and FCA for generator interconnection J589	12/10/2018	\$371,500

Michigan Public Power Agency (MPPA)

There are two projects moving to Appendix A with a total cost of \$2.95 million for Michigan Public Power Agency (MPPA) in the MTEP18 cycle,

Baseline Reliability Projects

There are no Baseline Reliability projects moving to Appendix A in this MTEP cycle for MPPA.

Generation Interconnection Projects

There are no Generation Interconnection projects moving to Appendix A in this MTEP cycle for MPPA.

Transmission Delivery Service Planning Projects

There are no projects moving to Appendix A in this MTEP cycle for MPPA with network upgrades for transmission service, directly assigned to customer per Energy Markets Tariff (EMT).

Other Projects

Projects that are not defined as Baseline Reliability, Generation Interconnection or Transmission Delivery Service Planning projects per Attachment FF, but are still needed for system reliability for various reasons, are categorized as Other projects.

There are two Other projects moving to Appendix A in this MTEP cycle for MPPA.

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Project ID	Project Name	Project Description	Preliminary System Need	In-Service Date	Estimated Cost
14124	Riley 138/69 kV Transformer Addition	This project will provide additional 138/69 kV transformer capacity at the Riley station, with the addition of a second Riley 138/69 kV transformer and associated switching equipment.	The Zeeland Board of Public Works service area lacks sufficient import capacity during heavy load conditions with the existing 138/69 kV transformer at the Riley station out of service. Transformer will serve as a back-up unit relocated to the Fairview station at such times as Wolverine Power Supply Cooperative (WPSC) converts their Fairview station to 138 kV.	12/31/2018	\$2,450,000
14188	Relocation of Riley 138/69 kV Transformer to Fairview	This project will provide additional Zeeland Import capacity for the forced or maintenance outage of the Blendon to Riley 138kV line and/or Riley 138/69kV transformer, by relocation of the second Riley 138/69kV transformer (project 14124) and associated switching to the Zeeland Fairview station.	The Zeeland Board of Public Works service area lack sufficient import capacity during heavy load conditions with the existing 138kV line from Blendon to Riley out of service and only the existing 69kV interconnection at the Fairview station with the Wolverine Power Supply Cooperative (WPSC) in service. In 2022 WPSC plans to convert the existing 69kV interconnection at the Fairview Station to 138kV. Without this transformer relocation project, Zeeland would be supplied by the single 138kV line from Blendon to Riley. Such a circumstance would leave Zeeland with no import capability for he forced or maintenance outage of the supply from Blendon.	12/31/2022	\$550,000

Wolverine Power Supply Cooperative Inc. (WPSC)

There are 23 projects moving to Appendix A with a total cost of \$166 million for Wolverine Power Supply Cooperative (WPSC) in the MTEP18 cycle, of these 13 projects: 11 have an estimated cost greater than \$5 million, five have an estimated cost between \$1 million and \$5 million, and seven have an estimated cost lower than \$1 million.

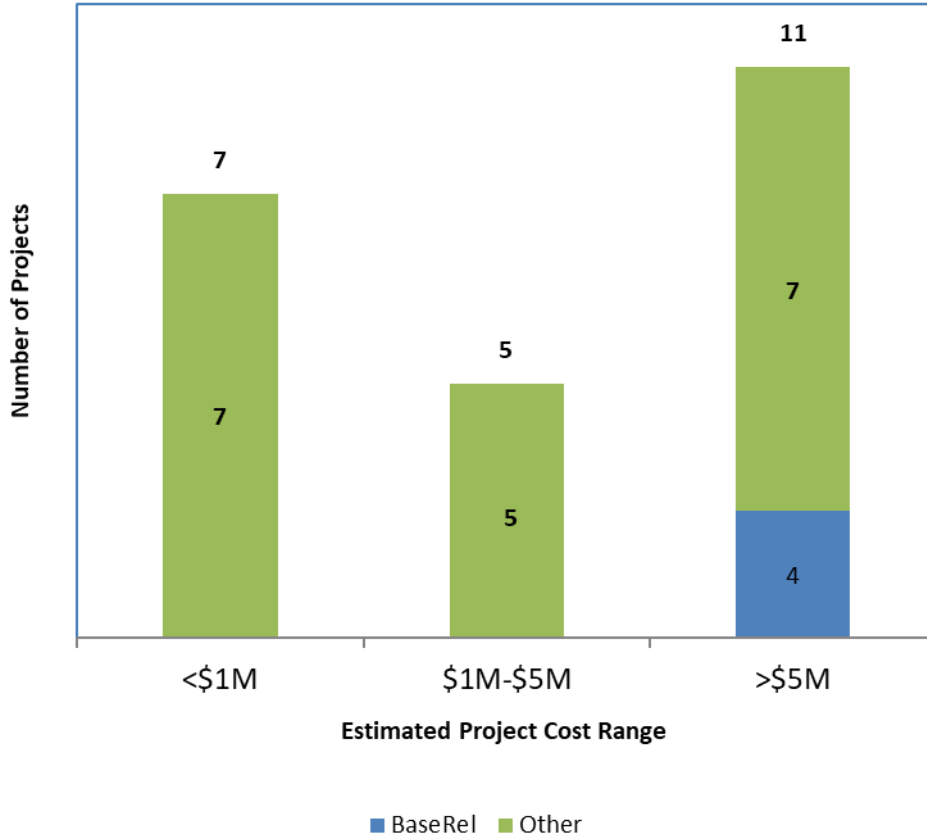


Figure P-1: Cost Range by Project Type

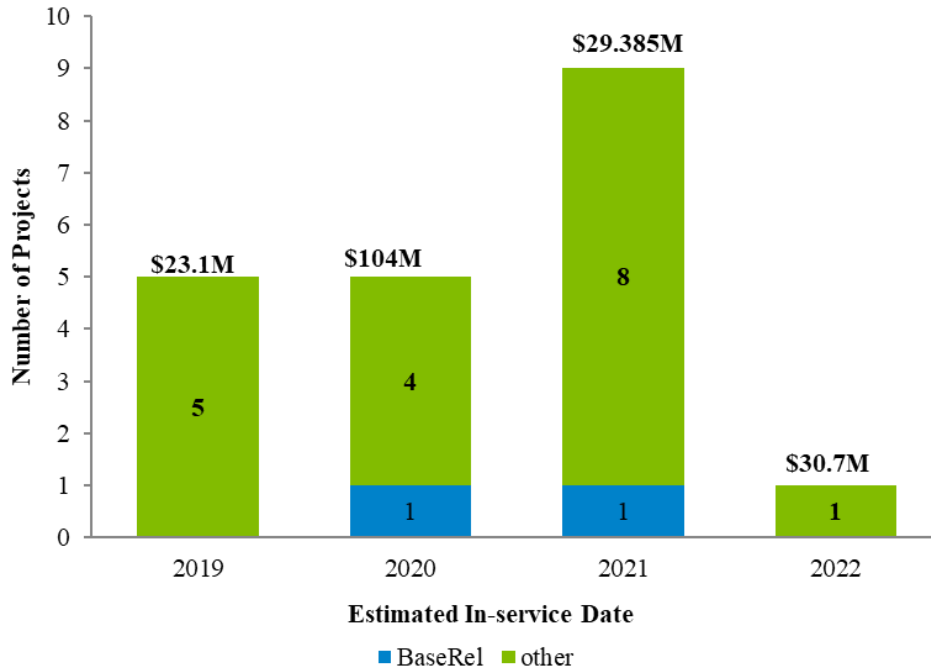


Figure P-2: Estimated In-Service Date by Project Type

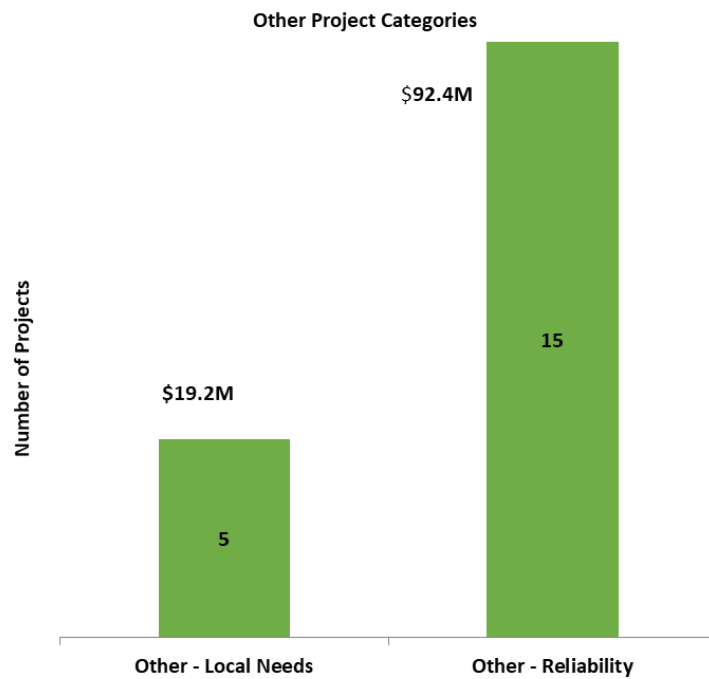


Figure P-3: Cost of Different Other Project Categories

Baseline Reliability Projects

There are two BRP projects moving to Appendix A for Wolverine Power Supply Cooperative in the MTEP18 cycle with estimated cost of \$66M and \$9M respectively.

Project 13581: Oden Area Support Project

Transmission Owner: Wolverine Power Supply Cooperative Inc.

Project Description

This project will rebuild and upgrade multiple 69 kV line to 138 kV design, 795ACSS conductor and OPGW significantly reducing the line impedance, to provide support to the area from the Atlanta and Airport stations. The estimated cost of this project is \$66 million and the expected in-service of this project is December 31, 2021.

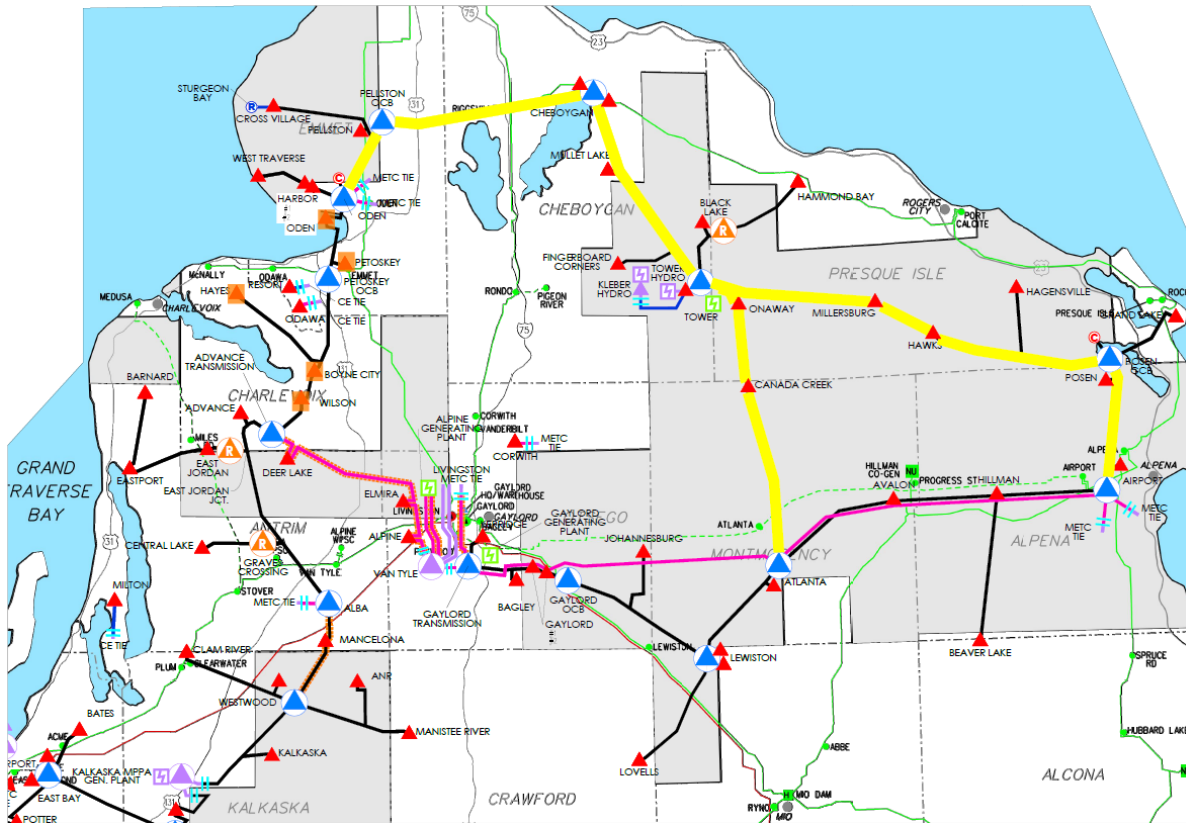


Figure P13581-1: Geographic Map of the Project

Project Need

The Oden area experiences severe under voltage and thermal issues under maintenance and contingency conditions. This project is also driven by condition based need.

Multiple voltage violations are observed for single contingency events and maintenance plus contingency conditions. The worst thermal overload of 125 percent is seen on 2023 Shoulder case for maintenance plus contingency event. WPSC also stated that all of the proposed lines have been targeted for condition

based rebuild with ages between 50 to 70 years old. 15 percent to 45 percent of poles need replacement. Based on the analysis this project is needed to resolve the voltage and thermal issues.

Con Type	Bus	Cont. V(PU)	Base V (PU)	V-MAX	V-MIN
P21	263352 - 18CHEBOYGAN1	0.8899	0.978	1.06	0.9
P21	263426 - 18PELLSTON	0.877	0.994	1.06	0.9
P21	263554 - 18CROSS VILG	0.8734	0.994	1.06	0.9
P21	263374 - 18PELLST OCB	0.877	0.99	1.06	0.9
P21	263450 - 18CHEBOYGAN2	0.8899	0.978	1.06	0.9

Table P13581-1: 2023 Summer Peak Case Voltage Issues

Limiting Element	Rating	Contingency	Cont. Flow	Loading
263304 18TOWER 69 - 263353 18FINGERBD X 69 (1)	34.2	P21 + P13	42.2	123.4%
263304 18TOWER 69 - 263353 18FINGERBD X 69 (1)	34.2	P21 + P13	38.6	112.9%
263304 18TOWER 69 - 263353 18FINGERBD X 69 (1)	34.2	P21 + P13	42.1	123.1%
263304 18TOWER 69 - 263353 18FINGERBD X 69 (1)	34.2	P13 + P12	32.7	95.6%
263304 18TOWER 69 - 263353 18FINGERBD X 69 (1)	34.2	P21 + P13	32.7	95.6%
263304 18TOWER 69 - 263360 18ONAWAY 69 (1)	30	P21 + P13	30.5	101.7%
263304 18TOWER 69 - 263360 18ONAWAY 69 (1)	30	P21 + P13	28.6	95.3%
263304 18TOWER 69 - 263360 18ONAWAY 69 (1)	30	P21 + P13	30.6	102.0%

Table P13581-2: 2023 Shoulder Peak Case Thermal Issues

Alternatives Considered

N/A

Cost Allocation

This is an Other project type, which is not eligible for regional cost sharing.

Project 13581: Gaylord OCB to Lewiston Rebuild

Transmission Owner: Wolverine Power Supply Cooperative Inc.

Project Description

This project will rebuild and upgrade 18 miles of 69 kV line to 138 kV design, 795ACSS conductor and OPGW. The estimated cost of the project is \$9 million and the expected in-service date is December 31, 2020.

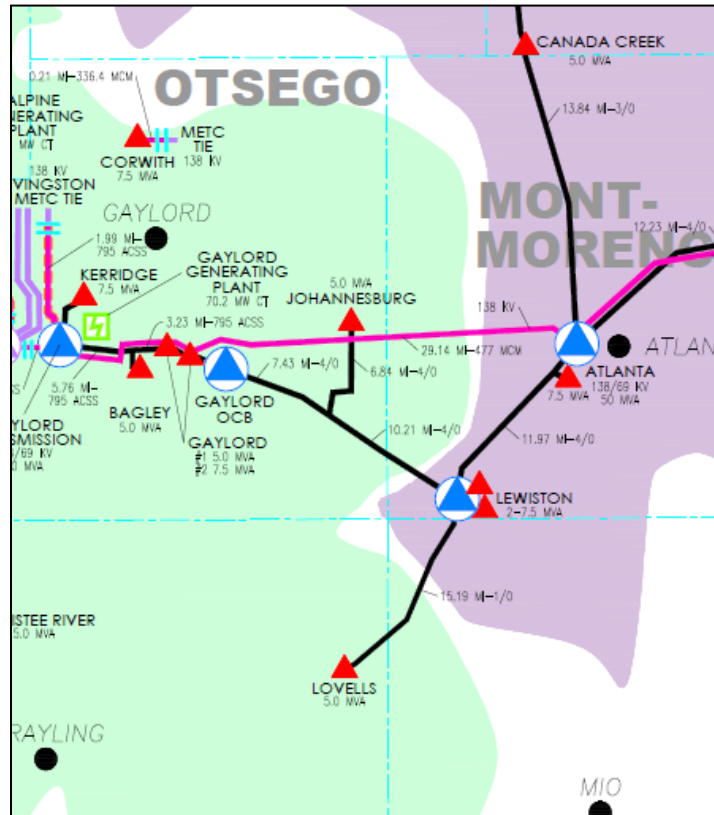


Figure P14644-1: Geographic Map of the Project

Project Need

Overloads were identified in MTEP17 for multiple contingencies, including P1, P3 and P6. This project is also driven by condition based need to replace aging infrastructure. This line is loaded at 99 percent for P12 event and loaded at 97 percent for P22. Also overloading of 110 percent was seen in the MTEP17 cycle. Sensitivity adjustment on Gaylord units that operates Gaylord generation overloads this line to 112 percent.

Limiting Element	Contingency	Cont. Flow	Base Flow	Rating	Loading
263369 18GAYLORDOCB 69 - 263418 18JOBORG X 69(1)	P12	33.3	18	34.2	97%
263369 18GAYLORDOCB 69 - 263418 18JOBORG X 69(1)	P22	33.8	18	34.2	99%

Generation Interconnection Projects

There are no GIP projects moving to Appendix for Wolverine Power Supply Cooperative in the MTEP18.

Transmission Delivery Service Planning Projects

There are no Transmission Delivery projects moving to Appendix for Wolverine Power Supply Cooperative in the MTEP18 cycle.

Other Projects

Projects that are not defined as Baseline Reliability, Generation Interconnection or Transmission Delivery Service Planning projects per Attachment FF transmission project definitions but are still needed for various other system reliability reasons are categorized as Other projects.

There are eighteen Other projects moving to Appendix A for Wolverine Power Supply Cooperative in the MTEP18 cycle.

Other – Reliability Issues

Project ID	Project Name	Project Description	In-Service Date	Estimated Cost
14000	Airport Station 138kV Terminal Addition	The Airport station has been designed for expansion and can accept additional line terminations without major reconfiguration. A structure must be installed for the transmission line termination. A circuit breaker and disconnect switches will be installed in their planned positions. Line relay protection equipment and interconnection metering will be installed.	12/31/2021	\$600,000

Other – Age and Condition Based

Project ID	Project Name	Project Description	In-Service Date	Estimated Cost
14000	Burnips to Portland Rebuild	Rebuild and upgrade 69 kV line to 138 kV design, 795ACSS conductor and OPGW	12/31/2020	\$29.7M
13577	Atlanta to Hillman Rebuild	Rebuild and upgrade 69 kV line to 138 kV design, 795ACSS conductor and OPGW	12/31/2021	\$11M

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13575	Crawford to Weidman Rebuild	Rebuild and upgrade 69 kV line to 138 kV design, 795ACSS conductor and OPGW	12/31/2019	\$9M
13667	Hersey to Leroy Rebuild	Rebuild and upgrade 69 kV line to 138 kV design, 795ACSS conductor and OPGW	12/31/2019	\$7.5M
13576	Airport to Hillman Rebuild	Rebuild and upgrade 69 kV line to 138 kV design, 795ACSS conductor and OPGW	12/31/2021	\$4.5 M
13678	Gun Lake Junction to Otsego Rebuild	Rebuild and upgrade 69 kV line to 138 kV design, 795ACSS conductor and OPGW	12/31/2021	\$4M
13579	South Boardman Station Rebuild	The control house and controls will be upgraded to include Wolverine's standard protection and control system. The existing 69 kV switches limit facility ratings to sub-standard capacity and will be replaced. The existing bus configuration will be upgraded to a ring bus and will be built to 138 kV design.	12/31/2021	\$3,000,000
12199	Grand Traverse Station Upgrade	Upgrade the Grand Traverse Station, including the protection and control system, switches, bus and circuit breakers. Note: The project cost will be split 50/50 between TCLP and Wolverine, the cost for this MTEP project is the total cost of the project.	12/31/2020	\$2,150,000
9920	Graves Crossing Station Upgrade	Upgrade the Graves Crossing station	12/31/2020	\$500,000

Other – Interconnection Project

Project ID	Project Name	Project Description	Preliminary System Need	In-Service Date	Estimated Cost
14003	Grand Lake Interconnection Line	Construct approximately 0.5 miles of new 138kV transmission line to connect the Grand Lake Distribution Station to METC's 138 kV Port Calcite to Rockport transmission line.	New Construction	12/31/2019	\$400,000
14584	WPSC Pere Marquette Line Relocation	Relocate Pere Marquette to Lake County line termination into Pere Marquette station to coordinate with METC project #13934.	To coordinate with METC project #13934 (Pere Marquette 345/138 kV Transformer #1 and Station Expansion)	12/31/2021	\$250,000.00
14704	Stoney Corners Interconnection Tap	Install tap pole and 2 switches at Stoney Corners road on Richland to Cadillac line section to allow Consumers to interconnect service for new Stoney Corners substation.	New Construction	5/1/2019	\$200,000.00

Other – System-Wide Project

Project ID	Project Name	Project Description	Preliminary System Need	In-Service Date	Estimated Cost
14304	2019 Fiber Retrofit	Installation of fiber on recently rebuilt (post 2006) 138kV structures utilizing ADSS (All Dielectric Self Supporting) and OPGW (Optical Ground Wire). Install approximately 100 miles per year for four years, starting in 2019	<ul style="list-style-type: none"> • Increase cyber security by closing communication networks used for Energy Management System • Increase reliability of communications to stations, reducing reliance on 3rd party networks and 3rd party personnel • Acquire real time station data for control center monitoring, control, and real time contingency analysis • Utilize fiber for high speed relaying schemes where needed 	12/31/2019	\$6,000,000
14326	2020 Fiber Retrofit	Installation of fiber on recently rebuilt (post 2006) 138kV structures utilizing ADSS (All Dielectric Self Supporting) and OPGW (Optical Ground Wire). Install approximately 100 miles per year for four years, starting in 2019		12/31/2020	\$6,000,000
14327	2021 Fiber Retrofit	Installation of fiber on recently rebuilt (post 2006) 138kV structures utilizing ADSS (All Dielectric Self Supporting) and OPGW (Optical Ground Wire). Install approximately 100 miles per year for four years, starting in 2019		12/31/2021	\$6,000,000

Other – System-Wide Project – Battery Replacement

Project ID	Project Name	Project Description	Preliminary System Need	In-Service Date	Estimated Cost
12243	2020 Battery Bank Replacement	This project will replace one battery bank at a Transmission Station.	Ageing infrastructure	12/31/2020	\$35,000
13580	2021 Transmission Battery Bank Replacement Project	This project will replace one battery bank at a Transmission Station.	Ageing Infrastructure	12/31/2021	\$35,000

Northern Indiana Public Service Co. (NIPSCO)

Overview of Projects:

NIPSCO has two projects targeting Board approval in MTEP18. Both are baseline reliability projects.

Baseline Reliability Projects

Table P-1 shows the two projects, need for which was identified in MISO's independent analysis. Table P-2 shows the steady state thermal violations driving these projects.

Project ID	Project Name	Description	Expected ISD	Estimated Cost
15384	Maple to LNG - Maple Substation Conductor	Project will increase the capacity of the Maple to LNG 138 kV line (13812).	12/31/2019	\$140,181.00
15385	Dune Acres Breaker upgrade	Project is to upgrade the 13806 Breaker at Dune acres.	12/31/2021	\$310,234.00

Table P-1: Baseline reliability projects in NIPSCO

Monitored Facility	Contingency Category	Max Loading (%)	Comment
Bosserman – Trailcreek 138 kV Line	1 P55, 1 P12 and 1 P23	122	2020 SUM, 2023 SUM and 2028 SUM
LNG – Maple 138 kV Line	1 P7	101.9	2020 SUM

Table P-2: Baseline reliability projects in NIPSCO

Other Projects

The projects shown below in Table P-3 are projects driven by other Generation Interconnection upgrade.

Project ID	Project Name	Description	Expected ISD	Estimated Cost
16084	J513 network upgrades	Network Upgrades necessary for J513 to connect to Reynolds 138kV as stated in the GIA.	8/15/2020	\$7,752,504
16085	J351 network upgrades	Network Upgrades necessary for J351 Generating Facility to interconnect at NIPSCO's Stillwell 345kV substation.	3/31/2020	\$6,692,900

Table P-3: Other projects in NIPSCO

Summary of Expedited Review Projects

Project ID	Project Name	Description	Expected ISD	Estimated Cost
15464	Morenci Load Interconnection	Build a new single 10.5 miles of 138kV radial line by tapping Moore Road – Beecher line following the Wolverine's 10 MW of load interconnection request.	11/01/2020	\$20,700,000
15064	Magneto Interconnection	Construct a new 120 kV three breaker station named Magneto and cut in the ITCT Quaker Southfield 120 kV circuit. Install fiber for relay communication between Quaker and Magneto and between Magneto and Southfield.	06/01/2019	\$5,660,000