



### ***Zone 2 Updated Study Results***

Refer to Table PR-22 Summary of Changes.

After completing the 2007 Update process late in the summer of 2007, ATC became aware of the potential for extremely low hydro output in the eastern portion of the upper peninsula of Michigan, particularly during times of winter peak loads. During the fall of 2007, ATC has been working with customers in this area to develop emergency plans to prevent overloads and extremely low voltages in this area if critical equipment were to fail to operate as needed. Some emergency projects ATC is developing, which we were not able to include in the 2007 Update project lists, include second transformers at the Straits and Hiawatha substations and advancing installation of capacitor banks at the Nine Mile Substation. ATC is continuing to work with our customers to explore longer term solutions that continue to provide reliable transmission service in this area.

#### *Cancelled projects*

##### *Upgrade M38 138/69-kV transformer*

This project was cancelled due to the last study results. However, a more recent review of area load suggests a potential need may reappear in the near future.

##### *Install 1-5.4 MVAR capacitor bank at Sawyer*

This project was replaced with a distribution capacitor bank solution.

#### *Deferred projects*

##### *Install 1-4.08 MVAR capacitor bank at L'Anse 69 kV*

This 2008 proposed project has been deferred to 2009 as a result of revised construction schedules.

##### *Relocate Cedar Substation (North Lake)*

This 2008 proposed project has been deferred to 2009 as a result of revised construction schedules to support development of other critical projects.

##### *Rebuild/convert Conover-Plains 69-kV line to 138 kV*

##### *Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove Substation*

##### *Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Aspen Substation*

##### *Relocate Iron River Substation (Iron Grove)*

These 2009 proposed projects have been deferred to 2010 due to regulatory approval delays.



*Install second 345/138-kV transformer at Plains Substation*

This 2008 proposed project has been deferred to 2009 due to updated power flow modeling.

*Rebuild/convert Blaney Park-Munising 69-kV line to 138 kV*

Portions of the Blaney Park-Munising 69-kV line will need to be rebuilt due to poor physical condition. Reliability of service to customers served by this line is also a concern because this relatively long line is currently operated radially from Munising (open at Blaney Park). The condition and rating of the line prevents us from closing both ends at the same time. If this line is converted to 138 kV, it also could provide the continuation of another 138-kV outlet from the Presque Isle Power Plant in the Marquette area, enhancing the reliability of the substation. This provisional project has been deferred from 2012 to at least 2013 to allow time to establish an appropriate long-term plan for the area that considers whether the line should be rebuilt at 138 kV or at 69 kV.

**Other project changes**

*Install 1-4.08 MVAR capacitor bank at Roberts 69-kV Substation (2008)*

ATC continues to assess reactive power requirements in an effort to optimize the size and location of the capacitor banks. Recently completed studies indicate that 1-4.08 MVAR capacitor bank will provide sufficient voltage support to the area, instead of the larger 5.4-MVAR size previously proposed.

*Install 2-4.08 MVAR capacitor banks at Munising 69-kV Substation (2008)*

ATC continues to assess reactive power requirements in an effort to optimize the size and location of the capacitor banks. Recently completed studies indicate that 2-4.08 MVAR capacitor banks will provide sufficient voltage support to the area, instead of the larger 2-5.4 MVAR banks previously proposed.

*Uprate Chandler-Cornell 69-kV line clearance from 130 to 167 degrees F (2009)*

This project's status has been changed from provisional to proposed. The in-service date has been changed from 2010 to 2009 as a result of revised construction schedules.

*Construct new Mackinac 138/69-kV Substation*

*Rebuild Hiawatha-Pine River 69-kV line ESE\_6908*

These two projects were previously proposed as a more comprehensive Eastern Upper Peninsula (U.P.) review, but have recently been changed to provisional status with yet to be determined in-service dates. Our ongoing review will assess if all or some of those projects should still be constructed in the future, constructed in a phased manner, or perhaps a different set of projects proposed. The results of this review and ATC's future transmission plans in the Eastern U.P. will be communicated when the review is more fully developed.



## **New projects**

Since the 2007 Update analysis was completed, two emergency projects have been proposed in the eastern Upper Peninsula. The following two additional projects have been recently added to our plans:

- Install second 138/69-kV transformer at Straits Substation
- Install second 138/69-kV transformer at Hiawatha Substation

As a result of the recent proposal of these projects, they do not yet appear in the tables or figures outlined in this Update. These two projects will be in-service by the end of 2007.

*Construct ring bus at the Pine River 69-kV Substation and replace 1-5.4 MVAR capacitor bank with 2-4.08 MVAR banks (2008)*

*Install 2-16.32 MVAR capacitor banks at Perkins 138-kV Substation (2009)*

*Install 1-16.33 MVAR capacitor bank at Hiawatha 138-kV Substation (2009)*

*Install 2-4.08 MVAR capacitor banks at 9 Mile 69-kV Substation (2010)*

*Install 1-16.33 MVAR capacitor bank at Indian Lake 138-kV Substation (2010)*

These proposed projects will boost the voltage in the Eastern Upper Peninsula under normal and single contingency conditions to acceptable levels until additional reinforcements can be implemented in the area.

*Upgrade Empire-Forsyth 138-kV line to 302 MVA (2008)*

This planned project will boost the voltages in the Marquette County area under single contingency conditions to acceptable levels.

For a graphical depiction of projects in Zone 2, please refer to [Figure PR-2](#).

*Table PR-14  
Transmission System Additions for Zone 2*

<b>System additions</b>	<b>System need year</b>	<b>Projected in-service year</b>	<b>Planning zone</b>	<b>Need category</b>	<b>Planned, Proposed or Provisional</b>
Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	2006	2008	2	reliability, condition	Planned
Install 1-4.08 MVAR capacitor bank at Roberts 69-kV Substation	2007	2008	2	reliability	Proposed
Construct 138 kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover Substation	2008	2008	2	reliability, transfer capability	Planned
Install 2-4.08 MVAR capacitor banks at Munising 69-kV Substation	2008	2008	2	reliability	Proposed
Uprate Mass-Winona 69-kV line clearance to 185 degrees F	2008	2008	2	generation	Planned
Uprate Winona-Atlantic 69-kV line clearance to 185 degrees F	2008	2008	2	generation	Planned
Uprate Empire-Forsyth 138-kV line to 302 MVA	2008	2008	2	reliability	Planned
Construct ring bus at the Pine River 69-kV Substation and replace 1-5.4 MVAR capacitor bank with 2-4.08 MVAR banks	2008	2008	2	reliability	Proposed
Install 1-4.08 MVAR capacitor bank at L'Anse 69 kV	2008	2009	2	reliability	Proposed
Relocate Cedar Substation (North Lake)	2005	2009	2	reliability, condition	Proposed
Install 2-16.33 MVAR capacitor bank at Perkins 138-kV Substation	2009	2009	2	reliability	Proposed
Install 1-16.33 MVAR capacitor bank at Hiawatha 138-kV Substation	2009	2009	2	reliability	Proposed
Install 2-8.16 MVAR capacitor banks at the 9 Mile 69-kV Substation	2009	2009	2	reliability	Proposed
Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	2009	2009	2	reliability	Proposed
Install second 345/138-kV transformer at Plains Substation	2009	2009	2	reliability, transfer capability	Proposed
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2010	2010	2	reliability, transfer capability	Planned
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Iron Grove Substation	2010	2010	2	reliability, transfer capability	Planned

*Table PR-14  
Transmission System Additions for Zone 2 (continued)*

<b>System additions</b>	<b>System need year</b>	<b>Projected in-service year</b>	<b>Planning zone</b>	<b>Need category</b>	<b>Planned, Proposed or Provisional</b>
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Aspen Substation	2010	2010	2	reliability	Planned
Relocate Iron River Substation (Iron Grove)	2010	2010	2	reliability	Planned
Install 1-16.33 MVAR capacitor bank at Indian Lake 138-kV Substation	2010	2010	2	reliability	Proposed
Rebuild Blaney Park-Munising 69 kV to 138 kV	2013	2013	2	reliability, condition	Provisional
Rebuild/convert Holmes-Chandler 69 kV to 138-kV operation	2013	2013	2 & 4	reliability, condition	Provisional
Construct new Mackinac 138/69-kV Substation	TBD	TBD	2	reliability	Provisional
Rebuild Hiawatha-Pine River 69-kV line ESE_6908	TBD	TBD	2	maintenance	Provisional
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	TBD	TBD	2	reliability	Provisional
Convert Indian Lake-Hiawatha 69-kV line to double-circuit 138-kV operation, construct new Hiawatha 138-kV Substation	TBD	TBD	2	reliability	Provisional
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	TBD	TBD	2	reliability	Provisional
Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	TBD	TBD	2	reliability	Provisional
Install 2-8.16 MVAR capacitor banks at M38 69 kV	TBD	TBD	2	reliability	Provisional
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69-kV Substation	TBD	TBD	2	reliability	Provisional

**Table PR-22****Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2007 10-Year Assessment**

<b>PROJECTS CANCELLED</b>	<b>Former In-Service Date</b>	<b>Planning Zone</b>	<b>Reason for Removal</b>
Rebuild/reconductor Petenwell-Saratoga 138-kV line	2010	1	Updated study results
Uprate M38 138/69-kV transformer	TBD	2	Revised load/model information
Install 1-5.4 MVAR capacitor bank at Sawyer 69 kV	TBD	2	Replaced with distribution capacitor bank solution
Construct Huiskamp-Blount 138-kV line	2012	3	Further studies needed to determine scope and in-service date
Uprate North Monroe-Idle Hour 69-kV line	2012	3	Updated study results
Install series reactor at Cornell Substation	2007	5	Updated study results
Expand Oak Creek 345-kV switchyard to interconnect three new generators plus one new 345-kV line and 138-kV switchyard to accommodate new St. Martins line	2013	5	Elm Road generation Phase 3 cancellation
Construct a 345/138-kV switchyard at Hale (Brookdale) to accommodate two 345-kV lines, a 500 MVA 345/138-kV transformer and 4-138-kV lines plus three 138-26.2 kV transformers	2013	5	Elm Road generation Phase 3 cancellation
Install two 345-kV line terminations at Pleasant Prairie Substation and loop Zion-Arcadian 345-kV line into Pleasant Prairie	2013	5	Elm Road generation Phase 3 cancellation
Construct an Oak Creek-Hale (Brookdale) 345-kV line installing 4 mi. new structures, converting 16.2 mi. of non-operative 230 kV and 5 mi. 138 kV	2013	5	Elm Road generation Phase 3 cancellation
Construct Oak Creek-St. Martins 138-kV circuit #2 installing 16.6 mi. conductor on existing towers	2013	5	Elm Road generation Phase 3 cancellation
Construct a Hale (Brookdale)-Granville 345-kV line converting/reconductoring 5.6 mi. 138 kV, rebuilding 7 mi. 138 kV double circuit tower line and converting/reconductoring 3 mi. 138 kV on existing 345-kV structures	2013	5	Elm Road generation Phase 3 cancellation
Reconductor Cornell-Range Line 138-kV line	2014	5	Updated study results

**Table PR-22 (continued)****Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2007 10-Year Assessment**

<b>PROJECTS DEFERRED</b>	<b>New date</b>	<b>Planning Zone</b>	<b>Reason for Deferral</b>
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress Substation	2007	4	Was 2006; revised construction schedule
Construct new line from Southwest Delavan to Bristol at 138 kV and operate at 69 kV	2008	3	Was 2007; revised construction schedule
Construct North Madison-Huiskamp 138-kV line	2009	3	Was 2008; revised construction schedule
Install 1-4.08 MVAR capacitor bank at L'Anse 69 kV	2009	2	Was 1-5.4 MVAR bank in 2008; revised construction schedule
Relocate Cedar Substation (North Lake)	2009	2	Was 2008; deferred due to resource availability
Install second 345/138-kV transformer at Plains Substation	2009	2	Was 2008; revised load/model information
Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	2009	3	Was 2008; deferred due to route contention
Uprate Rockdale to Jefferson 138-kV line	2009	3	Was 2008; deferred because route contention
Uprate Rockdale to Boxelder 138-kV line	2009	3	Was 2008; deferred because of route contention
Uprate Boxelder to Stonybrook 138-kV line	2009	3	Was 2008; deferred because of route contention
Rebuild Crivitz-High Falls 69-kV double circuit line	2009	4	Was 2008; resource availability
Construct Brandon-Fairwater 69-kV line	2010	1	Was 2008; customer's decision to defer
Rebuild/convert Conover-Plains 69-kV line to 138 kV, construct 138-kV bus and install transformers at Iron Grove and Aspen, and relocate Iron River Substation (Iron Grove)	2009	2	Was 2008; deferred due to regulatory delays
Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona	2010	3	Was 2009; regulatory delay
Rebuild the Verona to Oregon 69-kV line Y119	2011	3	Was 2008; route overlap complications and associated regulatory delay for portion from Verona to Sun Valley (due to Oak Ridge to Verona delay) and Rockdale to West Middleton overlap for entire route
Install 200 MVAR capacitor bank at Bluemound Substation	2010	5	Was 2008; detailed study in progress to determine scope and in-service date

**Table PR-22 (continued)****Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2007 10-Year Assessment**

<b>PROJECTS DEFERRED (continued)</b>	<b>New date</b>	<b>Planning Zone</b>	<b>Reason for Deferral</b>
Rebuild Brodhead to South Monroe 69-kV line	2011	3	Was 2008; updated study results and resource availability
Construct Monroe County-Council Creek 161-kV line	2012	1	Was 2010; resource availability
Install a 161/138-kV transformer at Council Creek Substation	2012	1	Was 2010; resource availability
Uprate Council Creek-Petenwell 138-kV line	2012	1	Was 2010; resource availability
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2013	1	Was 2012; customer's decision to defer
Rebuild Blaney Park-Munising 69 kV to 138 kV	2013	2	Was 2012; Asset Management review
Construct 345-kV line from Rockdale to West Middleton	2013	3	Was 2011; updated study results
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	2013	3	Was 2011; updated study results
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	2013	3	Was 2008; revised rating information
Loop Nine Springs-Pflaum 69-kV line into Femrite Substation	2013	3	Was 2010; delayed due to resource availability
Install a 138/69-kV transformer at Bass Creek Substation	2013	3	Was 2010; delayed due to resource availability
Rebuild/reconductor Town Line Road-Bass Creek 138-kV line	2013	3	Was 2010; delayed due to resource availability
Replace the existing 46 MVA Hillman 138/69-kV transformer with a 100 MVA transformer	2013	3	Was second transformer in 2010; updated study results
Loop the Deforest to Token Creek 69-kV line into the Yahara River Substation and install 138/69-kV transformer at Yahara River	2014	3	Was 2011; delayed due to updated study results
Uprate Yahara River-Token Creek 69-kV line	2014	3	Was 2011; delayed due to updated study results
Install 138/69-kV transformer at Custer Substation	2014	4	Was 2012; updated study results
Construct Shoto to Custer 138-kV line	2014	4	Was 2012; updated study results
Construct a 345-kV bus at Bain Substation	2014	5	Was 2009; further study needed to determine scope and in-service date

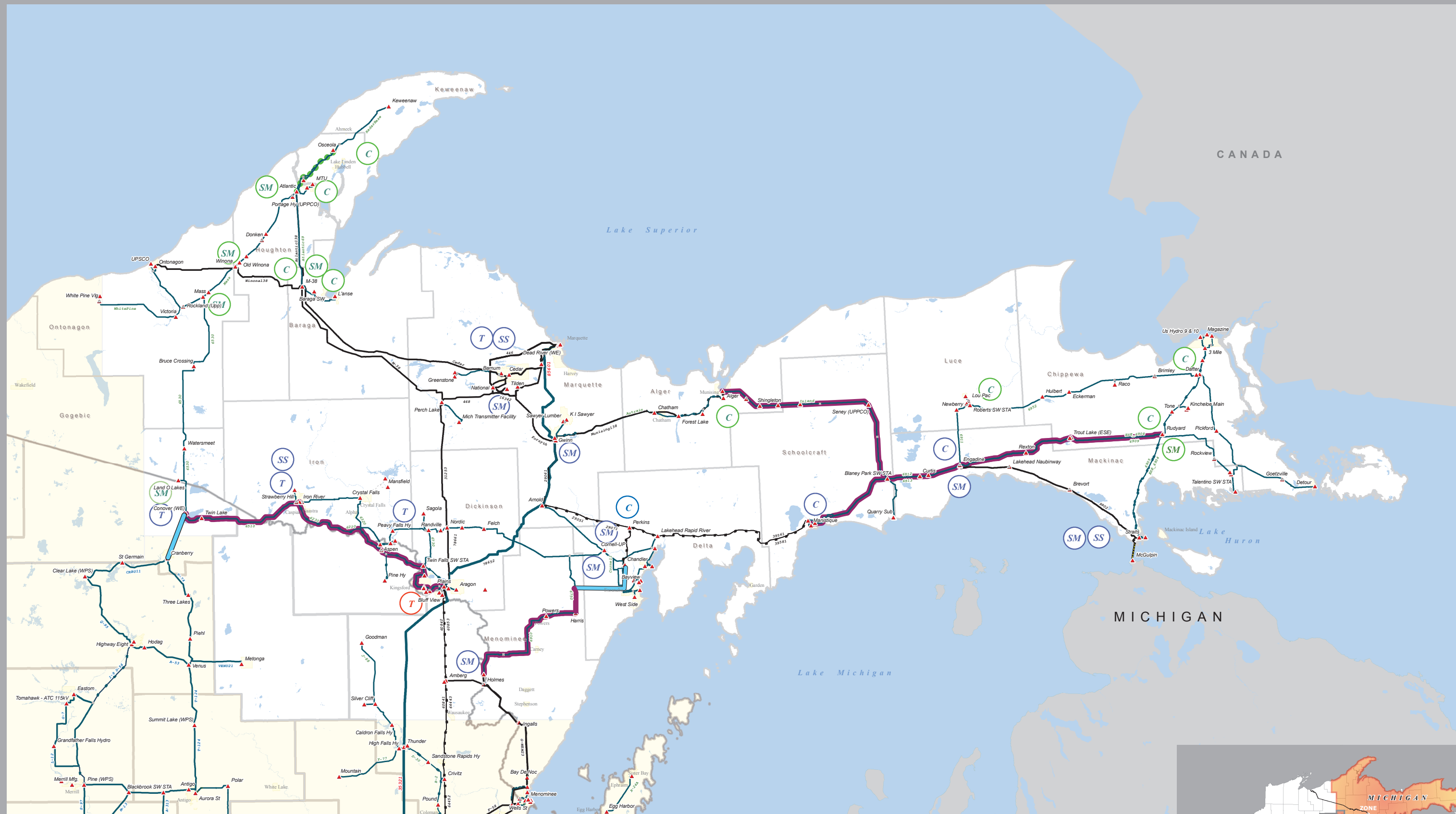


**Table PR-22 (continued)****Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2007 10-Year Assessment**

<b>OTHER PROJECT CHANGES AND POSSIBLE CHANGES</b>	<b>Date</b>	<b>Planning Zone</b>	<b>Nature of Change or Update</b>
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and upgrade the 5.4 MVAR capacitor bank to 10.8 MVAR at Berlin 69-kV Substation	2008	1	Was total of 12.8 MVAR upgrade
Install 1-4.08 MVAR capacitor bank at Roberts 69-kV Substation	2008	2	Was 5.4 MVAR capacitor bank
Install 2-4.08 MVAR capacitor banks at Munising 69-kV Substation	2008	2	Was 2-5.4 MVAR banks
Install 2-8.16 MVAR 69-kV capacitor bank at South Lake Geneva Substation	2008	3	Was 1-16.33 MVAR bank
Expand the Menominee 69-kV Substation and install 138 kV terminals. Loop the West Marinette-Bay De Noc 138-kV line into the Substation	2008	4	Was provisional, now proposed
Install 138/69-kV transformer at the expanded Menominee Substation	2008	4	Was provisional, now proposed
Install 2-1.2 MVAR distribution capacitor banks at Sister Bay 69 kV	2008	4	Was 2-4.1 MVAR banks on transmission side, was provisional and now is proposed
Construct Gardner Park-Hwy 22 345-kV line	2009	1	Central Wisconsin was renamed Hwy 22
Construct new Hwy 22 345-kV Substation	2009	1	Central Wisconsin was renamed Hwy 22
Upgrade Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	2009	2	Was provisional in 2010; now proposed in 2009
Install 3-16.33 MVAR 138-kV capacitor banks at North Beaver Dam Substation	2009	3	Was provisional, now proposed; was 2-24.5 MVAR banks
Install 2-24.5 MVAR 138 kV capacitor banks at Kilbourn Substation and install 2-24.5 MVAR 138-kV capacitor banks at Artesian Substation	2009	3	Was 2-16.33 capacitor banks at Kilbourn and 2-24.5 at Artesian
Expand the existing 69-kV capacitor bank from 5.4 to 8.1 MVAR at Richland Center Olson Substation and install 1-7.8 MVAR 12.4-kV capacitor bank at Brewer Substation	2009	3	Was 2-8.16 MVAR banks at Brewer
Construct second Paddock-Rockdale 345-kV line and replace 345/138-kV transformer T22 at Rockdale Substation	2010	3	Added the transformer replacement
Upgrade the existing 2-8.16 MVAR to 2-16.33 MVAR capacitor banks at South Lake Geneva Substation	2010	3	Was second 16.33 MVAR bank
Construct new Mackinac 138/69-kV Substation	TBD	2	Was Proposed in 2011, now Provisional and TBD
Rebuild Hiawatha-Pine River 69-kV line ESE_6908	TBD	2	Was Proposed in 2009; now Provisional and TBD
Construct West Middleton-North Madison 345-kV line	TBD	3	Was proposed in 2016; now Provisional and TBD

**Table PR-22 (continued)****Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2007 10-Year Assessment**

NEW PROJECTS	In-Service Date	Planning Zone	Reason for Project
Relocate Mishicot 138-kV Substation	2007	4	new generation
Upgrade St. Martins 138-kV bus to 2000A	2007	5	reliability
Upgrade St. Lawrence 138-kV bus	2007	5	reliability
Construct ring bus at the Pine River 69-kV Substation and replace 1-5.4 MVAR capacitor bank with 2-4.08 MVAR banks	2008	2	reliability
Uprate Empire-Forsyth 138-kV line to 302 MVA	2008	2	reliability
Uprate Portage 138/69-kV transformer to 143 MVA	2008	3	reliability
Uprate X-17 Eden-Spring Green 138-kV line to 167 degrees F	2008	3	reliability
Install temporary 24.5 MVAR capacitor bank at Boxelder 138-kV Substation	2008	3	reliability; Jefferson-Stony Brook project delay
Construct a 138-kV substation at new Cedar Ridge; loop existing Ohmstead-Kettle Moraine 138-kV line into new Cedar Ridge Substation	2008	4	accommodate new generation
Install 2-16.32 MVAR capacitor bank at Perkins 138-kV Substation	2009	2	reliability
Install 1-16.33 MVAR capacitor bank at Hiawatha 138-kV Substation	2009	2	reliability
Install 12.45 MVAR 69-kV mobile capacitor bank at Brick Church Substation	2009	3	reliability
Install 2-32 Mvar capacitor banks at Mukwonago 138-kV Substation	2009	5	reliability
Install 2-4.08 MVAR capacitor banks at the 9 Mile 69-kV Substation	2010	2	reliability
Install 1-16.33 MVAR capacitor bank at Indian Lake 138-kV Substation	2010	2	reliability
Replace two overhead Blount-Ruskin 69-kV lines with one underground 69-kV line	TBD	3	negotiated agreement with Madison
Install 2-32 MVAR capacitor banks at Summit 138-kV Substation	2010	5	reliability
Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	2010	5	reliability



**Transmission System Additions (May be Planned, Proposed or Provisional)**  
**PLANNING ZONE 2**

Substation Modifications	Capacitor Bank	115 or 138 kV Transmission Line
Transformer	New T-D Interconnection	Rebuilt 115 or 138 kV Transmission
New Substation	Rebuilt 69 kV Transmission	Transmission Line Voltage Conversion
		69 kV Transmission Line

**Transmission Related Facilities**

Substation, Switchyard or Terminal	ATC Office Location
Proposed/Design/Construction	Generation
	Other Facility

