

This page left intentionally blank.

States. At the inspection booths, drivers and passengers answer questions from CBP officers and discuss or provide paperwork for the cargo they are carrying.

If cars and trucks clear primary inspection, they would have two options to exit the plaza (as shown by the black arrow in **Figure 2.3.3**). They could take a ramp to I-94/I-69 headed west or a ramp to connect to the relocated Pine Grove Avenue at a signalized intersection. Freeway exits from the plaza would be similar to those for the existing plaza. Vehicles exiting the plaza would have to show proof that they are cleared to leave the plaza at an additional exit control booth.

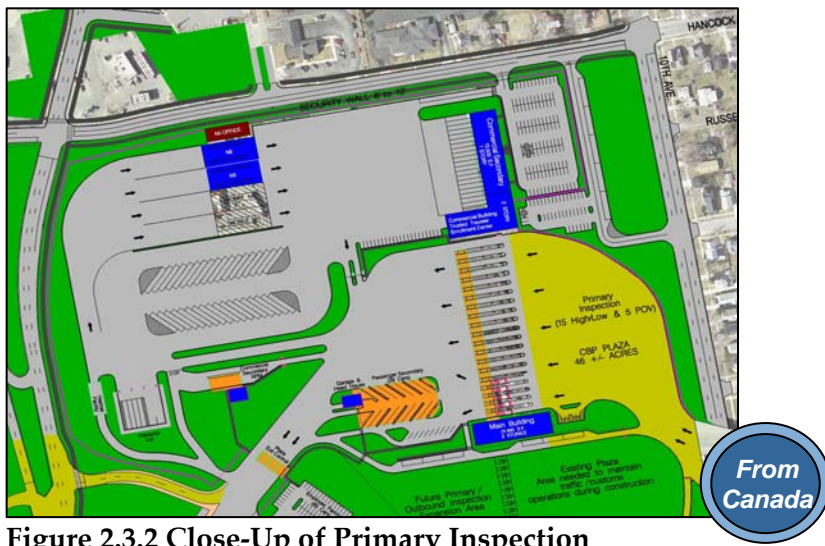


Figure 2.3.2 Close-Up of Primary Inspection

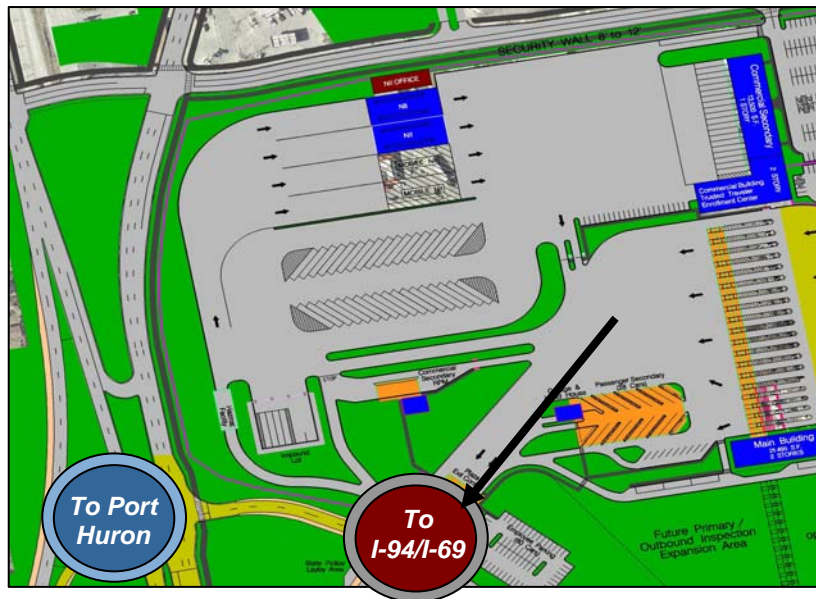


Figure 2.3.3 Primary Inspection Exit

Secondary Inspection (Commercial): Trucks not cleared at the primary inspection booths are sent to the secondary truck inspection area, as shown in **Figure 2.3.4**. As illustrated by the dashed line, the Recommended Alternative uses the block bordered by Hancock Street, 10th Avenue, the existing plaza, and the existing M-25 connector for the expanded secondary truck inspection area.



Figure 2.3.4 Close-Up of Secondary Inspection

The truck secondary inspection area contains 36 truck parking spaces to accommodate trucks sent to secondary inspection for document processing. Twenty docks for unloading trucks, and 35,600 square feet of office and unloading space are also included in this area.

The truck inspection area will include a special dock for livestock inspection that allows inspection officers to walk around the trailer on an elevated platform to view into a livestock trailer. No unloading of animals would occur on the plaza.

Up to four Non-Intrusive Inspection (NII) units will be utilized, which allow CBP officers to electronically scan the contents of vehicles.

Secondary Inspection (Passenger Vehicles): Cars with passengers that are not cleared to enter the United States or require further processing are sent to the secondary inspection area. The passenger secondary inspection area is located just downstream of the Primary Inspection Booths. The secondary inspection area for passenger vehicles includes space to inspect 28 cars and includes a head house building shown in dark blue on **Figure 2.3.5**. This building also would contain enclosed inspection garages and additional space for CBP officers to conduct border processing paperwork. There is also a parking area for cars that require further inspection.

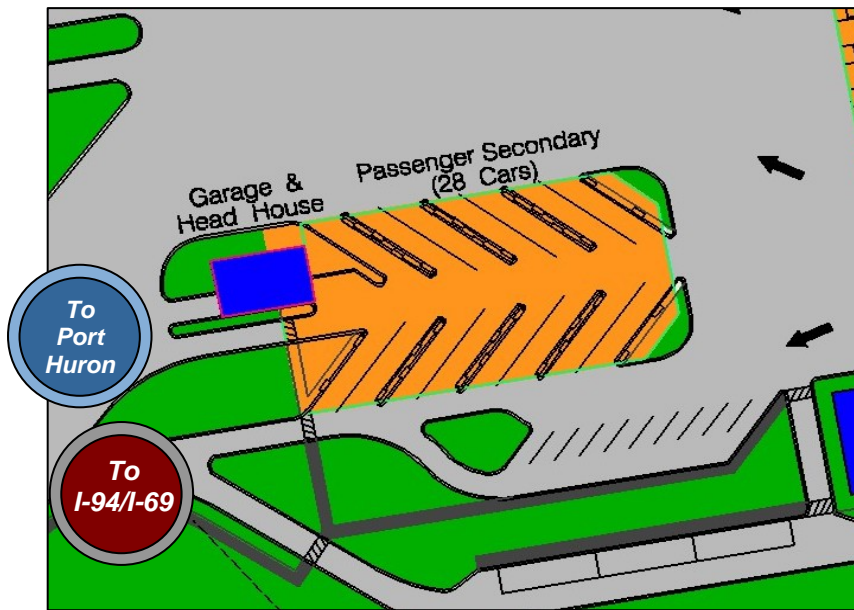


Figure 2.3.5 Head House Building of Secondary Inspection

Local Access: Local and international traffic that has cleared customs has easy access to both the city of Port Huron and Fort Gratiot. For visitors wishing to visit the city, a left hand turn at the signalized intersection will provide direct access to southbound Pine Grove Avenue. For those interested in visiting Fort Gratiot and points north, a right hand turn at the signalized intersection will provide direct northern access to northern St. Clair County and the thumb region of Michigan.

Leaving the U.S. to Canada: As shown by the black lines in **Figure 2.3.6**, cars and trucks traveling to Canada will have two entrances to the plaza. One is off of I-94/I-69 and the other is a ramp from the relocated Pine Grove Avenue. Facilities will be provided to allow CBP to inspect cars and trucks leaving the

What is Outbound Inspection?

Outbound inspection booths and facilities allow CBP to enforce export control legislation and inspect certain individuals leaving the country. Currently CBP conducts random exit control interviews by flagging down outbound vehicles after they pass through the toll booths.

United States. This area is called outbound inspection. Eight toll lanes will precede outbound inspection facilities. Following the toll lanes, cars and trucks pass through the outbound inspection facilities which include four booths, two docks for unloading trucks, and adequate truck and car parking spaces.

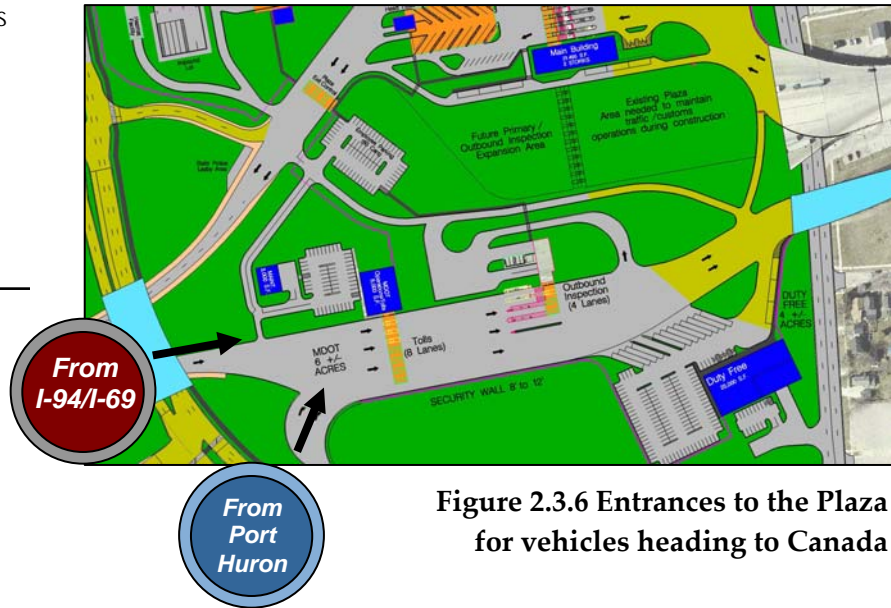


Figure 2.3.6 Entrances to the Plaza for vehicles heading to Canada

A new duty free store and parking would occupy approximately four acres and could only be accessed by drivers who have already cleared outbound inspection and the toll booths. Following the duty free store, all vehicles would take the bridge to Canada.

The plaza will also include parking for both MDOT and CBP plaza employees and visitors. The majority of CBP employee and visitor parking will be located in the northeast corner of the plaza. The proposed plaza will include separate secure lots for employees and visitors.

The existing plaza area will remain open throughout construction in order to maintain traffic and plaza operations. The border cannot be shut down during construction and must remain open at all times. Once the new plaza is open to new traffic, the existing plaza will be demolished and brought down to the level of the new plaza. This space will be used to accommodate future CBP primary inspection booth expansion.

Improvements to the I-94/I-69 corridor: The Recommended Alternative includes replacement and expansion of the Black River Bridge, the Water Street interchange and the Lapeer connector interchange. It also includes additional lanes on I-94/I-69, separation of eastbound border crossing traffic from local traffic, and a new Michigan Welcome Center in Port Huron Township.

Black River Bridge: The Recommended Alternative includes an expansion and replacement of the I-94/I-69 bridge over the Black River. The existing bridge is approximately 64-feet wide and has four travel lanes, two for eastbound traffic and two for westbound traffic along with narrow shoulders.

Figure 2.3.7 shows the proposed lane configuration on the Black River Bridge. The new bridge will be approximately 200 feet wide and will consist of 12 spans. The new bridge will have nine travel lanes, three lanes for eastbound local traffic, three lanes for eastbound international traffic heading to Canada and three lanes for combined border crossing and local westbound traffic. The designated lanes for eastbound border crossing traffic will be barrier separated from the lanes for local traffic.

To reduce the potential for conflicts between border crossing traffic waiting to be inspected and local traffic, separate lanes for eastbound border and local traffic are provided between the Lapeer connector interchange and the plaza. The eastbound border crossing lanes will include one lane for cars, one lane for trucks, and one lane for vehicles enrolled in the FAST and NEXUS program. The eastbound local M-25 connector traffic lanes will include three lanes connecting to relocated Pine Grove Avenue. At the intersection of the local lanes and relocated Pine Grove Avenue, traffic may turn left for northern destinations such as Fort Gratiot and northern St. Clair County, or right to access downtown Port Huron.

The new bridge will include 12-foot shoulders for emergency access/vehicle storage, an upgrade over the two foot shoulders on the existing bridge. The bridge will also have a 14-foot dual-direction non-motorized path. This path will be located on the south side of the bridge and will connect with the existing sidewalks along Water Street and the newly



Figure 2.3.7 Recommended Alternative Lanes on the Black River Bridge

constructed non-motorized facilities along relocated Pine Grove Avenue.

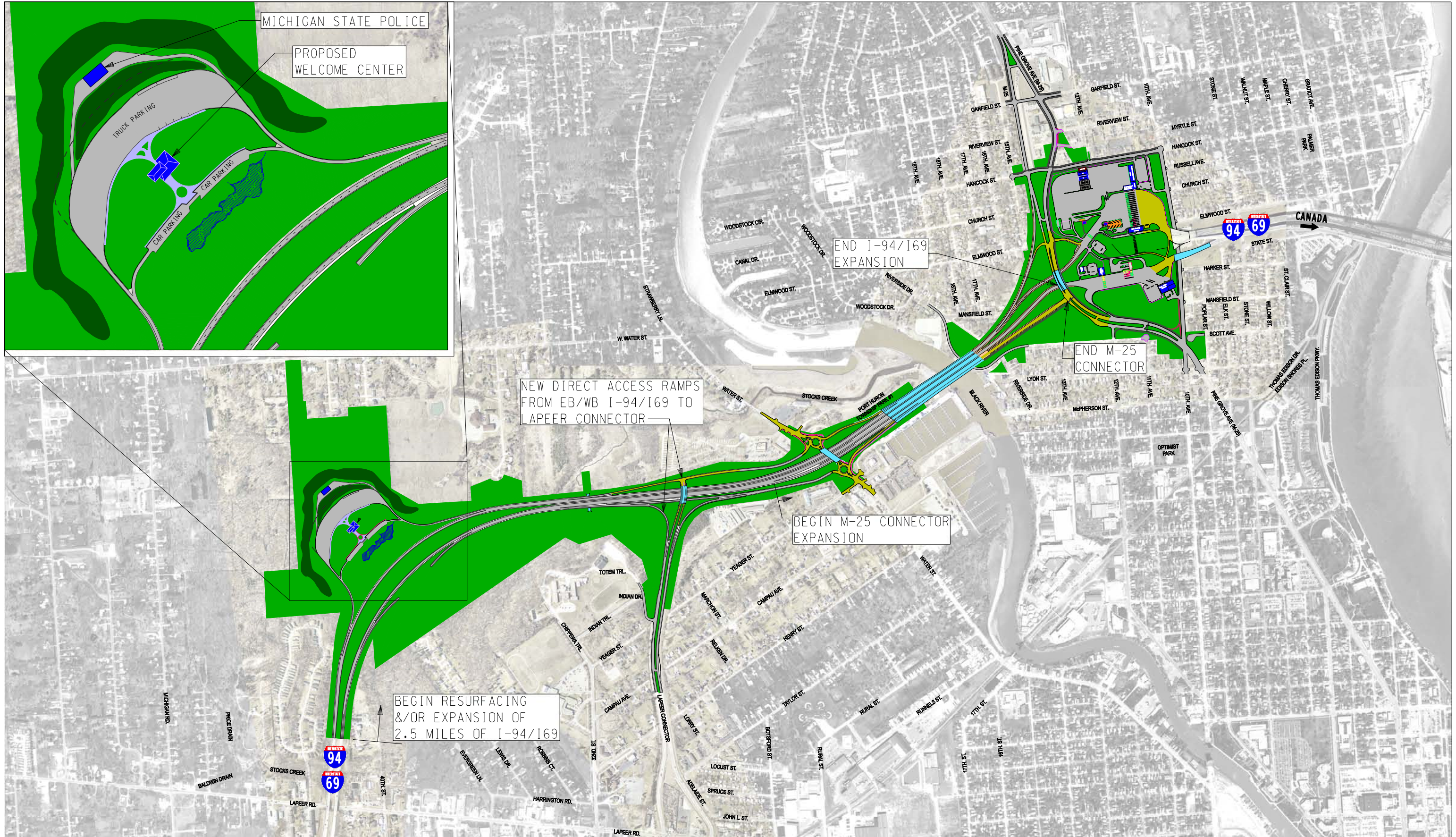
I-94/I-69 Freeway Improvements: The Recommended Alternative includes resurfacing and expansion of 2.5 miles of existing I-94/I-69 as shown in **Figure 2.3.8** on the following page. Much of the expansion includes an extension of the eastbound M-25 connector between the ramps to the existing plaza and the Lapeer connector. This will allow for the separation of local traffic from eastbound traffic crossing the border. Access from I-94/I-69 will be provided to the Water Street and the Lapeer connector interchanges.

Water Street Interchange: The Recommended Alternative includes the replacement of the existing interchange at Water Street including the Water Street Bridge over I-94/I-69. As illustrated in **Figure 2.3.9**, the replacement bridge will be two lanes wide, with one travel lane in each direction. Roundabouts are proposed for each end of the bridge at the freeway ramp intersections. The bridge will also accommodate pedestrian traffic by including one 10-foot sidewalk on the east side of the bridge.

Access along Water Street for existing businesses will remain unchanged for the following businesses/land uses: Cracker Barrel, Bridgewater Marina, Bob Evans, Speedway and the Girl Scouts Building. Access to Township Park 1 will be modified slightly. (see **Chapter 4.0** for further details).

For the visually impaired, a signalized pedestrian crossing could possibly be provided. The crossing would provide a signal to stop traffic on demand for pedestrians by pushing a crossing button which would activate the signal. Another option could be to provide a down-stream pedestrian crossing.

The exact configuration of the intersections and pedestrian crossing will be determined during the design phase of the project. The amps to Water Street will be upgraded to current design standards.



LEGEND	
	Rising or Elevated Sections
	At Grade
	Impacted Parcels

Recommended Alternative Blue Water Bridge Plaza Study

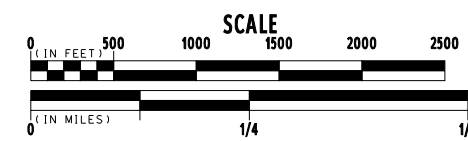


Figure 2.3.8 I-94/I-69 Corridor Improvements

This page intentionally left blank.

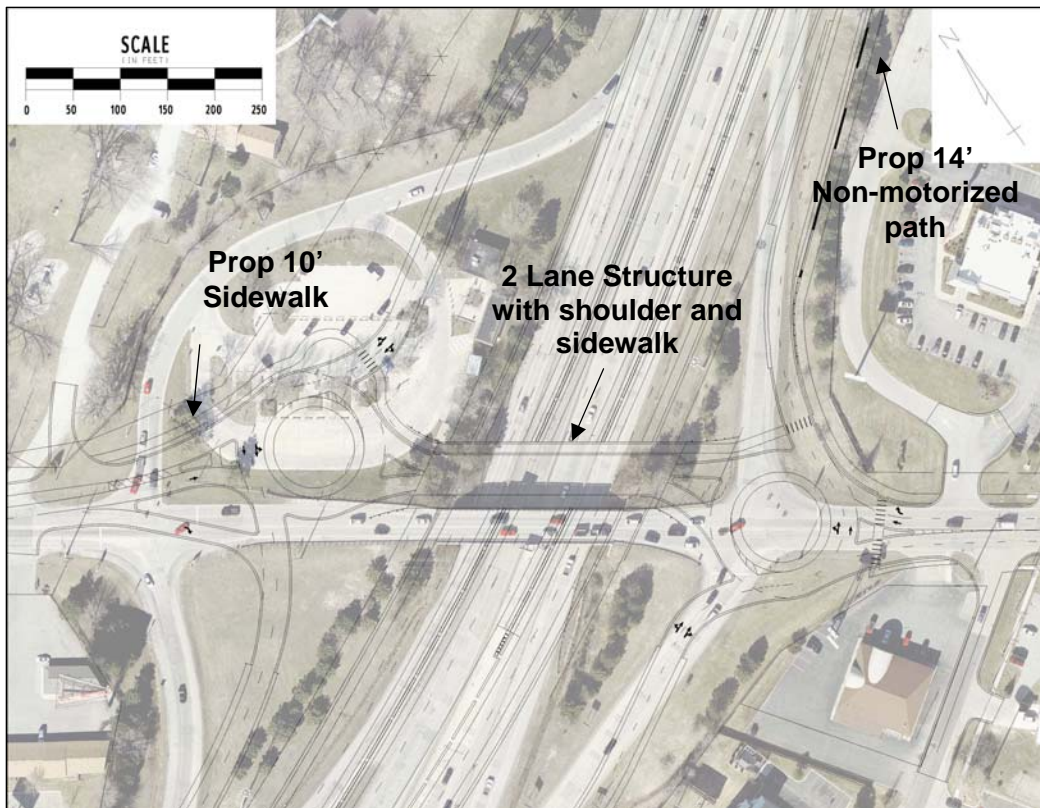


Figure 2.3.9 Water Street interchange

Lapeer Connector Connections: The Recommended Alternative will improve access for local traffic to the Lapeer connector. Currently, only traffic headed to I-94/I-69 east or from I-94/I-69 west can use the Lapeer connector. The Recommended Alternative provides access from all directions of I-94/I-69 as illustrated in **Figure 2.3.10**.



Figure 2.3.10 Lapeer Connector interchange

Eastbound I-94/I-69 will have direct ramp access from the freeway to the Lapeer connector. The other access movements will all use auxiliary/collector lanes. Traffic from northbound Lapeer connector wanting to travel east will travel through the Water Street interchange to connect to the eastbound lanes for local traffic.

A collector road will be constructed along westbound I-94/I-69 that will connect with the westbound intersection at the Water Street interchange. The collector road will include an intersection at the Lapeer connector that will allow westbound traffic to turn onto the Lapeer connector and head south. Northbound traffic on the Lapeer connector will be able to turn left at this intersection and proceed onto westbound I-94/I-69. Traffic from westbound I-94/I-69 wanting to travel south on the Lapeer connector will exit at Water Street, travel through the Water Street interchange and then onto the collector road. The collector road also would serve as the ramp from Water Street to westbound I-94/I-69 as well.

The new Lapeer connector configuration will require the entrance from Indian Drive onto the Lapeer connector to be shifted approximately 300 feet south to meet current MDOT safety standards.

New Michigan Welcome Center: In response to comments received on the DEIS, the location of the new Michigan Welcome Center was analyzed further. The first location was on the vacant land to the north of I-94/I-69 approximately one mile west of its current location (as shown in the DEIS). The second location was within the median (between eastbound and westbound lanes) of I-94/I-69, also one mile west of the current welcome center. The new Michigan Welcome Center property will encompass approximately 54 acres.

The median option was evaluated and dismissed due to geometric and safety concerns and the inability of this alternative to meet minimum MDOT and FHWA safety standards. Specifically, there was not enough traffic weaving space between the newly proposed westbound Lapeer connector on-ramp and a proposed left-hand off-ramp to the Michigan Welcome Center to safely accommodate this movement. The same problem existed with the eastbound

ramp from I-69 to I-94/I-69 and the eastbound welcome center off-ramp. Additionally, the amount of space available within the median did not provide enough acreage to meet the minimum design standards needed to accommodate parking requirements for a full service welcome center.

Figure 2.3.8 shows a conceptual layout for the new Michigan Welcome Center for the Recommended Alternative with the proposed I-94/I-96 corridor. The Michigan Welcome Center layout has changed slightly since the DEIS. The new Michigan Welcome Center will consist of a modern building per MDOT's current design standards for welcome centers along with parking for up to 100 cars and 50 trucks.

North of the truck parking area a Michigan State Police (MSP), Motor Carrier Inspection facility has been added. This facility will be used by MSP to assist in the enforcement of State of Michigan and Federal Motor Carrier regulations. The facility will include a weigh scale and a small inspection building.

The Michigan Welcome Center will be landscaped and will include a berm of up to 15-feet high on three sides to reduce noise and visual impacts for surrounding residents.

The Study Team has held ongoing public consultation and has examined conceptual ideas for the Michigan Welcome Center. The development of Context Sensitive Solutions (CSS) has been an ongoing part of the study process to date. The CSS approach involves all stakeholders to develop a facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. The Study Team will continue to follow the CSS process throughout the design phase.

The final parking layout and building structural appearances will be finalized during the design phase. MDOT will hold a public workshop to develop aesthetic and landscaping treatments for the Michigan Welcome Center. These will include preservation to the extent possible of existing forested land and wetlands on the site in areas not affected by the welcome center complex.

Local Road Improvements: The Recommended Alternative will include several improvements to local roads surrounding the

plaza. The intersection at 10th Avenue and Pine Grove Avenue will be reconstructed for the new Pine Grove Avenue. Scott Avenue will no longer connect to this intersection, ending in a cul-de-sac. North of the plaza, Hancock Street will be realigned to connect with the relocated Pine Grove Avenue and will be widened to three lanes between 10th Avenue and relocated Pine Grove Avenue. The M-25 connector northbound will end at Pine Grove Avenue. A minor realignment of Riverside Drive will occur where it crosses under I-94/I-69 and connects to Scott Avenue.

Pine Grove Avenue Relocation: The relocation of Pine Grove Avenue to the west of the new plaza is a key part of the Recommended Alternative. Existing Pine Grove Avenue between 10th Avenue and Hancock Street will be closed. The new relocated Pine Grove Avenue will be a boulevard from 10th Avenue northbound. Since the release of the DEIS, the proposed roundabout on Pine Grove Avenue at 12th Avenue has been changed to an indirect left. As illustrated on **Figure 2.3.11**, the proposed relocation of Pine Grove Avenue will have the following features:

- **A:** A ramp from northbound Pine Grove Avenue to the new plaza
- **B:** An intersection at the ramp for local traffic from I-94/I-69 to Pine Grove Avenue
- **C:** A bridge over the ramps from I-94/I-69 to the plaza
- **D:** An intersection at the ramp from the new plaza to Pine Grove Avenue to provide access in all directions and access from Pine Grove Avenue to westbound I-94/I-69
- **E:** A new intersection, Hancock Street and the new northbound lanes of relocated Pine Grove Avenue
- **F:** A connection to existing Pine Grove Avenue at Riverview Street for the northbound lanes of the realigned Pine Grove Avenue

2.3.3 Design Criteria (Corridor and Plaza)

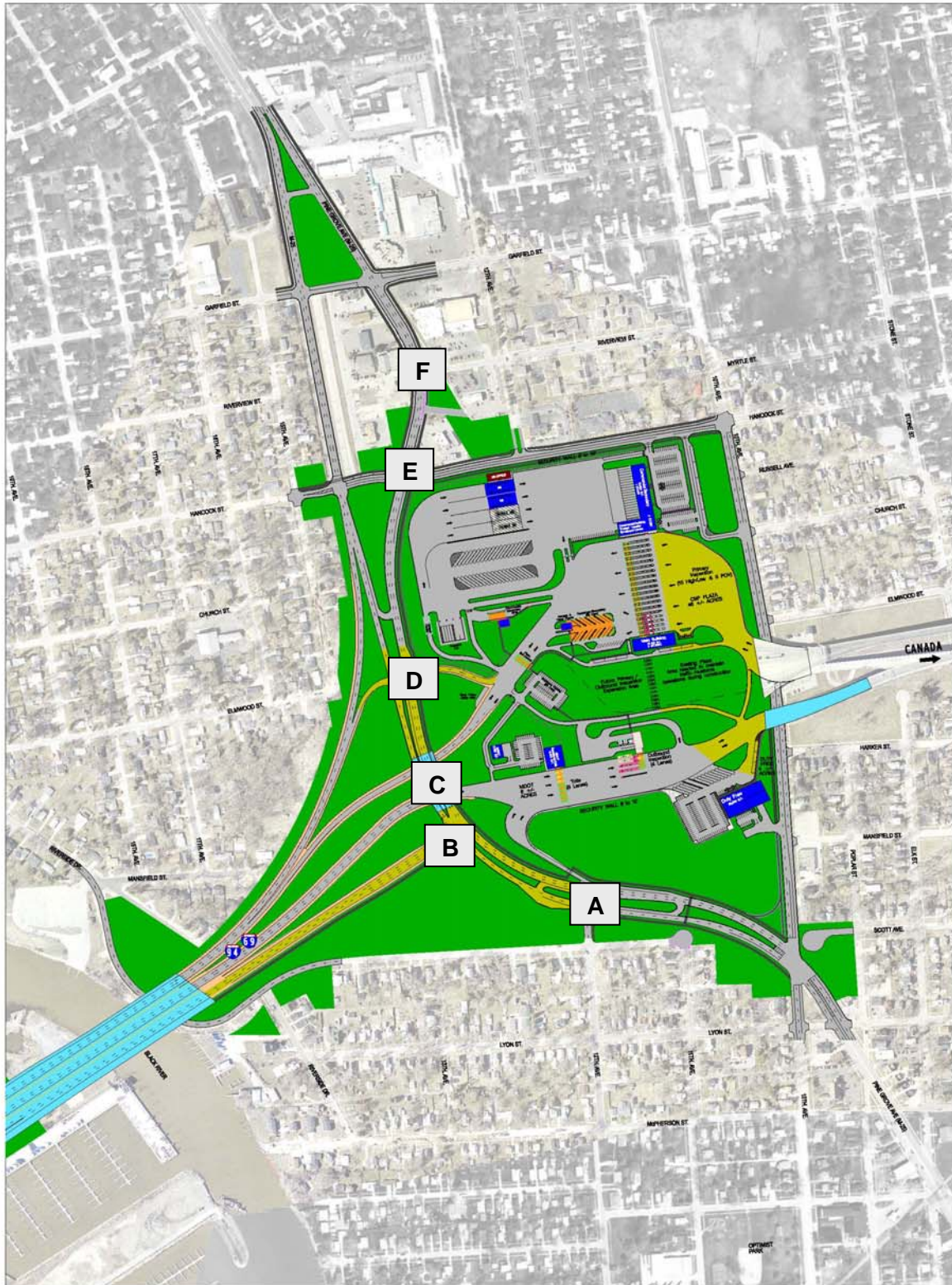
The Study Team identified key engineering and facilities design criteria based on reasonable engineering standards and information on facilities and security requirements provided by CBP and GSA. Refer to **Section 2.2.1** of the DEIS for full design criteria details. All roadway and bridge design criteria

remained consistent between the DEIS and this FEIS, with the exception of roundabouts added at the Water Street interchange.

Roundabout Design Criteria: Roundabouts were designed at the Water Street interchange to maximize safety and to minimize ROW impacts to businesses and Township Park 1 along Water Street. Signalized intersections would have greater ROW impacts on businesses and park property located along Water Street.

Refer to the **Roundabout Technical Memorandum**, available from MDOT, for full roundabout details at the Water Street interchange. Traffic analysis was completed using RODEL (Roundabout Delay) software to determine the required geometry and resulting traffic performance. The two Water Street roundabouts have been designed according to the *MDOT Roundabout Guidance Document*. **Figure 2.3.12** and **Table 2.3.0** shows basic roundabout design criteria. Each roundabout was designed to provide a geometrically safe and efficient continual flow intersection that fits within the constraints of each individual intersection. This is unlike a regular intersection designed to specific design standards based on the design speed of the through road, in this case requiring additional ROW from adjacent businesses.

Recommended Alternative Blue Water Bridge Plaza Study



LEGEND	
	Widening or Elevated Sections
	At Grade
	Impacted Parcels



Figure 2.3.11 Recommended Alternative and Pine Grove Avenue Relocation

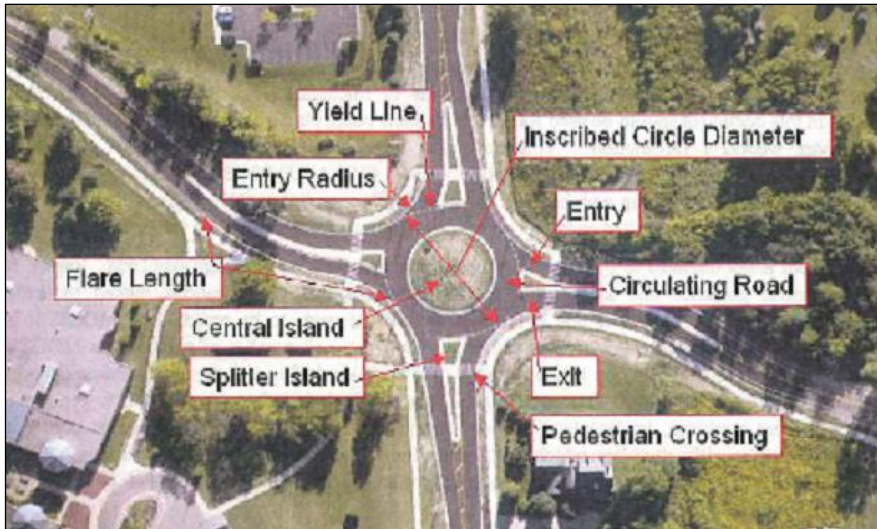


Figure 2.3.12 Basic Roundabout Criteria

Table 2.3.0 Design Criteria

Design Criteria	Value
Circulating Speed	25 mph +/-
Percentage Trucks	10%
Design Vehicle	WB-65
Entry Lane Width	Min.=10 ft., Max.=22 ft., Ave.=12 ft. to 16 ft.
Circulating Lane Width	1.0 to 1.2 times widest entry lane width
Level Of Service (LOS)	D or better
Average Delay (minutes)	1.0 or better

The goal of a roundabout design is to keep vehicles flowing at a controlled slow speed providing safe operation and increased efficiency over conventional intersections. The two Water Street roundabouts keep circulating speeds at or below 25 mph.

Each roundabout has a skew angle of 82 degrees for the I-94/I-69 exit ramps. This is more desirable for the elderly community than the signals in which both intersections have skew angles of 73 degrees. According to an Elderly Mobility Study conducted by the Southeast Michigan Council of Governments (SEMCOG), elderly drivers favor angles as close to 90 degrees as possible.

In **Tables 2.3.1** and **Table 2.3.2** are the Water Street roundabout summary of results for 2030 AM and PM Peak Hour traffic. The signal queue length is based on the 95th percentile, while the roundabout queue is two times the maximum queue length. Both equate to approximately the worst-case queue length.

Table 2.3.1 and **Table 2.3.2** show delay information at the WB intersection for a signal and roundabout. The majority of approach legs perform better with roundabouts than signals with the exception of NB Water Street in the PM peak. Queue lengths are all shorter for roundabouts which is desirable with the close proximity of the two intersections (370 feet) and the short length of each ramp.

Table 2.3.1 I-94/I-69 Westbound Off Ramp and Water Street Intersection – 2030 AM Peak Hr.

West Bound Intersection	AM 2030 volumes	Signalized			Roundabout		
		Ave. Delay (s)	LOS	Queue 95 th (feet)	Ave. Delay (s)	LOS	Max Queue (x2) (feet)
Water St. SB	600	28.5	C	369	23.4	C	150
Ramp EB	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water St. NB	240	22.1	C	143	12.6	B	0
Ramp WB	1060	32.2	D	343	15.6	B	50
OVERALL	1900	29.8	C	N/A	17.7	B	N/A

Table 2.3.2 I-94/I-69 Westbound Off Ramp and Water Street Intersection – 2030 PM Peak Hr.

West Bound Intersection	PM 2030 volumes	Signalized			Roundabout		
		Ave. Delay (s)	LOS	Queue 95 th (feet)	Ave. Delay (s)	LOS	Max Queue (x2) (feet)
Water St. SB	470	28.9	C	295	22.8	C	100
Ramp EB	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water St. NB	790	6.9	A	152	19.2	B	100
Ramp WB	860	33.1	D	392	13.8	B	50
OVERALL	2120	22.4	C	N/A	17.8	B	N/A

Table 2.3.3 and Table 2.3.4 show that roundabouts perform better than signals for all approach movements. Again, the queue lengths for the signals are significantly longer than for roundabouts. The closest signal is south on Water Street at Campau Avenue, which provides actuated signal access for the neighborhood. It is not anticipated that there will be any interaction between this signal and the southern roundabout.

Table 2.3.3 I-94/I-69 Eastbound Off Ramp and Water Street Intersection – 2030 AM Peak Hr.

East Bound Intersection	AM 2030 volumes	Signalized			Roundabout		
		Ave. Delay (s)	LOS	Queue 95 th Percentile (feet)	Ave. Delay (s)	LOS	Max Queue x2 (feet)
Water St. SB	650	32.1	D	392	14.4	B	50
Ramp EB	790	11.8	B	262	15.6	B	50
Water St. NB	450	21.9	C	175	12.0	B	0
Ramp WB	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OVERALL	1890	21.2	C	N/A	14.3	B	N/A

Table 2.3.4 I-94/I-69 Eastbound Off Ramp and Water Street Intersection – 2030 PM Peak Hr.

East Bound Intersection	PM 2030 volumes	Signalized			Roundabout		
		Ave. Delay (s)	LOS	Queue 95 th Percentile (feet)	Ave. Delay (s)	LOS	Max Queue x2 (feet)
Water St. SB	560	17.1	B	149	16.8	B	50
Ramp EB	940	33.4	D	470	12.6	B	50
Water St. NB	870	27.9	C	328	16.8	B	100
Ramp WB	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OVERALL	2370	27.5	C	N/A	15.1	B	N/A

Pine Grove Avenue Roundabout: Other elements of the project design were reviewed to ensure the best local road operations in conjunction with the plaza design. The roundabout previously located at 10th Avenue and Pine Grove Avenue has been replaced with a non-signalized boulevard with indirect lefts to provide more storage for local vehicles accessing the plaza in case of unforeseen delay from the plaza.

CBP Plaza Facilities/POR Design Criteria: **Table 2.3.5** highlights the basic CBP plaza design criteria changes from the DEIS to this FEIS. The changes were made to be consistent with CBP's revised POR issued in June 2008.

The following basic security features are required for the plaza and remained consistent between the DEIS and this FEIS:

- Separation of public and inspection functions
- Eight to ten-foot perimeter walls/fencing
- All vehicles entering and exiting the plaza are subject to inspection
- Exit control to ensure vehicles do not exit the plaza prior to completion of inspection

Table 2.3.5 Basic CBP Plaza Design Criteria

Facility	DRAFT EIS	FINAL EIS	Comments:
CBP Overall Acreage	60-80 acres	46 acres	
CBP Inspection Office Bldgs.	190,000 sq. ft.	44,000 sq. ft.	FEIS space includes space in Main, head house, Commercial Secondary, and Outbound Building's.
Loading Docks	18,000 sq. ft. 12 docks	18,000 sq. ft. 20 docks	
NII Building	3 NII Buildings	2 permanent NII 2 temporary NII	Adequate space is needed to accommodate truck circulation through the facilities.
Primary Inspection Booths	20 lanes with the ability to expand to 30	20 lanes with the ability to expand to 30	
Outbound Inspection Facilities	Space equivalent to a small port of entry, including: 10 inspection booths	4 inspection booths 2 docks	The outbound inspection facility shrank significantly for this FEIS as discussed in Section 1.6.1 .
Secondary Commercial Parking	100 spaces	36 spaces	
Employee Parking	580 spaces	170 spaces	Does not include MDOT staff parking.
Custom's Broker Office Space	12,000 sq. ft.	Not included on the plaza	Brokers will be located off the plaza. All future business will occur via a kiosk/call window.

- No major roadways located underneath plaza inspection facilities or under plaza exit/entry ramps (I-94/I-69), although minor city roadways may remain under the Blue Water Bridge and under plaza exit/entry ramps

- Incorporation of basic security standards from the GSA Land POE design guide for plaza facilities
- Space for Radiation Detection Portals
- Space for a USDA observation area for animal inspections. No unloading will occur on the plaza
- Space for impounding vehicles and hazardous materials containment is still required. However, the June 2008 POR required less vehicle parking

2.3.4 Projected Travel Time Delays

In response to comments received on the DEIS, the Blue Water Bridge Study Team prepared a Travel Time Delay Study. This analysis was prepared in response to DEIS commenters wanting to know how the Recommended Alternative would perform compared to existing border crossing delays. The results show delay in the form of wait times and queue length at the existing plaza compared to the 2030 No-Build Alternative and the Recommended Alternative.

Delay Analysis Model: To provide an accurate analysis of traffic operations on the Blue Water Bridge, it is essential for the entire border crossing to be treated as a system. Toll facilities, bridge structures, customs facilities, approach roadways, and the off-site routing of agricultural inspections all affect traffic movements and delay times. The Study Team utilized WATSim®, a computer simulation software, for the Blue Water Bridge delay analysis to model the proposed improvements.

WATSim® is a microscopic traffic simulation model. The model's strength lies in its ability to accurately represent the performance characteristics of individual vehicles as well as driver behavior over the full range of decision processes.

WATSim® models driver behavior to select the most appropriate toll, customs, or CBP lane, based on current queue. Simulated drivers "decide" which lane will offer the fastest service based on a realistic assessment of current conditions. The model also simulates weaving and merging movements on the plaza and bridge and was utilized to calculate delay and the spatial extent and duration of queues based upon plaza processing times. Just as important, WATSim® represents driver behavior along the local road and

freeway approaches and exits. This enables the simulation to accurately predict the effectiveness of the proposed improvements and confirm that plaza improvements do not result in adverse traffic operations on the I-69/I-94 corridor and local roads downstream from the plaza.

The model was used to validate and calibrate a delay condition for inbound primary inspection based on the existing number of car and truck lanes, current volume of traffic, and existing average processing times. It should be noted that processing times are dependant on many factors that can produce significantly different results such as national security level, or the types of trucks passing through the plaza.

The existing model was validated and was then used to simulate Future 2030 Build and No-Build conditions and analyze traffic operations. Delay is a measure of the time added to the normal travel time of a particular movement travelling below the free flow speed.

Data Collection: MDOT provided traffic and plaza operations data for the last week in July, 2008, based on the criteria above. The goal for the existing model was to provide validated processing capacities of the PILs in comparison to corresponding observed average queue lengths and wait times. These validated values for processing rates, queue length and wait time were then applied to the 2030 forecasted volumes to provide a prediction of the existing plaza under future traffic conditions and the proposed plaza. The Study Team selected Tuesday, July 29, 2008 as the sample to model, which demonstrated average heavy traffic volumes and queue lengths that reflected average wait times on an average busy day with all 13 PILs open, as summarized below in **Table 2.3.6**. The traffic volumes shown below are between 10 am and 4 pm, which were the heaviest volumes of that particular day. The data in **Table 2.3.6** was taken from CBP's log from July 29th, 2008.

Table 2.3.6 Recorded Sample Traffic Data

Hour Ending at	Cars	Lanes Open	Trucks	Lanes Open
Tuesday July 29th, 2008				
10 am	418	5 + 1	160	6 + 1
11 am	425	7 + 1	134	4 + 1
12 pm	359	7 + 1	140	4 + 1
1 pm	291	7 + 1	140	4 + 1
2 pm	391	6 + 1	134	5 + 1
3 pm	340	6 + 1	130	5 + 1
4 pm	348	7 + 1	102	4 + 1

The +1 in **Table 2.3.6** designates an open FAST or NEXUS lane. The data above at 11 am to 12 pm produced car queues to the center of the Blue Water Bridge with approximately 15 to 25 minutes delay, and truck queues from the U.S. inspection plaza over the bridge to the Canadian plaza with approximately 40 to 50 minutes delay as verified by MDOT Bridge personnel. This does not include inspection time or the time taken to travel the same distance at free flow speed. It measures the time taken for a vehicle to travel from the queue end to the stop prior to U.S. Inspections excluding the free flow speed time. The average time for a vehicle to travel from the Canadian plaza to the stop prior to U.S. inspection at free flow speed is approximately three minutes based on an average speed of 30 mph over a distance of 1.3 miles. Therefore, delay is a measure of the additional time taken to cross the border on top of free flow time (Canadian plaza to U.S. plaza) and processing time, in this case equal to an average of five minutes including start and stop times for heavy vehicles.

Assumptions: To validate the existing model a number of assumptions were made:

- All PILs are open for processing (fully staffed)
- Car queues backup to center of bridge and truck queues backup to Canadian plaza
- 17% of traffic uses FAST/NEXUS (trucks and cars)
- Mid-week, mid-day peak hour model
- 7 car lanes, 4 truck lanes, 1 FAST lane, & 1 NEXUS lane (11:00 a.m. sample design hour selected)

- Processing rates were deemed to be reflective of orange threat level on a typical day in July (2008)
- 25% commercial vehicles
- The validated average processing times are directly applied to the future No-Build scenario and the Recommended Alternative for 2030 traffic
- The FAST/NEXUS percentages were modified to 30% for the future models. There will be the ability on the proposed plaza to have up to two FAST and two NEXUS lanes, but this model assumes only one FAST and one Nexus lane.

Existing 2008 Model Validation/Calibration: The existing model was calibrated using the traffic volumes described in **Table 2.3.6** with all 13 booths open as 7 car lanes, 4 truck lanes, 1 FAST lane and 1 NEXUS lane. The approach lanes on the bridge include the left lane for trucks, the center lane for FAST/Nexus vehicles, and the right lane for cars. The processing rates were assigned based on the same average rates observed for the time slot based on a national security level of orange. FAST and Nexus vehicles are processed separately and at a quicker rate than standard processing, therefore 17 percent of vehicles were set as FAST and Nexus vehicles. The results were validated to field observations as displayed in Table 2.3.7.

Table 2.3.7 Model Outputs versus Field Observations

Description	Field Observations	Simulation
Vehicles Processed at Facility (per hour)	575 vehicles (average)	585 vehicles
Maximum Queue	Cars ~ 0.6 mile (half way across bridge) Trucks ~ 1.3 miles (close to Canadian Plaza)	Cars ~ 0.5 mile Trucks ~ 1.3 miles
Average Delay*	26.3 min/vehicle (weighted average)	22.3 min/vehicle (weighted average)
* Delay is the queue time from beginning to end not including the time taken to drive the same distance at free flow speed (delay = total wait time in queue – normal travel time).		

The results show that the existing model closely replicates the field observations and hence validates the model.

Proposed 2030 No-Build Models: Two different peak periods were analyzed; peak passenger traffic in July, and peak commercial traffic in October. The same assumptions and average processing times used for the existing model were applied to the existing plaza with 2030 traffic volumes. Below in **Table 2.3.8** is the summary of results for 2030 Passenger and commercial design hours.

The 2030 No-Build results show that the existing plaza would experience greater delays and backups in 2030 than with existing traffic for commercial and passenger design hours.

Table 2.3.8 2030 No-Build Passenger and Commercial Results

	Passenger Design Hour	Commercial Design Hour
PILs Configuration	8 Car Lanes 3 Truck Lanes 1 FAST Lane 1 NEXUS Lane	4 Car Lanes 7 Truck Lanes 1 FAST Lane 1 NEXUS Lane
Maximum Queue	Approx ½ mile beyond Canadian plaza	Beyond Study Area over 0.8 miles beyond Canadian plaza
Average Delay*	31.8 minutes/vehicle	23.7 minutes/vehicle
Hourly Throughout	814 Total vehicles processed in model	539 Total vehicles processed in model
* Delay is the queue time from beginning to end not including the time taken to drive the same distance at free flow speed (delay = total wait time in queue – normal travel time).		

Proposed 2030 Build Models: The same assumptions and average processing times used for the existing model were applied to the proposed plaza with 2030 traffic volumes. The same peak periods used for the future No-Build model were used for the future peak along with the high range volumes from the traffic forecast. The reason for using the high range forecast **was to analyze a potential** worst case scenario. The model assumes that all 20 future Primary Inspection Lanes (PILs) are operational. The results for the passenger and truck 2030 design hours are presented in **Table 2.3.9**.

Table 2.3.9 Passenger and Commercial Results

	Passenger Design Hour	Commercial Design Hour
PILs Configuration	13 Car Lanes 5 Truck Lanes 1 FAST Lane 1 NEXUS Lane	5 Car Lanes 13 Truck Lanes 1 FAST Lane 1 NEXUS Lane
Maximum Queue	Contained within plaza area	Contained within plaza area
Average Delay*	3.4 minutes/vehicle	3.1 minutes/vehicle
Hourly Throughput	944 Cars DHV 181 Trucks DHV 1125 Total vehicles processed in model	362 Cars DHV 496 Trucks DHV 858 Total vehicles processed in model
* Delay is the queue time from beginning to end not including the time taken to drive the same distance at free flow speed (delay = total wait time in queue – normal travel time).		

The results show that given the proposed plaza configuration and the 20 PILs that all traffic in the passenger and commercial design hours can be adequately processed with minimal delay. It is important to note that the two scenarios modeled are based on the following factors:

- Proposed 2030 DHV forecast
- Average processing times
- Fully staffed booths
- A set booth configuration
- No downstream impact on booth operations

All of the factors above are fluctuating variables that will affect the operation of the PILs; however, the 2030 models developed provide a level of confidence that given two conservative design hours, the proposed plaza operates well. The delay analysis results are summarized in **Table 2.3.10**.

Table 2.3.10 Delay Analysis Summary

Model Output	Passenger Peak		Commercial Peak	
	Future No-Build	Future Build	Future No-Build	Future Build
Vehicles Processed per hour	814	1110	539	844
Average delay* (min/veh)	31.8	3.4	23.7	3.1
Maximum Queue Cars	1.7 miles	Within Plaza	Within Plaza	Within Plaza
Maximum Queue Trucks	1.5 miles	Within Plaza	Beyond Study Area (>1.8 miles)	Within Plaza
* Delay is the queue time from beginning to end not including the time taken to drive the same distance at free flow speed (delay = total wait time in queue – normal travel time).				

Sensitivity Check: A sensitivity check was developed to provide a level of confidence as to how close to capacity the proposed model plaza would be operating during the two design hours. The number of PILs open during the passenger and trucks design hour models were decreased to assess the change in delay given the same traffic loads. During the passenger peak, commercial booths were closed and during the commercial peak, passenger lanes were closed. **Tables 2.3.11** and **2.3.12** are the summary of the sensitivity results.

During the passenger design hour, the model predicts that closure of three-commercial lanes would result in severe delay into Canada. During the commercial design hour, the model predicts that closure of three-passenger lanes would result in some additional delay.

Table 2.3.11 Sensitivity of Passenger Results

Case	Delay*	Maximum Queue (Cars)	Maximum Queue (Trucks)	Vehicles Processed per hour
18 Staffed Lanes	3.4 minutes/vehicle	Within Plaza	Within Plaza	1110
15 Staffed Lanes	9.2 minutes/vehicle	Within Plaza	Beyond Study Area (more than ½ mile beyond Canadian Plaza)	1036
13 Staffed Lanes	15.5 minutes/vehicle	0.1 mile	Beyond Study Area (more than ½ mile beyond Canadian Plaza)	922
No-Build 11 Staffed Lanes	31.8 minutes/vehicle	1.7 miles	1.5 miles	814
* Delay is the queue time from beginning to end not including the time taken to drive the same distance at free flow speed (delay = total wait time in queue – normal travel time).				

Table 2.3.12 Sensitivity of Commercial Results

Case	Delay*	Maximum Queue (Cars)	Maximum Queue (Trucks)	Vehicles Processed per hour
18 Staffed Lanes	3.1 minutes/vehicle	Within Plaza	Within Plaza	844
15 Staffed Lanes	19.5 minutes/vehicle	1.0 mile	Within Plaza	705
13 Staffed Lanes	22.8 minutes/vehicle	1.0 mile	0.5 mile	668
No-Build 11 Staffed Lanes	23.7 minutes/vehicle	Within Plaza	Beyond Study Area (more than ½ mile beyond Canadian Plaza)	539
* Delay is the queue time from beginning to end not including the time taken to drive the same distance at free flow speed (delay = total wait time in queue – normal travel time).				

2.3.5 Comparison of Recommended Port Huron Port of Entry (POE) to other POE's

To provide the reader with a wider understanding of the Port Huron POE, this section provides an overview of some of the other northern border crossings. Port Huron is consistent with

other northern border plaza improvements. **Table 2.3.13** is a comparison of existing and proposed U.S plaza acreages and existing traffic volumes for the larger border crossings between the U.S. and Canada proposed for improvements.

Table 2.3.13 Existing and Proposed U.S. Plaza Acreages vs. Existing Traffic Volumes

Border Crossing	Existing Size (acres)	Proposed Size (acres)	Existing Truck Volumes (2005 ADT)	Existing Car Volumes (2005 ADT)	Existing Total Volumes (2005 ADT)
Ambassador Bridge	39	39	1,722,793	2,932,817	4,693,939
Peace Bridge	14	45	644,148	2,803,130	3,462,904
Lewiston/Queenston	28	30	481,081	1,547,309	2,034,413
Thousand Island Crossing	13	63	232,186	650,658	885,157
Champlain	16	27	388,869	973,706	1,371,040
DRIC	N/A	150	N/A	N/A	N/A
Blue Water Bridge	18	56	922,401	1,953,413	2,879,563

Based on public comments received for the DEIS the Port Huron POE was compared to the Peace Bridge. The historical traffic numbers above show that Port Huron has greater volumes of truck traffic despite having a lower overall traffic volume. Trucks require approximately three times the space as passenger cars and take longer to inspect. The Port Huron plaza accommodates toll collection facilities and outbound inspection facilities, which are not present on the Peace Bridge.

2.3.6 Project Staging/Maintenance of Traffic Goals

Maintenance of Traffic (MOT) is related to construction staging as they both have a substantial impact on the amount of time it takes to build a project. In construction staging, an in-depth plan is laid out for each stage of construction to determine which elements of a project may or may not be constructed simultaneously and to make sure that traffic flow can be maintained safely and efficiently.

Another important impact is how these stages affect the business areas that rely on the roads to be reconstructed and those used for detours. It must be understood that re-routing I-69/94 corridor and bridge traffic on to the surface streets within the city will cause gridlock. Police, fire and ambulance response will be interrupted, as will the operation of the

remaining businesses. All efforts must be made to minimize the local impacts of this project, to the greatest extent possible.

Should traffic need to be detoured during construction, then the presence of the existing Bascule Bridges within the city must be taken into consideration. In accordance with Federal Law, these bridges must open for boat traffic, which can cause a disruption in the flow of traffic for up to seventeen minutes per hour (17 min/hr).

MDOT and the city recognize the importance of minimizing the traffic impacts to the local community as a result of this project, to the greatest extent possible.

The main objectives of construction staging are to minimize delays, minimize congestion, maintain the required access, and complete the project in a reasonable timeframe. Below is a summarized list of preliminary planning goals for the project construction staging:

- Provide two lanes of I-94/I-69 traffic in each direction
- All plaza operations will be maintained throughout construction with the aid of temporary connections
- Minimize Water Street and Lapeer connector ramp closures
- Maintain Water Street traffic over I-94/I-69 throughout construction
- Complete the upgraded Black River Bridge prior to beginning construction on the plaza
- Maintain two lanes of Pine Grove Avenue traffic in each direction
- Maintain access to businesses and minimize delay to thru traffic

These planning goals will be further defined during the design phase. MDOT will make every effort to reach agreement with the City and County Road Commission engineering staffs on final goals and implementation strategies, prior to the beginning of construction.

Based on comments received on the DEIS in regards to MOT staging concepts, the Study Team revised the preliminary staging plan. The following is a description of the original

proposed MOT staging plan that meets the aforementioned MOT planning goals that could be implemented for the Recommended Alternative:

I-94/I-69 Corridor Construction Staging:

Stage 1: Temporary construction including crossovers and pavement widening to accommodate shifted traffic movement during later stages.

Stage 2: Construct southern portion of Black River Bridge, eastbound I-94/I-69, the new Michigan Welcome Center, Lapeer connector and Water Street interchanges.

Stage 3: Construct westbound portion of Black River Bridge, westbound I-94/I-69, and remaining portions of the Michigan Welcome Center.

Plaza and Local Roads Construction Staging:

Stage 1: Site preparation, including the demolition of all required structures within the construction limits and removing debris from the site, and construction of relocated Pine Grove Avenue.

Stage 2: All Pine Grove Avenue traffic will be rerouted onto the new Pine Grove Avenue facility. Construction of the southern portion of the plaza will commence.

Stage 3: Construction of the northern portion of the plaza will commence.

Stage 4: The existing elevated plaza and facilities will be demolished and graded with final elements of plaza construction completed.

Compliance with MDOT's Mobility Policy: MDOT's Work Zone Safety and Mobility Policy and corresponding manual were established by MDOT to improve safety and mobility in work zones by reducing congestion and traffic incidents. This policy will be followed to minimize congestion within work zones. MDOT will work closely with the city of Port Huron and St. Clair County Road Commission engineering staff and

make every effort to reach consensus on the final staging plan and maintenance of traffic provisions prior to the beginning of construction.

This FEIS staging and Final staging prepared are also designed in accordance with the Michigan Manual of Uniform Traffic Control Devices Design Manual. The current edition of the MDOT Standard Specifications for Construction presents guidelines for traffic control and maintaining traffic.

During the final design and construction phases of the project, MDOT will coordinate closely with the city of Port Huron, local emergency responders, and the Blue Water Transit Authority to minimize to the greatest extent possible delays associated with construction activity.

Construction Duration: The estimated time period to construct the corridor is three years. The estimated time period to construct the plaza and the associated local road realignments is three years. If construction begins in 2011 (likely on the Black River Bridge), construction would be completed on the entire project by the end of 2016.

2.3.7 Cost Estimate of the Recommended Alternative

Since the release of the DEIS, the Study Team has refined the cost estimate for the Recommended Alternative to reflect the changes made to the Recommended Alternative and additional engineering analysis. The costs were developed by estimating the items that make up the largest parts of the Recommended Alternative. The largest costs for the alternatives include:

- **Roadway Items** – such as pavement, curbs and earthwork
- **Drainage** – includes enclosed drainage systems, detention areas and erosion control treatments
- **Maintaining Traffic** – Includes all items associated with maintaining the flow of traffic throughout the stages of construction
- **Bridges** – includes all bridge items such as steel beams, and concrete foundations
- **Permanent Pavement Markings/Signs/Signals** – includes all items associated with the above

- **Miscellaneous Items** – includes buildings such as toll booths, inspection booths, main buildings and other items such as retaining walls, lighting and landscaping
- **Right-of-Way** – the estimated cost of purchasing homes, businesses, and vacant properties affected by the Recommended Alternative

The cost estimate is based on the engineering level developed during the environmental process. During the final design process, a final estimate will be prepared and distributed to construction contractors. The actual costs will depend upon the bidding process, which contractors and their suppliers will eventually bid on and determine the price of the selected alternative.

This estimate includes a fifteen percent contingency to cover unknown elements that will arise during design. This cost estimate is based on 2008 average unit prices tracked by MDOT. **Table 2.3.14** contains the estimated costs for constructing the I-94/I-69 corridor, the Black River Bridge with Riverside Drive, and the plaza with I-94/I-69 and local roads.

The U.S. cost includes the bridge, plaza, interchange, associated property (including purchase of mineral rights) and relocation of utilities. The costs in 2008 dollars have been adjusted for inflation to translate the total costs to year of expenditure. This total cost assumes completion of the entire project in 2017.

A week-long Cost Estimate Review was conducted March 16-20, 2009 involving cost specialists from FHWA, MDOT and their consultants. During this review, the Recommended Alternative cost estimates were updated using the FHWA level-of-confidence approach. A similar approach is used for all major projects, such as the Blue Water Bridge Plaza, to determine the risks and opportunities associated with project elements (i.e., what is the likelihood that costs might change from those now estimated?). At the 70% confidence level, the updated cost estimate for the Recommended Alternative is calculated to be \$583.5 million. This cost includes the U.S. plaza, the I-94/I-69 corridor and local street improvements. It is recognized that this Recommended Alternative cost estimate may vary as risks and opportunities are encountered.

That is why this cost total is somewhat greater than the base cost expressed in **Tables 2.3.14** and **2.3.15**. Continued attention will be directed to the cost issue throughout implementation of the Blue Water Bridge Plaza project.

The Recommended Alternative has been included in SEMCOG's fiscally-constrained Regional Transportation Plan and will be added to its Transportation Improvement Program (TIP) for 2009 prior to the signing of the Record of Decision.

Year of Expenditure Estimate: Based on the construction staging and phasing components identified in **Section 2.3.9**, MDOT estimates the earliest construction could begin on either the corridor or plaza project is 2011. The cost estimates in **Table 2.3.14** are shown in 2008 dollars. In order to obtain a more realistic picture of the anticipated construction costs, MDOT must inflate these cost estimates to the year construction is anticipated to begin.

Based on past inflationary trends, MDOT utilizes an annual inflation of 5% for major road and bridge construction projects to project future construction costs. Using this assumption, MDOT estimates the following Year of Expenditure Costs for the project in **Table 2.3.15**.

Table 2.3.14 2008 Construction Costs

Cost Item	Corridor	Black River Bridge	Plaza	Total
Roadway Items	\$13,940,000	\$2,800,000	\$46,020,000	\$62,730,000
Drainage	\$1,700,000	\$580,000	\$2,820,000	\$5,100,000
Maintaining Traffic	\$1,460,000	\$300,000	\$4,110,000	\$5,870,000
Bridge Costs	\$6,020,000	\$28,500,000	\$10,650,000	\$45,170,000
Pavement Markings/Signs/Signals	\$1,720,000	\$530,000	\$3,800,000	\$6,050,000
Buildings/Miscellaneous	\$12,450,000	\$10,730,000	\$102,360,000	\$125,540,000
Sub-Station Relocation	N/A	N/A	\$20,750,000	\$20,750,000
ROW	-	-	-	\$150,000,000
CE Costs	\$3,690,000	\$4,300,000	\$16,160,000	\$24,150,000
Total	\$41,000,000	\$47,700,000	\$206,700,000	\$445,400,000
Source: Wilbur Smith Associates, 2008 2008 FEIS Total Cost Estimate = \$ 445,400,000 (includes Construction Engineering costs) 2007 DEIS Total Cost Estimate = \$ 433,000,000				

Table 2.3.15 Year of Expenditure Costs

Year of Expenditure Cost Estimate:	Corridor	Black River Bridge	Plaza & Local Road	Total
Construction Sub-total	\$43,179,000	\$50,244,000	\$225,635,000	\$319,058,000
Design/ROW/Misc.				\$213,566,000
Utility Relocations				20,750,000
TOTAL				\$553,374,000
Environmental Clearance				\$11,700,000
Source: Wilbur Smith Associates, 2008 Environmental Clearance cost not included in \$553,374,000 estimate Assumes Design occurs FY 2009-2011 Assumes ROW occurs FY 2009-2012 Assumes Construction occurs FY 2011-2016				

2.3.8 Funding/Implementation of Recommended Alternative

Following the issuance of the Record of Decision, MDOT will develop and submit to FHWA a financial plan for the project. This document will identify the detailed project costs and the proposed funding sources to be utilized to fund all phases of the project. The financial plan will be developed in compliance with FHWA’s guidelines for Mega Projects (defined as any project over \$500 million). The document will be available for public review once published, and will be updated annually in accordance with federal guidelines.

Funding for the design, ROW, and construction phases of the project will likely utilize funds from the following sources:

- Federal Aid SAFETEA LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users) Earmarks
- Federal Aid (Corridor and Border Improvement Program)
- Bonds backed by revenue from an updated GSA lease, an updated Duty Free lease, and BWB Toll Revenue.

Any proposed toll increases on the U.S. side of the Blue Water Bridge will be completed in accordance with the existing toll agreement.

The transportation industry is always looking for alternative ways to finance the construction, operation and maintenance of its assets. One of the new innovative methods is through a

partnership between the public sector and the private sector. Under this approach, the private sector funds what are traditionally public sector activities (design, construction, operation and maintenance of a facility) in exchange for the revenue generated by this asset for a pre-determined amount of time. This arrangement is called a public-private partnership (PPP). This PPP funding mechanism may be utilized to finance all or a portion of the plaza expansion project.

During the financial plan development phase, MDOT and its cooperating agency partners will make an assessment whether a public-private partnership can meet the following objectives:

- Maintain a safe and secure Blue Water Bridge crossing
- Conform with all CBP/GSA plaza requirements
- Ensure the efficient and integrated cross-border movement of people, goods, and services
- Minimize the use of public (state and federal) funds to the greatest extent possible
- Provide public transparency and accountability
- Protect the public interest

This evaluation will also be combined with legislative efforts to allow Michigan to enter into such agreements with private concessioners and to provide the underlying authority for the use of PPPs. It is expected that a resolution of this issue will be complete shortly after the Record of Decision.