

This chapter discusses the alternatives considered for improvements to both the United States Plaza at the Blue Water Bridge and the I-94/I-69 corridor and how the Study Team developed, refined and analyzed the alternatives over the course of the study.

The first part of the chapter, **Section 2.1 Alternatives Development**, discusses the alternatives development process and all of the alternatives that were considered during the study. The second part of the chapter, **Section 2.2 Alternatives Carried Forward**, discusses the No-Build Alternative and the three Build Alternatives still being considered by the Study Team. The third part of this chapter, **Section 2.3 Evaluation of Alternatives**, discusses how well the alternatives address the reasons for improving the plaza. **Section 2.4** discusses why the Study Team has identified the **City West Alternative as the Preferred Alternative**.



Existing United States Blue Water Bridge Plaza

**2.1 Alternatives Development**

This section discusses how the Michigan Department of Transportation (MDOT) and the Federal Highway Administration (FHWA) worked with government agencies, stakeholders, and the public to develop, refine, and evaluate potential alternatives for improvements to the United States Plaza at the Blue Water Bridge. The No-Build Alternative was always a consideration and was carried forward throughout the evaluation process. The alternatives development process included several steps. First, the Study Team developed some initial concepts for a new plaza. These initial concepts were further developed into 19 Illustrative Alternatives concepts. The Illustrative Alternatives concepts were further refined into six Illustrative Alternatives that were presented to the public. The other concepts were eliminated because they did not adequately address the purpose of and need for the improvements as stated in **Chapter 1 Why Are Improvements Needed?** The Study Team then evaluated the Illustrative Alternatives and modified them based on public and agency comments. Three of the Illustrative Alternatives were

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**What is an Illustrative Alternative?**

Illustrative Alternatives are conceptual layouts or ideas for proposed improvements and are developed early on in the process. There is not a lot of detailed engineering that goes into the Illustrative Alternatives.

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eliminated because they did not address the reasons for the improvements as well as the other alternatives. The remaining Updated Alternatives were presented for further public and agency comments. Based on a further analysis, the Study Team reduced the list of alternatives down to three Build Alternatives and the No-Build Alternative. These final four alternatives carried forward are described in detail in **Section 2.2 Alternatives Carried Forward** and are discussed throughout this Draft Environmental Impact Statement.

### 2.1.1 Initial Concepts

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#### What is a Charrette?

A charrette is a workshop to facilitate an open discussion between the stakeholders of a project, which typically uses a mixture of brainstorming and laying out of potential alternatives.

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Initial Concepts Charrette

The Study Team began the alternatives development process by collecting data on the existing facilities at the Blue Water Bridge plaza/corridor and discussing future facility needs with stakeholders. **Chapter 6 Public and Agency Coordination** identifies the stakeholders for the project. An initial list of the facilities needed was developed based on a facilities analysis prepared by the General Services Administration (GSA) and other needs expressed by plaza agencies.

Using the facility needs developed through GSA, MDOT held an Initial Concepts Charrette with plaza stakeholders. The charrette was attended by 47 individuals including representatives from Customs and Border Protection (CBP), GSA, Canadian stakeholders, and local governments. Charrette participants worked in breakout groups to identify issues and concerns to develop preliminary concepts for plaza improvements. Ideas from the charrette were used in the development of the Illustrative Alternatives.

### 2.1.2 Illustrative Alternatives - Phase 1

The Illustrative Alternatives development process included two phases. In the first phase, a wide variety of concepts and ideas for plaza improvements were explored. Some of these concepts were fully developed into alternative plans. Others were discarded once it became apparent they would not meet the objectives of the project. Nineteen concepts were evaluated during this phase of alternatives development. These alternatives are described below.

### **Illustrative Alternative 1 - Expand Elevated Plaza North and South over Pine Grove Avenue**

Illustrative Alternative 1 expanded the elevated plaza to the north and south over Pine Grove Avenue. An 11.5 acre street level truck secondary inspection area was added to the north between the existing plaza and Hancock Street. Illustrative Alternative 1 required property from the blocks between Hancock Street and the existing plaza and along the north side of Mansfield Street. Elmwood Street, between 10<sup>th</sup> Avenue and Pine Grove Avenue, and Harker Street west of 10<sup>th</sup> Avenue would have been closed. Illustrative Alternative 1 was refined into Illustrative Alternative A during Phase 2 of the Illustrative Alternatives development process as described later in this section.



**Initial Concepts Charrette**

### **Illustrative Alternative 2 - West Loop Ramp for Local Access**

Illustrative Alternative 2 expanded the elevated plaza to the north and south over Pine Grove Avenue. This alternative included a large bridge structure that provided additional local access and plaza movements at a central access point. A 12-acre street level truck secondary inspection area was added to the north between the existing plaza and Hancock Street. Illustrative Alternative 2 would have required property from the blocks between Hancock Street and the existing plaza and from both sides of Mansfield Street west of Pine Grove Avenue. Plaza ramps would have impacted properties on Elmwood Street and 17<sup>th</sup> Avenue west of the M-25 Connector. Due to extensive relocations and poor ramp connections with the freeway and local road system, Illustrative Alternative 2 was not carried forward. Illustrative Alternative 2 did not meet the purpose and need of the project.



**DTE Energy Substation by the Existing Plaza**

### **Illustrative Alternative 3 - Expand Elevated Plaza with Minimal Secondary Inspection Expansion**

Illustrative Alternative 3 maintained the existing north plaza boundary east of Pine Grove Avenue while expanding the elevated boundary along the southern edge. All of the plaza functions remained elevated with this alternative. A six-acre elevated truck secondary inspection facility was proposed on the location of the existing duty free store and DTE Energy



**Existing Duty Free Store**

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### **Why are Sightlines Important?**

Clear sightlines between inspection booths and the other inspection facilities on the plaza are important as CBP wants to ensure that vehicles sent for further inspection actually go to the inspection area they are sent to.

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**The former London's Dairy Plant on the south side of the existing plaza has been demolished**

substation. Illustrative Alternative 3 would have required relocations along the north side of Mansfield Street, west of Pine Grove Avenue. Harker Street would have been closed west of Poplar Street and Mansfield Street would have been closed between 12<sup>th</sup> Avenue and Pine Grove Avenue. Due to the limited space provided for truck inspections and parking, poor sightlines for security, and large distances between buildings and booths, the Study Team decided not to carry Illustrative Alternative 3 forward. Illustrative Alternative 3 did not meet the purpose and need of the project.

### **Illustrative Alternative 4 - Expand Plaza North and East**

Illustrative Alternative 4 maintained the existing elevated north and south plaza edges west of Pine Grove Avenue. The plaza was expanded slightly to the north and south on the east side of Pine Grove Avenue. A 12.5 acre street level truck inspection area was added to the north between the existing plaza and Hancock Street. Toll booths were also at street level while other plaza facilities remained elevated. Illustrative Alternative 4 included staggered truck primary inspection booths and arc shaped outbound toll booths. Illustrative Alternative 4 used part of the London's Dairy property and would have required Elmwood Street between Pine Grove Avenue and 10<sup>th</sup> Avenue to be closed. Illustrative Alternative 4 was refined into Illustrative Alternative B during Phase 2 of the Illustrative Alternatives development process as described later in this section.

### **Illustrative Alternative 5 - Expand Plaza South**

Illustrative Alternative 5 maintained the existing north plaza edge, and expanded the plaza only to the south. All plaza facilities were kept above grade. Illustrative Alternative 5 required property on both sides of Mansfield Street east of Pine Grove Avenue. Mansfield Street and Harker Street would have been closed east of Pine Grove Avenue while 11<sup>th</sup> Avenue and 12<sup>th</sup> Avenue would have been terminated north of Scott Avenue. Due to the limited space provided for truck inspections and parking, lack of flexibility for future modifications that may be required by CBP, and lack of significant local access improvements, the Study Team decided not to carry Illustrative Alternative 5 forward.

Illustrative Alternative 5 did not meet the purpose and need of the study.

### **Illustrative Alternative 6 - Expand Plaza West of Pine Grove Avenue**

Illustrative Alternative 6 maintained the same elevated plaza footprint to the east of Pine Grove Avenue. West of Pine Grove Avenue the elevated plaza was expanded to the south. A 14.5 acre street level truck secondary inspection facility was added to the north between the existing plaza and Hancock Street. Illustrative Alternative 6 required property from both sides of Mansfield Street west of Pine Grove Avenue. Mansfield Street would have been closed west of Pine Grove Avenue. 11<sup>th</sup> Avenue and 12<sup>th</sup> Avenue would have been terminated between Scott Avenue and Mansfield Street. Illustrative Alternative 6 was refined into Illustrative Alternative C during Phase 2 of the Illustrative Alternatives development process as described later in this section.

### **Illustrative Alternative 7 - Offsite Secondary Inspection with Electronic Tracking**

Illustrative Alternative 7 expanded the existing elevated plaza to the south and east. Primary inspection, tolls, outbound inspection, and the duty free store would have remained on the existing plaza. Truck secondary inspection was moved to a 32.5 acre offsite location on the north side of I-94/I-69 approximately two miles west of the existing plaza. This alternative proposed using the existing I-94/I-69 freeway to provide access between primary and secondary inspection. Vehicles would have been monitored using electronic tracking technology. Illustrative Alternative 7 would have required property on the north side of Mansfield Street and required the closures of Harker Street west of 10<sup>th</sup> Avenue and 11<sup>th</sup> Avenue, and 12<sup>th</sup> Avenue north of Mansfield Street. Representatives from CBP stated that electronic tracking technology did not provide adequate security for ensuring vehicles reported for secondary inspection. As a result, the Study Team dropped Illustrative Alternative 7 from further consideration. Illustrative Alternative 7 did not meet the purpose and need of the project.



**The use of electronic tracking technology was considered**

## **Illustrative Alternative 8 - Offsite Secondary Inspection with Dedicated Lanes on the North Side of I-94/I-69**

Illustrative Alternative 8 expanded the existing elevated plaza and moved truck secondary inspection off-site in the same manner as Illustrative Alternative 7. Access to secondary inspection was provided through dedicated and secure lanes constructed on the north side of I-94/I-69. In addition to the property impacts described for Illustrative Alternative 7, Illustrative Alternative 8 would have required property along the north side of I-94/I-69 between the existing plaza and the proposed off-site location. This property acquisition would have included parts of two township parks.

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### **What is Section 4(f)?**

Section 4(f) is a part of the 1966 Department of Transportation Act which prohibits the use of land from a public park, recreation area, wildlife and waterfowl refuge, or historic site for transportation projects unless there is no prudent or feasible alternative to using the land.

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**The existing elevated plaza crosses over Pine Grove Avenue**

Illustrative Alternative 8 impacted protected Section 4(f) sites in the form of two township parks. With six Illustrative Alternatives fully developed for the project, including an alternate potential location for off-site facilities, MDOT was able to find a prudent and feasible alternative to using park land. As a result, this alternative was dropped from further consideration.

### **Illustrative Alternative 9 - Relocate Pine Grove Avenue to the West**

Illustrative Alternative 9 would have brought much of the plaza down to street level and relocated Pine Grove Avenue west of its existing location. Existing Pine Grove Avenue traffic would have used the relocated Pine Grove Avenue, which was combined with the existing M-25 Connector. The relocated section of Pine Grove Avenue would have connected with the existing Pine Grove Avenue at Scott Avenue. Illustrative Alternative 9 would have required property from the blocks between Hancock Street and the existing plaza and on both sides of Mansfield Street west of 10<sup>th</sup> Avenue. Illustrative Alternative 9 was refined into Illustrative Alternative D during Phase 2 of the Illustrative Alternatives development process as described later in this section.

## **Illustrative Alternative 10 - Relocate Pine Grove Avenue to the East**

Illustrative Alternative 10 would have brought much of the plaza down to street level and relocated Pine Grove Avenue to 10<sup>th</sup> Avenue between Hancock Street and Scott Avenue. Illustrative Alternative 10 would have required property from the blocks between Hancock Street and the existing plaza and from the north side of Mansfield Street west of 10<sup>th</sup> Avenue. Illustrative Alternative 10 was refined into Illustrative Alternative E during Phase 2 of the Illustrative Alternatives development process as described later in this section.

## **Illustrative Alternative 11 - Relocate Most Plaza Functions Offsite**

Illustrative Alternative 11 would have relocated almost all of the plaza facilities to an alternate 71 acre plaza approximately 1.5 miles west of the current plaza. Illustrative Alternative 11 would not have expanded the existing plaza. The existing I-94/I-69 freeway lanes would have been converted to a secured route to take vehicles between the new plaza and the Blue Water Bridges. Local traffic was to be shifted onto a new extension of the M-25 Connector on the south side of the existing freeway. The existing bridge over the Black River would have remained at four lanes and an additional four-lane bridge would have been built over the Black River for the new local extension of the M-25 Connector.

The relocated plaza facilities included a relocated Welcome Center and the MDOT Maintenance facility. Illustrative Alternative 11 was refined into Illustrative Alternative F during Phase 2 of the Illustrative Alternatives development process as described later in this section.

## **Illustrative Alternative 12 - Transportation Systems Management**

Transportation Systems Management (TSM) refers to a wide range of minor system and technology improvements to improve the efficiency and safety of existing and future highways. Potential TSM improvements for the Blue Water Bridge Plaza Study could include highway information

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### **What is NEXUS?**

NEXUS is a program that allows pre-approved low risk travelers to enjoy a simplified border crossing process. NEXUS pass holders can use dedicated lanes at border crossings, reducing their waiting time.

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### **What is FAST?**

The Free and Secure Trade (FAST) program offers quicker clearance of pre-registered, low risk shipments. To be eligible to use the dedicated FAST lanes, the importer, trucking company, and driver must all be pre-approved.

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systems, changeable signs, and demand management efforts. Current and potential systems management efforts are described below.

Dedicated NEXUS/FAST lanes have been added on the existing plaza at the primary inspection booths to provide quicker inspection times for participating vehicles. Advance signing could be provided along the I-94/I-69 corridor to allow NEXUS/FAST participants to efficiently process through primary inspection.



**Changeable Message Sign**

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### **What is a Ramp Meter?**

A ramp meter is a set of traffic signals located on a freeway entrance ramp, usually about halfway down the ramp. Ramp meters regulate the flow of traffic onto the freeway so that merging traffic does not slow down the freeway.



**Entrance Ramp Meter**

Changeable message signs are being installed at various locations along the I-94/I-69 corridor to provide traffic with up-to-date information about current bridge plaza traffic conditions. Signs could also be used to redirect outbound traffic to the Pine Grove Avenue plaza entrance during freeway backups. Another changeable message sign could be placed on the southbound M-25 Connector prior to the connection with the plaza off ramp. This sign could be used to warn southbound vehicles of heavy oncoming traffic flows from the plaza and provide for an easier merge movement for the vehicles exiting the plaza.

Ramp metering could provide for smoother merge flows onto freeways during peak traffic times. A ramp meter could be added to the plaza off ramp where it meets the southbound M-25 Connector to reduce the high merge volume's affect on freeway flow. The meter could be used during peak traffic times and turned off at other times.

Expansion of current ramps along the corridor provide for more capacity could help ease congestion on the interstate/street network surrounding the plaza. Additional plaza exit capacity could be provided by widening the existing bridge and ramp over the northbound M-25 Connector to two lanes. Designating the right hand lane on the Black River Bridge, between Water Street and the plaza, for plaza traffic only would help reduce network congestion. A dedicated off ramp to Water Street on the westbound side of the bridge could also improve the system.

MDOT, CBP, and Canadian officials implemented several short-term solutions to improve traffic flow at the Blue Water

Bridge Border Crossing. Several of the potential Transportation System Management (TSM) improvements were implemented as part of the 25 percent Challenge for the border crossing. The 25 percent Challenge was a collaborative effort between the U.S. and Canada and included the private sector with the goal to reduce transit times by 25 percent in Southeast Michigan within one year. The 25 percent Challenge was announced on December 17, 2004. This has included the conversion of several car only inspection booths into combined booths for cars and trucks so that more trucks can be processed during periods of high truck traffic.

The Study Team concluded that an alternative consisting exclusively of TSM improvements and the 25 percent Challenge would fail to address long-term traffic growth and the accommodation of new inspection technologies as outlined in the Purpose of and Need for the project. As a result, Illustrative Alternative 12 was not carried forward. However, TSM improvements were included as possible interim and permanent improvements as part of the Build Alternatives.

### **Illustrative Alternative 13 - Use of Land Underneath the Bridge Spans, east of Stone Street**

The Study Team considered using the land underneath the existing Blue Water Bridge spans for plaza facilities. Ideas for the use of this land included turning traffic around as they come off the bridge and routing it to plaza facilities underneath the spans. The Study Team also considered this area for parking or storage of impounded vehicles.

At Stone Street, the Blue Water Bridge spans are approximately 52 feet above street level. To use the land under the spans for inspection facilities, traffic would have to be turned around and brought to street level. Turning traffic around and bringing it to street level prior to Pine Grove Avenue is not possible from an engineering standpoint. For security reasons, plaza traffic crossing Pine Grove Avenue and/or 10<sup>th</sup> Avenue at street level would not be acceptable. Closing or rerouting both Pine Grove Avenue and 10<sup>th</sup> Avenue would be extremely disruptive to north-south traffic patterns in Port Huron and would not be practical from a local traffic circulation and access perspective. As a result, the use of land

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#### **What is a Bridge Span?**

A bridge span is the main part of the bridge that spans over the river, road or other feature.

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underneath the bridge spans east of Stone Street has been dropped from consideration for full regulation of plaza facilities.

#### **Illustrative Alternative 14 - Use of Land North of Hancock Street**



**Hancock Street Near Existing Plaza**

This initial concept involved expanding the truck secondary inspection facilities north of the existing plaza to cover the block immediately north of the plaza and west of Pine Grove Avenue and the block further north across Hancock Street. Alternatives crossing Hancock Street would require either the closure of the street or construction of a new structure similar to the one over Pine Grove Avenue. As Hancock Street is a major thoroughfare at that point and because there are a variety of alternatives that do not require crossing it, use of land north of Hancock Street for expansion of the plaza was dropped from further consideration.

#### **Illustrative Alternative 15 - Bridging Pine Grove Avenue over the Plaza**

Alternatives that involved bridging Pine Grove Avenue over the plaza were considered. This would allow more of the plaza facilities to be placed at street level. However, a bridge over the plaza would require more than 2000 feet of right-of-way along Pine Grove Avenue. The bridge would also necessitate closing access from Church Street, Elmwood Street, Harker Street, and Mansfield Street to Pine Grove Avenue. For these reasons, bridging Pine Grove Avenue over the plaza was dropped from future consideration.



**The Study Team Considered Multi-modal and Transit Alternatives**

#### **Illustrative Alternative 16 - Multi-modal and Mass Transit Alternatives**

The existing plaza facilities have lanes for inspection of buses and all alternatives will accommodate bus inspection facilities. Both commercial and passenger rail traffic cross the border in Port Huron and are inspected at separate locations, approximately two miles south of the plaza. As this study is about plaza improvements, multi-modal and mass transit alternatives are not appropriate for the context of the study. Individuals and cargo would require inspection regardless of

the mode of transportation used. The potential for cross border transit services is beyond the scope of this study. As a result, multimodal and mass transit alternatives were dropped from further consideration.

### **Illustrative Alternative 17 - Relocation of Plaza Facilities to Canada**

The Study Team considered the possibility of moving some or all plaza inspection facilities to the Canadian side of the bridge. The major barrier to moving United States facilities to the Canadian side of the crossing is sovereignty related issues over jurisdiction, which can only be worked out through international diplomatic channels and are beyond the scope of this study. This alternative was dropped from further consideration.



**Canadian Blue Water Bridge Plaza in Point Edward, Ontario**

### **Illustrative Alternative 18 - Use of Port Huron Township Park No. 2 and RV Park**

Early on in the alternatives development process, members of the study team identified Port Huron Township Park No. 2 and RV Park as a possible location for potential off-site facilities. The park and campground are about one mile west of the existing plaza along I-94/I-69. This site was thought to have had potential for off-site facilities because it is near the Water Street Interchange, the first interchange southwest of the plaza.



**Port Huron Township RV Park**

The RV Park is a Section 4(f) recreation site. With several Illustrative Alternatives fully developed for the project, including an alternate potential location for off-site facilities, MDOT was able to find a prudent and feasible alternative to using the park and campground. As a result, this alternative was dropped from further consideration.

### **Illustrative Alternative 19 - Prior 1999 Study Alternatives**

A 1999 Bridge and Toll Plaza Operations Study suggested six alternative concepts for plaza improvements. At the time, inspection technologies such as permanent gamma ray inspection technology (GRIT) facilities, FAST program facilities, entry-exit program changes, truck unloading docks,



**GRIT Building on Existing Plaza**

warehouse facilities, and radiation portals were not included in the development of these concepts and there was no identified space for these facilities. In addition, these concepts did not include enough booths to accommodate the forecasted 2030 traffic. As a result, none of these concepts were kept as an Illustrative Alternative. However, several beneficial features of these concepts have been incorporated into other Illustrative Alternatives.

### **2.1.3 Illustrative Alternatives - Phase 2**

Phase 1 of the Illustrative Alternatives development process included extensive coordination with stakeholders and preliminary evaluation of the concepts based on the objectives of the project and potential impacts. As a result of this coordination and evaluation process, six of the Illustrative Alternatives emerged as more feasible and favorable. The Study Team discussed these alternatives, along with a No-Build Alternative, with stakeholders over the summer of 2003 and presented them at a public meeting on September 23, 2003. For clarity, the Illustrative Alternatives developed and presented in Phase 2 were renamed with letters as Illustrative Alternatives A through F. The following is a discussion of the Phase 2 set of Illustrative Alternatives.

#### **Illustrative Alternative A - Expanded Elevated Plaza**

Illustrative Alternative A was a refined version of Illustrative Alternative 1 discussed previously. Minor refinements included the addition of parking layouts and gates to connect the inbound and outbound sides of the plaza to accommodate maintenance and bridge closure situations. Illustrative Alternative A was originally estimated to require 28 residential and 10 business relocations. Illustrative Alternative A was carried forward and refined into Updated Alternative 1 discussed below.

#### **Illustrative Alternative B - Expand Plaza North and East**

Illustrative Alternative B was a refined version of Illustrative Alternative 4. Minor refinements included the addition of new crossover ramps where the bridge spans approach the plaza to accommodate maintenance and bridge closure

situations. Illustrative Alternative B was originally estimated to require no residential and seven business relocations.

Illustrative Alternative B was dropped from consideration due to its inability to adequately address the objectives of the project as well as the other alternatives. Not expanding the plaza over Pine Grove Avenue would result in a plaza which is very constrained and has little flexibility for both CBP's current and future inspection procedures. The constrained nature of Illustrative Alternative B also resulted in limited queuing space and a potential bottleneck for cars entering the United States as compared to other alternatives. This could lead to longer future back-ups onto the Canadian side of the bridge.

Refinements to the plaza footprint to address the problems with Illustrative Alternative B would have resulted in layouts and impacts similar to Illustrative Alternative A. Therefore, Illustrative Alternative B was not carried forward.

### **Illustrative Alternative C - Expand Plaza West of Pine Grove Avenue**

Illustrative Alternative C was a refined version of Illustrative Alternative 6. Refinements included changes in duty free access, expansion of employee parking, and gates to connect the inbound and outbound sides of the plaza, to accommodate maintenance and bridge closure situations. Illustrative Alternative C was originally estimated to require 49 residential and eight business relocations.

Illustrative Alternative C was not carried forward to the due to its failure to address the objectives of the project as well as other alternatives. Illustrative Alternative C did not expand the plaza over Pine Grove Avenue resulting in limited queuing space and a potential bottleneck for passenger vehicles entering the United States as compared to other alternatives. This would have potentially led to longer backups onto the Canadian side of the bridge. Illustrative Alternative C featured a potentially confusing exit from the passenger vehicle inspection area that resulted in short decision points and potential weaving situations for vehicles exiting the plaza.

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#### **Why is Queuing Space Important?**

Queuing space is where cars and trucks will line up for inspection at the booths on the plaza. If there is not enough queuing space or if the queuing space is poorly designed backups onto the Blue Water Bridge and I-94/I-69 will be more likely.

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Refinements to the plaza footprint to address the problems with Illustrative Alternative C would result in layouts and impacts similar to Illustrative Alternative A. Therefore, Illustrative Alternative C was not carried forward.

#### **Illustrative Alternative D - Relocate Pine Grove Avenue to the West**

Illustrative Alternative D was a refined version of Illustrative Alternative 9 presented above. Minor refinements included gates to connect the inbound and outbound sides of the plaza to accommodate maintenance and bridge closure situations. Illustrative Alternative D was originally estimated to require 13 residential and 23 business relocations.

Illustrative Alternative D was originally dropped from consideration due to its similarities to Illustrative Alternative E and the initial conclusion that Illustrative Alternative E would have fewer impacts on the community. After further development and review of the alternatives, Customs and Border Protection (CBP) suggested that the Study Team evaluate an alternative that refined and expanded upon the original Illustrative Alternative D concept. This expanded alternative concept became Alternative 4 in the Updated Alternatives phase discussed below and eventually became the City West Alternative discussed in **Section 2.2 Alternatives Carried Forward** and throughout this DEIS.

#### **Illustrative Alternative E - Relocate Pine Grove Avenue to the East**

Illustrative Alternative E was a refined version of Illustrative Alternative 10 presented above. Refinements included bringing more of the outbound part of the plaza down to street level and providing gates to connect the inbound and outbound sides of the plaza to accommodate maintenance and bridge closure situations. This at-grade plaza configuration required the relocation of Pine Grove Avenue to the east, combining it with 10<sup>th</sup> Avenue. Illustrative Alternative E was originally estimated to require 36 residential and 12 business relocations.

Illustrative Alternative E was carried forward and expanded and refined into Alternative 2 and eventually became the City East Alternative discussed in **Section 2.2 Alternatives Carried Forward** and throughout this DEIS.

### **Illustrative Alternative F - Relocated Plaza in Port Huron Township**

Illustrative Alternative F was a refined version of Illustrative Alternative 11. Refinements included a more detailed layout of parking and facilities at the proposed relocated plaza and a rearrangement of the existing plaza to allow for local access to a small set of primary inspection booths and toll booths. New ramps were introduced at the proposed plaza relocation site to avoid having a traffic signal at the exit of the relocated plaza. Illustrative Alternative F was originally estimated to require no residential or business relocations.

Illustrative Alternative F was carried forward and expanded and refined into Alternative 3 and eventually became the Township Alternative discussed in **Section 2.2 Alternatives Carried Forward** and throughout this DEIS.

#### **2.1.4 Updated Alternatives**

In Phase 2 of the Illustrative Alternatives development process, the original 19 alternatives were narrowed down to six Illustrative Alternatives (A through F), as well as a No-Build Alternative. After evaluating the potential impacts further and coordinating with stakeholders, these six Illustrative Alternatives were reduced to four Updated Alternatives. These Updated Alternatives were modified versions of the most feasible Illustrative Alternatives. The modifications were based on the objectives of the study, environmental concerns, traffic analyses, and both local stakeholder and public input. The Updated Alternatives for the plaza were substantially larger in size than the Illustrative Alternatives. Most of the increase in size was due to the additional space for adequate CBP inspection facilities including the addition of outbound inspection facilities. Outbound inspection booths and parking were added to allow CBP to inspect cars and trucks leaving the United States. Other inspection areas were also expanded to ensure better

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#### **What is Outbound Inspection?**

Outbound inspection booths allow CBP to inspect individuals and cargo leaving the country. Currently CBP conducts random exit control interviews by flagging down outbound vehicles after they pass through the toll booths. These inspections can cause severe backups on I-94/I-69.

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**Existing Elevated Plaza Wall**

traffic flow on the proposed plazas. The expanded outbound inspection and other facilities added approximately 30 to 40 acres to the Updated Alternatives, and increased the number of homes and businesses that would be purchased for the plaza.

The following paragraphs discuss the Updated Alternatives in detail.

### **Alternative 1 - Expanded Elevated Plaza**

Alternative 1 was a refined version of Illustrative Alternative A, which was a refined version of Illustrative Alternative 1. Alternative 1 expanded the plaza to the north and south over Pine Grove Avenue. The secondary inspection area for trucks would have been at street level and connected by ramps to the elevated plaza. Alternative 1 would have used all the land between the M-25 Connector and Pine Grove Avenue that lies south of Hancock Street and north of Scott Avenue, as well as the area bordered by Pine Grove Avenue, 10<sup>th</sup> Avenue, Church Street, and Mansfield Street. Alternative 1 as originally shown would have required 86 residential and 17 business relocations and occupied 75 acres.

Alternative 1 was not carried forward as it would have similar environmental impacts as Alternative 2 and Alternative 4 but did not address the project objectives as well as the other alternatives. Due to the high cost of building and maintaining a large elevated plaza, it was also more expensive than the other alternatives. A large elevated plaza would not have the flexibility to address future unknown security needs and technology as the elevated portions of the plaza would have been very expensive to alter. During the refinement of the Updated Alternatives, the area required for each plaza expanded by another twenty acres. Local road improvements were also required along Hancock Street and Pine Grove Avenue for all Build Alternatives. Had Alternative 1 been carried forward, it also would have expanded to a plaza area similar to the City Alternatives and would have included local road improvements similar to the other Build Alternatives. As a result, Alternative 1 would have had the highest number of residential and business relocations of any alternative and similar community impacts to the City of Port Huron as the

City East Alternative. The Study Team decided there was no point in continuing to study an alternative that was less flexible, had greater impacts, and was more costly when compared to the other Alternatives.

### **Alternative 2 – City East Alternative**

Alternative 2 expanded the plaza at its existing site in the City of Port Huron. Alternative 2 was a refined version of Illustrative Alternative E, which was a refined version of Illustrative Alternative 10. Alternative 2 relocated Pine Grove Avenue between Hancock Street and 10<sup>th</sup> Avenue, east of the existing plaza. Pine Grove Avenue would have been combined with 10<sup>th</sup> Avenue for three blocks and wrapped around the new plaza. Pine Grove Avenue would no longer run under the plaza. Alternative 2 was originally forecast to require 87 residential and 21 business relocations and 82 acres of land.

The Study Team carried Alternative 2 forward and refined it into the City East Alternative. The City East Alternative is one of the alternatives still under consideration and is discussed in detail in this DEIS. **Section 2.2.4 City East Alternative** discusses its features in detail.

### **Alternative 3 – Township Alternative**

Alternative 3 relocated the major plaza functions to an off-site plaza in Port Huron Township along I-94/I-69, west of the Lapeer Connector exit. Alternative 3 was a refined version of Illustrative Alternative F, which was a refined version of Illustrative Alternative 11. This alternative originally required 126 acres of right-of-way, including existing plaza re-use.

Alternative 3 included secured lanes to the relocated plaza along the existing I-94/I-69 alignment. Barrier walls were included to ensure security. Alternative 3 featured service drives parallel to the secured I-94/I-69 corridor to provide access for local traffic to I-94/I-69 west of the plaza, the plaza, the Lapeer Connector, Water Street, and Hancock Street. Alternative 3 also included a new intersection at the Lapeer/I-94/I-69 interchange. Alternative 3 was forecast to require 9 residential relocations and 1 acre of land.

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#### **What is Meant By Secured Lanes?**

Alternative 3 features a secured roadway along existing I-94/I-69 between the proposed relocated plaza and the Blue Water Bridge. The secured westbound and eastbound lanes would not allow vehicles or people to enter or exit the roadway between the relocated plaza and the Blue Water Bridge. The secured lanes would assure that all vehicles and people from Canada must be inspected at the new plaza. The secured lanes would also make sure that those leaving the United States must go to Canada after passing through the new plaza.

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The Study Team carried Alternative 3 forward and refined it into the Township Alternative. **Section 2.2.6 Township Alternative** discusses its features in detail.

#### **Alternative 4 – City West Alternative**

Alternative 4 expanded the plaza at its existing site in the City of Port Huron. Alternative 4 was developed after the other Updated Alternatives. In 2006, after reviewing the initial analysis of the other alternatives, CBP concluded that a potential alternative building on the original Illustrative Alternative D concept could reduce impacts in the City of Port Huron while still meeting the required security and facility needs. The Study Team developed this alternative in detail and determined that it merited further evaluation.

Alternative 4 was similar to the City East Alternative except that it relocated Pine Grove Avenue to the west of the plaza instead of east of the plaza. Most of the plaza facilities are at street level. Pine Grove Avenue would be relocated west of the plaza and merged into the existing M-25 Connector. Pine Grove Avenue would no longer run under the plaza.

Several local roadway options were evaluated as part of Alternative 4. This included a ring road around the plaza where northbound traffic would run east of the plaza and southbound traffic would loop around the plaza to the west. The Study Team also evaluated whether the relocated Pine Grove Avenue should be a boulevard with a planted median or a five-lane roadway with a continuous center turn lane. Although both options would fit within the footprint for this alternative, the Study Team concluded that the boulevard section allowed for better traffic flow through intersections and reduced potential conflict points, enhancing safety in the Study Area.

As Alternative 4 was developed later in the process, comparable impacts and costs in 2004 dollars do not exist for Alternative 4 as compared to the other alternatives. The Study Team carried Alternative 4 forward as the City West Alternative. **Section 2.2.5 City West Alternative** discusses its features in detail. A full alternatives comparison of the impacts and costs is included in **Section 2.3** and **Chapter 3**.

## 2.2 Alternatives Carried Forward

There are four alternatives still under consideration for improvements to the Blue Water Bridge Plaza and the I-94/I-69 corridor. The Alternatives Carried Forward include:

- The No-Build Alternative, which involves no expansion of the existing plaza or the I-94/I-69 corridor
- The City East Alternative, which expands the plaza in the City of Port Huron and relocates Pine Grove Avenue to the east and makes improvements along the I-94/I-69 corridor
- The City West Alternative, which expands the plaza in the City of Port Huron and relocates Pine Grove Avenue to the west and makes improvements along the I-94/I-69 corridor
- The Township Alternative, which relocates most plaza functions to a plaza in Port Huron Township and makes improvements along the I-94/I-69 corridor

All of the other alternatives discussed in **Section 2.1 Alternatives Development** have been eliminated from further consideration. The Alternatives Carried Forward were selected based on their ability to best address the reasons for improving the plaza/corridor when compared with other potential alternatives. The No-Build Alternative is considered the baseline condition for comparing the other alternatives. The No-Build Alternative could be selected if the benefits of the other alternatives do not outweigh the negative environmental effects. **Section 2.3 Evaluation of the Alternatives** discusses how well the alternatives address the reasons for plaza/corridor improvements identified in **Section 1.0 Why Are Improvements Needed?** **Section 2.4 The City West Alternative is the Preferred Alternative** identifies the City West Alternative as the Preferred Alternative and explains why the Study Team believes it is the best course of action for the project. The environmental effects of the alternatives are discussed in detail throughout **Section 3.0 The Environment: What's There Now and Project Effects.**

The Alternatives Carried Forward are described in detail in the subsections that follow.

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### What are the Alternatives Carried Forward?

The Alternatives Carried Forward are refined versions of Illustrative Alternatives that have undergone increased engineering, traffic, social, environmental, and economic analysis. These alternatives have been selected based on their ability to adequately address the objectives of the project.

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The Existing Plaza

The separate **Appendix E** volume contains exhibits of the Alternatives Carried Forward that can be referred to while reading this document.

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### What are Design Criteria?

Design criteria are the basic standards that a construction project needs to meet. In the case of this study, there are two types of design criteria: engineering design criteria and plaza facilities/security design criteria.

Engineering design criteria are the basic engineering standards and guidelines that should be followed in developing transportation improvements. There are different design criteria for different types of roads and bridges that guide the engineer in determining the best possible layout for a transportation project.

The plaza facilities/security design criteria were provided by CBP and GSA and include minimum standards for facilities to ensure an efficient, safe, and secure border crossing.

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### What are the Build Alternatives?

The term Build Alternatives refers to the alternatives that are still under consideration other than the No-Build Alternative. In the case of this DEIS, there are three Build Alternatives: the City East, City West and Township Alternatives.

### 2.2.1 What Design Criteria Were Used in Developing the Alternatives?

The Study Team identified key engineering and facilities design criteria based on reasonable engineering standards and information on facilities and security provided by CBP and GSA. Detailed roadway and bridge design criteria tables have been developed for the three Build Alternatives; see **Figures E.6 and E.7** in the separate **Appendix E** volume. This criteria contains fundamental roadway and bridge design elements adhering to MDOT and American Association of State and Highway Transportation Officials (AASHTO) guidelines. The design criteria were utilized in the development of the layouts of the Build Alternatives.

#### Roadway Design Criteria

Roadway design criteria were utilized in laying out the improvements for the roadways affected by the Build Alternatives, including freeways and local roads. The Build Alternatives meet or exceed the desirable roadway design criteria except for curve length, radii, and design speed at a few specific locations. The situations where the design criteria are not met are discussed in **Design Exceptions** (below).

All of the design criterion used can be found in the following documents:

- MDOT Road Design Manual
- MDOT Standard Plans
- MDOT Geometric Design Guides
- MDOT Drainage Design Manual
- MDOT Highway Capacity Manual
- MDOT Bridge Design Manual
- AASHTO Geometric Design of Highways and Streets (2004)
- AASHTO LRFD Bridge Specifications

## Bridge Design Criteria

New bridges are part of all Build Alternatives. The proposed bridges will either cross existing waterways or separate local roads and ramps from I-94/I-69. The preliminary specifications for bridges and other structures for the three Build Alternatives are based on design criteria values found in the documents listed above.

## Design Exceptions

As mentioned above, three of the desired design criteria values were not met at every location by the alternatives. A design exception is requested when the AASHTO design guidelines cannot be met. The following criteria are considered critical design elements and failure to meet the standard for any one of them results in a design exception:

- Design Speed
- Lane Width
- Shoulder Width
- Bridge Width
- Structural Capacity
- Horizontal Alignment
- Vertical Alignment
- Grade
- Stopping Sight Distance
- Cross Slope
- Superelevation
- Vertical Clearance (underneath bridges)
- Horizontal Clearance (not including clear zone)
- Acceleration and Deceleration lengths

The aim of a new design is to avoid all design exceptions, however with constricted sites it may be cost prohibitive in some instances. When adhering to design standards are too costly or require unreasonable right-of-way impacts, design exceptions may be requested, provided that the roadway will still operate safely and maintain adequate performance.

The Study Team Engineers identified potential elements of the Build Alternatives requiring design exceptions. The specific locations of potential design exceptions are discussed in **City**

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### What Do Engineers Mean by Grade?

Grade refers to the slope of the roadway. A four-percent grade means that the road rises or falls four feet for every 100 feet of length.

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### What is Superelevation?

A road has a superelevation when one side of the road is higher than the other through a curve in the road. This allows vehicles to drive through the curve at higher speeds and greater comfort.

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**East Alternative Design Issues, City West Alternative Design Issues and Township Alternative Design Issues** later in this section. As part of the refinement of the Preferred Alternative, the Study Team will look at options for eliminating these design exceptions.

### **Plaza Facilities/Security Design Criteria**

The following briefly describe the basic criteria for plaza facilities and safety and security per CBP and GSA guidelines.

A new plaza requires the following basic facilities:

- Sixty to 80 acres of plaza inspection space
- Approximately 190,000 square feet of inspection office buildings and 18,000 square feet of docks to unload cargo
- Space for up to three GRIT buildings including appropriate circulation space for traffic entering from Canada and space for one GRIT building for traffic leaving the United States
- Twenty inspection booths for cars and trucks with space to expand to 30 booths
- An Outbound Inspection area approximately the size of a small port of entry including room for up to ten inspection booths
- Space for Radiation Detection Portals
- Space for impounding vehicles and hazardous materials containment
- An observation area for animal inspections although no unloading will occur on-site
- Four hundred employee parking spaces

The following basic security features are required:



**Example Perimeter Wall**

- Separation of public and inspection functions
- Eight to ten-foot perimeter walls/fencing
- All vehicles entering and exiting the plaza are subject to inspection
- Vehicle control to ensure vehicles do not exit the plaza prior to completion of inspection
- 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 GSA Land Port of Entry design guide for plaza facilities

Additional security features are required for any alternative which moves the border plaza further inland and requires a secure corridor to take traffic to and from the plaza. These criteria apply specifically to the Township Alternative.

- A minimum twenty-foot wall on either side of the secure corridor to prevent penetration to and from the outside; additionally, an internal 20-foot wall would be required to separate inbound and outbound traffic
- A minimum of four-foot extension fence at a 45 degree angle from the top of the 20-foot walls to prevent objects from being thrown over or individuals from scaling the walls
- The external walls should be separated from the public by a ten foot buffer and an additional fence
- Pole mounted cameras to monitor both inside and outside the secure corridor
- No ability to access the secure corridor from the middle
- All traffic must access the secure corridor from either the inspection plaza or the Canadian side of the Blue Water Bridge
- No exit for traffic at the existing plaza location; all vehicles must be inspected at the relocated plaza

## Signing

Signing is one form of traffic control device used to notify road users of regulations, and provide warnings and guidance needed for the safe, uniform, and efficient flow of traffic.

The design, placement, and uniformity of signing are important in order to convey a clear message to drivers. The design of signing depends upon the type of roadway and the speed of vehicles on the roadway. Guide signs are used to give directions to the driver to reach a desired destination. Too much information on a specific sign or too many signs close together can confuse a motorist, leading to potentially erratic driving movements.



Due to the complexity of the Blue Water Bridge Plaza Study, a basic layout for guide signs was developed to ensure that signing could be done in accordance with Michigan and federal signing standards. **Figure 2.2.1** is an example of a guide sign with common information displayed.

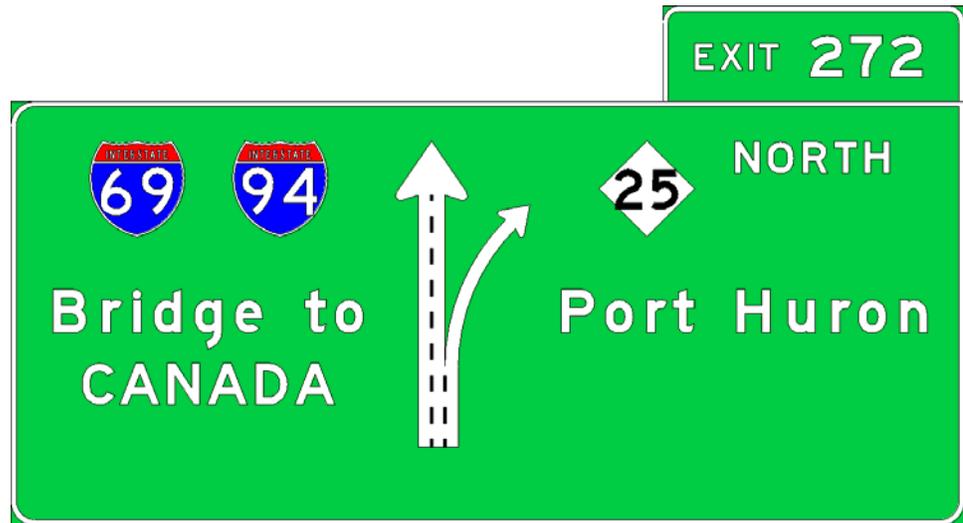


Figure 2.2.1 Sample Freeway Guide Sign

### 2.2.2 How Were the Alternatives Effects on Local and Border Crossing Traffic Analyzed?

The Study Team prepared a detailed traffic analysis which involved generating traffic forecasts for the Blue Water Bridge, I-94/I-69 freeway segments, and local roads surrounding the existing plaza. Forecasts were prepared for a 2030 No-Build scenario as well as for each Build Alternative carried forward. The traffic analysis consisted of the following steps:

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#### What is the SEMCOG Travel Demand Model?

It is a regional computer model that can predict future traffic based on demographics, land uses, population trends, and estimated vehicle trips.

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- Collection of traffic counts and historic traffic data that served as the basis of the analysis
- Analysis of historic border crossing data to develop forecasts for future crossings at the Blue Water Bridge
- Use of the Southeast Michigan Council of Governments (SEMCOG) Travel Demand Model to develop forecasts for all of the local roads and freeways affected by the project
- Intersection congestion analysis using the Synchro™ traffic simulation program
- Highway congestion analysis using the Highway Capacity Software (HCS) program

- Simulation of system wide traffic conditions on freeway segments, ramps, the plaza, local roads, and intersections using the WATSIM™ traffic simulation software
- Simulation of the plaza operations using GSA's Border Wizard™ software

Collection of Traffic Data and Development of Traffic Forecasts:

The Study Team prepared forecasts for future traffic crossing the Blue Water Bridge based on past historical traffic volume trends and the SEMCOG travel demand model. As the decision to cross the border typically occurs independent of the exact roadway configuration on either side of the border, the same cross-border traffic forecast was assumed regardless of the alternative. The plaza traffic analysis used 2005 traffic counts as the base year and 2030 as the forecast future year. The annual historical traffic volumes provided were used to calculate Annual Average Daily Traffic (AADT) for the plaza. The 2005 daily AADT was 4,900 trucks and 10,200 passenger cars for a total AADT of 15,100. The forecast for 2030 is 10,000 trucks and 12,300 passenger cars, for a total AADT of 22,300.

MDOT collected traffic counts in October 2003, on I-94/I-69 and local roadways potentially affected by improvements to the plaza. Traffic counts were also collected at two locations on Highway 402 in Canada by the Ontario Ministry of Transportation in order to identify patterns in the traffic entering the Blue Water Bridge. **Figure E.8**, located in the separate **Appendix E** volume, illustrate the roadway segments where traffic counts were collected or where counts could easily be derived through addition and subtraction of neighboring counts. These segments also served as the basic set of locations for the traffic forecasts prepared for the 2030 No-Build Alternative and the Build Alternatives. Following standard practices, all daily traffic counts were rounded to the nearest 100.

The collected traffic counts were converted into Annual Average Daily Traffic volumes. The conversion was accomplished by using seasonal and area-type adjustment factors developed by MDOT. The AADT volumes were then used to develop AM and PM Peak hour volumes and Design Hour Volumes (DHVs). The 2005 Existing AADT and DHVs served as the benchmark for comparing and adjusting the

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**What is WATSIM™?**

A network micro-simulation tool that analyzes freeways segments, ramps, local roads, and intersections as an integrated transportation system. This allows the analyst to see how traffic at individual locations is performing from a network perspective.

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**What is Annual Average Daily Traffic (AADT)?**

AADT is the average number of vehicles that use a roadway segment on an average day. It is an estimate of the number of cars and trucks that use the road segment during the entire year divided by 365. Sometimes AADT is used interchangeably with ADT (Average Daily Traffic).

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**What are Design Hour Volumes (DHV)?**

The DHV for a given segment approximates the 30<sup>th</sup> highest hourly traffic volume that will use that segment over the course of a year. DHV is used to determine traffic loads on the roadway, and is used to design appropriately sized transportation facilities.

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**What is a Peak Hour?**

The peak hour is the hour of the day when traffic volumes on a roadway are at their highest. The peak hour typically occurs during the rush hour in the morning or afternoon, when people are traveling to and from work.

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**What is a Geographic Information System?**

A geographic information system is a computer software package that allows people to examine and analyze data using maps.

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**What does it mean to “balance” traffic volumes?**

The daily traffic volumes and the DHV were assumed to have a 50/50 directional split. This means that on an east-west roadway the number of cars headed east during the day was assumed to equal the number of cars headed west. Traffic volumes were balanced throughout the Study Area except on Hancock Street, Pine Grove Avenue north of Elmwood Street, and through the Hancock Street and M-25 Connector intersection due to irregular travel patterns related to the Blue Water Plaza.

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traffic forecasts from the SEMCOG model. **Figure E.8** also displays the AADT for each segment under study.

The SEMCOG regional travel demand model developed for Southeast Michigan was used to develop traffic forecasts for freeways and roads potentially affected by the project. This model was designed to replicate existing travel characteristics, forecast future traffic volumes, and allow for analysis of alternative transportation improvement options. In developing this model, TransCAD<sup>R</sup> software was utilized, both for its Geographic Information System and travel demand modeling capabilities.

The SEMCOG model is a regional model covering seven counties. However, its use for this project was limited to the local area for the Blue Water Bridge Study. Traffic volumes were developed for the future 2030 No-Build and for the Build Alternatives carried forward based on the output from the SEMCOG Model. The general methodology used to develop future traffic volumes included:

- Develop Base Daily Volumes from SEMCOG Model
- Adjust Base Daily Volumes to ensure they reflect known local conditions
- Calculate AM and PM Peak Hour Volumes
- Balance AM and PM Peak Hour Volumes, including Turning Movement Counts at intersections and ramps
- Calculate Design Hour Volumes and Turning Movements

The final 2030 traffic forecasts for the carried forward alternatives are contained in the traffic discussions for each of the alternatives, located further on in this Chapter.

Intersection Congestion Analysis: Traffic analysts performed intersection capacity analysis at eight key intersections in the Study Area using Synchro<sup>TM</sup> and WATSIM<sup>TM</sup> traffic simulation software packages. These six intersections were identified by the Study Team as “Critical Intersections”.

- Hancock Street and M-25 Connector
- Hancock Street and Pine Grove Avenue
- Pine Grove Avenue and the Plaza on-ramp
- Pine Grove Avenue and 10<sup>th</sup> Avenue

- Water Street and the eastbound I-94 off-ramp
- Water Street and the westbound I-94 off-ramp

Intersection capacity analysis was performed at these critical intersections for the existing and No-Build conditions and for each Build Alternative carried forward. The traffic analyses were conducted for existing conditions and future conditions for the year 2030. Each alternative was evaluated for the PM peak hour volumes, which represented the worst case volume for the majority of movements.

Because several intersections within the Study Area would have high congestion (greater than 55 seconds delay) under the No-Build Alternative, intersection improvements were recommended for the carried forward alternatives. Improvements were made in the following order until the traffic simulation showed that the intersection would operate with acceptable levels of delay:

- Modify proportions of green times
- Modify signal phasing
- Modify signal cycle length
- Add right or left turn bays
- Add through lanes or consider grade separation

Under existing conditions, the majority of the intersections within the Study Area do not experience high congestion (greater than 55 seconds delay). However, the intersections of Hancock Street and Pine Grove Avenue and Pine Grove Avenue and 10<sup>th</sup> Avenue currently have some congested turning movements. **Figure E.9**, located in the separate **Appendix E** volume, illustrate where existing congestion is occurring in the Study Area.

Based on the existing traffic information and future traffic forecasts, a congestion analysis was performed on the freeway links within the Study Area. The Highway Capacity Software (HCS) 2000 was used to analyze each freeway segment in each scenario (Existing, No-Build, City East Alternative, City West Alternative and Township Alternative). In addition to the freeway links, the merge/diverge points and any defined weaving sections were also evaluated.

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### What are Critical Intersections?

Critical intersections are those intersections that have been identified by the Study Team as having high traffic volumes and will most likely be impacted by plaza improvements.

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### What is Intersection Capacity Analysis?

Intersection capacity analysis is the process of examining how well an intersection allows traffic to move through it. The number of turn lanes and the length of red and green lights are among the items that affect the capacity of an intersection. The goal is to reduce delays at the intersection as much as possible.

### What is Synchro™?

Synchro is a computer program that assists with intersection capacity analysis.

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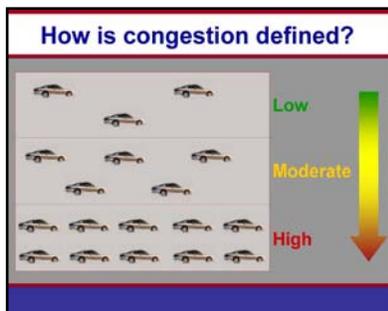


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### How is congestion defined?

The Study Team has defined congestion in terms of low, moderate, and high congestion based on the speed, crowding and delays that can be expected at each location. These levels of congestion are based on standards set by FHWA for the level of service or performance of highways, roads, and intersections.

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**What are merge/diverge points?**

A merge occurs where one stream of traffic flow joins the lane of another, such as an entrance ramp. A diverge occurs where one stream of traffic flow leaves another, such as an exit ramp. Merge/diverge points are where the merge/diverge lanes end or begin.

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**What is Border Wizard™?**

A computer simulation program produced for the General Services Administration (GSA) to model border crossing facility requirements in the United States.

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Results of the intersection and freeway congestion analysis are discussed in the individual traffic sections for each alternative located later in this chapter.

*Plaza Traffic Analysis Using Border Wizard™:* The Border Wizard™ software was used to analyze future facility requirements and preliminary operations for the city and township alternatives. Border Wizard™ simulations were run for a period of 24 hours for the truck and car peak times on Wednesday and Sunday accordingly. A 24-hour profile was used to give the full spectrum of plaza operations delay and backups. A new Border Wizard™ analysis will be performed on the Preferred Alternative following its formal selection.

Detailed explanations, descriptions, results and tables for the overall traffic analysis can be found in the **Blue Water Bridge Traffic Analysis Technical Memorandum**. The memorandum contains existing traffic data and the results of the traffic forecasts and level-of-service analysis for the freeway segments, local roads, and intersections. The memorandum also contains a summary discussion of the WATSIM™ micro-simulation results.

**2.2.3 No-Build Alternative**

The No-Build Alternative would not involve any changes to the existing plaza configuration or ramps. **Figure E.2**, located in the separate **Appendix E** volume, illustrates the existing plaza and the No-Build Alternative. The No-Build Alternative would not include any improvements to the Black River Bridge or the I-94/I-69 Corridor.

The No-Build Alternative would include continued maintenance and technology improvements as space allows, over the next 25 years. Accommodation of all of the required facilities for CBP would not be possible on the existing plaza and substantial gridlock would occur on the plaza as new facilities are introduced and the limited existing parking and queuing space is reduced. There would be no expansion of the existing plaza footprint.

*Recent Border Processing Improvements:* New notification requirements for cargo carriers entering the United States

include the need to electronically file information with CBP at least one hour before they arrive at the border crossing. This change has reduced the frequency of secondary inspection of cargo carriers. Also, in an effort to meet the 25% Challenge, a challenge by CBP and Canadian officials to increase vehicle processing capacity at the border crossing by 25 percent, CPB has implemented operational changes that include, but are not limited to: (1) streamlining processing procedures, (2) increasing staffing to meet demand, (3) converting car-only inspection booths to combined booths for cars and trucks during peak truck traffic, and, (4) encouraging participation in NEXUS/FAST Programs as described in **Section 2.1**.

These changes have helped to reduce vehicle processing times and backups of cars and trucks entering the United States. However, over the long-term, the benefits from these operational changes would be greatly reduced without expansion of the plaza facilities, as proposed under the Build Alternatives. The No-Build Alternative lacks the inspection facilities to meet long range traffic forecasts and the space to implement all of the security and inspection procedures discussed in **Chapter 1**.

### **No-Build Alternative Traffic Impacts**

Four traffic simulation software packages were used to determine the traffic impacts of each alternative. Three of the software packages were used to analyze the portion of the roadway/border crossing network that best fit the capabilities of the particular software.

- The Synchro™ software was used to examine the local intersections and road network
- The Highway Capacity Software (HCS) 2000 was used to analyze each freeway segment including the on/off-ramps in each scenario
- The Border Wizard™ software was used to develop future facility requirements for the Blue Water Bridge Plaza

The fourth software package, WATSIM™, was used to examine the entire network as a whole.



**Local traffic would experience long queues and delays at intersections under the No-Build Alternative**

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**What is a Collector-Distributor Road?**

A secondary roadway providing access between two or more major roadways. i.e. I-94/I-69 to the Lapeer Connector.

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Local Traffic Impacts: Projected 2030 traffic volumes indicate that the current problems on the local roadways and intersections would worsen. This would result in long queues and delays at several intersections. The intersections identified to be at risk for high congestion (greater than 55 seconds delay) are the Hancock Street and M-25 Connector intersection, the Hancock Street and Pine Grove Avenue intersection, the Pine Grove and 10<sup>th</sup> Avenue intersection, and the Water Street interchange.

Freeway Impacts: The freeway was divided into separate segments using the on/off-ramps as the beginning and end points between each segment. Each segment and the on-ramps and off-ramps were analyzed.

In the No-Build Alternative, the freeway segments which have high levels of congestion (greater than 88% of capacity) include the westbound segment between the existing plaza on-ramp and the westbound M-25 Connector as well as the westbound collector-distributor road between the Water Street entrance ramp and the ramp to the Lapeer Connector. These areas are illustrated in **Figure E.10**, located in the separate **Appendix E** volume.

All freeway ramps would experience low (less than 48% of capacity) or moderate levels (between 48% to 88% of capacity) of congestion without factoring potential delay caused by traffic backups onto the I-94/I-69 freeway from the existing plaza.

Border Crossing Impacts: The existing plaza operations sometimes produce large queues (up to one mile) and lengthy delays (one to two hours). Conditions at the plaza would likely worsen under the No-Build Alternative. Anticipated traffic growth would cause travelers to experience more severe delays and much larger queues into Canada and on the I-94/I-69 freeway. The steady increase in traffic would gradually increase the delays and queues at the plaza. The outbound plaza traffic queue is the spot that would trigger backups that would affect the entire roadway network.

WATSIM™ Microsimulation: As noted, the WATSIM™ software package was used to analyze a single, integrated

transportation network. The WATSIM™ simulations confirmed the following:

As the congestion builds at the local intersections, the traffic queues would also grow. Eventually the line of vehicles would stretch from the Pine Grove and 10<sup>th</sup> Avenue intersection all the way back to the Hancock Street and Pine Grove Avenue intersection. This would add to the high congestion already experienced at the Hancock Street and Pine Grove Avenue intersection. The same problem would occur between the Hancock Street and Pine Grove Avenue intersection and the Hancock Street and M-25 Connector intersection. The long queues from the Hancock Street and M-25 Connector intersection would extend onto I-94/I-69 as congestion grows high at this intersection. While this is happening on the local streets, the freeway would also have problems.

The high congestion and queues at the outbound plaza would extend onto I-94/I-69 lanes. Eventually, this queue would reach the eastbound Water Street on-ramp, which would already be experiencing high congestion. Local traffic wishing to travel north on the M-25 Connector would then be required to merge with stopped vehicles on the freeway. As a result, the backup would continue to grow until the entire roadway network is at a standstill.

### **No-Build Alternative Bridges**

With the No-Build Alternative, the Black River Bridge would not be replaced. A report on the condition of the bridge demonstrates that the deck surface has approximately 30 percent surface deficiency.

### **No-Build Alternative Utilities**

No improvements to the current utility services are anticipated for the No-Build Alternative.



**The Black River Bridge pier deterioration**

## 2.2.4 City East Alternative – Relocate Pine Grove Avenue to the East Around Expanded Plaza

This section discusses the features of the City East Alternative and begins with a basic description of the alternative. The section also includes a discussion of the following features of the City East Alternative.

- Layout and design issues
- Effects on border and local traffic
- Bridges, walls, and other structures
- Drainage
- Keeping traffic flowing during construction
- Utilities

### Describe the City East Alternative

The City East Alternative, as illustrated in **Figure E.3 – Sheets A, B, C, and D** located in the separate **Appendix E** volume, expands the existing plaza within the City of Port Huron. The City East Alternative would cover 67 acres and bring most of the existing elevated plaza down to street level. The City East Alternative would require the relocation of Pine Grove Avenue to the east along 10<sup>th</sup> Avenue between Hancock Street and Scott Avenue and would wrap around the northeast side of the plaza and tie into Pine Grove at Hancock Street. A section view of this area is shown in **Figure E.3 Appendix E**. Pine Grove Avenue and 10<sup>th</sup> Avenue would merge for a combined five-to-seven-lane segment between Scott Avenue and Elmwood Street. This description of the City East Alternative area includes all of the inspection facilities needed by the year 2030.



Truck Inspection Booths



Radiation Detection Portals

*The Plaza:* The City East Alternative brings traffic off of the Blue Water Bridge down to street level as quickly as possible. By the time cars and trucks reach the inspection booths on the plaza they are at street level. There would be 35 inspection booths for cars and trucks arriving from Canada. The number of booths may be reduced to 20 high-low booths (may be used for truck and car), however this will not affect the overall size of the plaza. Before the cars and trucks reach the inspection booths, they would pass through radiation detection portals, which ensure that they are not bringing radioactive material

into the United States. At the inspection booths, drivers and passengers answer questions from CBP officers and discuss or provide paperwork on the cargo they are carrying. If cars and trucks clear primary inspection, they would have two options to exit the plaza. They could take a ramp to I-94/I-69 headed west or a ramp north to the M-25 Connector and local city streets. The freeway exits from the plaza would be similar to the existing plaza. Trucks exiting the plaza would have to show proof that they are cleared to leave the plaza at an additional exit control booth.

Trucks not cleared at the inspection booths are sent to the secondary truck inspection area. The City East Alternative uses the block between Hancock Street and the existing plaza, west of Pine Grove Avenue for the expanded truck inspection area. The truck inspection area would contain adequate parking to accommodate trucks sent to secondary inspection for document processing, plus 12 docks for unloading trucks, and 43,500 square feet of office and unloading space. The office space would include space for the inspection agencies and for customs brokers who help process paperwork and payments for truck drivers. The inspection agent's offices would be in a separate secure area away from the customs broker's offices. The truck inspection area would also include separate space for the inspection of livestock. Up to three Gamma-Ray Inspection Technology (GRIT) buildings would be constructed, which allow CBP officers to electronically scan the contents of vehicles.

Cars with passengers that are not cleared to enter the United States or require further processing are sent to a secondary inspection building in the middle of the plaza, shown in dark blue on **Figure E.3 – Sheet D**. This building also would contain additional office space for the inspection agencies and the Michigan Department of Transportation staff. There would also be a parking area for cars that require further inspection and a garage for detailed car inspections.

Cars and trucks traveling to Canada would have two entrances to the plaza. One is off of I-94/I-69 and the other is a ramp from the combined Pine Grove Avenue/10<sup>th</sup> Avenue roadway. Facilities would be provided to allow CBP to inspect cars and trucks leaving the United States. This area is



**GRIT Building on Existing Plaza**

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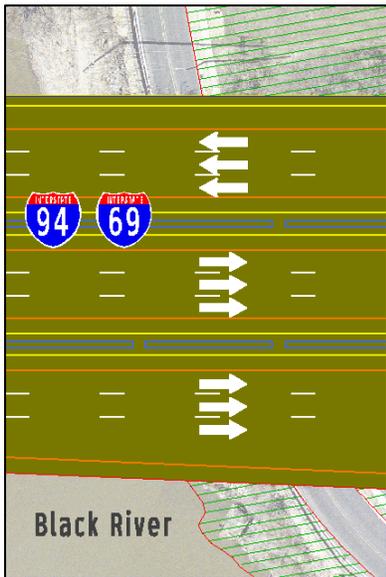
### **What is Outbound Inspection?**

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.

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called outbound inspection. The outbound inspection facilities would include 19 booths, ten docks for unloading trucks, and adequate truck and car parking spaces. Following outbound inspection, cars and trucks would pass through 11 toll booths. 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 would also include parking for both plaza employees and visitors. An employee lot would be located at the southeast corner of the plaza. A lot that would be divided into separate secure lots for employees and visitors would be located off of Pine Grove Avenue, across from the truck inspection area. The plaza would also have buffer areas, shaded green on **Figure E.3**, for the neighborhood northeast of the plaza and the neighborhood south of the plaza.



**Figure 2.2.2 City East Alternative Lanes on the Black River Bridge**

*The Black River Bridge and I-94/I-69:* The City East 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 MDOT Welcome Center in Port Huron Township. The City East Alternative and the City West Alternative feature the same improvements along the I-94/I-69 corridor.

*Black River Bridge:* The City East 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 2.2.2** shows the proposed lane configuration on the Black River Bridge. The new bridge will be approximately 200-foot wide and will consist of 13 spans. The new bridge will have nine travel lanes, three lanes for eastbound local traffic, three lanes for eastbound 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 and the plaza. The border crossing lanes would include one lane for cars, one lane for trucks, and one lane for vehicles enrolled in the FAST and NEXUS program for pre-cleared cars and trucks.

The eastbound local traffic lanes would include two lanes connecting to the M-25 Connector and one lane to an off ramp to Pine Grove Avenue. The off ramp would be a one way connection between I-94/I-69 and Pine Grove Avenue, south of the new plaza along what is currently Scott Street. Eastbound traffic headed to Canada will use the barrier separated middle lanes to flow directly onto the plaza. The new bridge will include 12-foot shoulders for emergency access/vehicle storage, an upgrade over the two foot shoulders on the existing bridge.

City Access: Local traffic exiting the eastbound freeway wishing to visit the city of Port Huron will remain in the right lane and will have direct access via a connector road intersecting Pine Grove Avenue at Mansfield Street. Local traffic that has cleared customs and wishing to visit the city will be required to take a ramp to the northbound M-25 Connector, turn right onto Hancock Street and right on Pine Grove Avenue.

I-94/I-69 Corridor: The City East Alternative includes resurfacing and expansion of 2.5 miles of existing I-94/I-69, as shown in **Figure E.3**. 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. The three lanes for local traffic will have a posted speed of 40 miles per hour and will provide all of the same access to Water Street, Hancock Avenue, and northern Port Huron as the existing I-94/I-69 Corridor provides.

Water Street Interchange: The City East Alternative includes the replacement of the existing interchange at Water Street including the Water Street Bridge over I-94/I-69. The replacement bridge will be four lanes wide, with two lanes in

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### What is a Roundabout?

A roundabout is a circular intersection where two or more roadways meet. Vehicles entering the roundabout must yield to vehicles already in the roundabout.

Roundabouts are being considered for several intersections for the Build Alternatives.

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either direction. The bridge will also accommodate pedestrian traffic by including two five foot sidewalks. Adequate right-of-way exists to place either traffic signals or roundabouts at the two intersections between Water Street and the freeway ramps. The exact configuration of the intersections would be determined during the design phase of the project. The ramps to Water Street will be upgraded to current design standards.

Lapeer Connector Connections: The City East Alternative would 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 City East Alternative includes access in all directions between the Lapeer Connector and the new I-94/I-69 Corridor as illustrated in **Figure E.3**. 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/connector 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 on to 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 intersection 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.



Existing Welcome Center

The new Lapeer Connector configuration would require the entrance from Indian Drive onto the Lapeer Connector to be shifted approximately 300 feet south to meet safety standards.

New Welcome Center: Two locations for the new welcome center were initially considered; on the vacant land to the north of I-94/I-69 approximately one mile west of it's current location, and within the median (between eastbound and

westbound lanes) of I-94/I-69, also one mile west of the current welcome center. The median option was not carried forward due to safety concerns by FHWA regarding left exiting and entering lanes. Additionally, the amount of space available within the median did not meet the amount of parking required for a full service International Welcome Center. **Figure E.3** shows a conceptual layout for the new Welcome Center for the City East Alternative. The new 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. The 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. MDOT will hold a public workshop to develop aesthetic and landscaping treatments for the 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 City East Alternative would include several improvements to the local roads surrounding the plaza. The intersections between Hancock Street and the M-25 Connector and Hancock Street and Pine Grove Avenue would be rebuilt as either intersections with additional turn lanes or roundabouts. The City East Alternative would widen Hancock Street between the M-25 Connector and Pine Grove Avenue to add extra turn lanes. The combined Pine Grove Avenue/10<sup>th</sup> Avenue would be two to three lanes in each direction with extra turn lanes added at the intersections with Hancock Street, the new plaza ramp, and 10<sup>th</sup> Avenue southbound. The current six-legged intersection between 10<sup>th</sup> Avenue, Scott Avenue, and Pine Grove Avenue would be eliminated and replaced with separate intersections with 10<sup>th</sup> Avenue and Scott Avenue.



**Roundabout Example**

### **City East Alternative Design Issues**

The following paragraphs identify locations where the City East Alternative fails to meet the design criteria as listed in **Figures E.6 and E.7**. The failure of an alternative to meet certain design criteria is acceptable when safety is not compromised and a substantial reduction in impacts is achieved.

The City East Alternative uses curve lengths that are less than desirable at several locations. Both Water Street exit ramps to I-94/I-69 and the westbound entrance ramp from I-94/I-69 are constrained by right-of-way limits, resulting in curve lengths that do not meet the desired design criteria. This is also true for the exit ramp from I-94/I-69 to Pine Grove Avenue, south of the new Blue Water Bridge Plaza. This design issue also exists for the City West and Township Alternatives.

The deceleration lane where eastbound local traffic on I-94/I-69 is separated from plaza bound traffic is approximately 10 percent short of the desired standard. This allows the proposed ramp to the Lapeer Connector to be kept inside the existing right-of-way and reduces impact to Stocks Creek. This design issue also exists for the City West Alternative.

The City East Alternative reduces the speed of an interstate freeway section along I-94/I-69 from a design speed of 60 miles per hour to a design speed of 30 miles per hour. This occurs where the freeway ends at the ramps to the new plaza and the approach to locations where plaza traffic will have to stop to pay tolls and for potential outbound inspections. Although this doesn't technically meet the design criteria, the reduced speed on the interstate system is beneficial at this point as it avoids high speed traffic approaching a stop condition. It also results in right-of-way savings. This design issue also exists for the City West Alternative.



### **City East Alternative Traffic Impacts**

The improvements for the City East Alternative are described in the sections above. The same traffic analysis techniques were used to analyze the traffic impacts of each alternative.

Local Impacts: In addition to relocating Pine Grove Avenue and expanding the plaza on street level, a number of local intersection improvements would be required to prevent the high congestion and queues experienced in the No-Build Alternative. Improvements were made at each intersection in the following step-by-step order until congestion was reduced to a moderate level.

- Adjust the traffic signal operations

- Add turn lanes
- Add through lanes

The resulting improvements are outlined in **Table 2.2.1**.

The City East Alternative improvements, along with the local intersection improvements noted above, would allow the Hancock Street and Pine Grove Avenue intersection, the Hancock Street and southbound M-25 Connector intersection, and both of the Water Street intersections to experience moderate congestion (21 to 55 seconds delay per vehicle) during the peak travel periods instead of high congestion (greater than 55 seconds delay per vehicle). The other intersections would have low levels of congestion (zero to 20 seconds delay per vehicle). Each of the critical intersections would experience fewer delays than under the No-Build Alternative.

**Table 2.2.1 Intersection Improvements for City East Alternative**

Intersection	Needed Improvements
Hancock and M-25 Connector	<ul style="list-style-type: none"> <li>• Prevented all left turn movements</li> <li>• Added additional westbound right turn lane</li> <li>• Added southbound right turn bay</li> <li>• Added northbound right turn green arrow</li> <li>• Provided indirect left turn at north approach for northbound left and westbound left</li> </ul>
Hancock and Pine Grove	<ul style="list-style-type: none"> <li>• Added eastbound left turn and right turn lanes</li> <li>• Added westbound left turn lane</li> </ul>
Pine Grove and 10 <sup>th</sup> Avenue	<ul style="list-style-type: none"> <li>• Redesigned as two T-intersections</li> </ul>
Water Street and EB Off-ramps	<ul style="list-style-type: none"> <li>• Added protected right turn arrow for the off-ramp</li> <li>• Added through lane for Lapeer Connector traffic</li> </ul>
Water Street and WB Off-ramps	<ul style="list-style-type: none"> <li>• Added protected right turn arrow for the off-ramp</li> <li>• Added through lane for Lapeer Connector traffic</li> </ul>

*Freeway Impacts:* Like the No-Build Alternative, the freeway was divided into separate segments using the on/off-ramps as the beginning and end points between each segment. Each segment and the on-ramps and off-ramps were analyzed separately.

In the City East Alternative, all freeway segments would experience low levels of congestion (0 to 47% of capacity). These areas are illustrated in **Figure E.13** in **Appendix E**. Each of the ramps would experience only moderate levels of congestion (48 to 88% of capacity).

*Border Crossing Transboundary Impacts:* The Border Wizard™ analysis indicated that the city alternatives would improve traffic flow through the plaza with moderate levels of congestion and vehicle queues. The Canadian bound traffic has three dedicated lanes separated from the local freeway traffic that extend back to the Lapeer Connector. This would allow the FAST/NEXUS traffic to flow freely up to the plaza and reduce the likelihood of backups onto I-94/I-69 in the event of a border slow down due to national security concerns or possible traffic delays on the Canadian side.

*WATSIM™ Microsimulation:* The City East Alternative would relocate Pine Grove Avenue and reconstruct the intersection of Pine Grove Avenue and 10th Avenue as two T-intersections; a northern intersection and a southern intersection. Between these two intersections, the through traffic on Pine Grove Avenue and 10th Avenue would be combined on a five to seven lane section. In addition, the City East Alternative was considered with typical intersections and with roundabouts at the following intersections:



Example of a Single-Span Rectangular Bridge

- Hancock Street/M-25 Connector
- Hancock Street/Pine Grove Avenue
- Pine Grove Avenue/10<sup>th</sup> Avenue (N)
- Pine Grove Avenue/Mansfield Street
- Water Street Ramps to I-94/I-69

There were no major queues or delays in the WATSIM™ analysis under the City East Alternative option, using either roundabouts or signalized intersections. However, because the City East Alternative combines both Pine Grove and 10<sup>th</sup>

Avenue, if a traffic incident were to occur on it, alternative north-south routes would be reduced and EMS response times adversely affected.

### City East Alternative Bridges, Walls, and Other Structures

*Bridges:* Two new bridges would be constructed with the City East Alternative and five existing bridges would be reconstructed. The new bridge is described in **Table 2.2.2**.

**Table 2.2.2 City East Alternative New Bridges**

N1	Inbound traffic to I-94/I-69 and Ramp to M-25 Connector over send-back lane on Plaza
N2	Outbound Car/Trucks over M-25 Connector

Bridge N1 could be a single-span rectangular structure. The inbound lanes and M-25 Ramp would be elevated slightly above street level. Bridge N2 could be a multi-span curved structure.



Example of a Multi-Span Curved Bridge

The existing bridges requiring reconstruction for the City East Alternative are identified in **Table 2.2.3**.

**Table 2.2.3 City East Alternative Reconstructed Bridges**

R1	Inbound Cars/Trucks over M-25 Connector
R2	I-94/I-69 over the Black River
R3	Water Street over I-94/I-69
R4	Ramp from I-94/I-69 to Lapeer Connector over I-94/I-69 Inbound and Outbound
R5	I-94/I-69 Over Stocks Creek East of Proposed Welcome Center

Bridge R1 would be widened multi-span curved structure. Bridge R2 would be rebuilt wider and longer than the current structure. One option for the new bridge would consist of three independent structures on common foundations. This structure would be built utilizing longer spans over the Black River, resulting in fewer obstructions in the waterway. Bridge R3 would be reconstructed wider and longer than the current structure to accommodate the additional lanes on Water Street and to span the widened I-94/I-69/eastbound M-25 Connector. Bridge R4 would be reconstructed as a multi-span rectangular



MSE Wall Example



Example of a Post and Panel Sound Wall

structure shorter than the original due to a less severe skew angle with I-94/I-69. The structure will be wider to accommodate the new movement from the northbound Lapeer Connector to the westbound I-94/I-69. The existing culverts (R5) at Stocks Creek would be replaced with a single span rectangular structure.

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### What are Geotechnical Components?

The elements of design for a transportation project that deal with soil conditions.

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Walls: The City East Alternative would require at least three different types of walls, retaining walls, security walls, and sound walls. Mechanically Stabilized Earth (MSE) retaining walls would be utilized in areas of the proposed plaza where different elevations would be required. Various styles of sound walls could be investigated for the areas around the expanded plaza affected by noise. The most common style is a pre-cast concrete post and panel sound wall.

Geotechnical Components: The banks of the Black River contain very poor soils within the proposed footprint of the new bridge. The poor soil conditions could impose foundation design challenges including its suitability for foundations or backfill for the bridge over the Black River. Soil borings indicate that the poor soil conditions exist up to 80 feet below the existing surface. The existing soils are not suitable for large foundations or retaining walls. There are three options that will be investigated to overcome the poor soils in the river bank regions.



Existing I-94/I-69 Bridge over the Black River



Example of a Land Bridge

The options are as follows:

- 1) Build a longer bridge over the poor soil area. This is typically referred to as a “land bridge”. The land bridge is a structure built very low to the ground utilizing support piers founded on piles, the piers in-turn support the bridge beams approximately three to four feet off the ground. A land bridge would be located outside the limits of the navigable waters of the Black River.
- 2) Utilize a construction technique known as a drained surcharge to compress the underlying poor soil layer. The surcharge is a large berm of engineered fill designed to be heavy enough, and placed long enough to compress the poor soils region. Once compressed

the roadway can be constructed. This option typically requires additional construction time to sufficiently allow the soil compression to take place.

- 3) Instead of bridging the poor soils (land bridge) or compressing the poor soils (surcharge), utilize light weight foam blocks as a backfill material behind retaining and bridge abutment walls to reduce the load on the poor soils to a manageable level. Further investigation into all foundation options will be provided in the FEIS.

### **City East Alternative Drainage**

Drainage improvements for the City East Alternative are discussed as part of **Section 3.11 Groundwater, Drainage, and Surface Water Quality**.

### **City East Alternative Maintenance of Traffic/Construction Staging**

Maintenance of Traffic (MOT) is related to construction staging as they both have 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 sufficiently maintained.

The main objectives of construction staging are to minimize delays and congestion, maintain the required access locations, and complete the project in a reasonable timeframe. Another means of MOT is a detour route which allows construction to progress most efficiently without the hindrance and danger that traffic in a construction zone presents. The MDOT would typically coordinate with local communities and study the residential and commercial traffic requirements in the area to determine desirable detour routes and access.

Plans for maintaining traffic, road detours and closures, and staged construction, would be designed per 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.

The following is a description of a potential MOT staging plan that could apply to the City East Alternative focusing on the plaza. The City East Alternative MOT plan would maintain the cross-border and local traffic throughout the construction of a new plaza and could consist of five stages of MOT.

Stage 1: Site preparation would be accomplished in stage 1 of construction, including the demolition of all required structures within the construction limits and removing debris from the site.

Stage 2: The local access ramp and relocated Pine Grove/10<sup>th</sup> Avenue would be constructed. To maintain traffic in stage 3 temporary ramps would be built for outbound traffic. The bridge to Canada over 10<sup>th</sup> Avenue, and the ten primary inspection booths would also be constructed to allow processing to continue throughout all stages of construction.

Stage 3: The truck secondary inspection area, northbound M-25 Connector, and outbound bridge over northbound M-25 Connector would be built. To maintain traffic during stage 3, Pine Grove traffic would be moved to the newly constructed Pine Grove/10<sup>th</sup> Avenue. Northbound M-25 Connector traffic would be diverted along the local access ramp to Pine Grove.

Stage 4: The existing plaza would be removed and traffic would be moved to the previously constructed areas of the new plaza. The central area of the plaza with the main building would be completed in this stage along with the inbound bridge over the M-25 Connector.

Stage 5: The outbound inspection areas and southbound M-25 Connector would be completed. M-25 Connector traffic would be maintained on the new section of northbound M-25 Connector with the use of a traffic crossover and part-width construction.

The Lapeer Connector, Water Street, and Black River Bridge construction would be independent from the plaza construction and would therefore be staged separately.

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### What is Part-Width Construction?

Part-width construction involves maintaining traffic flow on one half of the roadway while the other half is being re-constructed. Crossovers are constructed to direct traffic from one set of lanes to the other.

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**An Example of Crossovers for Part-Width Construction**

Although control of all construction related inconveniences is not possible, proper signing of all construction areas will ensure motorist and pedestrian safety. Access would be maintained to properties adjacent to the proposed right-of-way during construction, to the extent possible. The final maintenance of traffic plans will be developed in conjunction with local stakeholders during the design phase.

### **City East Alternative Utilities**

The City of Port Huron has an established, functional water and sewage treatment system. A ten-inch water main is crossed by M-25 Connector at Elmwood Street, and a 72-inch combined storm and sanitary sewer line crosses underneath and services the plaza. The City maintains sewer and water mains along 10<sup>th</sup> Avenue, however it is not anticipated these utilities would require relocation for the City East Alternative.

Numerous overhead and buried utilities (electrical, cable and street lighting) run throughout the city and currently provide services to the existing plaza. A DTE Energy electrical substation, located on the north side of the existing plaza, provides power to the plaza and will be relocated. Further investigation and coordination with utility providers for the provision of electrical service during the construction of a new plaza would be accomplished during the Final EIS phase. One solution may consist of providing an off-site power supply capable of servicing temporary plaza facilities during construction



**Existing DTE Energy Substation**

SEMCO Energy has established natural gas pipeline networks throughout the plaza area. Telephone service in the City is provided by AT&T. It is not anticipated that these lines will need to be relocated.

The Black River Bridge and Water Street Bridge carry electrical conduit which would be maintained during construction by means of temporary supports.

### 2.2.5 City West Alternative – Relocate Pine Grove Avenue to the West Around Expanded Plaza

This section discusses the features of the City West Alternative and begins with a basic description of the alternative. The section also includes a discussion of the following features of the City West Alternative.

- Layout and design issues
- Effects on border and local traffic
- Bridges, walls, and other structures
- Drainage
- Keeping traffic flowing during construction
- Utilities

#### Describe the City West Alternative

The City West Alternative, as illustrated in **Figure E.4 – Sheets A, B, C, and D** located in the separate **Appendix E** Volume, expands the existing plaza within the City of Port Huron.



Truck Inspection Booths



Radiation Detection Portals

The plaza component of the City West Alternative would cover 65 acres and bring most of the existing elevated plaza down to street level. The City West Alternative would require the relocation of Pine Grove Avenue to the west between 10<sup>th</sup> Avenue and Hancock Street. The relocated Pine Grove Avenue would wrap around the south and west sides of the new plaza. The relocated Pine Grove Avenue would then split into separate northbound and southbound lanes. The northbound lanes would turn back east and connect to the existing Pine Grove Avenue at approximately Riverview Street. The southbound lanes would follow the existing M-25 Connector. This description of the City West Alternative area includes all of the inspection facilities needed by the year 2030.

*The Plaza:* The City West Alternative brings traffic off of the Blue Water Bridge down to street level as quickly as possible. By the time cars and trucks reach the inspection booths on the plaza they are at street level. There would be 20 (expandable to 30) inspection booths for cars and trucks arriving from Canada. The number of booths may be reduced to 20 high-low booths (may be used for truck and car), however this will not affect the overall size of the plaza. Before the cars and

trucks reach the inspection booths, they would pass through radiation detection portals, which ensure that they are not bringing radioactive material into the United States. At the inspection booths, drivers and passengers answer questions from CBP officers and discuss or provide paperwork on the cargo they are carrying. If cars and trucks clear primary inspection, they would have two options to exit the plaza. 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. The freeway exits from the City West plaza would be similar to those for the existing plaza. Trucks exiting the plaza would have to show proof that they are cleared to leave the plaza at an additional exit control booth.

Trucks not cleared at the inspection booths are sent to the secondary truck inspection area. The City West Alternative uses the block bordered by Hancock Street, 10<sup>th</sup> Avenue, the existing plaza, and the existing M-25 Connector for the expanded truck inspection area. The truck inspection area would contain adequate parking to accommodate trucks sent to secondary inspection for document processing, plus 12 docks for unloading trucks, and 43,500 square feet of office and unloading space. The office space would include space for the inspection agencies and for customs brokers who help process paperwork and payments for truck drivers. The inspection agent's offices would be in a separate secure area away from the customs broker's offices. The truck inspection area would also include separate space for the walk-around inspection (no unloading would occur on the plaza) of livestock. Up to three Gamma-Ray Inspection Technology (GRIT) buildings would be constructed, which allow CBP officers to electronically scan the contents of vehicles.

Cars with passengers that are not cleared to enter the United States or require further processing are sent to a secondary inspection building in the middle of the plaza, shown in dark red on **Figure E.4 – Sheet D**. This building also would contain additional office space for the inspection agencies and the Michigan Department of Transportation staff. There would also be a parking area for cars that require further inspection and a garage for detailed car inspections.



City West (Preferred)  
Alternative

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### 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.

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Cars and trucks traveling to Canada would 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 would be provided to allow CBP to inspect cars and trucks leaving the 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 three booths, five docks for unloading trucks, and adequate truck and car parking spaces. 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 would also include parking for both plaza employees and visitors. Employee and visitor parking lots would be located in the northeast corner of the plaza. The proposed plaza would include separate secure lots for employees and visitors. The plaza would also have a buffer area, shaded green on **Figure E.4**, for the neighborhood south of the plaza.



**Figure 2.2.3 City West Alternative Lanes on the Black River Bridge**

*The Black River Bridge and I-94/I-69:* The City West 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 MDOT Welcome Center in Port Huron Township. The City West Alternative and the City East Alternative feature the same improvements along the I-94/I-69 corridor.

*Black River Bridge:* The City West 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 2.2.3** shows the proposed lane configuration on the Black River Bridge. The new bridge will be approximately 200 feet wide and will consist of 13 spans. The new bridge will have nine travel lanes, three lanes for eastbound local traffic, three lanes for eastbound 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 and the plaza. The border crossing lanes would include one lane for cars, one lane for trucks, and one lane for vehicles enrolled in the FAST and NEXUS program for pre cleared cars and trucks. The eastbound local traffic lanes would include two lanes connecting to the relocated Pine Grove Avenue, and a T-intersection where traffic may either turn on to Pine Grove Avenue going right to northern destinations or left to access downtown Port Huron. Eastbound traffic headed to Canada will use the barrier separated middle lanes to flow directly onto the plaza. The new bridge will include 12 foot shoulders for emergency access/vehicle storage, an upgrade over the two foot shoulders on the existing bridge.

City Access: Local traffic exiting the eastbound freeway wishing to visit the city of Port Huron will have direct access from the separated local traffic lanes. Drivers will have two right turn lanes available to them which provide direct access to southbound Pine Grove Avenue. Local traffic that has cleared customs and wishing to visit the city will be able to turn left at a signal and proceed southbound on Pine Grove Avenue.

I-94/I-69 Corridor: The City West Alternative includes resurfacing and expansion of 2.5 miles of existing I-94/I-69 as shown in **Figure E.4**. 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. The three lanes for local traffic will have a posted speed of 40 miles per hour and will provide all of the same access to Water Street, Hancock Avenue, and northern Port Huron as the existing I-94/I-69 Corridor provides.

Water Street Interchange: The City West Alternative includes the replacement of the existing interchange at Water Street including the Water Street Bridge over I-94/I-69. The replacement bridge will be up to four lanes wide, with two lanes in either direction. The bridge will also accommodate pedestrian traffic by including two five-foot sidewalks. Adequate right-of-way exists to place either traffic signals or roundabouts at the two intersections between Water Street and the freeway ramps. The exact configuration of the intersections would be determined during the design phase of the project. The ramps to Water Street will be upgraded to current design standards.



**Proposed Lapeer  
Connector Interchange**

Lapeer Connector Connections: The City West Alternative would 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 City West Alternative includes access in all directions between the Lapeer Connector and the new I-94/I-69 Corridor as illustrated in **Figure E.4**. 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/connector 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 on to 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 intersection 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 would require the entrance from Indian Drive onto the Lapeer Connector to be shifted approximately 300 feet south to meet safety standards.

New Welcome Center: Two locations for the new welcome center were initially considered; on the vacant land to the north of I-94/I-69 approximately one mile west of its current location, and within the median (between eastbound and westbound lanes) of I-94/I-69, also one mile west of the current welcome center. The median option was not carried forward due to geometric and safety concerns by FHWA regarding left exiting and entering lanes. Additionally, the amount of space available within the median did not meet the amount of parking required for a full service International Welcome Center. **Figure E.4** shows a conceptual layout for the new Welcome Center for the City West Alternative. The new 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. The 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. MDOT will hold a public workshop to develop aesthetic and landscaping treatments for the 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 City West Alternative would include several improvements to local roads surrounding the plaza. The intersection at 10<sup>th</sup> Avenue and Pine Grove Avenue would be reconstructed for the new Pine Grove Avenue. Scott Avenue would no longer connect to this intersection, ending in two cul-de-sacs. North of the plaza, Hancock Street would be slightly realigned to connect with the relocated Pine Grove Avenue. The M-25 Connector northbound would be closed north of Hancock Street. The southbound lanes would remain open carrying traffic southbound as part of the relocated Pine Grove Avenue. A minor realignment of Riverside Drive would 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 City West Alternative. Existing Pine Grove Avenue between 10<sup>th</sup> Avenue and Hancock Street would be closed. The new Pine Grove Avenue would be a boulevard from 12<sup>th</sup> Avenue northbound with an open center median and roundabouts or

signals at key intersections. A final plan for signals and roundabouts would be developed as part of the final design for the project. The proposed Pine Grove Avenue would include the following as illustrated in **Figure E.4**:



The Blue Water Bridge

- A roundabout for neighborhood access at 12<sup>th</sup> Avenue, south of the plaza
- A ramp from Pine Grove Avenue northbound to the new plaza
- An intersection at the ramp for local traffic from I-94/I-69 to Pine Grove Avenue
- A bridge over the ramps from I-94/I-69 to the plaza
- 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
- A new intersection with Hancock Street for the new northbound lanes for the relocated Pine Grove Avenue. The southbound lanes would connect to a modified version of the existing M-25 Connector/Hancock Street intersection
- A connection to existing Pine Grove Avenue at Riverview Street for the northbound lanes of the realigned Pine Grove Avenue

Several options were considered in the development of the relocated Pine Grove Avenue including:

- An option that would have split Pine Grove Avenue into a pair of one way streets that would circle the plaza for the entire plaza perimeter. Northbound Pine Grove Avenue would have run east of the plaza and southbound Pine Grove Avenue would have run west of the plaza. This option was dropped because it led to worse congestion than the boulevard option discussed above and because it would have resulted in a major roadway running along 10<sup>th</sup> Avenue underneath the connection between the Blue Water Bridge and the new plaza. The Study Team considers this a fatal flaw and a higher security risk as is the case for the City East Alternative. This option also presented more difficulty for ensuring easy access for emergency services in the areas surrounding the plaza.

- An option which included a five-lane roadway along the whole length of the relocated Pine Grove Avenue instead of a raised median. This option was dropped due to safety concerns with allowing left turns at all places along the busy new roadway. This option would have taken almost all of the traffic away from the existing businesses along Pine Grove Avenue between Hancock Street and the north side of Garfield Street.
- An option which connected the new Pine Grove Avenue/M-25 Connector to the existing Pine Grove alignment around Hancock Street and uses Pine Grove Avenue as the major roadway to take traffic north. This option redirects traffic to the original Pine Grove alignment and thus encourages visits to existing businesses.

After evaluating these options, the Study Team selected the last option discussed above and shown in **Figure E.4** as the best concept for relocating Pine Grove Avenue as part of the City West Alternative. This concept may be refined further as the study and design proceed.

### **City West Alternative Design Issues**

The City West Alternative has the same roadway configuration as the City East Alternative west of the Black River. The City West Alternative includes the same design issues at the Water Street Interchange, the separation between border and local traffic, and the lower freeway speed as discussed earlier for the City East Alternative.

### **City West Alternative Traffic Impacts**

The improvements for the City West Alternative are described in the sections above. The same traffic simulation software packages were used to analyze the traffic impacts of each alternative.

Local Impacts: In addition to relocating Pine Grove Avenue and expanding the plaza on street level, a number of local intersection improvements would be required to prevent the high congestion and queues experienced in the No-Build



Dual Left Turn Lane Example

Alternative. Improvements were made at each intersection in the following step-by-step order until congestion was reduced to a moderate level (21 to 55 seconds delay per vehicle).

- Adjust the traffic signal operations
- Add turn lanes
- Add through lanes

The resulting improvements are outlined in **Table 2.2.4**.

The City West Alternative improvements, along with the local intersection improvements noted above, would allow the Hancock Street and Pine Grove Avenue intersection, the Hancock Street and southbound M-25 Connector intersection, the Pine Grove and 10<sup>th</sup> Avenue and both of the Water Street intersections to experience moderate (21 to 55 seconds delay per vehicle) instead of high congestion (greater than 55 seconds delay per vehicle). The other intersections would have low levels of congestion (0 to 20 seconds delay per vehicle). Each of the critical intersections would experience fewer delays than under the No-Build Alternative.

**Table 2.2.4 Intersection Improvements for City West Alternative**

Intersection	Needed Improvements
Garfield Street and Pine Grove/M-25 Connector	<ul style="list-style-type: none"> <li>• Separated northbound and southbound traffic movements</li> <li>• Added northbound left turn lane</li> <li>• Added northbound through lane</li> <li>• Added southbound through lane</li> </ul>
Hancock and Pine Grove/M-25 Connector	<ul style="list-style-type: none"> <li>• Added northbound right turn bay</li> <li>• Added northbound through lane</li> <li>• Eliminated northbound and southbound left turn movements – traffic to use crossovers</li> <li>• Added southbound through lane</li> </ul>
Pine Grove /M-25 Connector and WB Plaza ramps	<ul style="list-style-type: none"> <li>• New intersection and signal</li> <li>• One left turn lane onto WB I-94/I-69</li> <li>• Ramp from Plaza with right turn lane and left turn lane</li> </ul>
Pine Grove and M-25 Connector	<ul style="list-style-type: none"> <li>• New intersection and signal</li> <li>• Eastbound two left and two right turn lanes</li> </ul>
Pine Grove and 12 <sup>th</sup> Avenue	<ul style="list-style-type: none"> <li>• New roundabout</li> <li>• Employee access to plaza</li> </ul>
Pine Grove and 10 <sup>th</sup> Avenue	<ul style="list-style-type: none"> <li>• Added southbound Pine Grove Avenue right turn lane</li> <li>• Added northbound Pine Grove Avenue right turn lane</li> <li>• Added northbound and southbound 10<sup>th</sup> Avenue double left turn lanes</li> <li>• Removed Scott Avenue from intersection (added cul-de-sac)</li> </ul>
Water Street and EB Off-ramps	<ul style="list-style-type: none"> <li>• Added eastbound through lane to the existing left and right turn lanes</li> <li>• Dedicated southbound left turn lane</li> </ul>
Water Street and WB Off-ramps	<ul style="list-style-type: none"> <li>• Added westbound through lane to the existing left and right turn lanes</li> <li>• Dedicated northbound left turn lane and through lane</li> </ul>

Freeway Impacts: Like the No-Build Alternative, the freeway was divided into separate segments using the on/off-ramps as the beginning and end points between each segment. Each segment and the on-ramps and off-ramps were analyzed separately.



Example of a Single-Span Rectangular Bridge

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**What is Border Wizard™?**

A computer simulation program produced for the General Services Administration (GSA) to model border crossing facility requirements in the United States.

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In the City West Alternative, two freeway segments would experience moderate (48 to 88% of capacity) levels of congestion. These segments include the westbound segment between the Water Street on-ramp and the westbound I-94/I-69 off-ramp as well as the eastbound segment between the I-94/I-69 on-ramp and the Water Street off-ramp. These areas are illustrated in **Figure E.16** in **Appendix E**. Each of the ramps would experience moderate levels of congestion (48 to 88% of capacity).

Border Crossing Transboundary Impacts: The Border Wizard™ analysis indicated that the city plaza alternatives would improve traffic flow through the plaza with moderate (48 to 88% of capacity) levels of congestion and vehicle queues. The east bound Canadian bound traffic has three dedicated lanes separated from the local freeway traffic that extend back to the Lapeer Connector. This would allow the FAST/NEXUS traffic to flow freely up to the plaza and reduce the likelihood of backups onto I-94/I-69 in the event of a border slow down due to national security concerns or circumstances on the Canadian side.

The outbound inspection facility is of particular concern as it has to be of sufficient size and capacity to prevent backups from occurring on the freeway network. For the City West Alternative, the Study Team’s analysis indicated that up to three outbound inspection booths would be required to prevent backups from occurring during the maximum outbound inspection process.



Example of a Multi-Span Bridge

**City West Alternative Bridges, Walls, and Other Structures**

Bridges: One new bridge would be constructed with the City West Alternative and five existing bridges would be reconstructed. The new bridge is described in **Table 2.2.5**.

**Table 2.2.5 City West Alternative New Bridge**

N1	Relocated Pine Grove Avenue over I-94/I-69 lanes to plaza.
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Bridge N1 would likely be a two-span rectangular structure. The ramps to/from I-94/I-69 would be below street level and slope upwards to connect to the plaza.

The existing bridges requiring reconstruction for the City West Alternative are identified in **Table 2.2.6**.

**Table 2.2.6 City West Alternative Reconstructed Bridges**

R1	I-94/I-69 over the Black River
R2	Water Street over I-94/I-69
R3	Lapeer Connector over I-94/I-69
R4	I-94/I-69 over Stocks Creek

Bridge R1 would be rebuilt wider and longer than the current structure. One option for the new bridge would consist of three independent structures on common foundations. This structure would be built utilizing longer spans over the Black River, resulting in fewer obstructions in the waterway. Bridge R2 would be reconstructed wider and longer than the current structure to accommodate the potential roundabouts or expanded intersections off each end of the structure. Bridge R3 would be reconstructed as a multi-span rectangular structure shorter than the original due to a less severe skew angle with I-94/I-69. The structure will be wider to accommodate the new movement from the northbound Lapeer Connector to the westbound I-94/I-69. The existing culverts (R4) at Stocks Creek would be replaced with a single span rectangular structure.



MSE Wall Example

Walls: The City West Alternative would require at least three different types of walls, retaining walls, security walls, and sound walls. Mechanically Stabilized Earth (MSE) retaining walls would be utilized in areas of the proposed plaza where different elevations would be required. Various styles of sound walls could be investigated for the areas around the expanded plaza affected by noise. The most common style is a pre-cast concrete post and panel sound wall.

Geotechnical Components: The banks of the Black River contain very poor soils within the proposed footprint of the new bridge. The poor soil conditions could impose foundation design challenges including its suitability for foundations or backfill for the bridge over the Black River. Soil borings indicate that the poor soil conditions exist up to 80-feet below the existing surface. The existing soils are not suitable for large foundations or retaining walls. There are three options



Example of a Land Bridge



Existing I-94/I-69 Bridge over the Black River

that will be investigated to overcome the poor soils in the river bank regions.

The options are as follows:

- 1) Build a longer bridge over the poor soil area. This is typically referred to as a “land bridge”. The land bridge is a structure built very low to the ground utilizing support piers founded on piles, the piers in-turn support the bridge beams approximately three to four feet off the ground. A land bridge would be located outside the limits of the navigable waters of the Black River.
- 2) Utilize a construction technique known as a drained surcharge to compress the underlying poor soil layer. The surcharge is a large berm of engineered fill designed to be heavy enough, and placed long enough to compress the poor soils region. Once compressed the roadway can be constructed. This option typically requires additional construction time to sufficiently allow soil compression to take place.
- 3) Instead of bridging the poor soils (land bridge) or compressing the poor soils (surcharge), utilize light weight foam blocks as a backfill material behind retaining and bridge abutment walls to reduce the load on the poor soils to a manageable level. Further investigation into all foundation options will be provided in the FEIS.

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#### What is Part-Width Construction?

Part-width construction involves maintaining traffic flow on one half of the roadway while the other half is being re-constructed. Crossovers are constructed to direct traffic from one set of lanes to the other.

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#### City West Alternative Drainage

Drainage improvements for the City West Alternative are discussed as part of **Section 3.11 Groundwater, Drainage, and Surface Water Quality**.

#### City West Alternative Maintenance of Traffic/Construction Staging

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 sufficiently maintained.

The main objectives of construction staging are to minimize delays, minimize congestion, maintain the required access locations, and complete the project in a reasonable timeframe. Another means of MOT is a detour route which allows construction to progress most efficiently without the hindrance and danger that traffic in a construction zone presents. The MDOT would typically coordinate with local communities and study the residential and commercial traffic requirements in the area to determine desirable detour routes and access.

Plans for maintaining traffic, road detours and closures, and staged construction, would be designed per 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.

The following is a description of a potential MOT staging plan that could apply to the City West Alternative focusing on the plaza. The City West Alternative MOT plan would maintain the cross-border and local traffic throughout the construction of a new plaza and could consist of five stages of MOT.

Stage 1: Site preparation would be accomplished in stage 1 of construction, including the demolition of all required structures within the construction limits and removing debris from the site. Hancock Avenue will be temporarily widened to allow for relocated Pine Grove Avenue in Stage 2. Pine Grove Avenue south of the proposed plaza will be constructed. All traffic will be maintained on the freeway and Pine Grove Avenue during this stage.

Stage 2: Pine Grove traffic will be routed to the temporary 10<sup>th</sup> Avenue/Hancock detour and removal of Pine Grove will commence. The secondary commercial inspection area will be constructed and temporary inspection booths will be installed



**An Example of Crossovers for Part-Width Construction**

to allow processing to continue throughout all stages of construction. Eastbound I-94/I-69 will be constructed from the Black River Bridge to approximately the location of the Pine Grove bridges over I-94/I-69. All traffic will be maintained on the freeway and plaza during this stage.

Stage 3: Inbound plaza traffic from Canada will use the newly constructed inspection lanes during this stage. A temporary gated exit will be constructed on Hancock for cleared plaza traffic while the permanent exit ramps are constructed. Pine Grove Avenue will be completed during this stage including the bridges over I-94/I-69. Five primary inspection lanes for traffic to Canada will be constructed and construction of the remainder of eastbound I-94/I-69 will be completed during this stage.

Stage 4: Plaza construction would be completed during this stage and temporary inspection facilities would be removed. Traffic would be shifted from the temporary 10<sup>th</sup>/Pine Grove detour onto the newly constructed Pine Grove west of the plaza. 10<sup>th</sup> Avenue will then be reconstructed north and south of Pine Grove and the temporary widening for the detour route will be removed. All traffic will be in its final configuration on side streets, Pine Grove Avenue, the interior plaza and I-94/I-69 at the completion of this stage.

The Lapeer Connector, Water Street, and Black River Bridge construction would be independent from the plaza construction and would therefore be staged separately. Although control of all construction related inconveniences is not possible, proper signing of all construction areas will ensure motorist and pedestrian safety. Access would be maintained to properties adjacent to the proposed right-of-way during construction, to the extent possible.

### **City West Alternative Utilities**

The City of Port Huron has an established, functional water and sewage treatment system. A ten-inch water main is crossed by M-25 Connector at Elmwood Street, and a 72-inch combined the storm and sanitary sewer line crosses underneath and services the plaza. The city maintains sewer and water mains along 10<sup>th</sup> Avenue, however it is not

anticipated these utilities would require relocation for the City West Alternative.

Numerous overhead and buried utilities (electrical, cable and street lighting) run throughout the city and currently provide services to the existing plaza. A DTE Energy electrical substation, located on the north side of the existing plaza, provides power to the plaza. Further investigation and coordination with utility providers for the provision of electrical service during the construction of a new plaza would be accomplished during the Final EIS phase. One solution may consist of providing an off-site power supply capable of servicing temporary plaza facilities during construction.



Existing DTE Energy Substation

SEMCO Energy has established natural gas pipeline networks throughout the plaza area. Telephone service in the City is provided by AT&T.

The Black River Bridge and Water Street Bridge over I-94/I-69 carry electrical conduit which would be maintained during construction by means of temporary supports.

### **2.2.6 Township Alternative – Relocated Plaza in Port Huron Township**

This section discusses the Township Alternative and begins with a basic description of the alternative. The section also includes a discussion of the following features of the Township Alternative:

- Layout and design issues
- Effects on border and local traffic
- Bridges, walls, and other structures
- Drainage
- Keeping traffic flowing during construction
- Utilities

#### **Describe the Township Alternative**

The Township Alternative, illustrated in **Figure E.5 – Sheets A to D**, located in the separate **Appendix E** volume, involves the relocation of major plaza functions to a mostly undeveloped site in Port Huron Township, 1.5 miles west of the current

facility. This description of the Township Alternative includes all of the facilities needed by the year 2030.



For the Township Alternative, inbound traffic would no longer be able to exit at the existing plaza

*The Plaza:* Traffic entering the United States would come off the Blue Water Bridge and continue west on a three lane roadway across the current Blue Water Bridge Plaza. The current plaza footprint would remain in place, however local traffic would no longer be able to exit at the existing plaza or use Pine Grove Avenue to access the plaza. All inspections would occur at the new plaza. The new plaza would be located in Port Huron Township and use 103 acres of vacant, residential, and MDOT owned land. To get to the new plaza, traffic would use a three-lane secure roadway running between the existing plaza and the new site. The roadway would be secured using 20-foot high walls with four-foot extensions angled 45 degrees inward. These three lanes would also be separated from the three secured lanes for traffic headed to Canada. There would be no gates or access points to allow vehicles to enter or exit the secured corridor other than at the new plaza or from the Canadian side of the Blue Water Bridge. **Figure E.17** in **Appendix E** provides an idea of how the secured corridor would look.

The plaza for the Township Alternative is setup with similar facilities as the plaza for the City East and City West Alternatives. There would be 34 inspection booths for cars and trucks arriving from Canada. The number of booths may be reduced to 20 high-low booths (may be used for truck and car), however this will not affect the overall size of the plaza. Before the cars reach the inspection booths, they would pass through radiation detection portals, which ensure that they are not bringing radioactive material into the United States. At the inspection booths, drivers and passengers answer questions from CBP officers and discuss or provide paperwork on the cargo they are carrying. If cars and trucks clear primary inspection, they would have three options when they exit the plaza. They could take a ramp to I-94/I-69 westbound and take either I-94 towards Detroit or I-69 towards Flint. If headed east, they could take a loop ramp that provides access to an extension of the M-25 Connector. The extension of the M-25 Connector would provide access to the Lapeer Connector, Water Street, Hancock Street, and Port Huron. Drivers could also visit a new MDOT Welcome Center, which

would occupy 31 acres, located to the west of the inspection plaza. Trucks exiting the plaza would have to show proof that they are cleared to exit at an additional exit control booth.

Trucks not cleared at the inspection booths are sent to the secondary truck inspection area. The truck inspection area would contain adequate parking to accommodate trucks sent to secondary inspection for document processing, plus 12 docks for unloading trucks, and 43,500 square feet of office and unloading space. The office space would include space for the inspection agencies and for customs brokers who help process paperwork and payments for truck drivers. The CBP offices would be in a separate secure area away from the customs broker's offices. The truck inspection area would also include separate space for the inspection of livestock. Up to three GRIT buildings, which allow CBP officers to scan the contents of vehicles, would also be constructed.



GRIT Building on Existing Plaza

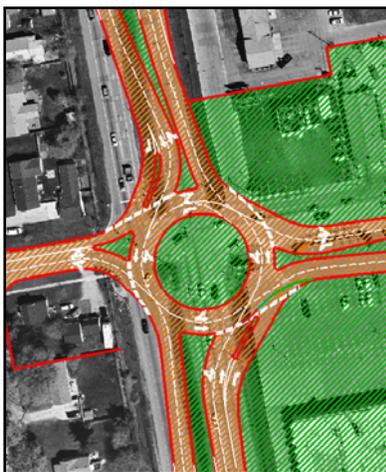
Cars with passengers that are not cleared to enter the United States or require further processing would be sent to a secondary inspection building in the middle of the plaza, shown in dark blue on **Figure E.5 Sheet B**. This building also would contain more office space for the inspection agencies and the Michigan Department of Transportation staff. There would be a parking area for cars that require further inspection and a garage for detailed car inspections.

Cars and trucks would have to exit the United States at the relocated plaza in Port Huron Township and would have two entrances to the new plaza. There would be a ramp from eastbound I-94/I-69 to the new plaza. A westbound extension of the M-25 Connector would run parallel to the secured corridor and provide access to the plaza from local destinations in the Port Huron Area.

Facilities would be included to allow CBP to inspect cars and trucks leaving the United States. This area is called outbound inspection. The outbound inspection facilities would include 18 booths, ten docks for unloading trucks, and adequate truck and car parking spaces. If vehicles do not pass outbound inspection they would be sent to outbound secondary inspection. Following outbound inspection, cars and trucks would pass through ten toll booths. After the toll booths, cars



Figure 2.2.4 Township Alternative Lanes on the Black River Bridge



Roundabouts are being considered instead of traffic signals at key intersections for all Build Alternatives

and trucks would use the three outbound lanes of the secured corridor to travel to the existing plaza. These lanes would also be secured with 20-foot high walls with four foot extensions angled 45 degrees inward. On the existing plaza, drivers headed for Canada would have the option of visiting a new duty free store located where plaza inspection facilities currently exist. Drivers would then proceed to Canada using the existing Blue Water Bridge.

The Township Alternative also includes parking for both plaza employees and visitors. Employees and visitors would access the plaza using the same ramps as traffic entering and exiting the country. Service drives would provide employee and visitor access to parking areas on the plaza. Two parking lots would be located next to the inspection building in the center of the plaza. A third employee parking lot would be located behind the truck inspection area on the north side of the plaza. The Township Alternative also includes buffer and berm areas, shaded green on **Figure E.5 in Appendix E**.

*The Black River Bridge and I-94/I-69:* The Township Alternative would expand the Black River Bridge from a four-lane bridge to ten lanes. **Figure 2.2.4** provides an idea of the layout of the new Black River Bridge. The new bridge would include three secured lanes to carry traffic from the relocated plaza, three secured lanes to carry traffic from Canada to the relocated plaza to Canada, and four lanes to carry local traffic, two in each direction. The Township Alternative would include a one-lane off ramp to Pine Grove Avenue south of the existing plaza for eastbound travelers on the M-25 Connector destined for downtown Port Huron. The off-ramp would be a one way connection between I-94/I-69 and Pine Grove Avenue. The border crossing lanes would include one lane for cars, one lane for trucks, and one lane for vehicles enrolled in the FAST and NEXUS programs for pre-cleared cars and trucks. The lanes to carry local traffic would be an extension of the M-25 Connector and run parallel to the secure corridor, between the existing and new plazas, and connect to I-94/I-69 south of the new plaza. With the Township Alternative, local traffic would have access to and from Water Street, Hancock Street, and Pine Grove Avenue, as it does today.

As a result of the expansion of the Black River Bridge and the extra lanes on I-94/I-69 for border crossing traffic, the Water Street Interchange would be rebuilt. The Water Street Bridge over I-94/I-69 would be widened from two lanes to four lanes, including two five-foot sidewalks. The ramps to Water Street would be re-built and new intersections or roundabouts capable of handling heavier volumes of traffic would replace the existing signalized intersections.

The Township Alternative would 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. With the Township Alternative, traffic headed in all four directions would be able to use the Lapeer Connector.

Local Road Improvements: The Township Alternative would include several improvements to the local roads surrounding the existing plaza. The intersections of Hancock Street and the M-25 Connector and Hancock Street and Pine Grove Avenue would be improved with either a roundabout or an intersection with additional turning lanes on all four legs. Hancock Street would be widened between the M-25 Connector and Pine Grove Avenue, including additional turn lanes. Pine Grove Avenue would be widened between Hancock Street and 10<sup>th</sup> Avenue to include up to six lanes instead of the current four lanes and a center turn lane. The six-legged intersection between 10<sup>th</sup> Avenue, Scott Avenue, and Pine Grove Avenue would also be improved to reduce traffic conflicts. Scott Avenue would no longer have access to this intersection and would be terminated on both sides with a cul-de-sac. The new intersection between 10<sup>th</sup> Avenue and Pine Grove Avenue would feature either a roundabout or additional turning lanes to accommodate more traffic.



Part of Hancock Street would be widened under the Township Alternative

### **Township Alternative Design Issues**

The Township Alternative includes similar roadway locations with design issues at the Water Street Interchange as discussed earlier for the City East and City West Alternatives. For the Township Alternative the issues are both Water Street ramps have curve lengths and curve radii that are less than desirable according to the design criteria. Avoidance of impacts to Port

Huron Township Park Number 1 and the Bridge Harbor Marina is the reason for these design issues.

The Township Alternative also has a less than desirable curve radius on the proposed bridge that would connect traffic from Water Street to the Lapeer Connector southbound. This is to avoid increased impacts to property owned by the Port Huron Area School District.

### **Township Alternative Traffic Impacts**

The improvements for the Township Alternative are described in the section above. The Township Alternative was analyzed using the same traffic simulation software packages as the other alternatives.

*Local Impacts:* In addition to the planned relocation of the plaza to Port Huron Township, the Township Alternative would include a number of local intersection improvements to prevent the high congestion and queues experienced in the No-Build Alternative. Like the City East Alternative, the local intersection improvements were made in the following step-by-step order until congestion was reduced to a moderate level at each intersection.

- Adjust the traffic signal operations
- Add turn lanes
- Add through lanes

The resulting improvements are outlined in **Table 2.2.7** below.

The Township Alternative improvements, along with the noted local intersection improvements above, would allow all of the intersections to experience only moderate congestion (21 to 55 seconds delay per vehicle). Each of the critical intersections would experience fewer delays than the No-Build Alternative.

*Freeway Impacts:* As with the other alternatives, the freeway was divided into separate segments using the on/off-ramps as the beginning and end points between each segment. In addition to evaluating each segment, the on-ramps and off-ramps were analyzed. In the Township Alternative, the

freeway and arterial segments would have low to moderate (0 to 88% of capacity) levels of congestion. These areas are illustrated in **Figure E.19**. No ramps would experience high levels of congestion (greater than 88% of) for the Township Alternative.

The Township Alternative includes a number of weave areas with the relocation of the plaza activities. There are two in the eastbound direction on the M-25 Connector between the Plaza on-ramp and the Lapeer Connector off-ramp as well as between the Lapeer Connector on-ramp and the Water Street off-ramp.

There are three weave areas in the westbound direction. They are between the Water Street on-ramp and the Lapeer Connector off-ramp, between the Lapeer Connector on-ramp and the access to the plaza, and between the I-94/I-69 merge with the M-25 Connector and the I-69 westbound off-ramp. Each of the weave areas were examined using the HCS 2000 software and resulted in moderate to low congestion. Overall, the 2030 traffic operates well with the Township Alternative improvements.



**Additional inspection booths for the Township Alternative would help backups from occurring**

**Table 2.2.7 Intersection Improvements for Township Alternative**

Intersection	Needed Improvements
Hancock and M-25 Connector	<ul style="list-style-type: none"> <li>• Prevent all left turn movements</li> <li>• Add southbound right turn bay</li> <li>• Provide indirect left turn at north approach for northbound left</li> <li>• Add two right turn lanes for indirect left to southbound M-25 Connector</li> </ul>
Hancock and Pine Grove Avenue	<ul style="list-style-type: none"> <li>• Add eastbound left and right turn lanes</li> <li>• Add westbound left turn lane</li> <li>• Add additional northbound left turn lane</li> <li>• Add southbound right turn bay</li> </ul>
Pine Grove Avenue and 10 <sup>th</sup> Avenue	<ul style="list-style-type: none"> <li>• Add right turn lane for southbound Pine Grove Avenue</li> <li>• Add right turn bay for northbound Pine Grove Avenue</li> <li>• Add additional left turn lane for northbound 10<sup>th</sup> Avenue</li> <li>• Remove Scott Ave</li> <li>• Add cul-de-sac for Scott Avenue (approaches removed from intersection)</li> </ul>
Water Street and EB Off-ramps	Add protected right turn arrow for the off-ramp (for the southbound left turn phase)
Water Street and WB Off-ramps	Widen bridge to provide one through and one left turn lane in each direction

*Border Crossing Impacts:* The Border Wizard™ preliminary analysis indicated that a township alternative would improve traffic flow through the plaza with moderate (48 to 88% of capacity) levels of congestion and vehicle queues. The secure corridor provides three dedicated lanes in each direction separated from the local traffic that would provide over two miles of vehicle storage in the event of a border slow down due to either side of the crossing.



MSE Wall Example

The outbound inspection facility is of particular concern as it has to be of sufficient size and capacity to prevent backups from occurring on the freeway network. For a township alternative, the Border Wizard™ analysis indicated that 18 outbound inspection booths would be required to prevent backups from occurring during the maximum outbound inspection process.

## Township Alternative Bridges, Walls and Other Structures

*Bridges:* Eleven new bridges would be constructed with the Township Alternative and five existing bridges would be reconstructed. Free flow traffic conditions are desired along the new M-25 Connector Extension at the Lapeer Connector and the existing and proposed plaza. New bridges would be required at these locations to eliminate the need for traffic signals. The new bridges are detailed in **Table 2.2.8**.

Bridge N1 and N2 would be single-span rectangular structures. Bridge N3, N5, N8 and N9 would be multi-span curved structures. Bridge N4, N6, N7, N10 and N11 would be multi-span rectangular structures.



Example of a Post and Panel Sound Wall

**Table 2.2.8 Township Alternative New Bridges**

N1	Inbound & Outbound over the Stocks Creek Drain
N2	M-25 Connector over the Stocks Creek Drain
N3	Cleared Inbound over WB M-25 Connector & I-94/I-69 NB
N4	WB M-25 Connector over I-94/I-69 Inbound & Outbound Secured Corridor
N5	Ramp from Lapeer Connector NB to M-25 Connector WB over M-25 Connector
N6	Cleared Inbound over Sendback and Employee Parking Road
N7	WB M-25 Connector over I-94/I-69 NB
N8	Ramp from M-25 Connector to Lapeer Connector over M-25 Connector EB
N9	Outbound over M-25 Connector EB
N10	I-94/I-69 SB over Lapeer Road
N11	I-94/I-69 NB over Lapeer Road

The existing bridges requiring reconstruction are shown in **Table 2.2.9**.

**Table 2.2.9 Township Alternative Reconstructed Bridges**

R1	Inbound over Existing Plaza Loop Ramp
R2	Inbound over M-25 Connector
R3	I-94/I-69/M-25 Connector over the Black River
R4	Water Street over I-94/I-69
R5	Ramp from M-25 Connector to Lapeer Connector over I-94/I-69 Inbound and Outbound

Bridge R1 would be a widened single-span rectangular structure. Bridge R2 would be widened multi-span curved structures. Bridge R3 over the Black River would be rebuilt much wider and longer than the current bridge. The new bridge may be comprised of four independent structures on common foundations. The new structure could be built utilizing longer spans over the Black River, resulting in fewer obstructions in the waterway. Bridge R4 would be reconstructed wider and longer than the current structure to accommodate the extra proposed lanes. Bridge R5 would be reconstructed as a multi-span curved structure with additional span lengths to allow for the wider lanes below.

Walls: The Township Alternative freeway corridor would require a variety of different types of walls. There would be retaining walls, sound walls and security walls. Cast-in-place concrete and Mechanically Stabilized Earth (MSE) retaining walls can be built outside of the Black River overbanks. Various styles of sound walls could be investigated for the corridor; the most common style is a pre-cast concrete post and panel sound wall. The dedicated inbound and outbound lanes for the proposed plaza in the Township Alternative would require 20-foot tall security walls on each side of the secure corridors. Various materials also could be investigated for the construction of the security walls. Variations of walls may be required due to their weight. Lighter weight sound or security walls would be required on bridges.

Geotechnical Components: The banks of the Black River contain very poor soils within the proposed footprint of the new bridge. The same poor soil conditions described for the City East and West Alternatives would impose foundation design challenges. Soil borings indicate that the poor soil conditions exist up to 80 feet below the existing surface. The existing soils are not suitable for large foundations or retaining walls.

Options to overcome the poor soils are discussed in **Section 2.2.4 City East Alternative**.

Further investigation into all foundation options will be provided in the FEIS.

### **Township Alternative Drainage**

Drainage improvements for the Township Alternative are discussed as a part of **Section 3.11 Groundwater, Drainage, and Surface Water Quality**.

### **Township Alternative Maintenance of Traffic/Construction Staging**

Basic maintenance of traffic (MOT) and construction staging procedures are discussed under the maintenance of traffic discussion for the City East Alternative. The Township Alternative MOT plan would maintain the cross-border and local traffic throughout the construction of a new plaza. Due to the off-site location of the Township Alternative plaza, MOT impacts to border plaza traffic during construction would be minimized. Security would be maintained throughout construction as the entire new plaza and secure corridor would be constructed before moving traffic to them. Due to existing conditions at the Black River Bridge, it is likely that this bridge would be constructed first, either as a stand alone project or as part of a larger construction phase that includes the Water Street interchange. The Township Alternative could include four other stages of MOT.



**The Black River Bridge**

Stage 1: Temporary travel lanes east of the Lapeer Connector on I-94/I-69, M-25 and Water Street would be built. Part-width construction of the Water Street Bridge and the local access ramp to Pine Grove Avenue would occur.

Stage 2: Sections of I-94/I-69, as well as completion of the Eastbound M-25 Connector extension and ramps would be built. The Lapeer Connector/M-25 Connector interchange, the existing plaza ramps over the M-25 Connector, and the remaining section of the Water Street bridge would also be completed during stage two. Traffic would be maintained on the existing I-94/I-69 up to the Lapeer Connector where traffic

would be shifted to the north side of the roadway, to allow southern roadway construction.

Stage 3: The entire off-site plaza, the Lapeer Connector, the northern section of I-94/I-69 including the secure corridor, and Water Street Bridge ramps would be completed. Traffic would be maintained on the newly constructed eastbound M-25 Connector.

Stage 4: Construction would be completed in stage four, which includes the remaining section of the southbound M-25 Connector and construction of new buildings on the existing plaza.



Disruption of traffic in the construction area would be minimized to the extent possible. Although control of all construction-related inconveniences is not possible, proper signing of all construction areas will ensure motorist and pedestrian safety. Access would be maintained to properties adjacent to the proposed right-of-way during construction to the extent possible.

### **Township Alternative Utilities**

The City of Port Huron and Port Huron Township have existing functional water and sewage treatment systems. Port Huron Township provides water, sanitary, and storm services from the north of the proposed plaza site. The water and sanitary services were installed in the late seventies and would most likely not require replacement. Many overhead utilities (electrical and cable) are available from the utility runs along West Water Street. Telephone service in the Township is provided by AT&T.

SEMCO Energy provides gas service via a gas main between Eastland and Westland Drives from the north, as well as Lewis Drive from the south. The gas main was installed in the mid-fifties and may require upgrading with the proposed plaza work.

The City of Port Huron has an established, functional water and sewage treatment system. A 10-inch water main is crossed by M-25 Connector at Elmwood Street, and a 72-inch

combined storm and sanitary sewer line crosses underneath and services the plaza. The city maintains sewer and water mains along 10<sup>th</sup> Avenue, however it is not anticipated these utilities would require relocation for the Township Alternative.

The Black River Bridge and Water Street Bridge over I-94/I-69 carry electrical conduit which would be maintained during construction by means of temporary supports.

## 2.3 Evaluation of Alternatives

The Study Team worked with the Stakeholder’s Advisory Committee and Cooperating Agencies to develop criteria for evaluating the Alternatives for improvements for the United States Plaza at the Blue Water Bridge. There were two key parts of the evaluation of the Alternatives Carried Forward that guided the identification of a Preferred Alternative for design and construction. First, the Alternatives were evaluated as to how well they address the reasons for improvements to the plaza as discussed in **Chapter 1.0 Why Are Improvements Needed?**. The Study Team determined that the City West Alternative best addresses the reasons for improvements. The City East Alternative does address most of the reasons for improvements although not as well as the City West Alternative. Additionally, it possesses major security and emergency response issues compared to the City West Alternative. The Township Alternative and the No-Build Alternative both fail to address key parts of the reasons for improvements. The rest of this chapter discusses the analysis behind these conclusions in detail.

The second part of the evaluation of the Alternatives Carried Forward is the consideration of all of the impacts that they would have on the human and natural environment. **Chapter 3.0 The Environment: What’s There Now and Project Effects** provides the full evaluation of the environmental effects of the Alternatives Carried Forward. **Section 2.4 The City West Alternative is the Preferred Alternative** identifies the City West Alternative as preferred based on the two part evaluation process.

### 2.3.1 How Were Alternatives Evaluated?

The Study Team developed the measures to evaluate the alternatives for the Blue Water Bridge Plaza Study in consultation with the Advisory Committee and other project stakeholders. The Study Team also used typical methods for evaluating transportation improvements and border crossing facilities. The evaluation of alternatives was based around the reasons for improvements to the United States Plaza. These include:

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#### Who was part of the Advisory Committee?

- FHWA
  - City of Port Huron
  - Port Huron Township
  - St. Clair County
  - CBP
  - Fort Gratiot Township
  - Elected Officials
  - GSA
  - Custom Brokers
  - SEMCOG
  - Transport Canada
  - Blue Water Bridge Authority (Canadians)
  - Coast Guard
-



One reason for improvements to the plaza is to minimize back ups

- Accommodate the latest CBP inspection technologies and procedures
- Provide flexibility to accommodate future unknown inspection technologies and procedures
- Improve security
- Provide facilities that ensure cars and trucks do not leave the plaza without being inspected
- Improve safety on the bridge, plaza, and I-94/I-69
- Accommodate projected 2030 traffic growth and future facility needs
- Minimize backups on Highway 402 and I-94/I-69
- Reduce vehicle and pedestrian conflicts on the plaza
- Improve local access
- Minimize routing of commercial traffic to local roads during maintenance operations
- Improve freeway infrastructure conditions including the aging Black River Bridge
- Create a more visible and accessible Welcome Center

The evaluation of alternatives included both numeric measures where appropriate along with evaluations that went beyond basic numbers. A complete evaluation of the alternatives cannot be completed based on numeric measures alone. Many issues such as improving security or flexibility are difficult to measure based on numbers. As a result the next section evaluates the Alternatives Carried Forward not only based on numeric measures but also based on more descriptive assessments of the benefits and drawbacks of the alternatives and how well they address the reasons for plaza improvements.

The Study Team developed a basic summary of the evaluation of alternatives. In this summary, the Study Team assigned one of four possible ratings for each alternative for each of the basic reasons for improvements. The ratings were defined as follows:

**Adequate** – The alternative meets the basic requirements for that particular reason for improvements.

**More than Adequate** – The alternative exceeds basic requirements for that particular reason for improvements.

**Less than Adequate** – The alternative meets some but not all of the basic requirements for that particular reason for improvements. A single “less than adequate” rating would not be grounds alone to eliminate an alternative as the Preferred Alternative.

**Substantial Flaws** – The alternative does not meet the basic requirements for that particular reason for improvements. A single “substantial flaws” rating would be enough to eliminate an alternative as the Preferred Alternative.

**Table 2.3.1** summarizes how each of the Alternatives Carried Forward addresses each of the key reasons for improvements.

**Table 2.3.1 Summary of Alternatives Evaluation**

	<b>No-Build</b>	<b>City East</b>	<b>City West</b>	<b>Township</b>
Accommodate the latest inspection technologies and procedures	Substantial Flaws	Adequate	Adequate	Adequate
Provide flexibility to accommodate future unknown inspection technologies and procedures	Substantial Flaws	Adequate	Adequate	More than Adequate
Improve security	Substantial Flaws	Substantial Flaws	Adequate	Substantial Flaws
Provide facilities that ensure cars and trucks do not leave the plaza without being inspected	Less than Adequate	Adequate	Adequate	Adequate
Improve safety on the bridge, plaza, and I-94/I-69	Substantial Flaws	Adequate	Adequate	Less than Adequate
Accommodate projected 2030 traffic growth and potential future facility needs	Substantial Flaws	Adequate	Adequate	Adequate
Minimize backups on Highway 402 and I-94/I-69	Substantial Flaws	Adequate	Adequate	More than Adequate
Reduce vehicle and pedestrian conflicts on the plaza	Less than Adequate	Adequate	Adequate	Adequate
Improve local access	Substantial Flaws	Less than Adequate	Adequate	Less than Adequate
Improve freeway infrastructure conditions including the aging Black River Bridge	Substantial Flaws	Adequate	Adequate	Adequate
Create a more visible and accessible Welcome Center	Substantial Flaws	Adequate	Adequate	Adequate
Minimize routing of commercial traffic to local roads during maintenance operations	Substantial Flaws	Adequate	Adequate	Adequate

### 2.3.2 How Well Do the Alternatives Carried Forward Address the Reasons for the Improvements?

#### Accommodate the Latest Inspection Technology and Procedures

No-Build	Substantial Flaws
City East	Adequate
City West	Adequate
Township	Adequate

#### Accommodate the Latest Inspection Technologies and Procedures:

The No-Build Alternative would not provide enough space to accommodate necessary inspection technologies and procedures. As outlined in **Chapter 1**, the existing plaza does not have enough office space for inspections, lacks space to unload cargo, does not have room for a designated impound area or space to construct and operate three Gamma-Ray Inspection Technology (GRIT) buildings. Each of the City East, City West and Township Alternatives provide the necessary space for CBP and other agencies to carry out their required inspection procedures and use the latest technology.

#### Provide Flexibility to Accommodate Future Unknown Inspection Technologies and Procedures

No-Build	Substantial Flaws
City East	Adequate
City West	Adequate
Township	More than Adequate

#### Provide Flexibility to Accommodate Future Unknown Inspection Technologies and Procedures:

The No-Build Alternative lacks any remaining flexibility for new facilities, technologies, or procedures requiring any substantial space. CBP and MDOT have found ways to maximize the space on the existing plaza through moving MDOT maintenance facilities off of the plaza and a series of other minor interim improvements. Each of the City East, City West, and Township Alternatives provide GSA and CBP with the necessary 60 to 80 acre facility that is desired for new or expanded border crossings. The Build Alternatives have been developed to allow flexibility within the plaza footprint for future adjustments and alterations to deal with future unknown requirements and procedures.

#### Improve Security

No-Build	Substantial Flaws
City East	Substantial Flaws
City West	Adequate
Township	Substantial Flaws

#### Improve Security:

The Alternatives Carried Forward are substantially different in their ability to provide facilities that meet the security requirements of CBP and other agencies. Both the No-Build Alternative and the Township Alternative have substantial flaws when it comes to meeting the required security criteria for a new plaza. The City East Alternative addresses some but not all security concerns. The City West Alternative addresses all of the required security criteria.

An evaluation of the security of the proposed plaza must be looked at from the perspective of the primary mission of CBP. CBP's primary mission is to secure the border while facilitating legitimate trade and travel. The new plaza must serve this primary mission well. The following are key parts of the security evaluation of the alternatives based on this mission:

- Interdiction and containment of hazardous materials and contraband from entering the country including terrorists and their instruments.
- Vulnerabilities to terrorist attacks.
- Location and distribution of inspection staff and resources.
- Personal safety and security for inspection agents, plaza staff, and plaza users.

The No-Build Alternative has substantial flaws when it comes to security primarily because it does not provide the space for the new inspection technologies and procedures as discussed in the sections above. The No-Build Alternative also fails to provide secure separation of inspection functions and public uses. The No-Build Alternative maintains Pine Grove Avenue underneath key inspection areas of the plaza; having a major roadway underneath the plaza represents an elevated risk.

The City East and City West Alternatives meet the basic security criteria of allowing for the quick interdiction and containment of people and hazardous materials that threaten the country. They allow for radiation portal monitors and other key inspection equipment to be placed close to the border and provide fewer opportunities to avoid inspection.

The City East and City West Alternatives reduce the vulnerability of the plaza by removing Pine Grove Avenue from underneath the plaza. However, the City West Alternative is superior to the City East Alternative because it moves all major north-south roadways past the locations of inspections. The City East Alternative still has a major traffic flow along the combined 10th Avenue/Pine Grove Avenue that runs under the location where the Blue Water Bridge connects with the plaza. CBP has indicated that having a major traffic route under a portion of the bridge/plaza is a serious security concern. Bridges and overpasses with the



**Pine Grove Avenue runs underneath the elevated plaza**

highest vulnerability to threats are those that have higher volumes of traffic, are closer to the ground, and locations where an explosive device or other incident could shut down the entire crossing for an extended period of time. The Blue Water Bridge spans are less vulnerable as they are higher and the low traffic roadways underneath them are easier to monitor. For the City West Alternative, the relocated Pine Grove Avenue is bridged over top of the major plaza entrance and exit ramps but there are other entrance and exit ramps that could be used in case of an incident. The City East Alternative remains most vulnerable to an incident where the combined 10<sup>th</sup> Avenue/Pine Grove Avenue Corridor runs underneath the bridge/plaza connection.

The City East and City West Alternatives locate all of the key inspection functions at one location and avoid splitting of resources that could reduce security. They also provide adequate space and facilities so security between public functions and inspection functions can be maintained.

The Township Alternative has substantial flaws in addressing the security needs of an improved border crossing plaza. Although the Township Alternative includes several features such as 20-foot high walls with angled extensions and buffer zones to ensure people and contraband do not avoid inspection, the 1.5-mile corridor still introduces additional risk. The location of radiation portal monitors and hazardous materials containment are key issues. With the Township Alternative, potential hazards would be allowed 1.5 miles further into the United States before being detected. If portal monitors were placed closer to the border, additional staff and space for containment would be needed at the location of the existing plaza. The separation of inspection staff introduces additional vulnerabilities in responding to a threat or incident. It would decrease the effectiveness of CBP officers in accomplishing their mission. Additional staff resources would also be needed to monitor and address potential corridor breaches.

The secure corridor for the Township Alternative provides a much easier target for terrorists than the Blue Water Bridge itself or a new street-level plaza at the location of the existing plaza. The bridge over the Black River is especially vulnerable

because of the water access and the fact that it is a relatively low bridge. Pine Grove Avenue would also remain under the existing plaza and there would be ramps for the secure corridor over the M-25 Connector. All of these locations provide a convenient target for terrorists to interrupt access to the border crossing through use of an explosive device to destroy or damage these bridges. They are all locations where a severe incident could close the entire border crossing for an extended period of time. It is likely that the vulnerability at the Black River Bridge would restrict authorized access for boat traffic under the bridge.

The additional mile and half separation between the existing Blue Water Bridge and the proposed plaza for the Township Alternative also poses security concerns over the additional time required to respond to an incident either within this corridor or on the bridge. All emergency vehicles would be required to arrive and depart through the plaza and to be inspected. Emergency vehicle access to the plaza and bridge under the City East and City West Alternative are better than the existing plaza conditions and the Township Alternative as a result of additional local access connections, along with at-street level facilities. **Section 3.5 Public Safety and Security** discusses impacts to emergency access and security in detail.

As is the case with the other Build Alternatives, the Township Alternative provides adequate space and facilities so that security between public functions and inspection functions can be maintained. These are the only security related items that the Township Alternative adequately addresses.

**Provide Facilities That Ensure Cars and Trucks Do Not Leave the Plaza Without Being Inspected:**

Exit control booths to ensure that cars and trucks do not leave the plaza once sent to secondary inspection could be added for the No-Build Alternative. However, the No-Build Alternative does not have adequate space to avoid additional queues, traffic conflicts, and potential blocked traffic as a result of the addition of exit control.

All of the Build Alternatives provide the necessary space to ensure that cars and trucks sent to secondary inspection will

**Provide Facilities That Ensure Cars and Trucks Do Not Leave the Plaza Without Being Inspected**

No-Build	Less than Adequate
City East	Adequate
City West	Adequate
Township	Adequate

arrive and cannot exit secondary inspection without verification of being inspected. All of the Build Alternatives show exit control booths as part of their plaza layouts.

**Improve Safety on the Bridge, Plaza, and I-94/I-69**

No-Build	Substantial Flaws
City East	Adequate
City West	Adequate
Township	Less than Adequate

**Improve Safety on the Bridge, Plaza, and I-94/I-69:**

The No-Build Alternative does not address safety issues on the Blue Water Bridge, Plaza, and I-94/I-69. The problematic mid-bridge weave as described in **Chapter 1** would remain. Existing conflicts between trucks exiting secondary inspection and cars and trucks leaving primary inspection booths would remain. There would be no separation of plaza and local traffic on I-94/69 at the Black River Bridge, leaving existing weave issues and traffic conflicts in place.

The City East and City West Alternatives address each of the key safety and traffic issues identified. They both eliminate the mid-bridge weave. They both provide space to allow better circulation on the plaza. Both of the City East and City West Alternatives separate local and border crossing traffic along I-94/I-69, eliminating weaves at the Black River crossing.

The Township Alternative also eliminates the mid-bridge weave and provides space for better circulation and reduced traffic conflicts on the inspection plaza. The Township Alternative would separate border crossing traffic from local traffic at the Black River and Water Street through the use of the secure lanes to the off-site plaza. However, the Township Alternative does not provide as much traffic separation for vehicles approaching the new plaza from the I-94/I-69 interchange and creates a potential weave movement between cars exiting the plaza to I-94 and local traffic trying to exit to I-69.

The Township Alternative introduces new potential safety issues. For the Township Alternative, the extended plaza roadway system between the existing Blue Water Bridge and the new plaza would pose significant challenges to providing emergency vehicle services to the plaza, the connecting corridor, and the bridge. Emergency vehicles and local law enforcement would only be able to access the secure corridor from the inspection plaza in Port Huron Township or from Canada. The secure corridor between the bridge and the plaza

would also pose enforcement issues as to how to police this corridor to ensure proper traffic control and speed.

**Accommodate Projected 2030 Traffic Growth and Future Facility Needs:**

The No-Build does not provide adequate space to accommodate future traffic or potential future facility needs. Each of the Build Alternatives provides the space and inspection booths required to accommodate projected traffic to the year 2030. The Township Alternative provides 30 acres of additional future space that could allow further plaza expansion for parking, building, technology or other facilities, as yet unidentified, but may be implemented in the future. The City East Alternative has 16 acres of additional land, which is mostly incorporated into buffer zones on the south side of the proposed plaza. The City West Alternative provides 12 acres of parking and buffer that could be used for future facilities as well as space to provide an expanded number of inspection booths.

**Minimize Backups on Highway 402 and I-94/I-69:**

The No-Build Alternative does not provide facilities to minimize long-term backups on I-94/I-69 and on Highway 402 in Canada. Many interim improvements have been made on the existing plaza to help reduce backups. These include requirements for electronic pre-notification for truck shipments, conversion of inspection booths for use by both cars and trucks, increased inspection staffing, and an additional on-ramp lane to the plaza from I-94/I-69. These interim improvements will not address long-term potential backups resulting from traffic growth and/or new inspection procedures.

Modeling of future travel forecasts on the surrounding highway systems determined that all of the Build Alternatives will not result in traffic backups onto the adjacent highways under normal inspection conditions and full staffing. All of the Build Alternatives have the space for the necessary inspection booths and other facilities to minimize future backups. The City East and City West Alternatives provide approximately one mile of storage for vehicles headed to Canada and additional queue space for vehicles headed to the

**Accommodate Projected 2030 Traffic Growth and Potential Future Facility Needs – Summary**

No-Build	Substantial Flaws
City East	Adequate
City West	Adequate
Township	Adequate

**Minimize Backups on Highway 402 and I-94/I-69**

No-Build	Substantial Flaws
City East	Adequate
City West	Adequate
Township	More than Adequate

United States. The Township Alternative includes 1.5 miles of secured three-lane roadway on the approach to both the United States plaza and the Canadian plaza, providing greater storage for vehicles waiting to enter into the United States or Canada. This storage would potentially be useful under higher alert levels when increased inspection procedures are required. It is not expected to be needed under normal operating conditions.

**Reduce Vehicle and Pedestrian Conflicts on the Plaza**

No-Build	Less than Adequate
City East	Adequate
City West	Adequate
Township	Adequate

**Reduce Vehicle and Pedestrian Conflicts on the Plaza:**

Vehicle and pedestrian conflicts exist between booths and other inspection areas for all alternatives. The No-Build Alternative has the fewest conflict points but features a much smaller plaza to handle the higher future traffic volumes at conflict points. The Build Alternatives will still have locations where pedestrian and vehicle paths must cross. There is enough space on the Build Alternative plazas so that pedestrian crossings can be designed to minimize conflicts with vehicles.

**Improve Local Access**

No-Build	Substantial Flaws
City East	Less than Adequate
City West	Adequate
Township	Less than Adequate

**Improve Local Access:**

The No-Build Alternative does nothing to improve local access to and from the plaza or on local roads surrounding the plaza. As congestion worsens in the vicinity of the plaza, local access may become worse.

The City East Alternative improves local access at several points including:

- Improvements at the Pine Grove Avenue/10<sup>th</sup> Avenue intersections
- Widening on Hancock Street and improvements at the Hancock Street and M-25 Connector intersections to handle future traffic
- A new access ramp between I-94/I-69 and the combined Pine Grove Avenue/10<sup>th</sup> Avenue
- Full access in all directions at the Lapeer Connector Interchange
- Separation of local traffic and traffic crossing the border before the Black River Bridge

The City East Alternative however, reduces local access through the relocation of Pine Grove Avenue and combination with 10<sup>th</sup> Avenue. This new combined roadway is expected to handle all of the traffic although there are concerns regarding emergency access as discussed in **Section 3.5 Public Safety and Security**. All other local access points would remain similar to existing conditions with minor changes such as potential roundabouts instead of traffic signals.

The City West Alternative also improves local access at several points including:

- Improvements at the Pine Grove Avenue/10<sup>th</sup> Avenue intersections. Scott Avenue ends in two cul de sacs at this location but a roundabout is provided at 12<sup>th</sup> Street along the relocated Pine Grove Avenue for neighborhood access.
- A new access ramp between I-94/I-69 and the relocated Pine Grove Avenue.
- An intersection for Pine Grove traffic wishing to travel westbound on I-94/I-69.
- An intersection at the local plaza exit ramp to provide access to go either north or south on the relocated Pine Grove Avenue.
- Full access in all directions at the Lapeer Connector Interchange
- Separation of local traffic and traffic crossing the border before the Black River Bridge.

The City West Alternative reduces local access through the relocation of Pine Grove Avenue to the west. Part of the existing M-25 Connector would be replaced by the new roadway. The new roadway is expected to handle all of the traffic. Access to businesses on existing Pine Grove Avenue between Hancock Street and Riverview Street will remain but would be less direct. All other local access points would remain similar to existing conditions with minor changes such as potential roundabouts instead of traffic signals.

The Township Alternative improves local access at several points including:

- Improvements at the Pine Grove Avenue/10<sup>th</sup> Avenue intersections



Looking north along Pine Grove Avenue from the plaza

- Widening on Hancock Street and improvements at the Hancock Street and M-25 Connector intersections to handle future traffic
- A new access ramp between I-94/I-69 and the combined Pine Grove Avenue/10<sup>th</sup> Avenue
- Full access in all directions at the Lapeer Connector Interchange
- Separation of local traffic and traffic crossing the border before the Black River Bridge through the use of the secure corridor

The Township Alternative reduces local access for border crossers. There would be no local access for border crossers at the existing plaza as all inspection would take place at the new plaza in the township. Border crossing traffic wishing to access locations near the existing plaza, in downtown Port Huron or north of Port Huron would use the M-25 Connector extension to connect with Pine Grove Avenue and other local roads. The trip out for inspection and back to Pine Grove Avenue would be approximately four additional miles.

**Minimize Routing of Commercial Traffic to Local Roads During Maintenance Operations**

**Minimize Routing of Commercial Traffic to Local Roads During Maintenance Operations:**

No-Build	Substantial Flaws
City East	Adequate
City West	Adequate
Township	Adequate

The No-Build Alternative would still include single lane ramps that would have to be closed during maintenance, forcing plaza traffic to use local roads. All Build Alternatives minimize the routing of commercial traffic to local roads during maintenance operations by providing ramps that can be maintained without being closed.

**Improve Freeway Infrastructure Conditions Including the Aging Black River Bridge**

**Improve Freeway Infrastructure Conditions Including the Aging Black River Bridge:**

No-Build	Substantial Flaws
City East	Adequate
City West	Adequate
Township	Less Than Adequate

The No-Build Alternative would not replace the Black River Bridge and other substandard freeway infrastructure. All Build Alternatives improve the freeway infrastructure along with the replacement of the Black River Bridge. However, the Township Alternative freeway improvements would present new challenges for maintenance and safety as discussed earlier due to the secure corridor.

Create a More Visible and Accessible Welcome Center:

The No-Build Alternative would retain the existing substandard Welcome Center. All Build Alternatives would relocate the Welcome Center to the township location which would increase its visibility and accessibility. However, with the Township Alternative the new Welcome Center would be located next to the new border plaza. MDOT indicated that this location is less desirable for a Welcome Center due to the activities taking place at the adjacent border plaza.

Create a More Visible and Accessible Welcome Center

No-Build	Substantial Flaws
City East	Adequate
City West	Adequate
Township	Less Than Adequate

Summary:

As illustrated in **Table 2.3.1**, the No-Build Alternative fails to address most of the parts of the reasons for plaza improvements. The City East Alternative addresses the reasons for improvements except for the security and emergency response issues related to having a major single north/south traffic movement underneath the connection between the Blue Water Bridges and the new plaza. This results in an unacceptable security risk for the City East Alternative. The City West Alternative adequately addresses all of the reasons for improvements and is the only alternative to do so. The Township Alternative adequately addresses most of the reasons for improvements. However, it is substantially flawed with regards to addressing plaza and border crossing security. It also has concerns regarding safety and substantial negative changes to local access. The Township Alternative does provide the largest plaza area in terms of flexibility for future needs and addressing traffic backups during high security events.

**2.3.3 Costs**

Cost is another potential factor in the evaluation of alternatives although it is not covered in the analysis of the reasons for improvements or the analysis of environmental impacts. Cost is not the key factor in determining the selection of an alternative but it is an important consideration.

The Study Team developed cost estimates for the construction of each of the Alternatives Carried Forward. The estimated costs for the Alternatives Carried Forward were developed by individually estimating the items that make up the largest

parts of the alternatives. The largest costs for the alternatives are:

- **Roadway Items** – such as pavement, curbs, and sewer systems
- **Earthwork** – removing the existing soil and placing new soil
- **Bridges** – all bridge items such as steel beams, and concrete foundations
- **Walls** – providing retaining walls to hold back soils, security walls around plaza, and noise wall in various areas
- **Buildings and Plaza Facilities** – toll booths, inspection booths, main buildings (not including the MDOT Welcome Center)
- **Miscellaneous Items** – such as lighting, landscaping, traffic signals and other improvements to the existing local roads
- **Right-of-Way** – the estimated cost of purchasing homes, businesses, and vacant properties affected by the alternatives

The cost estimates are not final and are based on how the Alternatives Carried Forward have been designed to date. The actual costs will depend upon the bidding process, where the contractors and their suppliers will eventually bid on and determine the price of the Selected Alternative. These cost estimates are based on 2007 average unit prices that are tracked by the Michigan Department of Transportation.

**Table 2.3.2** contains the estimated costs for constructing the three Build Alternatives.

**Table 2.3.2 Alternatives Cost Estimates - 2007 Dollars**

<b>Alternative</b>	<b>Construction Cost (millions)</b>	<b>Right-of-Way Cost (millions)</b>	<b>Contingencies Cost (millions)</b>	<b>Total Estimated Cost (millions)</b>
<b>No-Build</b>	\$0	\$0	\$0	\$0
<b>City East</b>	\$237	\$150	\$44	\$431
<b>City West</b>	\$232	\$158	\$43	\$433
<b>Township</b>	\$244	\$150	\$47	\$441

These estimated costs do not indicate or suggest what the best alternative is, and they only show that the probable costs for each of the Build Alternatives are similar. The other sections of the document evaluate other features of the Alternatives Carried Forward. Cost is only one component in the determination of the Preferred Alternative.

## 2.4 The City West Alternative is the Preferred Alternative

The Study Team has identified the City West Alternative as the Preferred Alternative for the Blue Water Bridge Plaza Study. The designation as the Preferred Alternative does not mean that the City West Alternative has been formally selected as the final alternative for design and construction. Selection of the final alternative will not occur until after a Public Hearing has been held to review this DEIS, a Final EIS has been published addressing comments on the DEIS, and a Record of Decision has been issued by the Federal Highway Administration. The designation of a Preferred Alternative means that at this time the Study Team believes that the City West Alternative best addresses the reasons that plaza improvements are needed while minimizing impacts to the human and natural environment to the extent feasible. Comments on this DEIS may lead to further alternative changes, reductions in environmental impacts and/or new measures to mitigate for the impacts of the project.

The Study Team identified the City West Alternative as the Preferred Alternative after a long consultative process that included discussions with the cooperating agencies for the project, meetings with local officials and multiple public meetings. Further discussion on the process of developing alternatives is contained in **Section 2.1 Alternatives Development** while discussion of the coordination process is contained in **Chapter 6 Public and Agency Coordination**.

The Study Team's identification of the City West Alternative as Preferred was based upon the evaluation contained in **Section 2.3 Evaluation of Alternatives** and the environmental effects analysis contained in **Chapter 3 The Environment: What's There Now and Project Effects**. The following paragraphs briefly highlight the reasons behind the identification of the Preferred Alternative and the reasons the other alternatives are not preferred.

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### What is a Preferred Alternative?

It is the alternative that has been identified as best meeting the purpose and need for the project while minimizing social, environmental and economic impacts.

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#### 2.4.1 Key Reasons Why the City West Alternative is Preferred

The City West Alternative best addresses the reasons for plaza improvements and has specific advantages over the other alternatives with regards to security and community impacts for the plaza improvements.

The City West Alternative is preferred for the safety and security of the border crossing. The City West Alternative avoids having a major roadway either underneath the inspection areas or the connection between the Blue Water Bridges and the plaza. All major roadway crossings and the Black River crossing are located past the inspection points on the plaza. This enhances the security of the facility and reduces the vulnerabilities of the plaza to a terrorist incident that could shut the border crossing down for a long period of time. The City West Alternative includes all of the inspection facilities required and space for expansion for additional facilities as traffic conditions and new technology create new demand. The Preferred City West Alternative also features a facility layout that is preferred by CBP and GSA.



Inspections and technology enhance safety and security at the border.

The City West Alternative best addresses several current and future traffic issues on the local roads surrounding the plaza and enhances local access to and from the plaza. The City West Alternative would address current layout and traffic issues at the Pine Grove Avenue and 10<sup>th</sup> Avenue intersection as well or better than the other alternatives. It will also reduce current and future congestion at the Hancock Street and M-25 Connector and Hancock Street and Pine Grove Avenue intersections.

The City West Alternative would provide several local access enhancements including direct access from the plaza to local destinations north and south of the plaza. This is a substantial improvement over the indirect access provided by the No-Build Alternative and the four miles of extra driving required for local access for the Township Alternative. As is the case with the other Build Alternatives, the City West Alternative provides access in all directions at a redesigned Lapeer Connector Interchange, an additional enhancement for road access in the Port Huron area.

The Preferred City West Alternative also has key advantages when it comes to impacts to the human and natural environment. As discussed in **Section 2.3 Evaluation of Alternatives**, there are substantial security and safety concerns with relocating the plaza to Port Huron Township. The City West Alternative has similar impact to the community in terms of relocations of homes and impacts to the local tax base of the two alternatives that expand the plaza at its existing site. The City West Alternative would relocate 18 fewer homes than the City East Alternative, although there are three more business relocations with the City West Alternative than the City East Alternative. The City West Alternative reduces the local tax base by about \$700,000 less compared to the City East Alternative. Although the Township Alternative would have fewer relocations than either of the city alternatives, the lower relocation count does not compensate for the security, safety, visual and local access impacts of the Township Alternative.

The City West Alternative also provides better north-south local access around the new plaza than the City East Alternative. 10<sup>th</sup> Avenue would provide north-south access on the east and the relocated Pine Grove Avenue would provide north-south access to the west. Emergency access to neighborhoods surrounding the plaza would be better maintained with the City West Alternative. Emergency responders would still be able to use 10<sup>th</sup> Avenue or the relocated Pine Grove Avenue as a north-south alternate route if one or the other became blocked by an accident or other incident. Emergency Access to the plaza would be maintained as it is currently, through gated access from local streets.

The City West Alternative would provide a superior visual entrance to the City of Port Huron and the Port Huron area when compared to the other alternatives. The boulevard feature of the City West Alternative could provide a better visual connection to City of Port Huron destinations both north and south of the plaza. There is less opportunity to create visually appealing connections for the City East Alternative due to property and bridge pier location constraints on the combined 10<sup>th</sup> Avenue/Pine Grove Avenue. The security features for the secure corridor for the Township Alternative would make it very difficult to provide a visually



Port Huron Number 4 Fire Station

pleasing welcome to the Port Huron Area and the United States.

The City West Alternative has the same effects on natural resources as the City East Alternative and fewer natural resource impacts than the Township Alternative. This includes fewer wetland impacts and less pavement width at stream crossings.

As illustrated in **Table 2.3.2 Alternatives Cost Estimates** in **Section 2.3 Evaluation of Alternatives**, the City West Alternative has comparable construction and right-of-way costs as the other Build Alternatives. However, the City West and City East Alternatives will include lower long-term maintenance and staffing costs than the Township Alternative. The extra facilities to provide a secure corridor along I-94/I-69 will result in additional long-term maintenance costs for the Township Alternative. The major agencies that will have staff on the plaza have all indicated that the Township Alternative will require more staff to provide the same level of security and service for those crossing the border.

#### **2.4.2 Key Reasons Why Other Alternatives are not Preferred**

The following paragraphs briefly outline the key reasons why the Study Team did not identify other Alternatives Carried Forward as the Preferred Alternative. The full evaluation of the alternatives is contained throughout this DEIS and this section only highlights reasons why the other alternatives are not preferred.



Existing Vehicle Primary

No-Build Alternative: The No-Build Alternative is not preferred because it fails to address most of the reasons for plaza improvements as discussed in **Section 2.3 Evaluation of Alternatives**. The No-Build Alternative does not have the space to address existing or future inspection, security, and traffic needs as the existing plaza is approximately 18 acres and CBP requires between 60-80 acres in order to complete their mission at the border. The Study Team determined that although there are substantial impacts of the Build Alternatives, they do not outweigh the deficiencies of the

existing plaza. As a result, the No-Build Alternative is not preferred.

City East Alternative: While the City East Alternative addresses most of the reasons for plaza improvements, it is substantially flawed. There are two key areas of concerns for the City East Alternative:

- The combining of Pine Grove Avenue and 10<sup>th</sup> Avenue the security, circulation, and emergency access issues it creates
- The additional impacts to homes, businesses, and the local property tax base when compared to the City West Alternative

The relocation of Pine Grove Avenue to 10<sup>th</sup> Avenue leaves a major roadway running underneath the connection between the Blue Water Bridges and the plaza. This high-traffic volume running underneath parts of the Blue Water Bridges that are closer to street level leaves the border crossing more vulnerable to a terrorist action. The combined segment of Pine Grove Avenue and 10<sup>th</sup> Avenue also could affect emergency response times to neighborhoods and businesses north and south of the plaza in the event of an incident on the combined roadway that would block traffic. With the City West Alternative, emergency responders would still be able to use 10<sup>th</sup> Avenue on the east side of the plaza and the relocated Pine Grove Avenue on the west side of the plaza.

The City East Alternative would relocate 18 more homes and impact \$700,000 more of the City of Port Huron's tax base than the City West Alternative. Other major impacts for the two alternatives are similar. One benefit of the City East Alternative when compared to the City West Alternative is that there would be no adverse effect on the E.C. Williams House. However, the Study Team concluded that the failure of the City East Alternative to address key parts of the reasons for improvements such as security and safety was not acceptable. As a result, the City West Alternative has been identified as the Preferred Alternative.



Pine Grove Avenue

Township Alternative: The Township Alternative fails to adequately address three of the reasons for plaza improvements as discussed in **Section 2.3 Evaluation of Alternatives**. There are four key concerns for the Township Alternative:

- The secure corridor concept introduces additional security risks for the border crossing.
- The secure corridor would not provide good access for emergency responders dealing with an incident on the plaza.
- The secure corridor would create a visually divisive and aesthetically unappealing border crossing.
- Border crossers traveling to destinations north of or near the existing plaza would travel four additional miles, reducing the likelihood of short stops at businesses in the Port Huron area.



The Township Alternative would prevent traffic from exiting at Pine Grove Avenue

The Township Alternative has substantial flaws in addressing the security needs of an improved border crossing plaza. With the Township Alternative, potential hazards would be allowed 1.5 miles further into the United States before being detected. The secure corridor for the Township Alternative also provides an easier target for terrorists than the Blue Water Bridge itself or a new street-level plaza at the location of the existing plaza.

The Township Alternative also poses security concerns over the additional time required to respond to an incident either within the secure corridor or on the Blue Water Bridge. All emergency vehicles would be required to arrive and depart through the United States or Canadian plazas and be inspected.

The secure corridor would include minimum 20-foot high walls with four foot angled extensions as well as fenced buffer zones. These would create a 1.5 mile walled barrier between parts of the City of Port Huron and Port Huron Township that would not be visually appealing to border crossers or residents of the area.

The Township Alternative reduces local access for border crossers. There would be no local access for border crossers at

the existing plaza as all inspection would take place at the new plaza in the Township. The trip out for inspection and back to Pine Grove Avenue would be approximately four additional miles. The businesses near the existing plaza and at the Water Street interchange would be effectively bypassed, decreasing the likelihood short stops at businesses in the Port Huron area by border crossing traffic.

The Township Alternative would have lower community impacts in terms of relocations of homes and businesses and impacts to the local property tax base. The Township Alternative would also have slightly higher effects on natural resources including increased wetland impacts and wider pavement over stream crossings. The Study Team concluded that the failure of the Township Alternative to address key parts of the reasons for improvements such as security, safety, and local access was not an acceptable compromise for the lower property impacts. As a result, the Township Alternative is not preferred.